

Electric Railway Journal

A CONSOLIDATION OF

Street Railway Journal and Electric Railway Review

VOL. XXXV.

NEW YORK, SATURDAY, MARCH 12, 1910

No. 11

PUBLISHED WEEKLY BY THE
McGraw Publishing Company
239 WEST THIRTY-NINTH STREET, NEW YORK

JAMES H. MCGRAW, President.
HUGH M. WILSON, 1st Vice-President. A. E. CLIFFORD, 2d Vice-President.
CURTIS E. WHITTLESEY, Secretary and Treasurer.
TELEPHONE CALL: 4700 BRYANT. CABLE ADDRESS: STRYJOURN, NEW YORK.

HENRY W. BLAKE, Editor.
L. E. GOULD, Western Editor. RODNEY HITT, Associate Editor.
FREDERIC NICHOLAS, Associate Editor.

CHICAGO OFFICE.....590 Old Colony Building
CLEVELAND OFFICE.....1015 Schofield Building
PHILADELPHIA OFFICE.....Real Estate Trust Building
EUROPEAN OFFICE....Hastings House, Norfolk St., Strand, London, Eng.

TERMS OF SUBSCRIPTION:

For 52 weekly issues, and daily convention issues published from time to time in New York City or elsewhere: United States, Cuba and Mexico, \$3.00 per year; Canada, \$4.50 per year; all other countries, \$6.00 per year. Foreign subscriptions may be sent to our European office.

Requests for changes of address should be made one week in advance, giving *old* as well as new address. Date on wrapper indicates the month at the end of which subscription expires.

NOTICE TO ADVERTISERS.

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to Tuesday noon of the week of issue.

Copyright, 1910, by MCGRAW PUBLISHING COMPANY.

Entered as second-class matter at the post office at New York, N. Y.

Of this issue of the ELECTRIC RAILWAY JOURNAL 9000 copies are printed.

NEW YORK, SATURDAY, MARCH 12, 1910.

CONTENTS.

Depreciation Fund in St. Louis.....	433
The Problem of Heavier Expenses.....	433
Sympathetic Strike in Philadelphia.....	433
Liability of Automatic Drivers.....	434
An Exhaust Steam Turbine Test.....	434
The Wear of Bearings and Gears.....	435
Reinforcement of Conduit Rails at Washington.....	436
Rail Wear on London Underground Rails.....	438
Inland Empire Mail Service.....	439
Rolling Stock Improvements of the Coney Island & Brooklyn Railroad	440
Testimony on Depreciation before Nebraska Commission.....	441
Receiver Discharged in Cleveland.....	442
Discussion of Chicago Elevated Railway Improvements.....	443
Trademark of Ft. Wayne & Springfield Railway.....	443
Effect of Floods in Mohawk Valley.....	444
Members of the Central Electric Railway Association.....	444
Garbage and Utility Car for Chicago.....	444
Cast Iron and Steel Wheels Discussed at Hartford.....	446
Clearing Frozen Clogged Switches.....	449
Modifications of Franchise Requirements Asked in Richmond, Va.....	449
Through Routes between Electric and Steam Roads.....	450
Test of a 15,000-kw Steam Engine-Turbine Unit.....	451
The Philadelphia Strike.....	454
Ten-Cent Fare to Coney Island Upheld by Public Service Commission	456
New Horizontal Impulse Turbine.....	459
Valuation of Coney Island & Brooklyn R. R.....	460
Long Trip by Trolley.....	461
A Street Railway Steam Motor Car.....	461
Committee on Railway Mail Pay.....	461
News of Electric Railways.....	462
Financial and Corporate.....	463
Traffic and Transportation.....	465
Personal Mention.....	467
Construction News.....	469
Manufactures and Supplies.....	471

Depreciation Fund in St. Louis

With the year 1905 the United Railways Company of St. Louis began to set aside 5 per cent of its gross earnings as a depreciation reserve. It has followed that practice in the ensuing years until 1909, when a change was made in the percentage of the revenue applied to this purpose. Starting with July 1, 1909, the company credited 6 per cent to this fund. The total set aside from income during 1909 was \$609,761, or substantially 5.5 per cent on the gross revenue. In addition \$6,058, received from other sources, was added to the fund, making a total of \$615,819. During the year the charges against the reserve fund amounted to \$633,908, but a balance was left to the credit of the fund as of Dec. 31, 1909, of \$154,329. The addition of 1 per cent will probably mean over \$100,000 more for the depreciation fund in 1910 than would have been available at the rate of 5 per cent.

The Problem of Heavier Expenses

A pamphlet issued by the Eastern steam lines, entitled "The Demands of the Railroad Employees," contains many facts which are applicable to the existing situation upon electric railways. The tendencies of costs of labor and materials to advance and of average fares per passenger to decline are striking elements in the conditions that confront urban and interurban electric lines. While street railways in large cities cannot point to a decrease in the revenue received per passenger mile, because of the absence of statistics showing the length of haul, they can demonstrate that the average gross revenue per passenger has declined in most instances because of the fast-increasing use and abuse of the free transfer. The remedy may lie in one of several changes, namely, increased fares, restricted transfers, lessened taxes, the zone system of charge or in some other direction of greater or less resistance, but close study will be required to determine the costs and value of the service in order to place electric railways in the best position to meet the issues arising from the problems of heavier expenses.

Sympathetic Strike in Philadelphia

It is the general opinion in Philadelphia, as expressed in the public press and by others, that the sympathetic strike called in that city on March 5 to coerce the officials of the Philadelphia Rapid Transit Company into making peace with its former employes is the failure which it deserved to be and represented a desperate effort to retrieve a lost cause. The labor leaders claim that 120,000 men left work in response to their general order, but a careful enumeration by the municipal authorities indicates that less than 20,000 men were idle on March 7 because of strike conditions. Of this number 3,200 men returned to work March 8, and the total included all those thrown out of work because of a strike in one or more departments of a factory. The authorities have published a list of the industries

affected and the number of men out to substantiate their claim, while the strike advocates have not. This much is certain, that the railroad company has now established a reasonably efficient transportation service which is improving every day, and that there is little to suggest to the visitor in Philadelphia the prevalence of any strike on either the railway lines or generally throughout the city. The attempt to transfer the labor contest from the railway lines in Philadelphia to all of the industries of the city has been of help in clarifying the situation because it has clearly demonstrated the uselessness of trade agreements, so far as the execution of their provisions by employees is concerned. No one claimed that the men who were called out in sympathetic strike had any grievances of their own which warranted them in stopping work, and it was evident that if their action should in any way compel the Philadelphia Rapid Transit Company to make terms with its striking employees, the latter might again be ordered from duty next week or next month to assist one of their present allies in another contest. In the meantime the Merchants Association is complaining that the existing state of affairs is diverting buyers from Philadelphia and injuring both wholesale and retail trade, and is demanding that the municipal authorities be upheld in their efforts to repress sternly all disorder. If this is done, the company should have no difficulty in rapidly restoring its service. In other words, the crisis in the Philadelphia strike seems to have passed, and matters are gradually returning to a normal condition in that city.

Liability of Automobile Drivers

Automobiles are now in such general use it is not surprising that decisions governing their use of the streets should multiply. Two which are of interest to street railway companies were recently rendered, one in Pennsylvania and the other in Colorado. The first arose from an injury by an automobile to a person who had just left the steps of a car at a regular crossing and was walking to the sidewalk. In this case (*Kaufman vs. Nelson*, 73 Atlantic Reporter, 1105) the court ruled that a high degree of care is required of the driver of a vehicle in passing a car which has stopped to receive or discharge passengers, but that this obligation did not relieve those leaving or boarding the car from the exercise of ordinary vigilance to avoid accident. In the second case (*Gale vs. Denver City Tramway Company*, 173 Federal Reporter, 787) the injury occurred because an automobile, while running parallel to a car, turned so suddenly across the tracks that the motorman was unable to bring his car to a stop. The person injured was not the chauffeur, but the court held that the motorman was not bound to anticipate that the automobile would attempt to cross the track recklessly. There is no doubt that the risks of street travel to cars and pedestrians have been greatly enhanced by the large number of high-speed and high-powered automobiles which race along the city highways and country roads regardless of those who have equal rights to be there. So long as automobiles do not violate existing ordinances as to speed, the tendency of the courts has been to regard them in the same light as other vehicles. But infractions of these speed ordinances by chauffeurs are common, and we believe that the courts will hold automobile owners to strict account in cases of collision between automobiles and street cars when it can be shown that the speed laws have been broken.

An Exhaust Steam Turbine Test

We have several times called attention to the great promise of the exhaust-steam turbine as a method of obtaining high efficiency, particularly in connection with plants already installed, and more than once have had occasion to note successful installations of this kind. The test of the installation recently made for the Interborough Rapid Transit Company and reported by Mr. Stott at the meeting of the American Society of Mechanical Engineers this week, is a very striking example of advanced practice in this line. The problem to be solved was the obtaining of additional power for the Interborough company in the most economical possible manner. The main generators, as our readers will remember, are 7500-kw generator sets, maximum rating, of which the engine part is a four-cylinder compound-reciprocating engine. It is now well known that the multiple-stage turbine can excel in the matter of economy a compound engine of any type yet tried. What the turbine can do in competition with a triple or quadruple engine with high super-heating is another problem which need not be here discussed.

Now, after casting about over all the range of things which could be done, the engineers of the Interborough company very wisely decided in favor of adding a low-pressure turbo-generator to the existing engine. This plan virtually amounts to converting the old unit into the highest class of triple-expansion engine and delivering the power gained by the better utilization of steam through a generator operated in parallel with the original one. In other words, instead of coupling on another cylinder and increasing the size of the generator, the final stage of the compounding is reached through the low-pressure turbine tied to the earlier stages of the expansion through its generator. It is noteworthy that in this instance the generator used was one of the three-phase induction type, a form of machine which possesses many merits and only recently has come to be properly appreciated in this country.

The original engine was admirably efficient at and near its rated load of approximately 5000 kw, but at half load and at the extreme load sometimes necessary in railway practice the water consumption rose to a high point. On the other hand, the turbine end of the combination increases in steam efficiency clear up to its maximum load of 7500 kw. The many curves given in the paper show in great detail the character of the actual performance. The essential thing about the matter is that the results have been highly successful from the economic and every other standpoint. The capacity of the combination is double that of the original engine, so that the maximum output of the great power house can be increased by 100 per cent without demanding additional space. It is the maximum rather than the average or rating output which has to be taken into consideration in the enormous peaks of a great traction system. Next there has resulted an average improvement in steam economy of 25 per cent in the region between rated and maximum output over the results obtained by the engine units alone. This means that overloads can be handled efficiently instead of at a very serious loss. The thermal efficiency obtained by this combination at its higher outputs, between its rated 7500 kw and its 15,500 maximum, reaches the wonderfully encouraging figure of 20.6 per cent. This is getting up into the vicinity of gas-engine efficiency and under conditions of overload at that.

Finally, it is very interesting to note that the results obtained

are stated to be at 13 per cent better in economy than could be reached by the best high-pressure turbine operated alone. If this gain over high-pressure turbine practice is fully confirmed the combination unit has an even greater future before it than has been yet predicted. It assuredly furnishes a very admirable means of increasing the output and efficiency in stations which have now reached their limit of output and are suffering from the inefficiency characteristic of overloaded reciprocating engines. A low-pressure turbine is thermo-dynamically so much better than the final expansion in a reciprocating-engine system that it really stands in a class quite by itself and the simplicity of the electrical linkage is such that the change from the old unit to the new is made with the utmost facility. We see every indication that the practice so well exemplified in the tests before us is one which should be found advantageous in many places on a very large scale.

The Wear of Bearings and Gears

The subject discussed at the Pittsburgh meeting of the committee on maintenance of equipment should be of vital interest to every railway mechanic. This committee is composed of successful electric railway men who are well qualified to make recommendations that should command widespread attention. It was not expected that the committee would arrive at any definite conclusions so early in the year, but rather would lay down plans for the preparation of a valuable report to the 1910 convention of the Engineering Association. We believe that the Pittsburgh meeting was successful in accomplishing this work. Sessions were held on two consecutive days, and the topics suggested for consideration were discussed from the viewpoints of purchase, maintenance and manufacture. Reviewing this discussion, as presented in the *ELECTRIC RAILWAY JOURNAL* for Feb. 26, it will be seen that the two subjects which received the most attention were gearing and car weights. Subcommittees will make special studies of these and the other subjects assigned to the committee, and it is hoped will be able to do special research work.

A rather extended discussion of gears and pinions served to emphasize one point which, although not generally overlooked is not always given full recognition. This is the effect of worn bearings and gears on the motor equipment. No matter how much care is taken in the design and cutting of gears and in the choice of long-lived gear materials this part of the power transmission train cannot do its best work unless the axles supporting the gears are held closely in alignment. The task of maintaining the gear and pinion in proper mesh thus falls upon the armature and axle bearings. If, for example, the axle bearings are permitted to wear to such an extent that there is an appreciable play, then the forces transmitted do not always act in the proper direction and the surfaces of the teeth wear irregularly. In carefully designed gears the teeth are so shaped that power is transmitted by the face of one tooth rolling upon that of another. Irregularity of wear brings about a sliding contact between the teeth and greatly increases the friction which, in turn, reduces the life of the teeth. This condition of wear will be quickly brought about if the gear and pinion are not held properly in mesh.

