

practically to eliminate horizontal pressure on the walls. The extreme height of these walls, 72 ft. in the maximum, made this unusual precaution advisable.

The discussion showed a general opinion that too much has been spent for some retaining walls and that possibly a part of the excessive cost is caused by trying to design a wall in which there will never be the slightest movement. The tendency in the face of increasing land values and increasing traffic on the railways is of course to build all structures with greater consideration of permanence, and this tendency is probably justified in many cases. It is worth considering, however, if too much is not being paid for the degree of permanence secured in some retaining walls. A careful analysis of the costs and the advantages and disadvantages of the various types for the particular conditions surrounding the Milwaukee track elevation work is included in Mr. Lacher's paper. The same conclusions might not be reached, however, under different conditions, and a careful study of the requirements for any particular retaining wall and all the possible methods of meeting them will be well repaid by the lower annual charge on the work.

FUEL COSTS AND TRAIN LOADING

IN the endeavor to effect economies in railway operation, attention naturally has first been directed to the larger classes of expenditures, any reductions in which have correspondingly great effects on the total. One of the items entering prominently into the cost of railway operation is the cost of fuel. The report of the Interstate Commerce Commission for the year ending June 30, 1912, shows that practically \$225,000,000 or 11.83 per cent of all operating expenses was expended for fuel. This is two-thirds of the amount spent for wages of yard and road engineers and trainmen. In seeking to promote improvement in this field the problem divides itself immediately into two sections, each of which must be treated separately. The education of the firemen and engineers in the proper use of fuel is now receiving a great deal of attention and the results secured along this line on the Chicago, Burlington & Quincy, the Chicago Great Western and other roads, have been related in these columns.

Mr. Price emphasizes the importance of the second division of this problem in his article in another column. The conservation of fuel by using it in such a manner as to secure the greatest amount of productive work from it, is a problem which depends for its successful solution upon the chief dispatcher, the trainmaster, the superintendent and other men having supervision over train loading as well as on the engine crew, and the best endeavor to conserve fuel on the part of the engineers will not overcome the results of inefficient train loading. The economy of handling tonnage trains is fairly well realized in the abstract. However, it is not as well realized from the standpoint of its effect on fuel supply.

When the tonnage rating on a division is increased it very frequently meets with the open opposition of the train and engine crews as well as of the traveling engineers and trainmasters. However, if they can be shown that in many cases these increases are made with the use of a relatively small increase in the amount of fuel burned the opposition will be at least partially overcome. This condition was illustrated in a striking manner by the experience of one western road during the past year. Becoming convinced that the tonnage rating for certain classes of engines was too low, the general superintendent ordered that it be increased 100 tons. He at once encountered the active opposition of the traveling engineers particularly. After a couple of months, however, these men saw that the number of ton-miles handled per unit of fuel consumed showed an increase, resulting to the credit of their division in comparison with other divisions on the system. Their attitude was immediately changed and the general superintendent now has their hearty co-operation in raising the ratings still higher. Thus in the endeavor to secure the greatest amount of work from each unit of fuel the entire responsibility for improvement does not lie with the engineer and the fireman, but the superintendent and his staff as well can afford to give this subject their careful attention.

PENNSYLVANIA RAILROAD

IT would appear that the Pennsylvania Railroad in the calendar year 1914 carried out the first experiment on a very large scale in the history American railroading of a comprehensive scientific reduction in operating expenses commensurate with a reduction in both freight and passenger traffic without extending the policy of cutting down expenses to maintenance of way. The experiment was successful within the limits in which it was carried in 1914. It could not have been carried out successfully, probably, by the majority of the other large railroad companies in the country, nor can it be, probably, extended even by the Pennsylvania very much further to meet a continued falling off in traffic.

