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The LOCOMOTIVE WORLD

Volume VI October, 1913 Number 6

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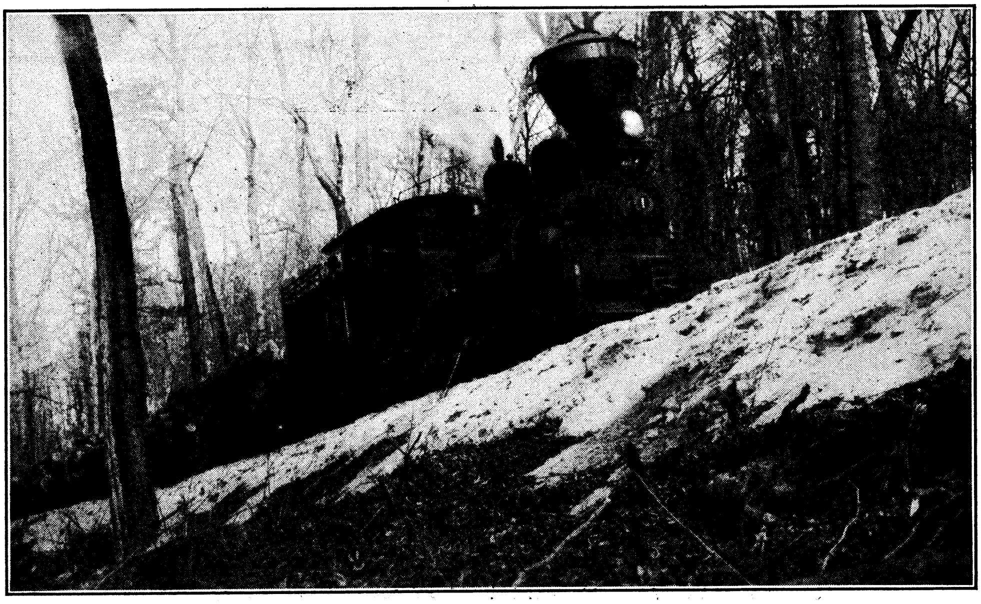
LOGGING PLANTATION MINING INDUSTRIAL AND STANDARD RAILROAD MOTIVE POWER

SHAY

Standard Geared Locomotive the World Over



Forty-two ton Shay Locomotive Climbing 7 % Grade with 17,000 feet of Hardwood on six Russel Cars.

Why Experiment with Untried Geared Locomotives, and Supply your Experience in Perfecting Locomotives of this Type for Manufacturers, when you can buy a SHAY? Absolutely *Reliable, Efficient and Economical.* Passed the experimental stage many years ago.

Let us Solve your Locomotive Problems.

Lima Locomotive Corporation

LIMA, OHIO

THE LOCOMOTIVE WORLD

VOL. 6, NO. 6 LIMA, OHIO OCTOBER, 1913

THE LOCOMOTIVE WORLD

PUBLISHED MONTHLY BY

THE FRANKLIN TYPE AND PRINTING COMPANY

H. C. HAMMACK, Editor

210 N. ELIZABETH ST., LIMA, OHIO.

Published in the interest of Private Railroad owners and users of Equipment for Logging, Mining, Plantation and Industrial Railroads, etc.

SUBSCRIPTION RATES

United States, Canada and Mexico....................50c a year
Foreign....................75c a year

NOTICE TO ADVERTISERS

Advertising rates furnished upon application. Change in advertisements intended for a particular issue should reach the office of the Locomotive World no later than the 20th of the month prior to the date of issue. New advertisements requiring no proof can be received up to the 1st of the month of date of issue.

THE FRANKLIN TYPE AND PRINTING COMPANY

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SETTING UP WEDGES

In the course of operating direct locomotives, a question that may come up in connection with the above subject was recently asked by an engineer and answered by the Railway and Locomotive Engineering. As this will no doubt be of interest to some of our readers, we are pleased to reprint it with the permission of the above journal, as follows:

In setting up wedges is it necessary to place the engine in any particular position or to move it from place during the operation?

Answer.—In setting up wedges it is necessary that the engine should be heated and under steam pressure, because the parts of the frame that are near the firebox become heated to some extent and slightly expand. The crank pins should be on the top center on the side where the wedges are being set up. A block may be placed on the rail back of the main driving wheel and the engine moved back against it, or the wheel may be pinched forward with a pinch bar, the object being to jam the driving box against the shoes so that any lost motion that there may be between the driving box and wedges will be at the back of the box, so that the wedges will move up freely. Set the wedges up moderately with a 12-inch monkey wrench and tighten the jam nuts with a large wrench. The reason the crank pins should be on the top, on the side that the wedges are being adjusted, is because if the pins were at or near the center and the side rods were too long or too short they would force one of the driving boxes against the wedge instead of the shoe, and if the crank pins were below the centers when the wheel was pinched forward the side rod would have a tendency to draw back on the crank pin and would, therefore, draw while if the crank pins were on the top quarter the tendency would be to force all the boxes on that side against the shoes. It would be well to slack all the rod keys before setting up the wedges, if the rods are keyed, and tram the wheel centers when the job is finished. When the wedge is tightly screwed up a good plan is to scribe a line on the frame at the top of the wedge, then draw down the wedge about 1/8 of an inch, and jam the nuts on the wedge bolt. It must be observed that if there is lost motion on the head of the wedge bolt, the bolt should be so adjusted that the wedge cannot slide down an added distance on account of the lost motion.

Government Statistics for Lumber Production in 1912 Show Increase

Washington, D. C.—A preliminary statement of the output of lumber, lath and shingles in the United States during the calendar years 1912, 1911 and 1910, was issued to-day by the director of the census, William J, Harris. It was prepared under the direction of William M. Steuart, chief statistician for manufactures, by Jasper E. Whelchel. The data were collected, as for several years past, in co-operation with the Forest Service of the Department of Agriculture. The publication of the statistics for 1912 over four months earlier than for the preceeding year gives them additional interest and value.

The number of active mills contributing to the totals were 29,648 in 1912, 28,107 in 1911, and 31,934 in 1910, while the reported production in these years was, in M. feet board measure, 39,158,414, 37,003,207 and 40,018,282, respectively. The statistics were collected almost entirely through correspondence by the Bureau of the Census, and cover the output of practically every commercial mill in operation during the whole or any part of this period. Annual returns from small neighborhood mills and others showing a total cut of less than 50 M. feet board measure have not been included.

On the whole, the showing for the past year indicates improved conditions in the lumber industry. Although the total reported cut was slightly less than in 1910, the average yield per mill was 5.3 per cent greater than in that year, while the total production over 1911 was 2,155,207 M. feet board measure, or nearly 6 per cent. In view of the fact that it was a presidential election year, the degree of activity in the lumber industry during 1912 as reflected by the figures is especially noteworthy, the output exceeding that of four years earlier—1908—by nearly 6,000,000,000 feet board measure, or 17.9 per cent.

LEADING STATES AND CENTERS

Increases among the individual states were quite general, slight exceptions appearing in certain of the eastern states and a few of the western mountain states, with of course the usual decrease in the output of the lake states which has characterized the showing for several years, due directly to the rapidly decreasing supply of lumber material in this region. While both the principal lumber producing centers, namely, the southern states and the Pacific coast states, reported larger cuts in 1912 than in the preceding year, the increased production in the first named group was substantially greater than for the United States as a whole. The development of the lumber industry in the southern states during recent years has been rapid. At the census of 1900, 38.7 per cent of the total production in the United States was reported from this region, while in 1907 it contributed 45.7 per cent of the output, and in 1912, 51.4 per cent, or more than one-half of the total.

The production reported from Washington in 1912 was the largest recorded since 1906. Although for nearly a decade this state has led all others in the production of lumber and shingles: in 1912 it contributed more than one-tenth of all the lumber and nearly two-thirds of the shingles manufactured in the United States.

SOFTWOODS AND HARDWOODS AND LEADING SPECIES

Of the reported total lumber production, softwoods contributed 30,526,416 M. feet board measure in 1912, as against 28,902,388 M. feet in 1911, and 31,160,856 M. feet in 1910. More than nine-tenths of the present stand of yellow pine—the softwood which is drawn upon most heavily for lumber material—is in the yellow pine belt, which comprises the Atlantic and Gulf coast states from Virginia to Texas, inclusive, together with Missouri, Arkansas, and Oklahoma. Under the term yellow pine are included the several species—longleaf, shortleaf, loblolly, Cuban, etc. The reported cut from yellow pine timber in this territory during the year amounted to 14,470,617 M. feet board measure, or about 98 per cent of the total output from this species in the United States. Douglas fir, the species which ranked next to yellow pine among the conifers or softwoods, supplied material for 5,175,123 M. feet board measure. The production from both of these species was greater in 1912 than in the preceding year.