The question of economical maintenance appears when considering this subject. There must be some critical point in the

life of a bearing when economy is sacrificed if the bearing is not replaced. Upon the proper determination of this scrapping point the life of the motor gearing will largely depend. The opinion of the engineers who discussed this subject at Pittsburgh was that axle bearings now are allowed generally to wear beyond the most economical point, if the entire motor is considered. An improvement in bearing practice would thus bring about an economy in gearing alone which would warrant the additional cost for maintaining the bearings in better condition.

A representative of one of the motor manufacturing companies who took part in the deliberations of the committee called attention not only to the thought just presented here, but also to another equally important reason for giving closer attention to motor bearings. It has been said that loose bearings bring about unequal and uneconomical wear of the gearing. In addition to the loss of power the loose bearings and gears practically force the motor to chatter and vibrate as the car moves along its route. This vibration is said to be very largely responsible for the frequent recurrence of troubles within the motor cases. As proof of this, it is noted that on single-end cars the No. 2 motors of each truck are found to be more frequently in trouble than the No. 1 motors. Briefly, the reason for this is attributed to the stresses set up when the truck receives a jar from an inequality in the track. The forces acting between the pinion and gear of a No. 2 motor have a downward direction and when the car wheels strike a "bump" the torque of the motor directly opposes the force which acts upward from the track. At the teeth of the No. 1 pinion the continuous torque of the motor is in the direction of the track reaction and so the stresses set up are not so severe as in the gearing of the No. 2 motor. The cumulative stresses must be taken care of in the axle bearings and the suspension of the motor, and as the No. 2 motor has to receive blows of greater effect than the No. 1 motor its parts are called upon to withstand more severe stresses.

Railway motors are rugged pieces of apparatus, but they should not be expected to give good service unless they are relieved of every possible outside action that might cut down their life. These fundamental points of motor maintenance are generally recognized, and so it was the consensus of opinion in the committee that considerable economy could be effected if more attention was paid to providing against the damage brought about by loose bearings and gearing. In return for the additional expense for maintenance of axle bearings and gears the owner of the motor could expect to reduce considerably the cost for maintaining armature and field coils, brush holders and commutators.

It is suggested that any additional data to substantiate these arguments would have considerable value in emphasizing the desirability for more frequent replacement of gears and axle bearings. The committee on equipment, with the resources of the Engineering Association at its command, will no doubt be able to present some definite figures which may be generally applied in motor practice. These data, which we trust will be found in the 1910 report of the committee, will tell the mechanical inspector just when to renew axle bearings and motor gears in order to obtain the greatest economy in the railway motor as a unit.

REINFORCEMENT OF CONDUIT RAILS AT WASHINGTON

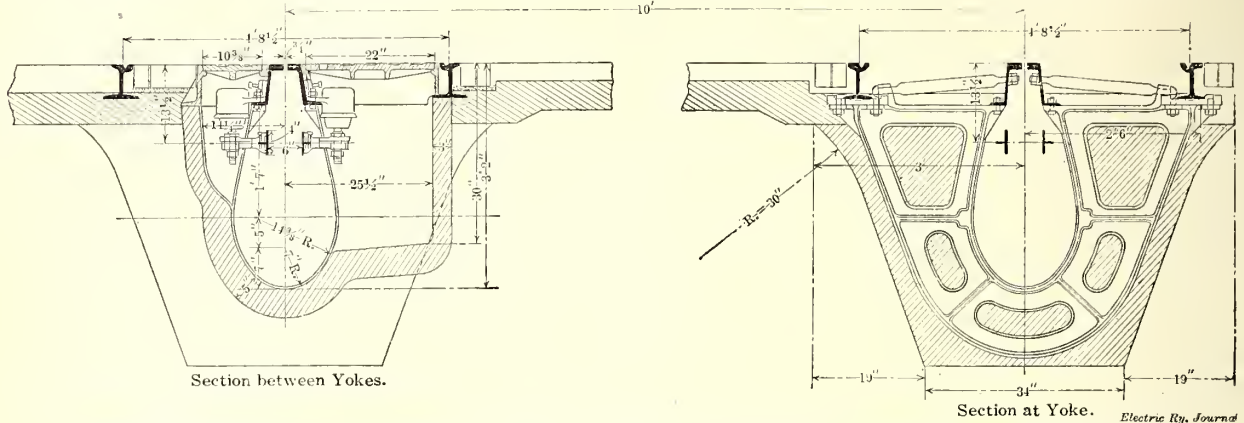
BY PHILANDER BETTS.

When the Washington, Baltimore & Annapolis electric railway was projected it was expected that cars or trains would run over its own tracks into the center of both terminal cities. But for various reasons the Washington terminus was located at the eastern limits of the city, Fifteenth and H Streets, N. E., and up to March 1 all passengers had to transfer to the cars of the Washington Railway & Electric Company at this point.

The cars in use on the Washington, Baltimore & Annapolis

weight on the rails would be to depress them, widen the slot, and break the yoke. After some discussion it was decided to place under each rail a reinforced concrete beam, made continuous and shown in section in Figs. 3 and 4. The beam, as will be noted from Fig. 3, is 12 in. wide by 16½ in. deep. The reinforcement consisted of two 1½-in. mild steel round rods, supported in stirrups of ¼-in. steel, placed midway between each yoke, requiring one for each 5 ft. of beam.

The concrete was hand mixed and was in the proportions of 1 part cement, 2½ parts of sand and 5 parts of gravel by bulk. Rough board forms were required to hold the concrete in place, as the trench had to be excavated to an extra width to facilitate



Conduit Reinforcement in Washington—Fig. 1—Original Conduit Construction, Columbia Railway

Railway when the single-phase system was used were 62 ft. 2¾ in. long and weighed 58 tons without passengers, and there were objections to their operation through the Washington streets. With direct current, smaller cars have been adopted for service in the streets of Washington and the car finally selected is 50 ft. over all and weighs without passengers about 40 tons. A description of these cars was given in the issue of the ELECTRIC RAILWAY JOURNAL for May 29, 1909. These cars now run in Washington to the Treasury at Fifteenth Street and New York Avenue, N. W., using the tracks of the Columbia Line of the Washington Railway & Electric Company.

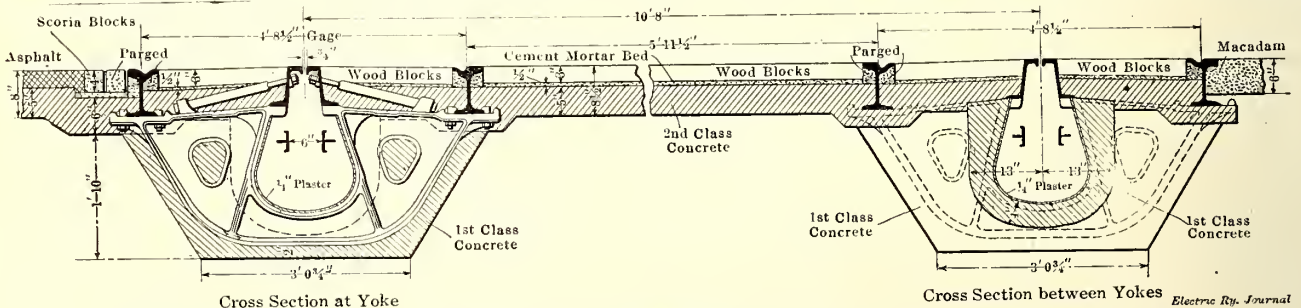
The Columbia Railway was built in 1895-96 as a cable road, operating cars weighing 12,300 lb. not including passengers. In 1898 this line was changed to the underground conduit electric system, and larger cars were put in service. Four types of cars have been in use on the line, the heaviest of which weighed 17 tons without passengers. As the Washington, Baltimore &

the removal of the material. The forms were afterward removed, and the spaces back filled to the top of the beam and rammed solid.

In the original construction of the road, the only material excavated was that required to allow of setting the yokes, with their enclosing concrete, and for the construction of the conduit tube, so that the material taken out to make room for the supporting beam had never before been displaced. The net result was that the beam when completed rested on solid earth foundation. The work was performed partly by contract and partly by men in the regular employ of the Washington Railway & Electric Company.

As originally planned the method of procedure was to be about as follows:

First. The brick stretcher courses were to be removed from the pavement, two rows outside and one row inside each wheel rail. Where pavement was of scoria or granite block, the



Conduit Reinforcement in Washington—Fig. 2—Standard Construction of Other Conduit Lines

Annapolis Railway proposed to operate cars weighing 40 tons over the line, some consideration had to be given to the possible effect due to the increased weight and it was decided that the underground construction would require reinforcement. Fig. 1 shows the standard construction along this line. Fig. 2 shows the standard construction on other lines of the Washington Railway & Electric Company.

From Fig. 1 it will be seen that the track rails are supported entirely by the yokes, which are placed 5 ft. apart on tangents. These yokes are entirely encased in No. 1 concrete and the tube consists of a concrete shell. On account of the form of the yoke and its method of support, the effect of increased

necessary amount was to be removed to allow the excavation to proceed. This material was to be piled up along the line of work.

Second. Sufficient material was then to be removed to allow for the installation of the concrete beam.

Third. The additional hook bolts and liners were then to be inserted in each cast-iron yoke.

Fourth. The reinforcing bars and hangers were then to be put in place. The hangers were to be placed along each rail, one either side of and as near as practicable to each yoke. The reinforcing bars were to be hung with joints overlapping 5 ft.

Fifth. The work of mixing and placing concrete was then to follow.

Sixth. After the concrete beam had set sufficiently, bearing surfaces were to be placed upon the beam 1 ft. 3 in. each side of each yoke. These surfaces were to be of a strong mixture of sand and cement and be brought to a true surface $\frac{5}{8}$ in. below the base of the track rails.

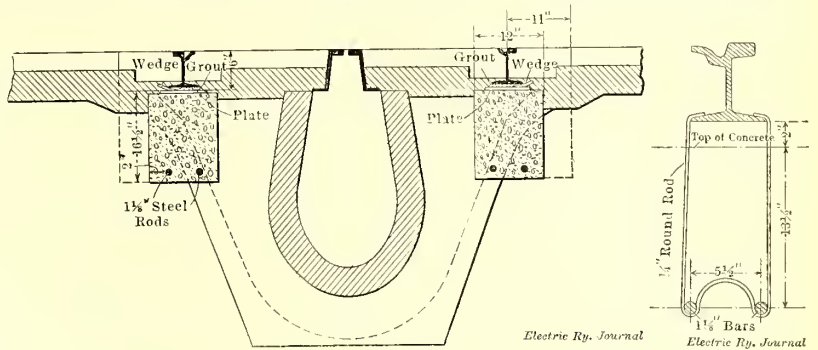
Seventh. When the cement bearing surfaces had reached a permanent set, bearing plates 8 in. x 8 in. were to be inserted between the bases of the rails and the tops of the bearing surfaces upon the concrete beam.

Eighth. The necessary concrete paving base was then to be replaced and the street pavement repaired.

Some of the details mentioned above had to be modified. It was found necessary to remove part of the asphalt pavement adjacent to and outside of each rail in order to insert the 8-in. bearing plates and to get sufficient room to excavate for the beam. It was also decided to place the bearing plates and hangers 5 ft. apart and midway between yokes. It was at first planned to provide a bed of cement and sand and drive in the steel plates, but this could not be done without destroying the cement beds. An attempt was then made to bring the concrete beam to sufficient height under the rail without using cement grout and before the beams should take their first set, screening off sufficient concrete to permit a driving fit of the plates and allowing the beam to take a final set before inserting the plates.

moved from the crossover near the terminus at the Treasury. Fig. 6 shows the new construction.

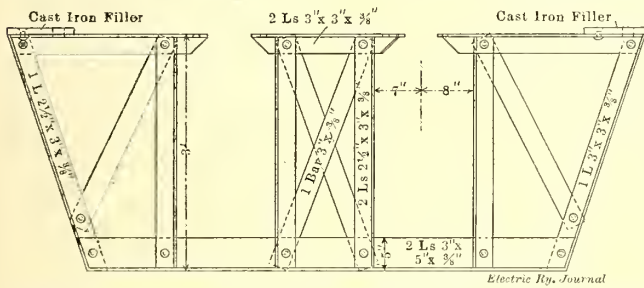
Fig. 7 shows the electric crane in the act of placing portions of the new work. This crane is employed ordinarily in reclaiming coal at a power plant, but was brought into the city to



Conduit Reinforcement in Washington—Figs. 3 and 4—Section Between Yokes, Showing Rod Reinforcement

handle the new special work, the heaviest single piece of which weighed 5600 lb. The greater weights of this special work presented an unusual problem in this class of work, which, however, was very nicely solved by the use of the electric crane.

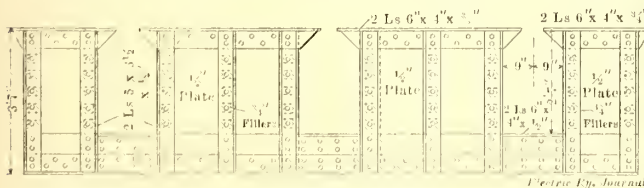
All street railways in Washington since 1896 have used a



Conduit Reinforcement in Washington—Fig. 5—Old Type of Special Work

This was found very unsatisfactory because of uneven shrinkage in the beam.