The calendar year 1914 was a black cloud for the eastern railroads without a vestige of silver lining. The total operating revenues of the Pennsylvania Railroad were \$187,252,000, a decrease of \$17,828,000 from the 1913 total.* Railway operating income in 1914 amounted to \$35,259,000, or \$3,983,000 less than in 1913. Freight traffic, measured in ton-miles, fell off 11.67 per cent, and passenger traffic measured in passenger miles, 4.31 per cent. Transportation expenses amounted to \$72,234,000, a decrease of \$6,021,000, or 8.34 per cent; maintenance of equipment expenses amounted to \$37,144,000, a decrease of \$5,841,000, or 15.73 per cent; while maintenance of way amounted to \$25,020,000, a decrease of \$1,315,000, or 5.26 per cent. If maintenance of way had been cut in the same proportion as transportation expenses and maintenance of equipment expenses, there would have been little loss in railway operating income for 1914 as compared with 1913. It will be seen that transportation expenses were reduced in proportion to the loss in business and this reduction was effected by a reduction in train mileage. With the ton mileage smaller by 11.67 per cent, freight train mileage was reduced 13.87 per cent; with the passenger mileage smaller by 4.31 per cent, passenger train mileage was reduced 4.73 per cent. The approximate reduction in number of employees in 1914 as compared with 1913 was 8 per cent.

The reasons why the Pennsylvania could cut its transportation and maintenance of equipment expenses proportionately to the loss in business, while the majority of other roads and the Pennsylvania itself have never succeeded in doing this before, are many and somewhat complicated; but there are two fundamental reasons which are capable of explanation. On the one hand, traffic density, both freight and passenger, on the Pennsylvania is so heavy, necessitating such frequent train service, that with a falling off in business, trains can be taken off in proportion to the loss in business up to a certain definite limit. In 1914 this limit had not been reached. The other reason was a composite one, made up of the strength of the company's credit, the confidence of the security holders in the management, the identity between the final authority and the active management, the Pennsylvania's form of organization which in matters of policy so centralizes and concentrates authority, and the spirit in which the situation which confronted the company at the beginning of the year was met.

The Pennsylvania Railroad operates 4,512 miles of road. In 1913, the year of greatest business in the history of the company, the system handled 25,025,000,000 ton-miles and 2,108,000,000 passenger miles. Thus the freight density (ton-miles per mile of road) in 1913 was 5,587,000, and passenger density (passenger miles per mile of road), 471,000. While, of course, the total capacity of the plant, exclusive of terminals, was not reached even in 1913, so great a percentage of its total capacity was then in use that the vast majority of freight traffic was handled in trains given their full rating of tonnage, and but a very small part of the freight business was handled in light trains, run because the traffic could not wait for a full train tonnage.

With a reduction of a little less than 12 per cent in ton mileage, the total ton mileage in 1914 amounted to 22,104,000,000, and the freight density to 4,899,000. Of the total 135,296,000

* Throughout these comments the combined figures of the Pennsylvania Railroad and the Northern Central for both 1914 and 1913 are used, the Pennsylvania having taken over the Northern Central as of July 1, 1914, and added it to the Erie division to form the Central division.