White pine ranked third among the softwoods in 1912, though the cut from this wood was smaller than in the preceding year, and has been declining steadily for several years past.

The reported cut of hardwood lumber in 1912 was 8,631,998 M. feet board measure, as against 8,100,819 M. feet in 1911, and 8,857,426 M. feet in 1910. To this total oak, the leading hardwood species, contributed 3,318,952 M. feet, or 38.4 per cent, and showed an increase over the output for the preceding year of 220,-508 M. feet, or 7.1 per cent. Maple, red gum, tulip poplar, chestnut, beech and birch followed oak in the order named.

The production of lath and shingles in 1912 did not differ materially from the output of these products during the preceding calendar year although each was reported in slightly smaller quantities than in 1910.

The comparative summary follows:

	Lumber Production (M ft. bd. meas.)		
State—	1912.	1911.	1910.
United States	39,158,414	37,003,207	40,018,282
Washington	4,099,775	4,064,754	4,097,492
Louisiana	3,876,211	3,566,456	3,733,900
Mississippi	2,381,898	2,041,615	2,122,205
North Carolina	2,193,308	1,798,724	1,824,722
Oregon	1,916,160	1,803,698	2,084,633
Texas	1,902,201	1,681,080	1,884,134
Arkansas	1,821,811	1,777,303	1,844,446
Virginia	1,569,997	1,359,790	1,652,192
Wisconsin	1,498,876	1,761,986	1,891,291
Michigan	1,488,827	1,466,754	1,681,081
Minnesota	1,436,726	1,485,015	1,457,734
Alabama	1,378,151	1,226,212	1,465,623
West Virginia	1,318,732	1,387,786	1,376,737
California	1,203,059	1,207,561	1,254,826
Florida	1,067,525	983,824	992,091
Pennsylvania	992,180	1,048,606	1,241,199
Georgia	941,291	801,611	1,041,617
Tennessee	932,572	914,579	1,016,475
Maine	882,128	828,417	860,273
South Carolina	816,930	584,872	706,831
Idaho	713,575	765,670	745,984
Kentucky	641,296	632,415	753,556
New York	502,351	526,283	506,074
Ohio	499,834	427,161	490,039
New Hampshire	479,499	388,619	443,907
Missouri	422,470	418,586	501,691
Indiana	401,017	360,613	422,963
Montana	272,174	228,416	319,089
Massachusetts	259,329	273,317	239,206
Vermont	235,983	239,254	284,815
Maryland	174,320	144,078	154,554
Oklahoma	168,806	143,869	164,663
Illinois	122,528	96,651	113,506
Connecticut	109,251	124,661	126,463
Colorado	88,451	95,908	121,398
New Mexico	82,650	83,728	83,544
Arizona	76,287	73,139	72,655
Iowa	46,593	59,974	75,446
New Jersey	34,810	28,639	36,542
Delaware	28,285	23,853	46,642
South Dakota	20,986	13,046	16,340
Rhode Island	14,421	9,016	14,392
Wyoming	13,560	33,309	30,931
Utah	9,055	10,573	11,786
All other	*22,525	*11,786	*12,594
Lath (thous.)	2,719,163	2,971,110	3,494,718
Shingles "	12,037,685	12,113,867	12,976,362

*Includes Kansas, Nebraska and Nevada.

Locomotive Repairs

A writer in the Engineering Magazine discussing the subject of locomotive repairs, writes as if the present system was criminally careless or needlessly negligent. The writer, like others of his kind, seems to have all the requirements that are necessary to meet the situation except experience. The propositions look great—on paper. It is claimed that a locomotive now taking ten or twelve days' time to be repaired should be done in three days. When the plans are carefully analysed a whole army of clerks rise into view, and an endless chain of printed forms to be filled up come in volumes, like a circulating library. Of course, there is no mention made of what salary, if any, these clerks are to be paid, not speaking of the time that would be consumed in carefully perusing and thoughtfully digesting the detailed documents. In short, were these plans to be adopted and carried into actual practice, a machine shop would be changed into a reading room, and the handicraftsmen would become students.

The writers, of course, make no allowance for the great and growing advances already made both in means and material in nearly a century of the most remarkable progress in mechanical science in the history of the world. To their minds it seems to be all wrong. As a matter of fact it is all right. All real progress is slow. Perfection eludes and ever will elude the most earnest worker. There should be a supreme satisfaction in feeling and knowing that we are advancing in the matter of better appliances and a higher degree of skill, and that

(Continued on page 8.)

BOILER EXPLOSIONS

The life of a steam boiler depends upon three principal factors:

1. The design, materials and workmanship;
2. The purity of its feed-water; and
3. The treatment it receives in service.

Lancashire and Cornish boilers have lasted for 30 years, while locomotive boilers rarely exceed six years.

The above periods of life may be called the natural or normal life. It frequently happens, though, that the life of a boiler is ended by an explosion. The injury to and loss of the boiler itself is usually the smallest item of an explosion. The property loss of the building and contents often runs up to thousands of dollars. But worst of all is the sacrifice of human lives, which, in several boiler explosions of recent years, have summed up over half a hundred for each explosion. In the last 25 years there have been about seven thousand boiler explosions from various causes, with an average of one person killed and nearly three injured for every explosion. Let us consider for a moment why it is that a steam boiler possesses this enormous power of destruction.

Power Liberated. In the average boiler the water and steam are at a high temperature. In other words, the heat confined in the boiler is very great, and heat, we know, is a form of energy. In general there are two cubic feet of water to a cubic foot of steam. Let us suppose the pressure is 100 pounds per square inch. Then the water is at 337 degrees Fah. One cubic foot of steam weighs approximately a quarter of a pound, and two cubic feet of water weigh 120 pounds. If the pressure on this water is reduced to that of the atmosphere its temperature falls to 212 degrees Fah. (337—212) B. T. U. are devoted to vaporizing the water. The 120 pounds of water would then produce

$$\frac{120\ (337-212)}{9.66} =$$

15 pounds of steam. If the shell ruptures at any point, it is liable to tear completely open and relieve the pressure, so that the energy due to the generation of the 15 pounds of steam adds itself to that due to the expansive force of the quarter pound of steam, and thereby a violent explosion is produced. The weight of steam in a boiler is so small that the energy stored in the water very greatly exceeds that stored in the steam. In the above problem the energy in the water is nearly 60 times that in the steam. The following formula gives approximately the energy stored in the water and liberated by the explosion. Energy in foot pounds=

$$\frac{T-212)^2 \times 778 \times W}{1135 \times T}$$

T=the temperature of the steam at the instant of the explosion.

W=the weight of the water in the boiler in pounds.

Let us apply the formula to a plain tubular boiler 60 inches in diameter, 15 feet long and containing 66 3-inch tubes. It is rated at 70 horsepower and weighs approximately 9,500 pounds, and usually contains about the same weight of water. We will suppose 10,000 pounds of water in the boiler under a pressure of 100 pounds gauge. The temperature of the steam at 100 pounds is 337 degrees Fah. W= 10,000 pounds. Therefore the formula we have is energy in foot pounds=

$$\frac{(337-212)^2 \times 778}{1135 + 337} \times 10{,}000 = 8{,}258 \times 10{,}000$$

= 82,580,000 foot pounds. The indicated horsepower released by the explosion then is

$$\frac{82{,}580{,}000}{33{,}000} = 2{,}502$$

horsepower if expended during a minute. It would be 60 times this, or over 150,000 horsepower, if the energy was all expended on one second. If a weight of one pound is thrown one mile high it requires an expenditure of energy of 5,280 foot pounds. The energy liberated, therefore, in example, would project the boiler, if it was unimpeded, to a height of

$$\frac{82{,}580{,}000 \text{ (foot pounds liberated by explosion)}}{9{,}500 \text{ (weight of boiler in pounds)} \times 5{,}280} =$$

1.6 miles. It would start with an initial velocity of 720 feet per second. The causes from which explosions proceed are very numerous, but they may be classified as follows:

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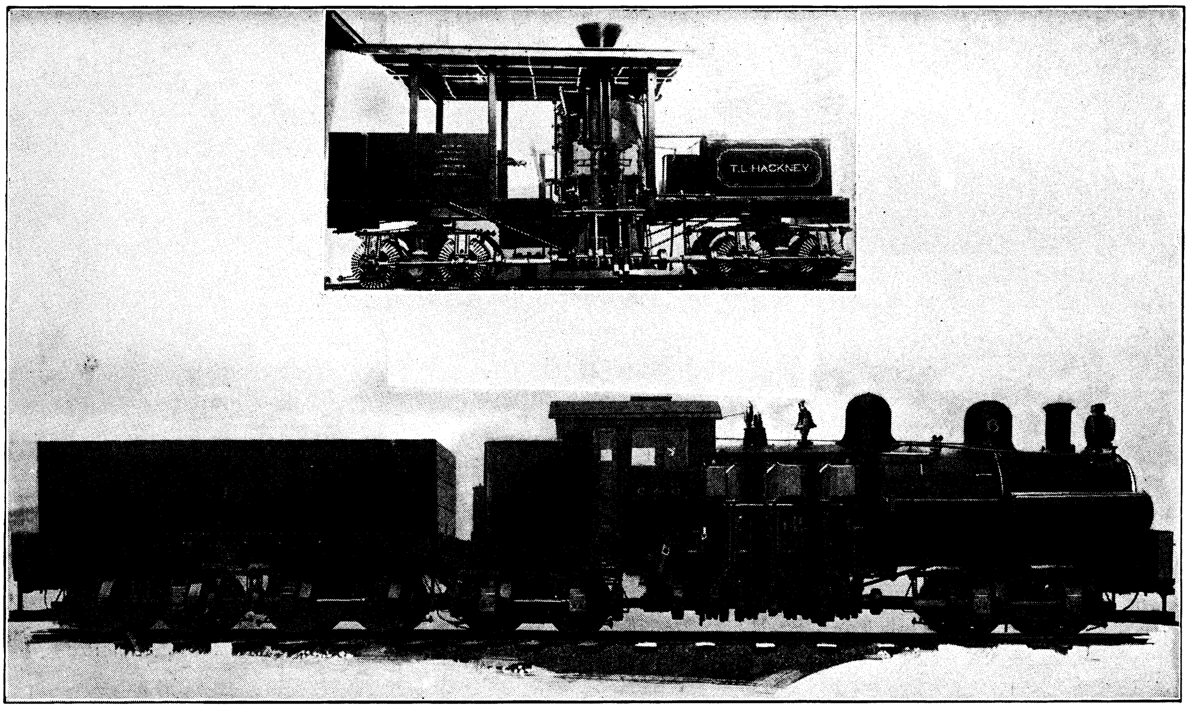
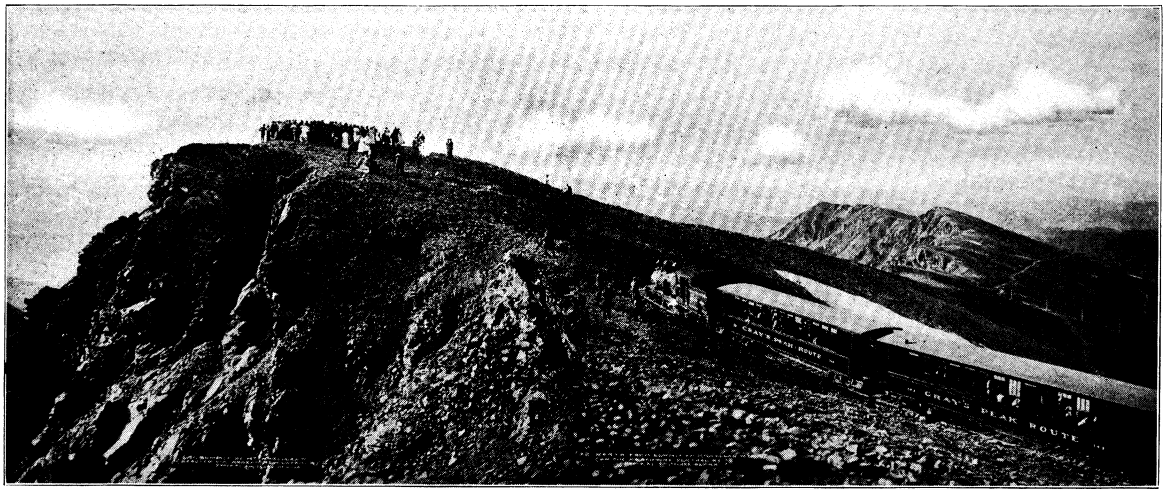
A World Renowned Geared Locomotive

OUT of nowhere into everywhere" can fittingly express the trail of this wonderful geared locomotive. The inventor, a lumberman who owned and operated a sawmill at Haring, Michigan, conceived the idea that the only way to make a success in logging his timber and get it out at a cost which would make a profit was to put in a tramway and use cars instead of trying to log his mill with horses and logging wheels, which was the best known plan up to that time. He still used horses in pulling his cars over the tramway,



but the cars would catch the horses on down grades and kill them, as the hand brakes on the cars were impractical and not sufficient to hold the load. Notwithstanding the saving effected in logging by tramway over the old way, which was $1.25 per thousand, quite an item at that time, yet the loss of horses and cars soon used up all the saving. He then decided to try a light locomotive, but his track being built out of maple rails, the locomotive destroyed the track. His experience thus far demonstrated to him that if he could convey the power to the trucks instead of to the drivers and use a flexible truck under the locomotive, the same as an ordinary car that the ack would stand up.

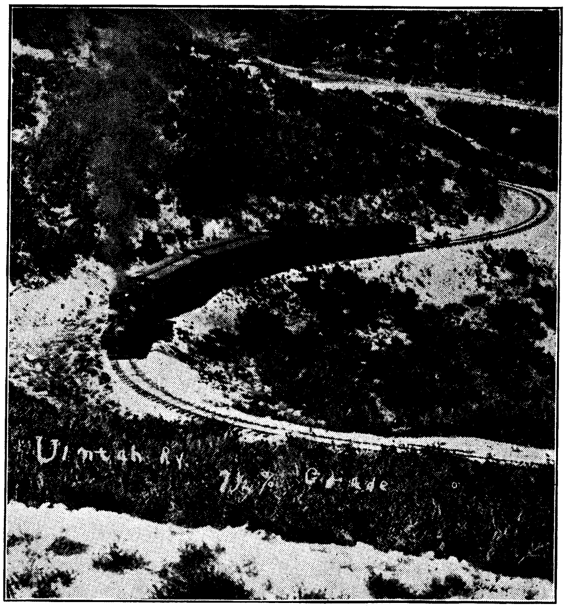
As in the case of nearly all important inventions ever brought out "Necesssity is the Mother of Invention," so it was true in this case. The locomotive which he had been using could not be operated on the wood rail while snow was falling in winter, so during the winter he remodelled the locomotive and conveyed the power to trucks. Hence, the birth of the Shay Geared Locomotive. This was during the winter of 1873. This locomotive, while being very crude indeed, worked better than the locomotive with drivers of the ordinary design, but the inventor states that for six winters he did the same rebuilding making improvements as experience seemed to require, until the cylinders only were left of the original design. Mr. Ephriam E. Shay, the inventor, advises that his friends remonstrated with him for spending so much money and time on such a crazy idea, he himself was actually tired of it and would have been glad to give it up, but the constant ridicule to which he was subjected angered him and he was obliged to continue in self defense to make it a success.



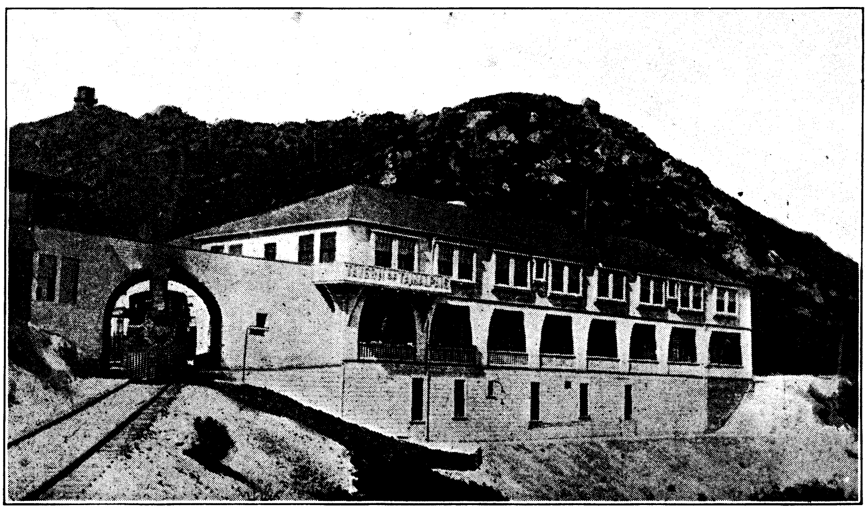
One of the consoling features which favored Mr. Shay was that during all this time he was experimenting with this crude locomotive and being ridiculed by his friends he was making money. His customers knew that rain or shine, bad roads or good, nothing would prevent him from logging and their timber bills would be delivered on time promised. The ridiculing kept up until one of Mr. Shay's friends was about on the verge of failure and came to him for advice. The advice was to get a locomotive like the one he was using. The friend at once wanted Mr. Shay to build it, but on account the fact that he could not take time from his own work recommended that he try Carnes, Agerter & Co., Lima, Ohio. He telegraphed this firm and shortly a man was on the ground arranging details, and later came the locomotive. This was really the first Shay Geared Locomotive, and many others followed in the footsteps of Mr. Shay's friend and the Carnes, Agerter & Co. soon were busy filling orders.