The final and most satisfactory method and the one which was adopted was to place shortly after the concrete in place 8-in. x 8-in. iron bed plates, 5 ft. apart, on top of the concrete beam and at the center of the span between the yokes. These plates were placed $\frac{1}{2}$ in. more or less below the bottom of the rail and were allowed to set in the concrete beam. After the concrete had finally set, a 2-in. x 4-in. x $\frac{5}{8}$ -in. wedge was driven between the top of each plate and the bottom of the rail and a moist mixture of one to one sand and cement was rammed full width between the bottom of the rail and the top of the beam, throughout its entire length. After experi-



Conduit Reinforcement in Washington—Fig. 6—New Type of Special Work



Conduit Reinforcement at Washington—Fig. 7—Electric Crane

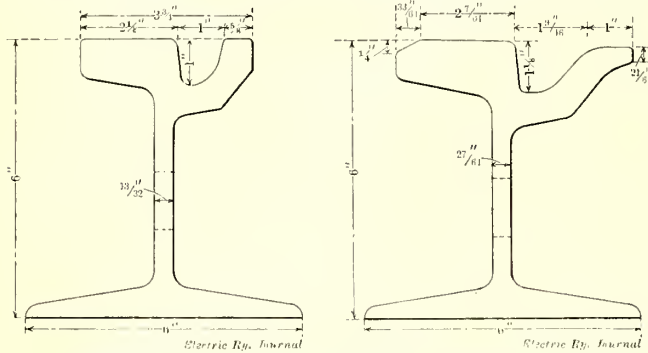
menting with this scheme the rail was found to be perfectly rigid and it has been possible to maintain a true bearing surface uniformly over and along the concrete beam.

The special work at five intersections and at the new terminus had to be renewed, using, of course, much heavier construction. Fig. 5 shows the type of the old sub-structure which was re-

grooved rail requiring a small wheel flange. A new type has recently been adopted which has many advantages over the old style. Fig. 8 shows the old standard rail. Fig. 9 shows the new rail section. All the new special work was built up using the new rail, but on the old special work which was not replaced, the groove had to be enlarged. This was accomplished

by means of motor-driven emery wheels, using current from the conductor bars.

Some figures regarding the cost of the work may be of interest. The entire route from the city limits on the east, to the new terminus at the Treasury on the west, comprises about 2 3/4 miles of double track, or to be exact 60,063 ft. of single rail. Special work at intersections, etc., not reinforced as above, caused deductions so that the total length of beam amounted to 57,400 ft. This required approximately 64,575 ft. of 1 1/8-in.



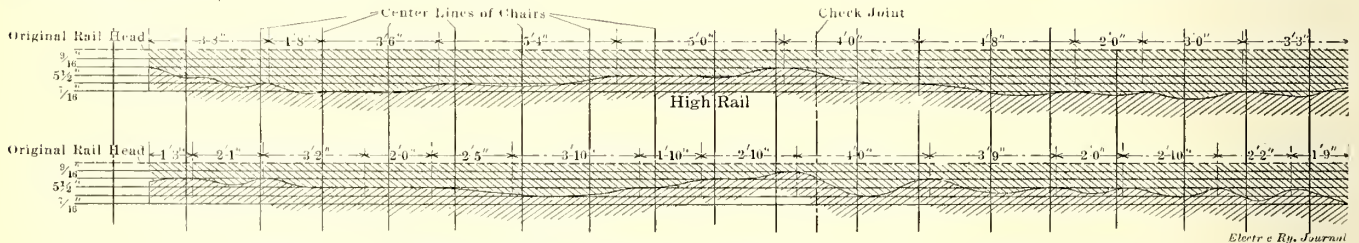
Conduit Reinforcement in Washington—Figs. 8 and 9—Old and New Rails

steel rod, 22,960 hangers, 11,480 8-in. x 8-in. x 5/8-in. plates and 11,480 2-in. x 4-in. x 5/8-in. wedges.

Below is a statement of costs of all work connected with the reinforced beam:

The cost per foot is based on 57,400 ft. of beam.

	Total.	Per ft. of beam.
Cement	\$4,250	.074
Sand and gravel.....	5,600	.098
Rods, plates and hangers.....	8,250	.144
Paving	14,500	.261
Hauling	300	.005
Lumber	500	.009
Total material.....	\$33,400	.580
Total labor.....	51,300	.895
Miscellaneous materials and tools.....	5,300	.092
Total for beam work.....	\$90,000	1.567



Profile of Battered Rail at Victoria Station, London, on a Curve of 660-ft. Radius

An analysis of labor costs for a period when the work was progressing at its best may be interesting:

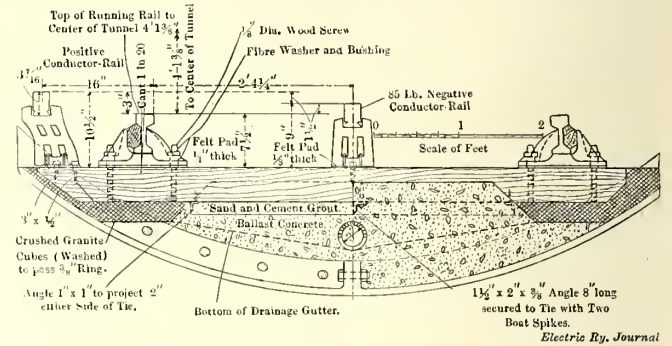
Removing asphalt and sub-base per ft., single track.....	\$.295
Removing excavation per ft. of track.....	.370
Cleaning yokes per ft. of track.....	.165
Forms and iron in place per ft. of track.....	.150
Concrete beam per ft. of track.....	.170
Tamping and wedging per ft. of track.....	.125
Backfilling180
Cleaning bricks.....	.065
Plastering manholes.....	.030
Total cost per ft. of single track.....	\$1.550
Total cost per ft. of beam.....	.775
Contractor's profit not included.	

The entire work was carried out under the direction of C. S. Kimball, engineer, Maintenance of Way, of the Washington Railway & Electric Company.

At a recent meeting of the Isle of Wight Central Railway Percy Mortimer referred to the proposal of a syndicate for equipping the railways in the Isle of Wight with electricity. He said that no railway in the United Kingdom which carried a mixed traffic of passengers, goods and minerals such as the company did had yet been electrified, and he did not think that the small extra traffic which it would get would justify the expense of electrification.

RAIL WEAR ON LONDON UNDERGROUND LINES

The experience of the London Underground Railways in the wear of rails casts an interesting light on the question of corrugation, for, although the Metropolitan District Railway interchanges trucks and motors with its three associated tube lines, only the former road suffers from serious rail wear. This wear takes the form of corrugation, battering and side-cutting. Corrugations occur at only few places and are devel-



Cross Section of Roadway in London Tubes

oped in particular on curves of large radius, these curves naturally being unchecked. The centers of the depressions are about 4 in. to 5 in. apart. Battering is the chief cause of rails being changed after being in the road only for a short time. This battering consists of hollows at centers varying from 2 ft. to 5 ft. and occurs mainly on curves of short radius. The hollows form more quickly on the low rail than on the high one, and they bear no relation to the position of the chairs and at any particular place they do not follow a regular pitch. At certain places depressions 1/4 in. deep are formed in six months, necessitating the renewal of the rails.

Side cutting has been almost done away with by the use of graphite grease and accurate lining up and leveling of the road,

together with the introduction of larger ties with closer spacing, preventing the formation of slacks.

Steel rails manufactured under the Sandberg process of added silicon have been used for four years now, with satisfactory results—both with open hearth and Bessemer acid processes. The chemical composition of the rails recently obtained is as follows:

	Bessemer Acid. Per Cent.	Open Hearth. Per Cent.
Silicon	0.35 to 0.45	0.2 to 0.4
Manganese (not to exceed).....	0.80	0.90
Phosphorus (not to exceed).....	0.07	0.06
Sulphur (not to exceed).....	0.07	0.07
Carbon (as high as mechanical test will allow, but not less than).....	0.50	0.65

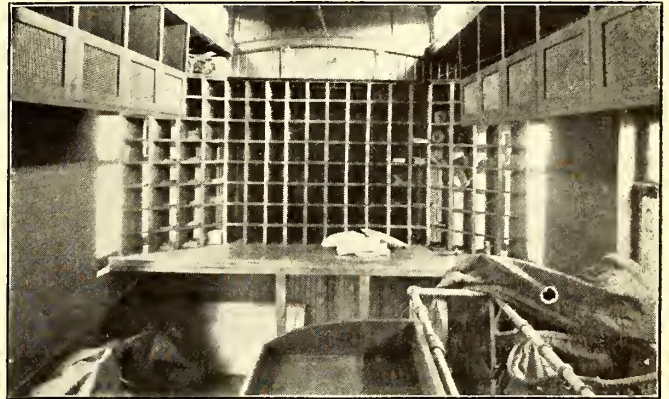
These rails are much tougher and have given increased wear though no appreciable reduction in battering has been obtained.

The Metropolitan Railway, which operates the so-called "Inner Circle" jointly with the Metropolitan District Railway, has also installed the Sandberg rail. At the 1907 engineering conference of the Bristol Institution of Civil Engineers, W. Willox, engineer of the Metropolitan company, also referred to the prevalence of battered rails. He spoke of depressions in the rail from 9 in. to 5 ft. in length and from 1/16 in. to 5/32 in. deep created in periods ranging from six weeks to four years. Mr. Willox has since found that the Sandberg rail is much less

subject to battering, and that side wear on curves can be eliminated by using a guard rail which is much harder than the running rail.

Neither the Charing Cross or Piccadilly tubes have shown the slightest sign of corrugation ever since the opening of the lines. The third tube, the Bakerloo, had about 900 ft. of corrugated rail, which was taken out about the end of 1908. This corrugation appeared on a 1500-ft. curve in the form of 4-in. waves and 1/16-in. depressions. In general, corrugation in the tubes has never gone beyond the incipient stage.

As the motors and trucks in the tube lines are exactly the



Exterior and Interior of U. S. Railway Mail, Express and Baggage Car used on Spokane & Inland Empire Railway

same as those used on the Metropolitan & District line, the only reason for the freedom from corrugation appears to be the difference in roadway construction. In the tubes the ties are set on a concrete cement-topped foundation for only part of their length and the running rails are carried on the overhanging ends. This construction gives such a springy track that the ends of the ties move as much as 3/16 in. under the load of passing trains. This type of roadway was designed by James R. Chapman, chief engineer of the Underground Electric Railways of London. Its efficiency may be judged from the fact that after nearly three years' service on the Piccadilly tubes 18 miles of single-track, not a single rail has required removal. The power rail is carried outside one of the running rails, and requires careful attention owing to the effect of vibration on the insulators, otherwise the maintenance of the tube roadbeds is a simple matter. The rails are of the open-hearth type similar to those discarded on the "Inner Circle."

Arthur R. Cooper, engineer for the associated tube lines and the Metropolitan District Railway, has been much interested in investigating the corrugation and battering trouble of the latter line. He is not prepared to believe that these faults are due to the composition or rolling of the rail, but attributes them as due more probably to a combination of factors which place an undue stress on the rails.

Among these factors are the low center of gravity of electric cars, the dead weight or partial carrying of the motors direct on the axles without intervention of springs; and in a lesser degree to the lightness of the trucks, slipping of one wheel on curves, and with small axles a one-sided drive. Since the more elastic tube roadbeds are subject to the same conditions, yet are, nevertheless, free from corrugation, Mr. Cooper reasons that the like result might be obtained on the Metropolitan District line if the same degree of springiness could be introduced in the rolling stock. An improvement in the District roadbed itself might be effected by a closer spacing of ties than was originally adopted for steam traction.

In further reference to the point whether corrugation is due to the rolling mill, it may be mentioned here that according to a recent statement by A. L. C. Fell, managing director of the London County Council Tramways, this effect has not appeared in some cases until the rails had been in service for two years. It is probable that if these rails had been of uneven hardness, the trouble would have developed much sooner.

At present experiments are under way by German railways and rail-makers to determine this point by trials at the mills and in service.

INLAND EMPIRE MAIL SERVICE

About the first of the year the Spokane & Inland Empire Railroad Company increased its already well-established mail service by putting a fully equipped mail motor car into service on the Inland division of that road between Spokane, Spring Valley and Colfax, Wash. Immediately after this schedule was inaugurated several of the towns along the Spring Valley-Moscow division petitioned for electric railway mail service and

as a result a closed pouch service has just been established between Spring Valley Junction and Moscow, 34.4 miles apart. Spring Valley Junction is about midway between Colfax and Spokane. The Inland Empire system now has on its southern division mail car service covering 76 miles of track and a closed pouch service covering 90.4 miles. It is expected that the pouch service soon will be replaced by a combined railway mail, express and baggage car just rebuilt at Spokane.

The Inland Empire system has carried mail on the Couer d'Alene division since the road was opened. During the summer of 1907 the company made a contract to collect and deliver



Interior of Spokane Mail Car, Showing Pouch Racks

regular United States mail at important points, making two round trips daily between Spokane and Couer d'Alene. The mail car is in charge of a mail clerk.

The accompanying illustrations show three views of one of the rebuilt mail and baggage cars used on this road. The cars are fitted with the regular mail equipment required by the United States postal department and are largely the product of the shops of the railway company.

A concession is being sought in Paris for the construction of an underground freight railway to connect all of the railroad terminal stations.