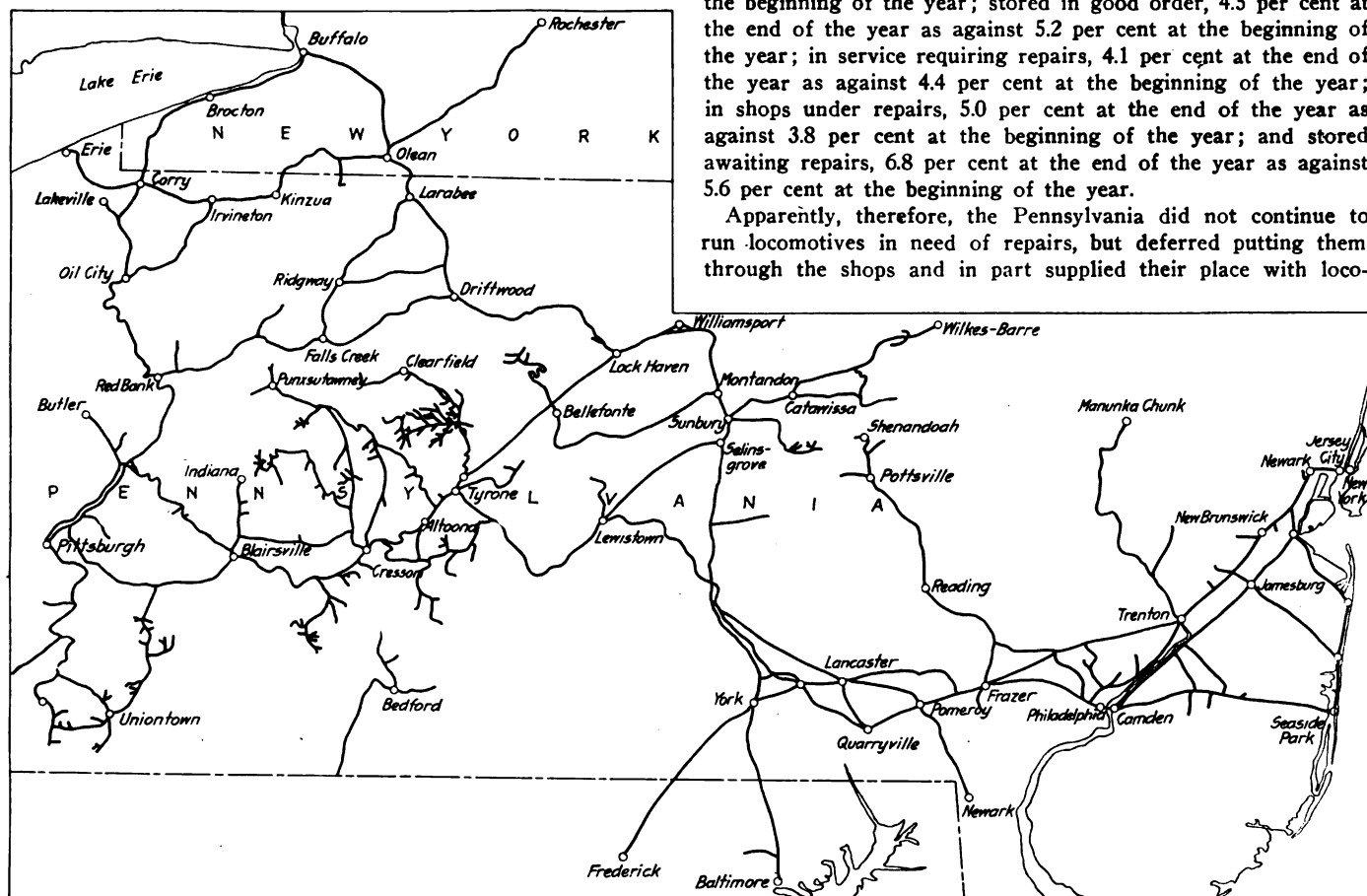
tons carried on the Pennsylvania in 1914, 69,962,000 tons, or more than half, was coal and coke. The total tonnage of all commodities in 1914 was less by 19,913,000 than in 1913. The tonnage of anthracite coal was slightly larger in 1914 than in 1913; but the total net falling off in coal and coke tonnage amounted to about 8,300,000 tons, and the decrease in tonnage of iron and of castings and machinery amounted to another 2,982,000 tons, so that out of the total loss of 19,913,000 tons, 11,282,000 tons was in tonnage which moved almost exclusively in drag freight trains. To meet the loss in this tonnage it was simply necessary to run fewer drag freight trains. As a matter of fact, with the large loss in tonnage and the large proportion of that loss in low grade freight, the Pennsylvania Railroad's average revenue freight train load in 1914 was 722 tons, an increase of 18 tons over the previous year. It would be hard to conceive of more striking testimony to the success of the Pennsylvania operating officers' work in 1914.

The Pennsylvania allocates its expenses as between freight and passenger, and although the allocation is made on an ar-

net loss in the year 1914 per passenger train mile of 9 mills as compared with a net revenue in the year 1913 of 4.1 cents.

Besides the reduction in transportation expenses there was a reduction in the amount spent for maintenance of equipment of \$5,841,000, the total in 1914 being \$37,144,000. This is deferred maintenance, in the sense that the cost of repairs which were needed in 1914 and not made will have to be paid for out of earnings of some other year; but unlike deferred maintenance of way expenses, they will not have to be paid for twice. The distinction is important in the case of the Pennsylvania, although under other circumstances it might be just as much of a false economy to defer expenditures on maintenance of equipment as on maintenance of way. What happened in the Pennsylvania case is shown by the following figures: Total locomotive mileage in 1914 amounted to 103,006,000, a decrease of 13,345,000, or 13 per cent; freight car mileage amounted to 1,268,000,000, a decrease of 149,000,000, or 10.5 per cent. The percentage of locomotives in service in good working order at the end of 1914 was 73.6 per cent, exactly the same percentage as at the beginning of the year; stored in good order, 4.5 per cent at the end of the year as against 5.2 per cent at the beginning of the year; in service requiring repairs, 4.1 per cent at the end of the year as against 4.4 per cent at the beginning of the year; in shops under repairs, 5.0 per cent at the end of the year as against 3.8 per cent at the beginning of the year; and stored awaiting repairs, 6.8 per cent at the end of the year as against 5.6 per cent at the beginning of the year.