The illustration herein shows one of the first models as well as one of the modern 150-ton Shay Locomotives furnished the Chesapeake & Ohio Railway. During the course of the growth of the Shay Locomotive many changes in the personnel of the company have taken place—from Carnes, Agerter & Co., to Lima Machine Works—then Lima Locomotive & Machine Company, now Lima Locomotive Corporation. The "Shay" is used in almost every country on the face of the globe. In every state of the union, in the forests of Mexico, Central America, British Honduras, British Columbia, Phillippine Islands, Hawaiian Islands, Australia, Tasmania, Formosa, Japan, South America, Porto Rico, Cuba and Nova Scotia.

The Shay is the power adopted on some of the most noted scenic as well as the crookedest railroads in the world. One of the roads the writer has in mind is the Arica La Paz Railway, Chile-Boliva line, crossing the Andes from Arica in Chile to La Paz in Boliva. At the summit of this road is the highest point reached by a regular railroad, and the elevation is 14000 feet above sea level. While this line cannot make claim to traversing the roof of the world, yet a true statement would be that it runs on the Earth's Top Floor. The great buttress to Gray's Peak in Colorado is the next highest point in the world reached by a regular railroad. The Argentine Central Railroad is the name of the railroad, and there are five Shay Locomotives working on this road. A view is shown here of an excursion train and Shay Locomotive standing at the Summit of Mt. McClellan or Gray's Peak. The grades encountered on this road vary from 5 to 6.6 per cent.



Another American scenic railroad on which a number of Shay Locomotives are operating is that of the Mill Valley & Muir Woods Scenic Railway. This is the road running from Mill Valley, California, to the summit of Mt. Tamalpais, the mount which almost everyone has read or heard about, and which lies across the bay from San Francisco. Robert Louis Stevenson has written "Tamalpais stands sentry, like a lighthouse, over the Golden Gate, between the bay and open ocean, and looks down indifferently on both." The building of this road was due to the great desire of the many to view the mountain from the summit. It was completed in 1896. The grades average about 7 per cent and there are 281 curves on the road, some as sharp as 93 degrees or 70 feet radius. It has been called the "Crookedest railroad in the world" and no doubt those who have had pleasure of making a trip over it will vouch to this being a fact. A familiar view is herein shown, "Tavern of Mt. Tamalpais" where a Shay Locomotive can be seen standing in the Arch. There is still another scenic road which is known as "The Line of Unimaginable Scenes." This is the Uintah Railway, running from Mack, Colorado, to Dragon, Utah. In describing the road we can say that for about fifteen miles from the southern terminus it passes through comparatively flat and level country, but beyond the country becomes gradually rougher and the distant foothills of the Book Cliff Range assume more definite shapes. Then the canyon is entered and the climb to the summit is commenced with a few miles of three and four per cent, one mile five, and finally an unbroken stretch of five miles of seven and one-half per cent grade. A view is shown where a Shay Locomotive with train is wending its way up the stretch of seven and one-half per cent grade.



The Chesapeake & Ohio Railway, "America's Greatest Coal Road" has working on its branches where grades up to four and one-half per cent are encountered fifteen Shay Locomotives of the 150-ton size. Leaving America we find the Shay on the Wolgan Valley Railroad in Australia, on the Taiwan Railway, Island of Taiwan (Formosa) and likewise where e'er we travel the world over, the Shay can be found operating on the roughest and most severe adhesion roads, not only the logging railroads in the forest, but as you will note by the references given, it is used for almost every conceivable purpose.

Biltmore Plans For 1914

Students admitted to the Biltmore Forest School in the coming fall or in the winter 1913-14 will be placed in the woods, to work a prenticeship in logging and milling, under the auspices of a graduate of the Biltmore Forest School They will be required to work for common wages and will be dismissed mercilessly unless they perform the work expected from them with the utmost diligence and energy. Every week a written report is submitted by the prentice to the director of the Biltmore Forest School. together with a certificate signed by the foreman testifying to the prentice's efficiency.

Such prentices as have stood the test successfully will be assembled by the director in March, 1914, and will be taken to the school's western camp in Oregon, there to join the junior and senior students of the school who have spent the winter in the western lumbering operations.

The spring, summer and fall of 1914 will be spent by the entire school in British Columbia, Washington, Oregon and California.

By October 1, 1914, the students will be allotted to various western lumber camps there to spend the winter 1914-15 under the auspices of the alumni of the Biltmore Forest School.

The students join the teachers in March, 1915, in the Adirondacks, to spend the spring, summer and fall in the eastern camps of the Biltmore Forest School, receiving, on October 1, 1915, the degree of bachelor of forestry provided that they have stood the tests prescribed.—*The Lumber Trade Journal.*

Just Think

Louis F. Payn, warhorse of the old-line Republicans of New York, approached a country delegation chairman at the Republican state convention in Saratoga this fall and offered the nomination for the governorship to a citizen of the chairman's county if the chairman would support him with his votes, says the Saturday Evening Post.

The chairman was all worked up over it until Jimmie Montague came along.

"Reminds me," said Jimmie, "of a man I knew out in Oregon who had an offer of $1,000 for a half interest in a soda water business. He told a friend about it.

" 'Huh!' said the friend. 'The man who made that offer never had $1,000 in his life.'

" 'I know it," replied the soda water man, 'but just think what a fine offer it was!' "—*Ideal Power.*

Locomotive Repairs

(Continued from page 3.)

the railroads are not only keeping pace with the forward march of civilization but, in fact, are leaders in the world's work.

In the matter of general locomotive repairs it is a well known fact that the work which occupied three or four weeks thirty or forty years ago, can now be done in less than two weeks. This has not been accomplished by increasing the clerical staff, but by the improvements in mechanism and the introduction of finer grades of material, particularly in tool steel, whereby higher speeds have been made possible. That progress will be continued is not to be doubted, but it is not to be expected that the progress will be so rapid. Indeed, in the very nature of things, it will be slower, as there is a limit to all things within the range of mere human accomplishment, and as we approach the summit of perfection, the steps of the climber become slower.

It is also a self-evident fact that all real progress in the means or methods of repair work come from actual workers, and is largely borne in upon the minds of the workers by sheer necessity. The invention of the hydraulic jack by Richard Dudgeon is an illustration. There is no knowing how many times he may have helped in the arduous task of raising and lowering the slow moving screw jacks before the happy inspration of applying hydrostatic pressure came to him. The idea would not likely ever have come to a writer, no matter how mercurial his mind might be in the manipulation of words and phrases. It would be interesting indeed to have some of these theoretical writers to whom we allude, put to work a few days on a well worn locomotive, or give them a turn as a blacksmith's helper, or they might try their hands at stripping a front end, or they might be asked to take down a set of wedges in a wet pit, or they might for a change, be called out in the middle of the night to rectify the brake rigging, when the thermometer was about zero and a strong wind let loose from a glacial cave in the cruel north was whistling a tune through their petrified whiskers. Then they could give a practical illustration of scientific management, but it is more likely that they have more sense than to try a personal application of their idle theories.

Review of New Orleans Lumber Trade for Thirty-three Years

The New Orleans *Tines-Democrat,* in its semi-centennial edition, has the following to say about the lumber business in New Orleans and Louisiana:

The north section of Louisiana is one of the greatest lumber producing territories of the state, and for that matter, of the United States. All of the north section was at one time covered with pine and hardwood trees, and while much has been cut, much timber remains standing. While the amount of standing timber varies greatly, there is probably enough timber left in this section of the state to keep the mills operating full time for the next fifteen to twenty years. Some mills, with their capacity for sawing, probably have a forty year's cut ahead; other mills with better facitities probably have fifteen to twenty years.

Take around Alexandria, for example. It was stated by a man who has made a somewhat careful investigation, that there are sixty-three mills operating within a radius of fifty miles of Alexandria. While some of the mills lie in South Louisiana, still a great number are in the North Louisiana territory.

It was estimated that these mills are sawing a daily average of 80,000 feet each. In round numbers this is 5,000,000 feet a day, or almost 2,000,000,000 feet a year. The figures are hardly comprehensible, or at least no more so than the distance between the earth and the sun.

WORTH OF THE MILLS

These mills are connected with every phase of commercial life. They furnish the main traffic for the tap line railroads which have in a great measure helped develop the country. In many sections these logging or tap line roads are the only connection a community has with the outer world. In time these roads will probably be absorbed as branches of trunk lines.

The mills make a market for all sorts of supplies from shoes and groceries to saws and engines.