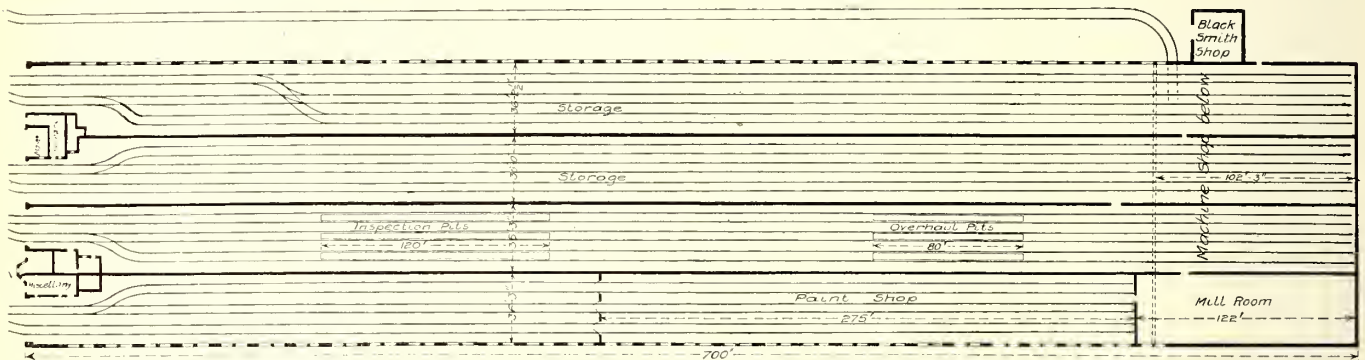
ROLLING STOCK IMPROVEMENTS OF THE CONEY ISLAND & BROOKLYN RAILROAD

The ELECTRIC RAILWAY JOURNAL of Aug. 14, 1909, contained an extended account of the important economies obtained by the Coney Island & Brooklyn Railroad through the rearrangement of its power distribution and the erection of a turbine station. The improvements, however, have not been confined to this department, but have also embraced the line, track and rolling stock. In this article some particulars will be given of the work which has been done in connection with the cars under President S. W. Huff's administration within the last two years.

During the fiscal year 1908-1909 the company rebuilt and repainted 67 closed cars; the remaining 111 closed cars and 216 open cars were thoroughly overhauled for satisfactory operation. The practice of having a canopy switch at one end and a circuit breaker at the other was abandoned, all cars being equipped with double GE circuit breakers and double-fuse boxes. The old stands were replaced by the No. 11 and No. 13 designs of the Electric Service Supplies Company, and the general safety of the cars increased by the installation of double brake chains and Van Dorn & Dutton solid gears for split gears. Careful attention was given to the wiring circuits, and while conduits were installed only in the cars of the DeKalb Avenue division, the canvas hose used elsewhere was renewed and relocated to better advantage. The controller and resistances were completely disassembled and rebuilt. The

on a contract basis. This practice proved unsuccessful, both as regards cost and time, despite the fact that there were plenty of foundries, wood-turning mills and the like in the vicinity. As an instance it may be mentioned that formerly the company paid \$26.50 to have a pair of wheels fitted to a 3¾-in. axle and the gear bored; to-day the same work is done on a 4-in. axle both at a lower total cost and much quicker delivery. During the overhauling period as many as 15 pairs of wheels were refitted daily. At present, the daily capacity is six pairs, which is ample to cover steady requirements. So far as car woodwork is concerned, the objection to the old practice was that the mills not only charged high prices, but were responsible for vexatious delays when they were too busy to fill promptly the comparatively small orders of the railway company. It was not unusual to have a car tied up for weeks due to the absence of a few moldings. The company also decided to do its own car painting, to make certain that this work would include more than a few coats of varnish spread over uncleaned and unscrapped panels.

In seeking to establish a repair shop the management was obliged to adopt a part of its principal storage building for that purpose, owing to the lack of funds for an entirely new structure in a central location. The place selected is at Covert and DeKalb Avenues, at the eastern extremity of the system. The building, which was put up only five years ago, is of brick and steel and covers an area of 720 ft. x 150 ft., divided into four through bays by solid brick walls. However, a basement running across the building has been built at the rear to accom-



Coney Island & Brooklyn Improvements—Plan of Car House as Partially Adapted for Maintenance

company has also secured much better results from its standard Westinghouse No. 49 and No. 68 motors by using armature coils made by John A. Roebling's Sons & Company instead of supplying its comparatively small needs by home manufacture. Besides the motors mentioned, there are 10 new cars operated with GE-90 motors. Only the work cars have four-motor equipments. A more recent change has been the adoption of the "Ideal" trolley wheel. The mechanical improvements on the cars, aside from the general overhauling and painting, included the substitution of 4-in. diameter axles for the 3¾-in. driving axles used with the 33-in. wheels of the maximum traction trucks.

It was originally proposed after a car had been rehabilitated in the manner outlined to inspect it every sixth night, irrespective of the mileage made. However, a test record was kept of the runs made by each car, and when it was found that the mileage for the same period varied from 2000 miles to 5000 miles, a delay of 10 hours and 21 minutes; in May, 1909, 20,215 cars were operated, with 12 break-downs and 23 minutes' delay; in June, 1909, 20,735 cars were operated, with 10 break-downs and 20 minutes' delay, and in July, 1909, 21,629 cars were operated, with only 17 break-downs and 37 minutes' delay.

In undertaking the rehabilitation of the rolling stock the management found itself greatly handicapped by the absence of proper shop buildings and equipment. The policy of the preceding management had been to have as much repair work as possible done by outsiders. Thus wheels and axles were sent to their manufacturer for returning and replacement; all woodwork was done by the local mills, and cars were painted

moderate a miscellaneous repair shop and storeroom. This portion has been arranged by transferring the few old woodworking tools elsewhere and building a lean-to for a steam-heating plant and for the blacksmiths so that the smoke from the forges will not interfere with the work in the general machine and electrical shop. This basement has no direct communication with the car floor, but it has a track entrance from the adjoining storage yard through which tools and supplies can readily be delivered. It would have been very desirable to have had an elevator to the new shop above and some mode of sending supplies quickly to the overhauling and inspection tracks, but these plans were met by strong objections from the fire underwriters and had to be abandoned. As the building has been rearranged, the first and second bays remain for storage; the third is used for inspection and overhauling, and the fourth is partitioned for a painting room 275 ft. long, and a mill room at the rear 122 ft. long. This arrangement was the best possible considering the great length of the building and the refusal of the fire underwriters to permit the removal of any part of the longitudinal partition walls. The master mechanic's office, is located across the front of the first and second bays, the headquarters of the local car superintendent having been placed in a separate building on the other side of DeKalb Avenue. Three open-air storage tracks have been provided also to stall the lay-over cars, which formerly entered the car house.

The company purchased a considerable number of tools to carry out its program of doing all maintenance at home. The machine shops received a 150-ton Caldwell wheel press, Bement-Niles-Pond borer, Hampden grinder, Columbia axle straight-

ener, Columbia field winder, a double-spindle bolt machine for making bolts out of scrap, a three-spindle drill press, etc. The latest addition is a Christensen compressor of 150 cu. ft. capacity for shop air lines. The mill room equipment, which had comprised only such tools as a cross-cut saw, band saw and rip saw, were reinforced by a Rogers molder, single surfacer and a two-spindle shaper from the American Woodworking Machinery Company. All of the woodworking tools are driven from one 25-hp motor.

As the bulk of the heavy overhauling has been completed, more attention is being devoted to equipment records. In connection with the shop foreman's daily car report, reproduced, the master mechanic has a board showing, with the aid of detachable numbered tags, the condition of every car on the system. Mileage records have been started for gears, trolley and

TESTIMONY ON DEPRECIATION BEFORE NEBRASKA COMMISSION

Prof. Edward W. Bemis, formerly of Cleveland and now Deputy Commissioner of Water Supply, Gas and Electricity of New York City, testified before the Nebraska State Railway Commission in relation to the consolidation of the properties comprising the Lincoln Traction Company. Professor Bemis stated on the subject of depreciation:

"The experience of street railways all over the United States the last few years has shown that from 4 cents to 5.5 cents per car-mile are needed for current repairs, which take about one-half of this, and for renewals from time to time of the various parts of the plant itself. The half dozen street railways of Massachusetts, the nearest in size to the Lincoln Traction Com-

CONEY ISLAND AND BROOKLYN RAILROAD COMPANY
CAR HOUSE SHOP FOREMAN'S DAILY CAR REPORT

DATE.....190

CAR HOUSE	Cars As-signed	Sched-ule	Cars Avail-able	CAUSE OF DISALEMENT						Cars at DeK Shop	Cars Sent to DeK Shops	Cars Rec'v'd From DeK Shops	Crip-ples Turned In	Crip-ples Found O. K.	Cars in Coney Island
				No. Cars Dis-abled	Col-lisions	Con-troller Trou-bles	Flat Wheels	Motor Trouble	Other Trouble						
DeKalb.....															
Franklin.....															
Smith.....															
Coney Island.....															
Grand Total.....															

Telephone to Master Mechanic's Office 9 a.m.....190

Weather.....

Master Mechanic

Daily Report on Disabled Cars made up by the Master Mechanic.

CONEY ISLAND AND BROOKLYN RAILROAD COMPANY
OIL AND GREASE REPORT FOR MONTH OF.....190

CAR HOUSE	RECEIVED					USED DURING										ON HAND					190					
	Car Oil	Motor Oil	Machine Oil	Gear Grease	Motor Grease	Car Oil	Per M Miles	Motor Oil	Per M Miles	Gear Grease	Per M Miles	Motor Grease	Per M Miles	Machine Oil	Cars	Mileage	Mileage per Car	Aver. Cost 190 M Miles	Aver. Cost 190 M Miles	Car Oil		Motor Oil	Machine Oil	Gear Grease	Motor Grease	
DeKalb.....																										
DeKalb Shop.....																										

CONEY ISLAND AND BROOKLYN RAILROAD CO.		CONEY ISLAND AND BROOKLYN RAILROAD CO.		CONEY ISLAND AND BROOKLYN RAILROAD CO.	
Gear No.....	Taken From Axle No..... Put On	Wheels	Pressed On Pressed Off	WHEEL SLIP	
Wheel No.....		Wheel No.....	Axle No.....	Car No.....	Wheels Put In Taken Out
Trouble.....		Trouble.....		Wheel No.....	Axle No.....
Date.....	Workman.....	Date.....	Workman.....	Trouble.....	
				Date.....	Foreman.....

Shop Slips each 3 1/2 in. x 2 1/2 in. in size upon which the office card records are based.

Coney Island & Brooklyn Improvements—Some Maintenance Forms Used at the Shops

car wheels, lubrication and for the new detachable brake shoes. Some of the record blanks used are shown on this page.

During the overhauling period time was found to build three wrecking cars, one gondola car and a depot farc-collection car which is also used as a pay car. All of the rolling stock rehabilitation and construction has been done by M. C. Killeen, master mechanic, under the direction of S. W. Huff, president.

An American consul in a European city reports that a local municipality will advertise within the next few weeks for bids for the construction of an electric line. Should any firm desire to bid, a letter in German should be addressed to an official named in the report, specifying exactly what work or equipment it is prepared to furnish. The system as planned will cost about \$1,000,000. Copy of the report giving full details and a map of the city indicating the line can be obtained upon application to No. 4610, the Bureau of Manufactures, Washington.

pany, spent 4.14 per car-mile for maintenance during the year covered by the last report of the Massachusetts Railroad Commission, Sept. 30, 1907-08. The track only has a life of 12 to 18 years, cars and other equipment from 15 to 20 years, the power plant and boilers, aside from buildings, have only 15 to 20 years, and so on with the rest of the plant. Of course, real estate does not depreciate, and good brick buildings have a long life; but they are only a small portion of a street railway plant. A plant with an average of 20 years would have to set aside 3 per cent of its investment annually in a 5 per cent sinking fund to pay out the principal at the end of 20 years. In taking 4 cents per car-mile for maintenance for the Lincoln Traction Company and 3.5 cents for the Citizens', which did not have a power house, a very conservative figure and one below the views of the best street railway experts and the experience of the best managed companies, was taken. One-half cent a car-mile more would probably have been nearer the correct figure for both companies."

RECEIVER DISCHARGED IN CLEVELAND

At 1:30 a. m. on March 1, 1910, after the last day car had made its trip, Warren Bicknell, receiver of the Municipal Traction Company, relinquished control of the property by order of Judge Tayler, of the United States District Court, and at 4:30 a. m., the time for placing the first day cars in service, the Cleveland Railway took possession, as arranged on Feb. 28, 1910, at conferences between representatives of the company and Judge Tayler. The company was required by Judge Tayler to return to the receiver the \$70,000 balance of unexpended funds advanced some time ago under court order and the \$500,000 secured on a loan to represent the interest fund. The court then ordered the receiver to pay Henry J. Davies \$339,721 and C. W. Stage \$344,189. They, as trustees, are to pay claims for supplies furnished and dividends on stock. Of the amount entrusted to Mr. Davies \$150,000 will be paid for salaries, attorneys' fees and expenses incurred by the Cleveland Railway before the receivership was ended; the remainder will be paid to the stockholders as a dividend of 1½ per cent. Mr. Stage will pay the debts of the Municipal Traction Company, the salaries of officers, the attorneys' fees and the 7½ per cent dividend which the holders of guaranteed stock are to receive. All other funds were turned over by the receiver to the Cleveland Railway.