Apparently, therefore, the Pennsylvania did not continue to run locomotives in need of repairs, but deferred putting them through the shops and in part supplied their place with loco-



Pennsylvania Railroad

bitrary basis, the figures arrived at are accurate for comparative purposes. The freight train revenue per train mile in 1914 was \$4.25, an increase of \$0.144. Expenses per train mile amounted to \$3.135, an increase of \$0.076, so that net per train mile was \$1.115, an increase of \$0.068.

In cutting off passenger train mileage the management was almost as successful as in freight train mileage; but probably largely because of the operation of the full-crew law during all of 1914, the increase in passenger train expenses per train mile offset the economies made through a reduction in train mileage. The total number of passengers carried one mile in 1914 was 2,017,000,000, a decrease as compared with 1913 of 91,000,000. The average revenue per passenger train mile in 1914 was \$1.60, an increase of \$0.021. The expenses per train mile in 1914 were \$1.609, an increase of \$0.071. There was, therefore,

motives which had been repaired in previous years and were stored in good order. Of course deferring maintenance expenses in this way, if there was any prospect of a large and sudden increase in business, would be poor economy. Repairs could be more cheaply made in slack times, but there is no present prospect for a sudden large increase in business on the Pennsylvania. The deferring of repairs, therefore, is not a grossly false economy. When the repairs to the equipment are made, present prospects are that they will cost little, if any, more to make than they would have in 1914.

Deferring maintenance of way, however, on a road like the Pennsylvania is an entirely different matter. A falling off in train mileage of 10 per cent. decreases the actual cost of maintenance of way, if the same standard is to be maintained on the Pennsylvania, by only 2 or 3 per cent. If, however, track is

allowed to deteriorate from standard, the expenditures necessary to bring it back, maybe 2 to 3 or 4 times as great, to those that would have been necessary to maintain it at standard.

The Pennsylvania executive officers are not the only railroad men in America who believe these principles are a fact beyond dispute; but the peculiar situation in regard to the strength of the company's credit and final authority being vested in the management has given the Pennsylvania officers an opportunity to live up to what they believe, where the great majority of other railroad officers have not been so fortunately placed. In 1913 the Pennsylvania spent the largest amount for maintenance of way in any year in its history and its appropriations were generously ample. In 1914 there was \$25,020,000 spent on maintenance of way, or only \$1,315,000, 5.26 per cent. less than in 1913.

Toward the latter part of 1913 it had become unmistakably plain that there would be a very heavy decrease in traffic in 1914. The Pennsylvania management, after probably very careful deliberation, decided on the policy of economy without arbitrary reduction in allowance for maintenance or any other expenses which was later carried out. The operating officers had the situation explained to them very fully. Any reduction in maintenance of way expenses had to be justified as carefully as an increase in expenses would have to be justified. No reduction of any class of expenses was to be made in such a way as might prove uneconomical in the long run. In other words, so far from sending out orders that shop forces must be cut, section men laid off, etc., headquarters put it up to the operating officers not to make reductions in expenses that would prove false economies.

In 1914 the Pennsylvania spent \$14,486,000 for additions and betterments. The most important construction work now in progress is summarized in the construction news columns of this issue, and it is only necessary to mention here that the electrification of the main line is proceeding without interruption; that the telegraph and telephone wires between Broad street station and Paoli, Pa., and Jersey City to Rahway, N. J., have been completely placed underground, and the work of placing wires underground between New York and Philadelphia is being carried out.

During 1914 the Pennsylvania sold no securities, but since the close of the year has sold \$49,000,000 of its consolidated mortgage 4½ per cent. bonds, which sale makes the consolidated mortgage practically a closed one, almost the entire \$100,000,000 bonds which can be issued under it being outstanding. There are \$86,827,000 convertible bonds due October 1, 1915. Stockholders had already authorized the issue of \$31,000,000 additional securities and at the annual meeting on Monday last authorized an additional issue of \$40,000,000, making a total of \$71,000,000 securities which may be issued to refund that portion of the \$86,827,000 maturing October 1 not provided for by the sale of the \$49,000,000 consolidated mortgage bonds and for any other purpose.