What is to become of the cut-over lands? This is a question that must be solved some time, but those in closest touch with the situation do not think the question will have to be touched probably for twenty to twenty-five years. There are thousands upon thousands of other acres that are ready for the plow and at prices per acre that make a field and a home of easy acquisition to every settler with little ready money.

Those who have given the matter deep thought believe that the pine cut-over lands will eventually be cleared of stumps by companies which will extract the turpentine and tar products from the stumps. They base their belief on the fact that the fir pines of northern climes are not nearly so rich in the tar products. It was stated that the Southern stumpage will yield fully fifty per cent more tar products.

CUTOVER LANDS

Aside from the fact that there are other lands available at present for settlement purposes at extremely reasonable prices, there is another reason why the cut-over lands will probably not be placed on the market in large quantities for some time. The mill companies, as a general rule, own the lands outright. In many instances, these lands are incumbered with blanket mortgages or bonds, the companies having used this method of raising operating funds, and it is hardly probable that the bonds will be taken up prior to the cutting off of the timber. The bonds, as a rule, mature at long-range dates, or at times when the companies bonding their holdings estimated the timber would be cut off.

In the main, then, the immigrants coming into North Louisiana are being placed on lands that have been prepared for cultivation for many years. It is also true that cut-over pine lands while they are considered excellent for truck farming, are not considered so good for general farming. In many sections of North Louisiana cut-over lands are quoted at $2.50 per acre, when general agricultural lands are quoted at $5 to $10, $15, $20 and $25 an acre, according to the improvements on the location. These figures are given for lands that would be classed as desirable holdings for homeseekers. There are, of course, improved farms in many sections of North Louisiana that could not be bought under $50 an acre.

INDUSTRY PASSING

The timber industry is fast passing. That is, the great tracts have been bought up and it is only a question of say a quarter of a century until the hum of industry will have ceased in this regard. The whole section of the state, however, is so prosperous that the probable passing of the sawmill gives the average citizen no concern.

The Cotton States Exposition, held in New Orleans in 1884-85, gave the lumber industry of Louisiana and adjoining states a lusty "boost". Its forest exhibits were carefully organized. Louisiana displayed 149 "varieties and speccies" of native woods; Mississippi's exhibit contained 134. There were notably fine exhibits also of sawmill machinery. Among the exposition visitors were many wealthy lumbermen and capitalists from the Northern states who by that time were searching out new fields.

ANALYSIS OF A BROKEN RAIL

Louisville & Nashville passenger train No. 7, southbound, was derailed October 1, 1912, near Hays Mill, Ala., resulting in the death of the express messenger and the injury of 21 passengers. This train consisted of nine cars and the cause of derailment was a broken rail. The Interstate Commerce Commission has issued a report by the chief inspector of safety appliances and by James E. Howard, engineer-physicist of the Bureau of Standards, from which the following is taken.

The fractured rail was of 80-lb. section, 33 feet long, of open hearth steel rolled by the Tennessee Coal & Iron Company in June, 1906, and laid that fall. The receiving end of the rail remained intact for a length of 13 feet 4 inches. The leaving end was broken into a number of fragments varying in length from 36 inches to 7¼ inches, 18 of which were recovered. The rail was fractured across its entire section at 14 places. At 11 of these places the metal of the head disclosed transverse fissures ranging in diameter from 0.37 to 2 inches. At only three of the complete fractures was the metal exempt from the presence of these transverse fissures, which were located either on the gage side of the head or directly over the web, none being present in the outer half of the head. The minimum distance apart of adjacent fissures was 7¼ inches, and the maximum distance 36 inches. In turning down a section of the rail for a tensile specimen the section fell apart in the lathe when the outer metal had been turned away for a distance, discolsing another transverse fissure, while one more was found in the head of the long section of the rail when bending the head. This latter fissure had a diameter of 0.37 inches and reduced the ultimate strength of the head 36 per cent. from that shown by a corresponding bending test on a section where no internal transverse fissure existed.

The chemical specifications under which this rail was rolled, the mill analysis and the Bureau of Standards analysis of the material are as follows:

	Specifications Per cent	Mil Analysis Per cent	Analysis of Rail: Top of head Per cent	Center of head Per cent	Upper part of web Per cent
Cathon	0.55–0.68	0.57	0.88	0.88	0.84
Phosphorus	(not over) .06	.057	.051	.052	.048
Silicon	(not over) .20	.008	.014	.014	.019
Manganese	.80–1.10	.88	.68	·67	.67
Sulphur	....	.040	.035	.032	.031

In discussing the rail Mr. Howard states that "it appears from the above that the carbon content of this rail was 23 per cent. higher than the upper limit of the specifications and 47 per cent. higher than the steel was reported, thus nullifying the value which might attach to the reported composition of the steel and giving such report a perfunctory character.

"Structurally the metal of this rail appeared uniform and sound. Cross sections polished and etched at six places along this length were uniform in appearance and substantially free from the dark markings which are frequently displayed by rail sections. So far as could be judged the formation and extension of these 13 transverse fissures was the result of service conditions to which the rail had been exposed in the track, not materially influenced by inequality of the steel.

"The combined bending stresses and intense wheel contact stresses which attend service conditions of a steel rail appear to constitute the features which lead to the formation and development of interior transverse fissures. Regardless of the grade or quality of the steel there must be present longitudinal strains which cause the separation of the metal of the rail in a longitudinal direction. The magnitude of those strains necessary to cause rupture will be greater or less according to the grade of metal.

"The effect of repeated alternate stresses in causing rupture in all grades of steel, without the display of ductility and under the action of fibre stresses somewhat below the elastic limit of the metal, is known. Repeated alternate bending of a steel rail, and all rails are exposed to repeated alternate bending stresses, has a tendency to cause ultimate rupture in a brittle manner under fibre stresses below the primitive elastic limit of the steel. But exposure to bending stresses alone—that is, unaccompanied by intense wheel pressures on the running surface of the head—would lead to fractures which would have their origins at the fibres most remote from the neutral axis of the rail, where the stresses would be the greatest. Under such circumstances rails would be expected to fracture, starting either at the running surface of the head or at the underside of the base.

"Since transverse fissures have their origins at the interior of the head and are longitudinal tensile fractures of the metal, it is necessary to look for a cause for the transference of the incipient place of rupture from the outside fibres to interior ones. The cold rolling of the running surface of the head by the wheels doubtless occasions this transference. The gage side of the head is most affected by the wheel loads, and that should be the side of the head to develop interior fissures as examples of fractured rail have shown it to be.

"The effect of the wheels is to put the metal at the running surface of the head into a state of internal compression. The springing of the head into convex shape on the running side, when detached from the web, is evidence of the release of internal compression. The present rail sprung in that manner when the head was detached from the web. Herein is found a cause which has a tendency to transfer the incipient place of rupture from the surface to the interior of the head. The metal in compression at the running surface must perforce put the metal next below it in a state of tension and augment the tensile strains of the bending loads. In a way the rail is an example of unsymmetrical loading, or rather presents an unsymmetrical result of loading, with bending stresses alone affecting the base, while the head is affected by the combined bending stresses and internal strains of compression.

"It is not a question of grade of steel whether or not this action takes place, but in specific cases a question of what constitutes an overload for the particular steel being used. Rails which develop this type of fracture have certainly been overloaded. The close proximity of transverse fissures to each other precludes the explanation that they are the result of bending stresses taken alone. The results call for the presence of an independent force, the influence of which is felt along the entire length of the head, and such in fact is the manner in which the compression metal acts.

"Since these fissures occur in planes at right angles to the direction in which the rails were rolled their formation would not be looked for as a result of mill practice. Certainly the presence of fissures approaching 2 inches in diameter would not be attributed to the action of the rolls of the rail mill, ignoring the fact, for the time being, that such fissures are located on one side only of the head. 'There is lack of continuity in steel in the ingot at places where slag inclusions exist, yet such globules, of one one-hundredth of an inch diameter, more or less, are drawn out in the finished rail into longitudinal filaments parallel to the length of the rail. The examination of rail steel through the successive reductions from the ingot to the rail has failed to furnish examples of incipient fissures developed at right angles to the direction of rolling.

"No method has been found capable of locating incipient interior fissures and which, it should be remarked, do not present oxidized surfaces. But so grave a matter as this should not be left in its present state of uncertainty, and data upon contributory causes, track conditions, wheel loads, and grades of steel in which these fissures appear should all be acquired. Primarily the formation of a transverse fissure is the result of an overload, for that particular rail, from whatever point the subject is viewed. It is regarded as an imperative duty, which should at once be performed, to ascertain and define the actual stresses to which the rails are daily subjected."—*Railway Age Gazette.*

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Who slipped on a vacant banana.
The words that he said
When he fell on his head
Wouldn't do for a Sunday school banner.