A statement of the earnings of the Municipal Traction Company during the receivership, with the exception of February, 1910, follows:

Gross earnings from operation.....	\$7,502,591
Operating expenses:	
Maintenance	1,501,426
Transportation	2,581,247
General	524,097
Total expenses.....	\$4,606,770
Net earnings	\$2,895,821
Neutral Street Railway rental.....	13,676
Taxes	373,516
Interest rental	567,151
Dividend rental	994,231
Total	\$1,948,574
Surplus	947,247

G. M. Dahl, street railway commissioner, assumed the duties of his office when the Cleveland Railway received its property from the court on March 1. He has employed Ernst & Ernst, public accountants, to do the accounting work of his office, with the idea that if independent public accountants do the work no complaint will develop from the company or the city. Mr. Dahl will have offices in the Electric Building, near those of the Cleveland Railway.

Problems difficult to solve have arisen since the final steps in the traction settlement were taken in Cleveland. That which is giving the greatest trouble is that of the fare that shall be granted to the people of Collinwood, which entered the city just before the referendum election was held. The county commissioners had previously taken action providing for the annexation of the village. If it should be shown that the village was really a portion of the city at the time the Tayler measure was passed the rate of fare in force in Cleveland might be demanded under the ordinance. If Collinwood was not a part of the city when the Tayler ordinance was passed the contract between the village and the company will have to be enforced. This provided for a 5-cent fare from the city of Cleveland to Adams Avenue in Collinwood and 10 cents to Euclid Beach. Years ago the company voluntarily reduced the Euclid Beach fare to 5 cents.

Street Railway Commissioner Dahl has rendered an opinion to Mayor Baehr that Section 30 of the Tayler ordinance provides that the company shall not increase the service or reduce the fare below the requirements of existing suburban contracts. This would apply in case the company should be willing to operate at 5-cent fare to Collinwood.

It has been suggested that the Tayler ordinance be amended to include the territory that is taken into the city, but it is doubtful if the company would accept an amendment of that kind.

Another matter that has caused trouble is the continuation of

the custom of charging a 5-cent cash fare unless either a ticket or the exact change is tendered. This practice was inaugurated under the management of the Municipal Traction Company and, as no special inducement is offered to lead people to purchase tickets, the company desires to continue the custom of making an extra charge for cash fares. Commissioner Dahl has rendered no opinion upon the legal point involved, but has stated that it will be best to continue the old practice in order to avoid delay in boarding cars. People will either have to secure tickets or tender the exact change, if the rule is allowed to stand. Mr. Dahl says that no financial advantage to the company is involved, as the dividends are fixed by the ordinance.

At a meeting of the board of directors on March 1, heads of departments were named. With one exception they are all men who left the departments when former-Mayor Johnson took charge of the system, and are as follows: General superintendent, George L. Radcliffe; auditor, Thomas Kilfoyle; assistant treasurer, William J. Meade; claim agent, W. F. Weh; cashier Frank Price; purchasing agent, C. H. Stanley; master mechanic, T. Scullin; superintendent of power, L. P. Crecelius; engineer of maintenance of way, Charles H. Clark. Mr. Crecelius held his position under the Municipal Traction Company.

A resolution was adopted by the board to establish the scale of wages agreed upon shortly before control of the property was acquired by the Municipal Traction Company. This means an advance of 2 cents an hour over the wages the men were receiving. The new scale provides for 23 cents an hour for the first year's service, 25 for the second and 26 for the third. It is said that many of the old men, who left the service when the strike occurred, are being taken back. No radical changes are being made, however.

Plans for converting the old cars for pay-as-you-enter operation were discussed at the meeting, but no definite action was taken. The question of securing more cars will be taken up later. No changes have been made yet in the routing of cars and this matter will probably be left for decision after careful study of the subject.

GOOD FOR THREE (3) CENTS TOWARD FARE

WORDING ON NEW TICKET IN CLEVELAND

Street Railway Commissioner Dahl made an inspection trip over the system with the officers early in the week. President Horace E. Andrews and Vice-President John J. Stanley also wanted to inspect the condition of the property.

In all probability negotiations will be opened with the Cleveland Electric Illuminating Company for the surplus power needed by the system, but if it cannot be purchased at least as cheaply as it can be produced in the company's own power houses, additions will be made to the existing plants.

The loss through operation at 3-cent fare averages about \$2,000 a day. Whether this will continue under different and better conditions is a question that can be answered only by experiment. One estimate indicates that a heavy loss will result in the eight months during which the company must operate at this low rate. The average fare at the rate of seven tickets for 25 cents plus 1 cent for a transfer, if that should be installed, has been figured at about 4.02 cents.

On the Cleveland Stock Exchange the securities of the company have shown a gradual gain, although an occasional large block of stock is thrown on the market and causes momentary weakening. The stock reached 98½, and remained about 98 most of the time, although it declined to 97½ when offerings were heavy.

Mayor Baehr sent a letter to the Cleveland Railway on March 7 ordering that the fare provided in its grant from the village of Collinwood be placed into effect to the section of the city formerly included in that village. This is five cents to Adams avenue and 10 cents beyond that point and to Euclid Beach. Mayor Baehr based his action on the opinion of City Solicitor Baker, who said that under the new grant to the Cleveland Railway the fare provided in the Collinwood grant would have to be charged.

DISCUSSION ON CHICAGO ELEVATED RAILWAY IMPROVEMENTS

Several conferences have been held between officials of the elevated railroads of Chicago and city representatives to formulate some acceptable plan for improving the elevated service in the business district.

As a result of preliminary conferences a committee chosen with the approval of Mayor Busse held executive sessions in the offices of the Board of Supervising Engineers on March 6 and made arrangements for gathering physical, operating and financial data which can be used in determining a feasible plan for through routing or partial through routing of the elevated trains using the Union Elevated Loop. Those who met at the first conference were:

Representing the city of Chicago—Bion J. Arnold, chairman; George Weston, assistant chief engineer Board of Supervising Engineers of Chicago Traction, and R. C. St. John.

Representing the elevated roads—South Side, Charles V. Weston, president; Garrett T. Seeley, general manager and chief engineer; Metropolitan, Britton I. Budd, president; James Walker, chief engineer; Northwestern, Mason B. Starring, president; C. F. Uebelacher, consulting engineer; Chicago & Oak Park, Clarence A. Knight, president; E. C. Noe, general superintendent.

After this committee has agreed upon a definite plan it will be submitted to the city. At one of the informal meetings of the committee a number of concessions which one member thought the roads should ask in return for changing their present plans of operation and installing through routes were suggested, as follows:

- "Withdrawal by the city from litigation against the loop.
- "Extension of loop platforms and a tacit validation of the loop's location.
- "The right to carry mail, express and freight at night.
- "Permission to bring interurban cars over the loop.
- "The right and privilege to extend the systems into outlying territory.
- "Permission to build additional express tracks on the structures.
- "The right to separate grades where it seems advisable.
- "A guaranty that the roads will be given trackage through the subway when it is completed."

Representatives of the city did not express any opinion concerning these concessions.

At the meeting on March 6 it was practically agreed that at least two of the stations on the Union Loop should be eliminated so that the running time could be reduced during the rush hours, and that the feasibility of running eight-car trains should be determined by an engineering committee comprised of one representative from each road and Messrs. Arnold, Weston and St. John representing the city. It is probable that if two stations on the loop are eliminated those chosen will be at La Salle and Van Buren streets and at Clark and Lake streets. It has been pointed out that these stations greatly increase the congestion of trains at the loop junction points at Van Buren Street and Fifth Avenue and at Lake Street and Fifth Avenue. Among the other engineering problems which were outlined are:

- "The feasibility of running South Side trains to Chicago Avenue.
 - "The feasibility of running North Side trains through to Twelfth Street or Twenty-second Street.
 - "The feasibility of running North Side and South Side trains west to Halsted Street.
 - "The feasibility of a system of complete through routing of trains to and from the extreme North, South and West Sides.
 - "Determination of means of turning back trains at terminal in a possible 'zone' system of limited through routing, by turning back on cross-over tracks, loops systems or storage yards."
- No action was taken regarding the question of transfers and fares in connection with a through-route system. This subject was discussed, however, and officials of the roads promised to

prepare complete data on the present cost of carrying a passenger, the average length of haul, and the distance the roads could afford to carry a passenger for 5 cents. It is stated that if through routes with terminals outside the congested district are established, storage yards may be required at the terminal points.

Meetings of the committee of engineers were announced for this week. Mr. Arnold agreed to organize and put into the field at once an engineering corps which would obtain detailed data regarding operating and service conditions within the district bounded by Twelfth Street on the south, Halsted Street on the west and Chicago Avenue on the north.

Regarding the meetings of the committee held during the week ending March 5 Mayor Busse is quoted as having said that representatives of the elevated roads had agreed to grant transfers if a feasible plan could be worked out. The Northwestern and Oak Park roads, it was shown, stood willing to accept through routing, but the other companies favored limiting the through-routed trains to a zone bounded by Eighteenth Street on the south, Division Street or North Avenue on the north, and Center or Halsted streets on the west. They also argued that any through routes that might be established under this plan be limited to six days of the week.

The establishment of a "through-route zone," it was pointed out, would not mean necessarily that passengers could not cover the entire length of the two lines. Travelers might be required to change cars and travel to their destinations on transfers given at the zone boundary, where the first train on which they rode turned back.

Mr. Arnold is quoted as having said that through routing by all the elevated roads is practicable from an operating standpoint and that the only questions are financial considerations, extent of service and fares to be charged. Mr. Arnold did not favor the discussion of transfers at the beginning of the conferences because they would give a passenger a longer ride for a single fare and would not relieve congestion on the loop.

One suggestion regarding the relief of congestion was that all trains on the loop run in the same direction instead of in opposite directions as now. Associated with this scheme was the plan to route the Metropolitan trains over the outer tracks and change the Northwestern trains to the inner tracks. Objection to this was raised by one of the roads using the inner tracks because it has built entrances from the various loop platforms into department stores and would lose the benefit of this traffic. The main question discussed during the week was the practicability of giving through service by separately owned roads operating trains over foreign tracks and passing through the loop district.

TRADEMARK OF FT. WAYNE & SPRINGFIELD RAILWAY

The Fort Wayne & Springfield Railway, Decatur, Ind., is distributing blotters among shippers and retail dealers in the communities reached by the company. The blotters contain a trade-mark which was originated by F. R. Fink, formerly general passenger and freight agent of the company, and is reproduced herewith. The blotter advertises especially the interurban freight service. It is headed "Stop! LOOK! Listen!" and calls attention to the following points:

- "Let us haul your goods and save you money.
- "Time is money and we save you time.
- "We give you express service at freight rates.
- "Goods received from and delivered to all parts of Indiana and Ohio.
- "Call us up at any time and we will be glad to give you rates or any other information you may desire."



Trademark of Fort Wayne & Springfield Railway.

EFFECT OF FLOODS IN MOHAWK VALLEY

Flood conditions in the Mohawk Valley caused interruption of railway traffic for several days during last week.

The principal point of difficulty for electric railways was at Herkimer, N. Y., which is on the line of the Utica & Mohawk Valley Railway and is also a terminal of the Otsego & Herkimer Railroad. The flood, which submerged the streets of the village of Herkimer, resulted from an ice jam which accumulated last winter and was not carried off or lessened materially until the warm weather about March 1 caused a thaw. The ice jam began at a point where the West Canada Creek enters the Mohawk River and extended up the creek north for a distance of approximately two miles. The ice was formed in that position in the middle of December and with the thaw of Feb. 25 and 26 immense quantities of water that rushed down the West Canada Creek were diverted on account of the ice and used the streets and the bed of the hydraulic canal for a channel.

C. Loomis Allen, vice-president and general manager of the Utica & Mohawk Valley Railway, writes that the damage to the property of the company so far as is known now consisted only of damage to field coils and armatures resulting from the fact that cars were operated through 2 and 3 ft. of water on the first day of the flood. The tracks of the company were covered with sand and gravel which was washed down and, on account of the risk of derailment, operation through Herkimer was discontinued temporarily. The road bed was not washed out and no loss resulted from injury to bridges.

During the worst of the flood conditions, the New York Central & Hudson River Railroad tracks on the main line at Herkimer were under water and all trains were operated over the West Shore tracks with resultant delays. About one-half mile of the main track of the New York Central road was undermined, but, when the water subsided, the damage was repaired in about eight hours.

Accompanying illustrations, showing the water in the streets of Herkimer, which have been received by the courtesy of Mr. Allen, give some indication of the extent of the floods in the locality.

Joseph K. Choate, general manager of the Otsego & Herkimer Railroad, writes that while that road was deluged with water and its track was overflowed at more than a dozen points, and one bridge was under water, the floods that were experienced were nothing like those that existed in the Mohawk Valley. By the courtesy of Mr. Choate, two photographs are reproduced showing the snow conditions on the lines of the Otsego & Herkimer Railroad four days before the thaw commenced.