The Pennsylvania had on hand December 31 (before the sale of the consolidated mortgage bonds, of course) \$15,587,000 cash and \$18,648,000 time drafts and deposits. There were \$5,110,000 loans and bills payable.

The table shows the principal figures for 1914 and 1913:

	1914	1913
Average mileage operated.....	4,512	4,512
Freight revenue	\$131,158,930	\$147,317,395
Passenger revenue	38,977,848	40,599,628
Total operating revenue.....	187,251,851	205,080,112
Maint. of way and structures...	25,019,605	26,334,595
Maint. of equipment.....	37,143,533	42,984,269
Traffic expenses	2,316,127	2,847,024
Transportation expenses	72,234,108	78,255,026
Miscellaneous	2,624,137	2,653,376
General expenses	4,954,732	4,923,127
Total operating expenses.....	141,292,243	154,997,418
Taxes	7,689,523	7,840,853
Net operating income.....	35,258,772	39,241,841
Gross corporate income.....	51,792,223	57,712,898
Net income	34,090,765	41,920,833
Sinking and reserve funds.....	1,785,243	1,882,775
Dividends	29,952,186	28,394,248
Income appropriated for additions and betterments	2,230,336	6,787,583
Held in reserve		2,500,000
Surplus	123,000	540,602

*The figures down to and including net operating income are for the combined properties—the Pennsylvania Railroad and the Northern Central—for both years. The figures below are for the Pennsylvania Railroad, and the Northern Central in the last half of 1914, for 1914. There is not, however, any serious discrepancy in the comparison, because previous to July 1, 1914, the Northern Central paid dividends to the Pennsylvania and its dividends were guaranteed by the Pennsylvania.

Letters to the Editor

CHEMICAL SPECIFICATIONS FOR BRAKEBEAMS

FRANKLIN, Pa.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In a letter on this subject, published in the *Railway Age Gazette*, November 20, 1914, page 940, I stated: "I know of one mill that is rolling sections for the solid type of beam from scrap steel axles."

I find that I was in error in making this statement, as I am informed that axles are not used for this purpose; therefore, not wishing to do an injustice, I retract the statement. There have, however, been thousands of brakebeams made, the members of which were rolled from scrap high carbon steel rails.

B. HASKELL, M.E.

ARE THE COMMISSION'S CONFERENCE RULINGS LEGALLY BINDING?

HARRISON, Ark.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

There are, no doubt, numerous railroad officials in all parts of the United States, whose early training and closely defined duties, have not made possible a satisfactory understanding of the various legal matters confronting the operating man of today.

For their benefit would it not be possible to briefly state through the columns of the *Railway Age Gazette* your views on the following:

Do, or do not, the Interstate Commerce Commission's conference rulings on the various acts to regulate commerce, have any judicial force or effect; or, in other words, considering the conference rulings in the light of working rules, would their violation invite the same penalties as obtains in connection with the Act to Regulate Commerce?

H. E. COCHRAN.

[It was our own opinion that the conference rulings of the commission had no binding legal effect and were not regarded by the commission itself as having such effect. We considered them merely interpretations of the law, disregard of which would bring punishment only if the courts should hold the rulings disregarded were correct interpretations of the law. However, we submitted our correspondent's question to George B. McGinty, secretary of the Interstate Commerce Commission, who has replied as follows: "This will acknowledge receipt of your letter of February 9, in which you ask to be advised whether the conference rulings of the commission have any judicial force or effect, and whether a deviation from a conference ruling is prohibited under the same penalties as are violations of the act to regulate commerce. As stated in the explanatory note published in Conference Ruling Bulletin No. 6, the conference rulings of the commission are simply expressions of the commission's views in connection with matters submitted informally to it, involving special facts or requiring interpretation and construction of the law. While these rulings are to be regarded as authoritative, and as precedents governing similar cases they do not have the force of formal orders entered by the commission under the authority conferred upon it by sections 13 and 15 of the Act to Regulate Commerce. There is no penalty provided for a violation of a conference ruling, as such, but obviously if a conference ruling is a correct interpretation or construction of the law, a deviation therefrom would necessarily involve an infraction of the law governing the particular matter to which the conference ruling relates. The penalty, if any, would be that attaching to the violation of the law." This statement from Mr. McGinty seems to cover the matter fully.—EDITOR.]