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BOILER EXPLOSIONS

(Continued from Page 4)

1. Weakness and defects in the design, material or construction.
2. Wasting from corrosion, wear and tear.
3. Improper treatment and attention. It must be borne in mind that this classification is arbitrary, and that the explosion may be, and usually is due to a combination of causes.

Defects. Plates have sometimes been stayed so rigidly as to interfere with their expansion, and as a result fractures occur. Or, again, strains produced on one part by excessive expansion of another part may be greater than the strength of the material. Unnecessary and dangerous fittings should not be used. A hand valve should never be placed between a safety valve and the boiler. While all boiler material is carefully tested and only accepted when conforming with standard specifications, yet it sometimes happens that defects will exist in the material which will be a source of weakness. Hidden flaws have been the cause of numerous explosions. Flaws along the line of rivet holes or between the rivet holes have frequently been caused by punching. Grooving has often been induced by improper calking, which causes the skin of the plate to be cut through and an indent to be made along the outside of the lap joint. Incipient flaws are sometimes started in the plates, especially those of a hard and brittle nature, during the process of manufacture, which may afterwards develop into a rupture from the strains thrown on the boiler when at work. Fractures have been started in many cases by the rough treatment the ends of plates receive in imparting the required set to the joint. When plates are bent after the rivet holes are made, the lessened resistance of the plates at the rivet holes permits the plate to become set instead of bending uniformly to the curve, and plates have been injured by flogging the bent edges back to the required curve. Laminated or unsound plates are liable to develop blisters, which often become dangerously weak, due to excessive heating. Improper use of the drift for the purpose of drawing the rivet holes fair has sometimes started fractures. A calking tool of improper shape may start a fracture by cutting grooves in the plate. If the edges of manholes are not strengthened by rings, fractures may be started by the strains from screwing up the covers. Failure of riveted seams, due to fracture at the rivet holes, has caused many explosions. These cracked rivet holes are often due to the use of a too brittle plate, and sometimes to badly fitted rivets. A chain is no stronger than the weakest link, so, too, with a boiler which is dependent upon its numerous fittings. If any of these are defective, they are liable to fail and precipitate an explosion. Water gauges are frequently of an inferior material that is seriously impaired by high temperature. Boilers are often prematurely worn out by corrosion in some of the many ways. Corrosive grooving has caused many explosions. Many explosions are known to have been directly due to external corrosion. In fact, any of the many forms of corrosion and wasting are liable to result in an explosion if not corrected in time.

Improper Treatment. In the following few paragraphs attention is called to the dangerous results of mismanagement.

The mismanagement may be due to carelessness, incompetent help, lack of inspection, or to short-sightedness of employers. A man in charge of a boiler has certain duties to perform, and must attend to them at a certain time, otherwise he is taking more or less risk, and the responsibility of a possible explosion on his shoulders. A man, under ordinary circumstances, will not work for less than his services are worth, and if a low salary is offered for a fireman, a low grade fireman is usually the result. An incompetent man may get along without an accident, but there is always the risk. Besides, a good fireman will more than save the difference in salary by his economical methods in firing and taking care of the property in his charge. An employer may require longer hours than the fireman is physically able to stand, or again, the fireman may have other duties taking him away from the boiler part of the time. In these instances the employer is often risking an explosion for the sake of a few extra dollars.

Many explosions are caused by overheated parts, due to defective circulation, shortness of water, and excessive incrustation. When the

(Continued on page 22)

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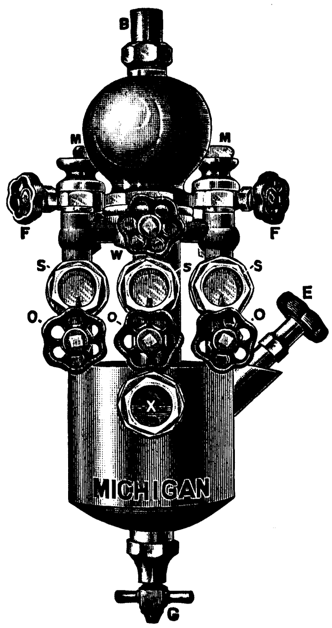

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TRANSPORTATION OF LUMBER

The transportation of forest products is one of the largest items in the business or railroads and other public carriers in this country. The tonnage is enormous, is widely distributed, and the average length of the haul is long.

Those who are accustomed to think of forest products as consisting almost wholly of sawed lumber are a long way from an understanding of the real situation. It is true that lumber is the most important item in money value and as a revenue producer for the transportation companies; but, surprising though the statement may be, lumber is not the largest item in this country's list of commodities commonly classed as forest products. It never has been the largest and it probably never will be.

As the term is usually understood, lumber is the product of the sawmill, and consists of planks, boards, beams, and other dimension stock of that kind. There are a number of other products, some of which never see a saw mill. The government, acting chiefly through the Census Bureau and the Forest Service, collects statistics from time to time, for the purpose of keeping tally on the output of the forests and to assist in its proper utilization. Some of the statistics are collected yearly, others every ten years, and still others at no stated time, but whenever it is thought desirable to do it. The figures become more complete every year, because the work is more thoroughly done.

It is now possible to state with fairly close approximation what the annual drain is upon the forests of the country, to supply the people with the various commodities of wood which enter into their daily lives. This can be done without going outside of figures contained in government reports; and with the assurance that the figures are in the main correct, though absolute correctness is not claimed in any particular.

The accepted measurement of some forest products is in board feet, but all are not so measured in ordinary business transactions. Below is a list of forest products, taken from the latest available government reports, reduced to board feet by using the customary processes. The statement that all are from government reports should be modified in the case of fence posts, which will be more fully explained in a succeeding paragraph. The annual output of all forest products in the United States, as far as available reports show, is presented as follows:

Commodity	Board Feet
Firewood	51,600,000,000
Lumber	40,000,000,000
Hewed crossties	3,552,000,000
Pulpwood	2,456,000,000
Fence posts	2,000,000,000
Shingles	1,622,000,000
Distillation	870,000,000
Tanbark	647,000,000
Tight cooperage	600,000,000
Slack cooperage	555,000,000
Veneers	478,000,000
Lath	436,000,000
Poles	227,000,000
Unsawed exports	165,00,0000
Excelsior	85,00,0000
Total	105,293,000,000

Transportation companies are interested in tonnage, and forest products supply a great deal of it. The weight of wood varies according to species and according to state of dryness. Many kinds of green wood weigh 5000 pounds or more per thousand feet, while some dry woods weigh little more than half of that. Averages figured out for many kinds, and in different degrees of greeness and dryness, including lumber, ties, cordwood, poles, and other commodities, show that an average weight is about 4000 pounds to the equivalent of 1000 feet board measure. The average of lumber alone is not so much, but lumber does not constitute half of the wood cut annually. On the basis of 4000 pounds per 1000 feet, the total output of the country's forest products amounts to 210,000,000 tons.

It is not all carried by transportation companies, but a surprisingly large part of it is. In 1909 the railroads of the United States carried 1,556,669,741 tons of freight of all kinds, and the Interstate Commerce Commissions figures that 11.75 per cent of it was forest products, or a total of 182,000,000 tons. On the 4000 pounds per 1000 foot basis, this represents 91,000,000,000 feet of such products, leaving only about 14,000,000,000 feet not carried by public carriers. In numerous instances the same material is carried two or three times after it leaves the stump and before it reaches the final consumer. That means that the actual material carried is somewhat less than 91,000,000,000 feet, and the quantity which is never handled by public carriers is more than 14,000,000,000 feet.

Firewood is actually not shipped far. It is heavy, and it supplies a great deal of tonnage, but the average short haul places it far below lumber as a revenue producer for carriers. It may be shown by statistics, which need not be reproduced here, that the average haul of all kinds of forest products in the United States is near 299 miles. Firewood probably has a shorter haul than any other important forest commodity, and does much to reduce the general average to 299 miles.

Lumber is without doubt the largest revenue producer of all forest products. From the fact that statistics of lumber shipments are not generally kept separate from those of other products of a similar kind it is impossible to say what is the average length of lumber haul. Shipments go long distances, some entirely across the continent, others halfway across, and others from the Gulf region to the East, North, and West. The softwoods of the Lake states, and to some extent the hardwoods also, are shipped hundreds of miles, sometimes thousands. While Pacific coast sugar pine and Douglas fir are entering the Lake states' factories, hardwood flooring is on its way from the Lake states to the Pacific coast. Shorter hauls—though running into hundreds of miles—carry lumber into every corner of the country.

Railroads carry large numbers of crossties, not only for the use of the line on which this freight originates, but for connecting and distant lines. Ties are heavy and are not often thoroughly seasoned. Hewed ties only are listed in the foregoing table, because sawed ties are included in lumber.

Pulpwood is not usually carried far, and it belongs with the short-haul commodities. It is cheaper to erect the mill convenient to supply than transport the wood long distances to the mill.