These illustrations indicate the conditions with which this company had to contend and some of the sources of the water that did the damage in the Mohawk Valley. One of the illustrations shows a snow bank 47 ft. high. This is illustrated by comparison of the snow bank with the pole carrying the d.c. transmission wires. It will be observed that an extension, which was 7 ft. in height, was placed on the top of this pole in order to carry the telephone wires with certainty that they would be kept out of the snow. The other illustration shows one of the large rotary plows in action.

While these photographs were made in reality to show the snow conditions with which the company had to struggle, Mr. Choate states that they are not exaggerations of the conditions existing on the 60 miles of road operated by the company.

W. H. Collins, general manager of the Fonda, Johnstown & Gloversville Railroad, writes that the only difficulty which that company experienced resulted from the flood in the village of Fonda, where it was impossible to reach the station on account of the high water in the streets. This condition lasted for only a short period.

The daily newspapers published accounts of the existence of serious flood conditions at Schenectady and Albany. E. F. Peck, general manager of the Schenectady Railway, states that no bad conditions affecting operation of the property existed in the locality served by that company. Edgar S. Fassett, gen-

eral manager of the United Traction Company of Albany, states that while the usual spring freshet interfered with travel to some extent, conditions were not different from those prevailing in previous years.

FLOODS IN OHIO

Melting snow in Ohio last week caused high water in many localities, and great difficulty was experienced in operation of some of the electric lines. The Lake Shore Electric Railway was unable to use its track through Fremont for a few days, and passengers were taken through the water in cabs from one car to another. Late in the week the Cherry Street bridge at Toledo was damaged by water and ice and the cars could not reach the terminal in the city. Passengers were taken over another bridge in cabs or 'busses. At Zanesville the lines of the Ohio Electric Railway were covered for several days and cars could not be operated. Trouble was experienced at Springfield, Dayton, Defiance, Napoleon and several other points in the State.

MEMBERS OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

A. L. Neereamer, secretary of the Central Electric Railway Association and chairman of the Central Electric Traffic Association, has just issued the annual list of members of those organizations.

The book contains the following information regarding the Central Electric Railway Association: List of officers and committees; revised list of members, showing 47 company members with 3604 miles of track; report of the secretary for the last year; a copy of bulletin No. 5 on "Charges for the Interchange of Equipment," both passenger and freight; and copy of the report of the committee on rules governing annual transportation.

For the Central Electric Traffic Association the following information is printed: List of officers and committees for 1910; annual report of the chairman; revised list of members of the 1000-mile interchangeable ticket agreement, which includes 27 companies with 2356 miles of track; rules for uniform method of accounting for traffic association mileage; and an announcement regarding official watermark paper for ticket stock. The following resolution has been adopted:

"That an official watermark paper be adopted using the official seal or trademark of the Central Electric Traffic Association as a watermark, and that the paper manufacturers be instructed to furnish this paper only to legitimate ticket printers (as designated by this association), and further that said ticket printers be instructed not to use this stock when printing tickets for lines not members of this association."

GARBAGE AND UTILITY CAR FOR CHICAGO

The Chicago Railways will receive from the Arthur Koppel Company a garbage and utility car of new design. The car is to be used on the North and West Side lines in Chicago with a view to determining the practicability of removing city garbage over the surface railways. The car is of all-steel construction, 34 ft. long and subdivided into three equal sections, with a total carrying capacity of 20 yd. The sections are so shaped and arranged that one man with a pole can dump a heavily loaded section by a movement entirely mechanical and without the use of air cylinders. The car body will be mounted on two Pullman No. 150 trucks, which are standard for the Chicago Railways.

No motors will be installed. Construction materials will be handled in the car during the day, and at night the garbage will be handled for the city. The subdivision of the car into three sections greatly increases its utility for maintenance work because a different class of material can be handled in each section. The sections are watertight and wet concrete or garbage will not leak on the pavement.



View in Herkimer, Showing Water Over the Tracks of the Utica & Mohawk Valley Railway



High Water in Herkimer and Method of Transporting Passengers Adopted Temporarily by Utica & Mohawk Valley Railway



Views Showing Snow and Rotary Plow on Otsego & Herkimer Railroad Four Days Before Thaw Commenced—The Snow Bank Illustrated in the Left-Hand View Was 47 Ft. High.

CAST-IRON AND STEEL WHEELS DISCUSSED AT HARTFORD

Upon invitation of the Connecticut Company, F. A. Beebe, general superintendent of the Griffin Wheel Company, Chicago, Ill., gave an interesting talk on cast-iron and steel wheels on Monday, March 7, at the Hartford shops in the presence of over 50 superintendents, master mechanics and shop foremen. Mr. Beebe's paper was prepared along rather novel lines, as it was composed principally of answers to practical questions submitted to him in advance. These questions had been gathered from the men and arranged in order for Mr. Beebe's replies by A. Blanchard, superintendent of the Hartford shops. Mr. Blanchard also presided at the meeting and explained that the invitation to Mr. Beebe was the result of a desire for further enlightenment on wheels after a discussion which the foremen had had among themselves at a meeting last December. Mr. Beebe's paper and the ensuing discussion follows.

CAST-IRON AND STEEL WHEELS

I will endeavor to answer as best I can the questions submitted with Mr. Blanchard's letter, but before doing so it may be of interest to mention something of the manufacture of cast-iron wheels. The starting point is with the analysis of the iron that makes up the given mixture. Iron in its pure state is not suitable for manufacturing purposes, and must contain a certain percentage of the following: Silicon, manganese, carbon (graphitic and combined), phosphorus and sulphur. After the chemist has determined the amount of each element desired in the wheel he selects and weighs the different kinds of iron that, after allowing for oxidation, will give him an iron closely approximating the predetermined analysis. The iron is then placed in the cupola in layers with the fuel, melted and tapped into a large ladle which contains sufficient iron to pour several wheels.

Before starting to pour, a test ladle of iron is taken and poured against a cast-iron block, chilled and broken. The chill or the amount of white iron shown is the guide as to whether the iron to be poured will give the necessary chill for the wheels. The regular pouring then begins, the iron being drawn from the large ladle into smaller ladles and delivered to the molders, who pour it into the flasks. The latter contain a ring of metal which conforms to the shape of the tread and throat side of flange. This ring, known to wheel-makers as a chiller, has a very important function in wheel-making in that it prevents the combined carbon in the iron from returning to the graphitic state, thus producing the extremely hard wearing surface found on cast-iron wheels. After it is cooled in the mold a sufficient length of time, the wheel is removed and sent to the annealing pits, where it is placed in a pit with several others. The pit is then covered and left to cool for four days.

After the annealing process is finished the wheels are removed and passed through a sand-blast cleaning machine, which removes the sand. It is further left to cool and on the following day it is chipped and inspected for surface defects. Representative wheels are then selected and tested to destruction in a drop-testing machine. The structure of the iron and the depth of the chill is examined, and if satisfactory, the wheels are passed for shipment. The entire process consumes approximately six days, and that is the reason you cannot order a wheel to-day and get it to-morrow.

We will now consider the questions in their order:

What causes thin flanges on steel or cast-iron wheels?

The causes of wheel flanges wearing thin are many, and may be due to one of the following, or to a combination of two or more of them:

- (a) Wheels improperly mated as to diameters.
- (b) Improperly mounted as to gage.
- (c) Improperly put on axles; that is, the distance from end of journal to gage line on one end of axle being greater than the other.
- (d) Improperly shaped flanges.
- (e) Trucks out of true.
- (f) Cars riding on side bearings, preventing free movement of the truck, bringing the work of turning on the flange.

(g) Track out of gage on curves.

(h) Improper elevation of outer rail.

(i) Running cars in one direction; that is, when cars at the end of the line run around a loop instead of being turned.

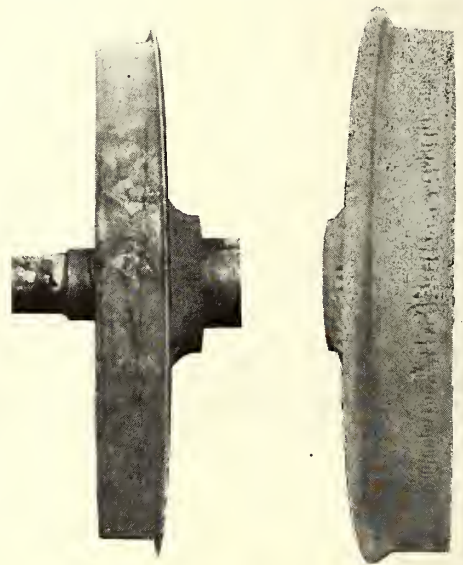
(j) Sanding one rail, causing one wheel to wear down faster than its mate.

Is the grooved rail any harder on the wheels in general than the T-rail?

No, providing the groove and flange are properly designed and the necessary clearance allowed.

In putting on new cast-iron wheels or turning down steel wheels, what should be the minimum difference in the circumference of the wheel?

Where possible, wheels mounted on the same axle should be of exactly the same circumference. This ideal condition does not exist in present-day practice as the shopmen will not take the necessary time properly to go over the stock to select wheels of the same tapes. It is not uncommon to find wheels varying as much as $\frac{5}{8}$ in. in circumference mounted on the same axle. It is recommended that wheels be taped and paired with a variation of not over $\frac{1}{32}$ in. difference in circumference. Under no circumstances should the variation be over one tape size, or $\frac{1}{8}$ in. A difference of $\frac{1}{8}$ in. in the circumference of wheels



Sharp-Flange Steel Wheel and Comby Tread of Cast-Iron Wheel

mounted on the same axle amounts to a slippage of 6,366 ft. per mile. Assuming a car runs 100 miles a day, this would mean a slippage of 636 ft., or, in other words, one wheel would make approximately 74 revolutions more than its mate. As the wheels are mounted rigidly on the axle, this must be compensated for by the sliding of one or both of the wheels.

In city work, from which trucks are best results obtained in relation to flange wear, a long-base truck or a short-base truck?

This is a question that could be best answered by the truck builders. From the wheel-maker's standpoint the distance between the centers of the axles should not be less than the track gage and not great enough to cause flanges to bind on the sharp-tread curves.

On some cast-iron wheels the flange is not true; in other words it appears warped. How much could a wheel of this kind be out of true before it should be condemned?

About $\frac{3}{16}$ -in. warpage is allowable.

What do you consider the maximum allowable difference in the diameter of wheels in the same car?

Little or no attention is given to this point. It is quite common to find steel wheels under the same car ranging in diameter from 34 in. to 31 in. Theoretically this would seem bad practice where the axles are motor-driven, as the heaviest load is thrown on the motor-driving axle with the largest wheels. I understand the motor builders do not build motors of the same

design or horse-power to run closer than 5 per cent in speed. In general, good practice would dictate that the wheels under the same cars should be of the same diameters to get uniform distribution of power to all motors. This would seem to be a field for considerable investigation, and no doubt some interesting data could be obtained if a series of tests were conducted to determine the effect the speed of the various motors has on wheel wear under the same car.

What is the proper tonnage to press cast-iron or steel wheels on an axle in relation to the diameter of the axle and the weight of the wheel?

The following pressures are used by the Griffin Wheel Company in pressing wheels on axles:

3 -in. wheel fit.....	25 to 35 tons
3½-in. wheel fit.....	30 to 40 tons
4 -in. wheel fit.....	35 to 45 tons
4½-in. wheel fit.....	40 to 50 tons
5 -in. wheel fit.....	45 to 55 tons
5½-in. wheel fit.....	50 to 60 tons
6 -in. wheel fit.....	55 to 65 tons

The diameter of the hub on cast-iron wheels should be approximately twice the diameter of the wheel fit.

Do you get as good results from braking power on cast-iron wheels as you do with steel wheels, taking into consideration change of weather; also should we use shoes with steel inserts or soft cast-iron shoes?

The Master Car Builders' Association is now conducting a series of experiments to determine what style of shoe will give the best braking result, also its relation to wear on the wheel. The kind of shoe used must largely be determined by each road. However, one should not lose sight of the point that it is better to wear out brake shoes than it is to wear out wheels.

Why do some cast-iron wheels run about half as long as others on the same kind of car, running on the same line and with both wheels of the same make?

Some of the causes bringing about this condition are improperly mated wheels, improperly adjusted brakes and improperly hung brakes.

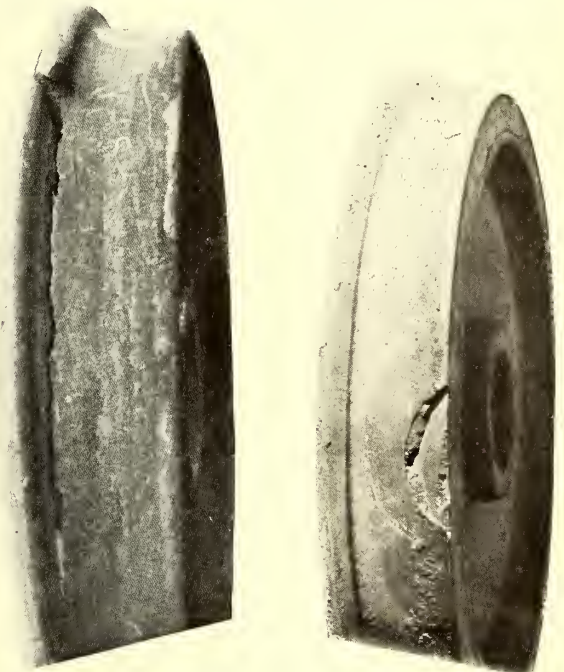
Does it pay to grind out flat spots in cast-iron wheels?

Yes; but it depends on whether the wheel has slid and been burned beyond the ability of the grinder to restore the tread and leave enough wearing value to warrant the cost of grinding. Neither does it pay if the flat spot is too long, and if the metal is so badly burned that the indications are that it will disintegrate and drop out. There are a few street railways which remove the wheels from service immediately on discovering the smallest kind of a flat spot and carefully grind them to remove as little metal as possible. In this way these companies have been able greatly to increase their wheel mileage. The facilities

compensate the difference in diameter between wheels on the same axle. It is also thought that this would compensate for some of the slippage in going around curves. Theoretically there would only be one radius of curve where this result would obtain. The Griffin Wheel Company has recently adopted as a standard a tread with much less taper than formerly. There can be no objection to grinding your wheels as indicated above.

Are steel wheels softer after being once turned down?

I understand from talking with various users of steel street-

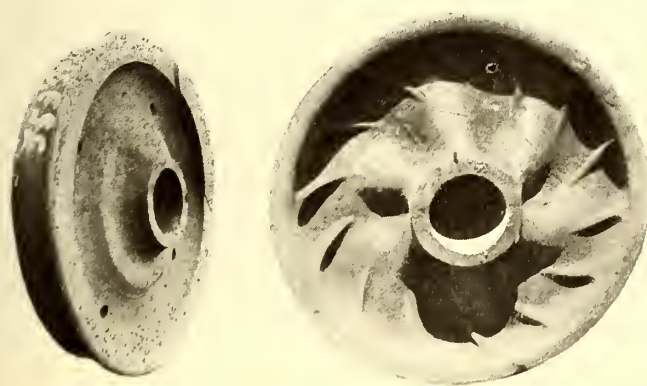


Steel Wheels with Seam in Throat and Damaged Tread Due to Defects in the Ingots

car wheels that this is the case. The usual result is that the mileage on the second and third turning is not as great. The reason for this is that it is impossible to obtain homogeneous metal through the entire thickness of the tread by rolling, the metal becoming less dense toward the center of the rim.

What causes flanges on steel wheels to wear more quickly after being turned than when new?

This is due to removing the hard, dense metal on the outside.



Flange Failure and Cracked Inside Plate of Steel Wheels

for removing and applying wheels to the cars and the machine-shop facilities for grinding must largely govern the practice of the different systems.

In grinding the flat spots out of our cast-iron wheels we grind the tread practically flat instead of taper, and in turning our steel wheels we turn them flat also. Theoretically the taper of the tread is correct, but do you think that for all practicable purposes it would be better if it was nearer flat?

The original idea of making wheel treads taper was to com-



The Result of Improper Brake-Shoe Adjustment

Would the springing of the truck frame have anything to do with the wear of flanges?

Yes.

What weight cast-iron wheel do you recommend for 25-ton cars?

Five hundred lb. to 575 lb., depending on the diameter of the axle, the width of the tread and the size of the flange.

What is the smallest flange you would recommend on 25-ton cars used in city, suburban and interurban railway service?

Common practice indicates that flanges of $\frac{5}{8}$ in. in city, $\frac{3}{4}$ in. in suburban and $\frac{7}{8}$ in. in interurban service are safe.

If one flange is starting to wear smaller and the other larger, either on a cast-iron or steel wheel, is it possible to correct this by the use of emery shoes or any other device without taking the wheel out from the truck?

No doubt the wheel could be corrected if proper facilities were provided for the car-house men to determine the difference in the circumference of the two wheels so that they could apply the emery shoe to the proper wheel. To do this the truck would have to be jacked up and the circumference of the wheel measured. There is danger that the wheel would be ground down too much. The proper remedy would seem to be to remove the axle from the car and to place it in the grinder, where the work could be properly done and the diameters of the two wheels made exactly the same.

What is the average life of a 33-in. cast-iron wheel on a 25-ton car when used in city and suburban service?

This is a rather difficult question to answer, as much depends on the number of stops per mile and the care with which the motorman applies the brakes. Statistics show that the average mileage varies considerably, being as low as 35,000 miles and as high as 55,000 miles.

What is the advantage of a solid cast-iron wheel over spoke wheels, and for what weight car would you recommend one or the other?

For 25-ton cars and over the double-plate cast-iron wheel has some advantages as a better distribution of metal in the wheel



Shelled-Out Cast-Iron Wheel

(c) See that the percentage of brake pressure is in proper relation to the load on the wheels.

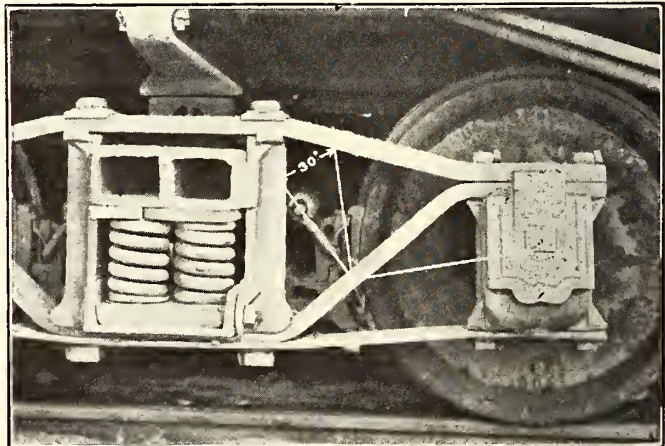
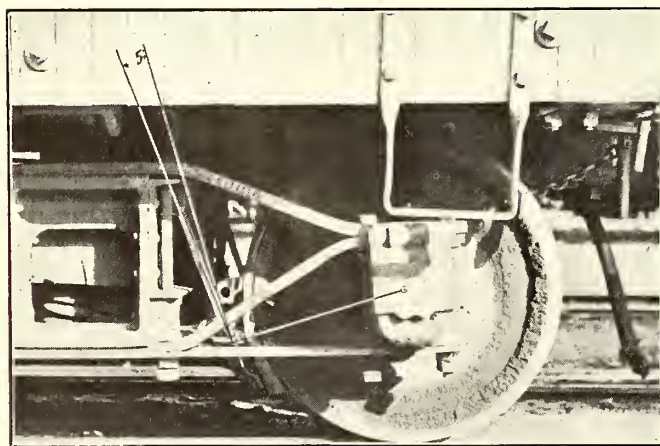
(d) An important point is the manner of hanging the brake. Most brake hangers are placed below a line passing through the center of the axle, parallel with the trucks, which allows the brake to fall away from the wheel by gravity. This angle may be made too large, so that with badly worn and loose parts the application of the brakes causes the shoe to crowd up against the wheel. This makes a toggle joint, producing excessive pressure on one pair of wheels in the truck and causing them to stop rolling while the other pair is still revolving. This is a prolific cause of slid flats and also results in excessive wheel wear. No doubt this peculiar condition has been noticed by railway men. This reply has a direct relation to the earlier question on the variations in the life of the same manufacturer's wheels under the same car.

Are manufacturers of cast-iron wheels succeeding in getting any greater life from wheels than was obtainable 10 years ago? If so, what is the average life according to the best statistics available?

When it is taken into consideration that the weight and speed of cars in the last 10 years have increased at a phenomenal rate and that there has also been a change from hand brakes to air brakes with a very slight increase in the weight of wheels to carry the increased loads, the showing made as to average mileage has been quite gratifying. As local conditions largely govern, it is difficult to state what average will be obtained under the varied conditions existing in different parts of the country.

Has any improvement in casting operations been developed lately to obviate spongy places in the tread of cast-iron wheels? The presence of these spongy spots is generally recognized as chiefly responsible in bringing about the flats to which we all object.

There seems to be a rather fixed opinion in the minds of most street-railway men that wheels have spongy spots in the tread. There are no such spots in the treads of cast-iron wheels as far as the writer's observations go. This so-called spongy condition has been called to our attention numerous times and without fail the wheels have had comby spots due to brake burning, causing cracks in the tread and the falling out of some of the metal. They are not the cause of flat spots, but the reverse is true.



Proper and Improper Brake-Shoe Hanger Adjustment

can be made. For the lighter cars, spoke wheels are usually used.

Is there anything which you can suggest that the mechanical department could do to eliminate flat spots on cast-iron wheels?

The following suggestions are offered for the consideration of the mechanical department:

- (a) See that the brakeshoes are properly adjusted.
- (b) Braking apparatus adjusted so that in coming to a stop the wheels will not lock.

DISCUSSION ON MR. BEEBE'S PAPER

In reply to a query on sand holes, Mr. Beebe said they were not due to sand, but frequently to the wheel sliding flat, which caused the metal to drop out through burning. The lecturer exhibited several specimens showing how one part of the wheel had been burned off in spots without affecting the rest. One of the men present said that the mechanical department could help to reduce flat spots by eliminating worn king bolts and lost motion in the brake rigging. Another master mechanic explained how he had failed to secure good braking on certain

cars despite the most careful adjustment until he fitted them with shoes taken from other cars which were braking well. Mr. Beebe thought the trouble might have been caused by using a compromise shoe. He was also of the opinion that it was very difficult to grind the treads of a wheel pair exactly alike when using pit grinders. He had seen cases where one of the grinding wheels barely scratched the first tread, while the other wheel ate right into the second tread. So far as his company's tests showed there was no difference in chill to account for this condition. Possibly this divergence in taking hold arose from differences in the length of wear and inequalities in the grinding wheels. In response to another question, the speaker stated that nothing was gained by grinding new wheels before sending them to the user. In fact, his company had discarded that practice as it figured that grinding a new wheel was equivalent to cutting down its life by about 10,000 miles.

Referring to the two views of brake-shoe hangers and shoes reproduced, Mr. Beebe said that they showed how the wheels were made to slide before the full braking power was applied because the shoe acted as a toggle between the hanger and the wheel.

CLEARING FROZEN, CLOGGED SWITCHES

Figs. 1 and 2 show diagrammatically a special design of fuel oil burner that was most effective in keeping clear the many switches and intersections in the yards and terminals of the Market Street Elevated Railway of Philadelphia during a recent snowstorm. Manual labor was entirely unequal to the occasion, and prompt recognition of this fact by the superintendent of roadway, J. Doughty, led to hasty development of the burner and accessories by Charles Radure, superintendent of shops, and obviated train movement delays.

The fittings shown were mounted on top of a 20-gal. tank, the top outline of which is indicated by the dotted circle in

MODIFICATION OF FRANCHISE REQUIREMENTS ASKED IN RICHMOND, VA.

William Northrup, president of the Virginia Railway & Power Company, of Richmond, Va., published recently in the daily newspapers of that city a two-page advertisement discussing the modifications desired by the company in its franchises. Maps included in the advertisement show the present and the proposed trackage of the lines.

The existing lines are operated under three franchises. One, granted to the Richmond Traction Company, expires on Jan. 1, 1926. The franchise of the Richmond Passenger & Power Company expires on Jan. 1, 1931. A franchise granted to the West-hampton Park Railway, covering only the right to cross the city boulevard, is unlimited as to duration, but is subject to revocation by the Council. The present State constitution of Virginia provides that municipal franchises for the use of streets may be granted for a period not exceeding 30 years.

"It is obviously to the advantage of the city," the company says, "to have all the franchises within its corporate limits expire on the same date, as it gives a greater value to any new franchise to be granted at the expiration of the period and saves complications with respect to existing companies.

"In the recent reorganization through foreclosure sale of the properties in this city, it was necessary to place upon the properties a new mortgage to secure a new issue of bonds to provide for the acquisition of the property under the reorganization and for future betterments, extensions and improvements. For well understood financial reasons it was found impracticable to place a bond which matured in a shorter period than 25 years from the date of the mortgage, and even a bond of this maturity is not as popular as one for a longer period.

"The bonds secured by the mortgage expires on July 1, 1934, which is beyond the period of the existing franchises. This fact not only proved a difficulty in connection with the reorganization, but will be a constant obstacle to the sale of bonds for improvements at reasonable prices, and if these bonds have to be sold at a large discount the company is thereby required to pay a greater rate of interest for money necessary for extensions and improvements, with a corresponding increase in the burdens upon the property and indirectly upon the public served, from which the revenue must be derived.

"For these reasons it would seem obvious that an extension of the limit of the expiration of the franchise for a period of 30 years from 1910 would be to the advantage of the community and of the company."

In explaining the advantages of rearranging tracks and re-routing cars in accordance with the detail plans suggested, the company states:

"The electric railway system in this city is the result of the consolidation of a number of small lines and the competitive conditions existing at various times in the development of the system and especially from 1896 to 1902 resulted in the construction of mileage far in excess of the requirements of the community, many tracks being directly parallel only one block apart. Much of this trackage is unnecessary for the public service, resulting in an excessive car mileage with corresponding obstructions to traffic and burdens upon the community served. It is believed that by a rearrangement of trackage and the rerouting of cars to meet the existing conditions, a better service can be rendered and some of the present waste in operation avoided."

Provisions fixing the schedules of cars in the present ordinances should be changed, the company urges, to require as much service as the traffic reasonably warrants. At present the schedule is far in excess of the ordinance requirements at times, while at other times the ordinance requirements are very much in excess of the demands of the traffic.