It is not always practicable to do this, because some of the mills are driven by water power, and raw material must be brought to them, whether the haul is long or short.

Fence posts are an important commodity, demanded in all parts of the country and supplied by not less than one hundred kinds of wood. The total annual output is not definitely known, since government statistics and other figures on the subject are fragmentary. The total of 2,000,000,000 feet given in the table was reached by calculation based on the best available information. Many communities supply their own posts, and transportation companies are not called upon to haul them far, if at all; yet some posts are carried hundreds of miles. A single order of 100,000 Osageo range posts was recently shipped from Oklahoma to Illinois, and another of equal size went from the same region to Kansas and Nebraska. Western cedar posts are sent hundreds of miles eastward, and posts of northern and southern cedar furnish fencing material far away from regions where the timber grows.

Shingles probably are carried farther than any other important forest product of this country. Nearly three-fourths of the whole output are made in the state of Washington and are distributed over the United States. They are made of western red cedar. Most of the others are of northern and southern white cedar, sawed in the Lake states and near the Atlantic coast, and the markets are hundreds of miles away. A few shingles are produced in all timbered regions of this country.

Most of the wood cut for distillation purposes belongs to the hardwood species; but the softwoods, particularly the southern yellow pines, are rapidly growing in importance. The hardwoods are converted into charcoal, alcohol, oils, and other articles; the pine into turpentine and rosin. The material is usually in the form of cordwood. Shipments are generally short. The most valuable hardwoods for distilling are birch, beech and maple.

Tanbark is bought by the ton or cord, but statistics are in cords. Nearly all of the bark is hemlock and chestnut oak, and it is calculated that one cord is equivalent to 600 board feet. Tanbark is not a long-haul commodity, because it is customary to build tanneries contiguous to bark supply rather than haul the bark long distances to the tanneries.

Cooperage stock consists of staves, heading, and hoops. Tight cooperage is made into

(Continued on Page 22)

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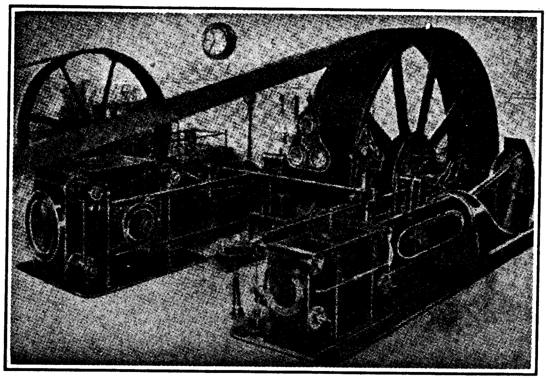

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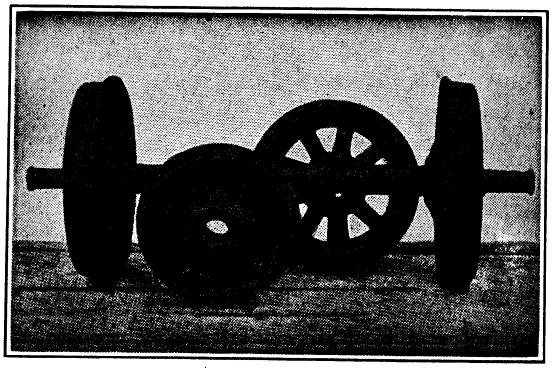

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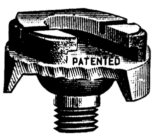

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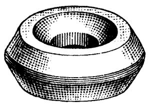
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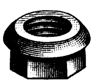
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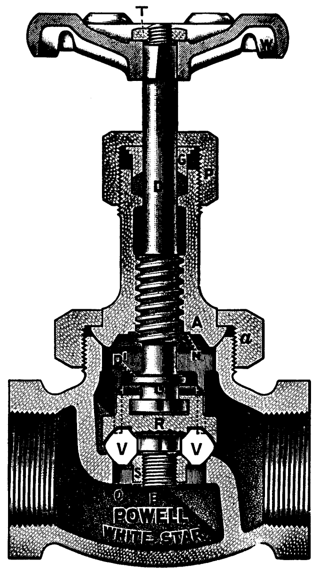

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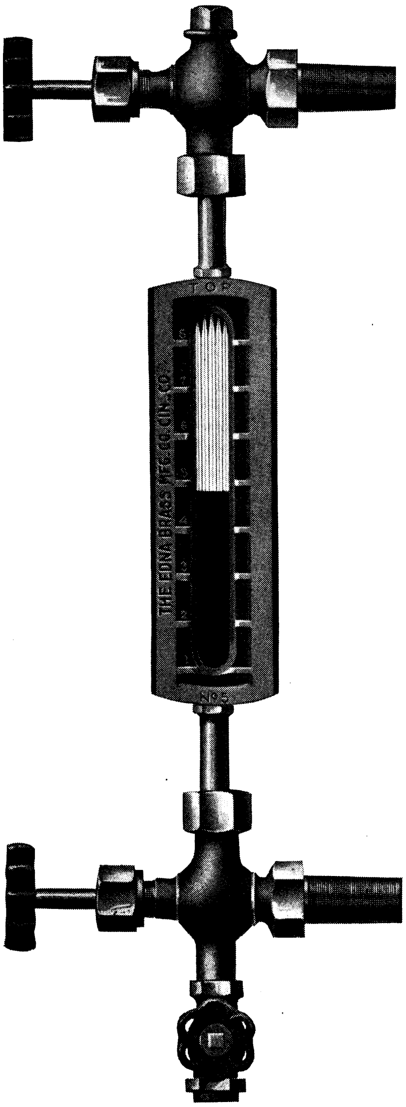

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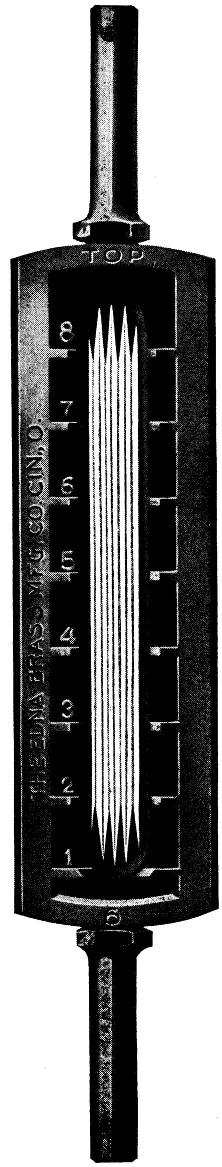

CATALOGUE AND PRICES ON APPLICATION

BOILER EXPLOSIONS

(Continued from Page 12

crowns of furnace tubes are overheated they are so much weakened that the tubes are liable to collapse and rupture under working conditions. Grease or oil on the surface of a plate is a serious obstruction to the transmission of heat. Organic oils, since they are most readily decomposed, are most liable to cause overheating, and mineral oils are the least dangerous. Muddy feed water and even chemicals, if injudiciously used, may cause overheating. If a furnace tube is in danger of becoming overheated the fire should be withdrawn. When, however, it is overheated it is dangerous to disturb the fire. It is usual in such cases to smother the fire with wet ashes. Never carry more pressure on a boiler than allowed by the Boiler Inspection Department.

Overpressure, and by this is meant a pressure above that adjudged safe by competent engineers, has caused numerous explosions.

The best means of preventing explosions are: (1) Efficient periodical inspection; (2) Maintenance of boilers in good condition; (3) Employment of trustworthy and competent attendants.

The inspection should begin when the material is selected and continue until the boiler is declared unfit for further service. The inspection should be thorough, both internal and external. The inspector should rely upon the hammer test, as it has been shown by experience that this is the best method for finding flaws. He should sound successively each part, and when he strikes a defective place the difference in sound reveals it to his trained ear. By all means have rigid inspections made on all boilers in your charge, insist on this.—*Steam Shovel and Dredge.*

The Locomotive World is published for the benefit of logging, mining, plantation and industrial railroads, also private railroad owners. Subscription, United States, Canada and Mexico, 50 cents a year; foreign 75 cents.

TRANSPORTATION OF LUMBER

(Continued from' Page 17)

barrels meant to contain liquids; slack cooperage is for dry commodities. The cooper shop, where barrels are made, is the market for the staves, hoops, and heading; and shipments of hundreds of miles are not unusual. Cooperage material is important as a revenue producer for the transportation companies.

Veneers follow much the same course as lumber in transportation channels, but the quantity is very small compared with the output of sawmills.

The manufacture of lath is as universal as the manufacture of lumber, for lath is a by-product of the sawmill. The supply being widely distributed, long hauls are not generally necessary. Any wood that makes lumber will make lath, but statistics do not show the various woods entering into the product.

Poles are classed with long-distance shipments. They are produced in three principal regions of the United States—the western cedar country, the northern cedar country, and the chestnut range in the East. More than three-fourths are cedar. The prevailing species is the northern white cedar of the Lake states, but the western red cedar is rapidly coming to the front as a source of poles. Pacific coast poles occasionally reach the Atlantic states; but such shipments usually consist of poles of large sizes only.

Unsawed exports are so listed because exports of sawed stuff are included in the lumber cut. Some logs are hewed and others are exported in the round. They are generally carried by rail to the shipping ports.

Excelsior is of no great importance from the viewpoint of the transportation companies, because the quantity is rather small and it is not shipped far. The principal regions of manufacture are Wisconsin, Virginia, New York, and New Hampshire; but it is made in twenty-seven states, ranging from Maine to Washington, and 122 plants are engaged in turning out the product.—*Hardwood Record.*

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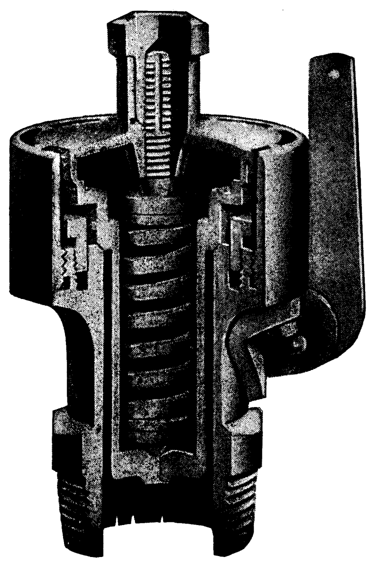
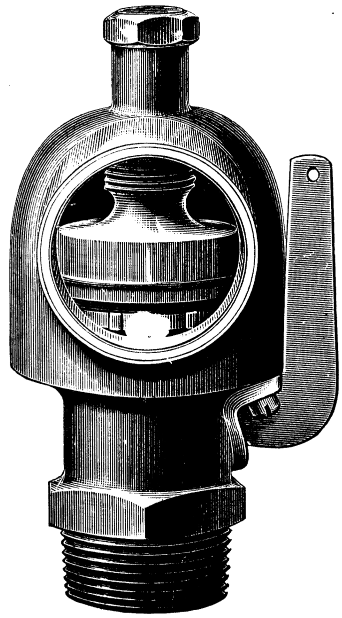
OVER 1,000,000 IN ACTUAL USE.

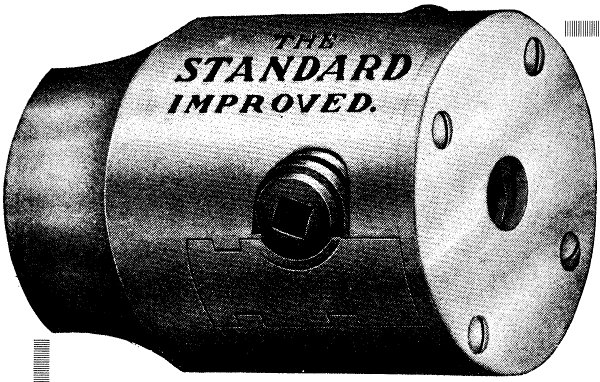




Fort Wayne Safety Valve Works

E. B. KUNKLE & Co.

817 Barr Street, Ft. Wayne, Ind.



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LARGE working parts made of specially treated steel insure a long life; face plates strengthen the bodies and prevent the insertion of wrong size tools and three tongues guide the jaws to keep them in accurate alignment. All of these parts and the bodies of the chucks are manufactured under scientific supervision. Their work is guaranteed to be satisfactory and efficient.

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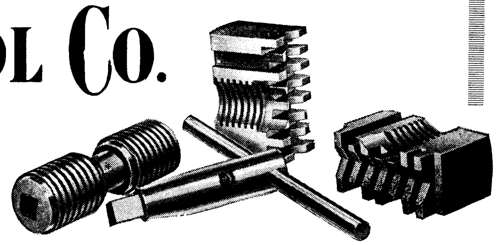

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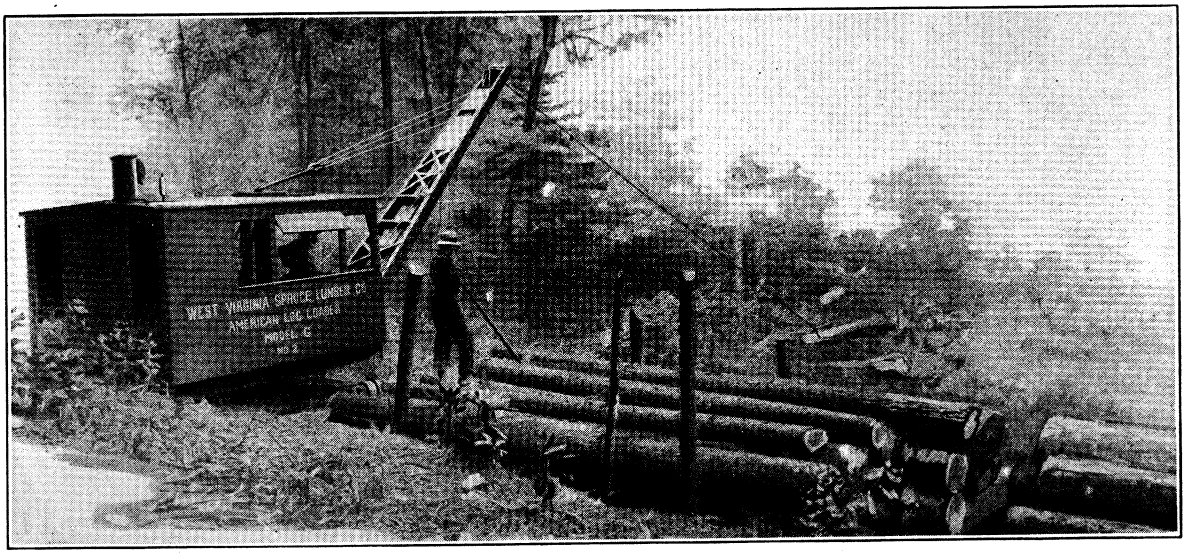

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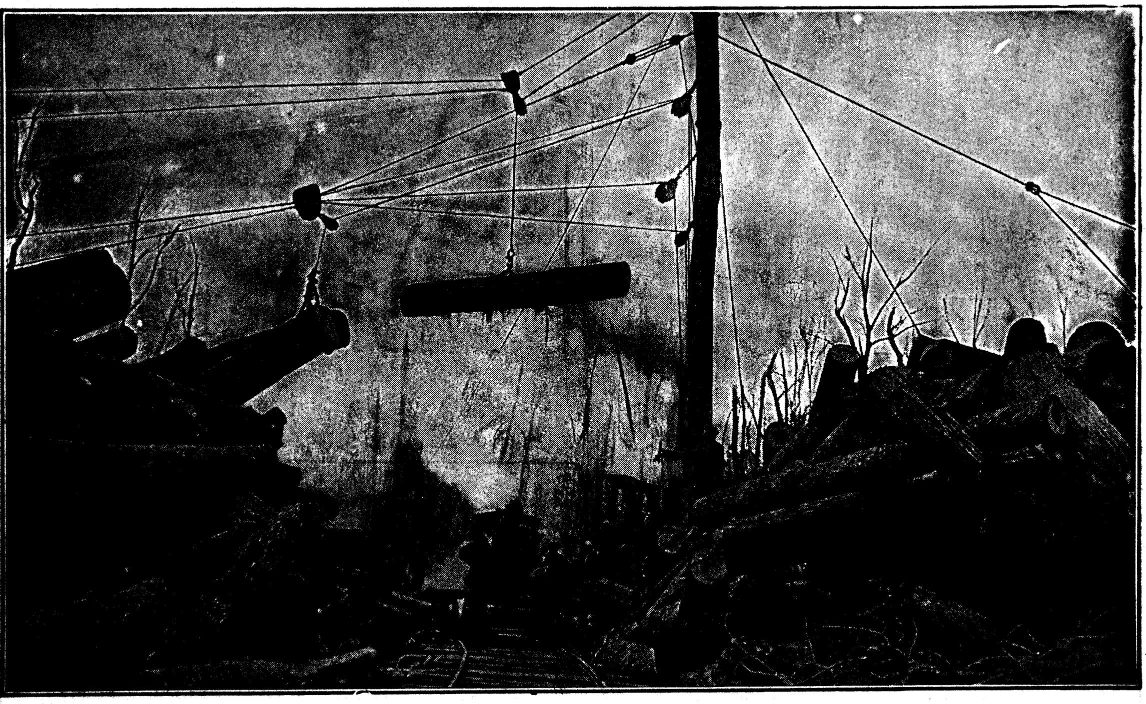

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