In addition to taxes on gross earnings as compensation for the use of the streets the companies comprising the system are subject to a State franchise tax of 1 per cent on gross transportation receipts, and are taxed on real and personal property for State and city purposes. Various other public benefits are re-

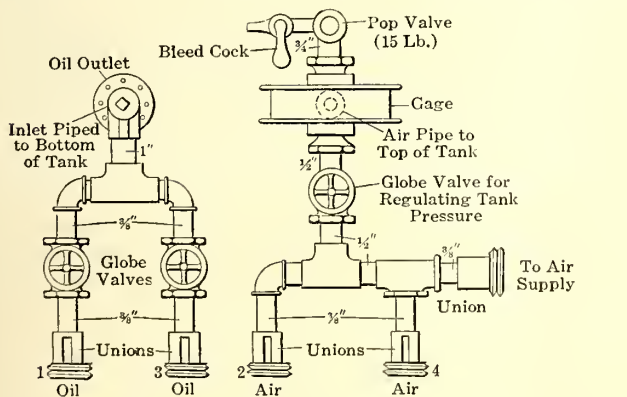


Fig. 1

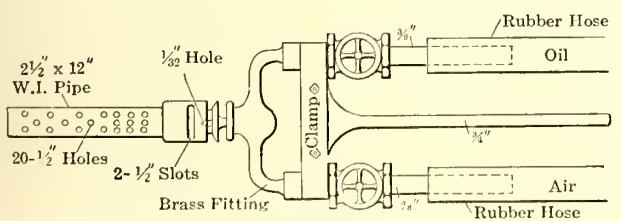


Fig. 2

Fittings for Fuel Oil Burner

Fig. 1. The shop air supply at 60 lb. per square inch is piped to convenient points in the yard and the rubber hose of the burner is sufficiently long to reach all areas with the given layout. The pressure acting to force the fuel oil from the tank is reduced to 15 lb. per square inch by means of the valve and gage provided for the purpose, and further regulation of the air pressure at the burner is afforded by the valves indicated in Fig. 2. The sketches and information were courteously provided by Superintendent McConbric, of the elevated division.

quired by ordinances. Under this system of taxation the companies paid to the city of Richmond in 1909 taxes on property and railway earnings as follows:

On real and personal property.....	\$31,154.99	
On railway earnings.....	49,975.42	
Total.....		\$81,130.41
Other charges:		
Street paving and repairs (approximate).....	\$20,000.00	
Sprinkling streets.....	4,719.00	
Free transportation to policemen, firemen and officers.....	8,650.00	
Free lighting.....	2,391.30	
		35,760.30
Total.....		\$116,890.71

In addition the companies are required by franchises to sell tickets between 6 and 7 a. m. at 2½ cents each and to sell school tickets at the same rates. The company computes the operating loss on this traffic within the city of Richmond at the rate of 2½ cents per passenger at \$18,849.03 per annum, making the total taxes and charges \$135,739.74, or 13.56 per cent of the gross railway earnings within the city for 1909, not including State and Federal taxes; while the entire taxes paid for 1909, including State and Federal taxes for the entire territory and including the special charges and loss on special tickets, amounted to \$187,664.31.

"It is obvious from these figures," the company declares, "that the taxation upon the street railways is out of all proportion to the taxes paid by other enterprises in the community. If the existing franchises are consolidated, resulting in the consolidation of the gross earnings, the aggregate amount of gross earnings subject to the maximum tax under the present franchises would be greatly increased, and the resulting taxation would be most burdensome. If, therefore, this consolidation of franchises is made, the rate of tax should be readjusted with reference to the consolidation income, without causing a reduction in amount of taxes paid.

"It is suggested that if a new franchise be granted, or the present franchises be consolidated, the rate of franchise tax be fixed at 5 per cent on the gross earnings, regardless of amount, within the city of Richmond. This would be a slight increase over the present amount paid the city, and would increase in future as the earnings increase, and with the other charges for street paving, free transportation, sprinkling and other expenses which arise incident to the operation upon the streets of the city, and which are constantly increasing, will make the public charges upon the company much heavier than those borne by any other enterprise within the community, and certainly as heavy as the traffic will bear."

Taking up the allied subjects of fares and transfers, the company computes the operating cost of carrying each revenue passenger, not including interest on capital, at 3.35 cents, divided as follows: Operating expense, 2.78 cents; taxes, State, city and county, 0.32 cent; depreciation, or provision for extraordinary maintenance, renewals and replacements, 6 per cent of gross earnings, the amount fixed in Chicago, 0.25 cent.

The average revenue per revenue passenger for the first 10 months of 1909 was 4.18 cents. The average revenue per revenue and transfer passenger for the same period was 2.97 cents. The company adds:

"If this subject be considered from the standpoint of car-miles, careful analysis has disclosed that the average operating cost of carrying each passenger a mile, including taxes, depreciation, and excluding interest on capital, is 2.14 cents, and for two miles is 4.28 cents, and for three miles is 6.42 cents; that upon this basis the average cost of carrying a passenger from Seventh and Broad Streets to Seven Pines, a distance of 9¾ miles, is 21 cents, while tickets are sold at only 4 1/6 cents, and in certain hours only 2½ cents; that the average cost of carrying a passenger from Seventh and Broad Streets to Westhampton Park, approximately 6½ miles, is 14 cents, while tickets are sold at only 4 1/6 cents, and at certain hours 2½ cents."

Costs of labor in the various departments in 1909 as compared with the period from 1896 to 1900 increased as follows: Transportation, 51.7 per cent; shop, 28.67 per cent; track, 26

per cent. Various commodities specified in detail are shown to have increased in cost from 1897 to 1907 an average of 68 per cent. The average fares per passenger on the Richmond division declined from 1904 to the 10 months' period ended Oct. 31, 1909, as follows: Including transfers, 3.19 to 2.97 cents; excluding transfers, 4.24 to 4.18 cents. In the same period the percentage of revenue passengers riding on transfers increased from 32.60 to 40.50 per cent.

Either the zone system of fare or a sufficient rate to give a reasonable return for the service rendered is suggested.

In response to an insistent demand the company experimented by extending the transfer system, with the result that 40 per cent of the revenue passengers now use transfers, the danger of "loop" trips has increased and the average revenue per passenger lowered. As a remedy it is suggested that transfers be given only at the time of the payment of fare, and only good at points of intersection, which would not restrict the present number of transfer points, but would enable the company to control the abuse of transfers; and that the transfer on a transfer be abolished.

The company concludes that if the zone system is not adopted and the present method of charge is followed a straight 5-cent fare is the least amount under existing conditions which will enable the continuation of an efficient service with modern equipment and the extension of the system from time to time to promote the convenience and encourage the development of the community.

THROUGH ROUTES BETWEEN ELECTRIC AND STEAM ROADS

Supplementing the formal hearings before the Committee on Interstate and Foreign Commerce of the House of Representatives on the railroad rate bill, of which a report was published in last week's issue, letters were received by the committee from various sources, principally in relation to the effect of the proposed legislation upon steam railroads. Letters relating to the electric railway interest in the situation were submitted by F. W. Coen, vice-president and general manager, Lake Shore Electric Railway, Sandusky, Ohio, and by Bentley W. Warren, of Boston.

LETTER OF F. W. COEN

Mr. Coen's letter is addressed to Congressman Paul Howland, of Ohio, and is in part as follows:

"We feel that that part of the bill prohibiting the Interstate Commerce Commission from establishing joint rates between steam and electric railroads is against the interest of the traveling public, the patrons of the interurban railroads, and the prosperity and development of such interurban roads.

"The Lake Shore Electric Railway Company has many points along its railroad where passengers do not take their cars to go to a nearby town or junction with a steam railroad to make their journey, for the reason that they cannot buy a through ticket to their destination; nor can they get their baggage checked to their destination, but, on the other hand, are required to travel upon the trains of our steam road competitors, who operate not more than two or three trains a day, affording very little train service as compared with the Lake Shore Electric Railway. The steam railroads working together and against the electric railroads in a case of this kind not only injure the electric railroads but inconvenience the traveling public. The traveling public under such circumstances do not get all the available benefits that are in store for them.

"There are also a number of points on this property where we have a large exchange of passenger traffic between this company and steam roads. In these instances it is now necessary for the travelers to purchase two tickets and have their baggage checked twice to reach their point of destination, and oftentimes are compelled to have their baggage transferred. These travelers are therefore receiving only a part of the advantages to which they are entitled when, on account of the convenience to them, they use an interurban and a steam road, while the steam roads

between themselves extend these advantages to the traveling public.

"I wish to say, however, that we have traffic arrangements with three different steam roads whereby through tickets are sold and baggage checked in exactly the same manner as the steam roads do among themselves and in these cases the public are receiving all the benefits.

"Looking at this matter broadly, it would seem to us that the portion of the bill should be amended so as to give the Interstate Commerce Commission authority to order through rates and through tickets as between interurban and steam roads, if in their judgment it was proper and advantageous to the public.

"If I have not made myself clear on the matter, I should be glad if you will advise me and I will endeavor to explain more in detail."

LETTER OF BENTLEY W. WARREN

Mr. Warren's letter, addressed to Congressman Andrew J. Peters, of Massachusetts, states in part:

"I have already sent you certain official figures from the Railroad Commissioners' report of Massachusetts relative to the small amount of freight or express business done by the Massachusetts street railway companies. Those figures showed that the receipts of the companies in Massachusetts from the sources indicated were less than 1 per cent of their gross receipts.

"I have now obtained similar figures, based on the proposed census report relative to street railways. These figures are not authoritative census department figures, nor is that department responsible for them. I nevertheless believe that they are approximately accurate and will be substantially confirmed by the census report on street railways when issued. These figures relate to 939 companies, and include not only street railways, but interurban roads. The sources of their total operating earnings, which amount to \$418,187,858, are classified as follows:

Passengers	\$382,132,494
Chartered cars	705,261
Freight	5,231,215
Mail	646,575
Express	1,560,802
Sale of electric current	20,093,302
Miscellaneous sources	7,818,209

"You will notice that the receipts from freight, as distinguished from mail and express, are but a small fraction over 1 per cent of the gross receipts. Including mail and express with freight, the receipts from all three sources are less than 2 per cent of the gross receipts.

"The sale of electric current is an item of some significance which may interest you. Many of the companies furnishing street railway transportation are equally electric light and power companies, manufacturing and selling electric current for use in the different cities and towns in which they also operate street railways. This would seem an additional reason for excluding street railways from the proposed legislation, if the avoidance of further complications between Federal and State jurisdiction and control is desired."

The seventh annual convention of the American Railway Engineering and Maintenance of Way Association will be held in Chicago, at the Congress Hotel, formerly the Auditorium Annex, March 15 to 17. As usual, there will be an exhibit of track appliances in connection with the convention. The exhibit will be held in the Coliseum Building on Wabash Avenue, opening March 14, and will continue the entire week.

The subjects upon which committees will report will include the following: Roadway, ballast, ties, rail, track, wooden buildings and trestles, signs, fences and crossings, signals and interlocking, records and accounts, iron and steel structures, economies of railway location, wood preservation, electricity.

An outline of the work of the committee on electricity follows: (1) Report on proper lateral and vertical clearances required for installations for electric traction; (2) report on best safeguards to be used in connection with transmission line crossings over tracks, giving recommendations in the form of specifications; (3) insulation; (4) maintenance organization; (5) electrolysis.

TEST OF A 15,000-KW. STEAM-ENGINE-TURBINE UNIT*

BY H. G. STOTT AND R. J. S. FIGOTT

During the year 1908 it became apparent that owing to the cost of increasing traffic in the New York subway, it would be necessary to have additional power available for the winter of 1909-1910.

The power plant of the Interborough Rapid Transit Company, which supplies the subway, is located on the block bounded by Fifty-eighth and Fifty-ninth Streets, and by Eleventh and Twelfth Avenues, adjacent to the North River; it contains nine 7500-kw (maximum rating) engine units, besides three 1250-kw, 60-cycle turbine units which are used exclusively for lighting and signal purposes.

The 7500-kw units consist of Manhattan-type compound Corliss engines, having two 42-in. horizontal high-pressure cylinders and two 86-in. vertical low-pressure cylinders. Each horizontal high-pressure cylinder and vertical low-pressure cylinder has its connecting rod attached to the same crank, so that the unit becomes a four-cylinder 60-in. stroke compound engine with an overhanging crank on each side of a 7500-kw, maximum rating, 11,000-volt, three-phase, 25-cycle generator. The generator revolving field is built up of riveted steel plates of sufficient weight to act as a flywheel for the two engines connected to it. This arrangement gives a very compact two-bearing unit. The valve gear on the high-pressure cylinders is of the poppet type, and on the low-pressure of the Corliss double-ported type. The condensing apparatus consists of barometric condensers, arranged so as to be directly attached to the low-pressure exhaust nozzles, with the usual compound displacement circulating pump and simple dry-vacuum pump.

These engine and generator units are in general probably the most satisfactory large units ever built, as five years' experience with them has proved; their normal economic rating is 5000 kw, but they operate equally well (water rate excepted) on 8000 kw continuously.

In considering the problem of how to get an additional supply of power, every available source was considered, but by a process of elimination only two distinct plans were left in the field. The electric transmission of power from a hydraulic plant was first considered, but owing to the high cost of a double transmission line from the nearest available water-power, and the impossibility of getting reliable service (that is, service having a maximum total interruption of not more than 10 minutes per annum) from such a line, further consideration of this plan was abandoned. The gas engine, while offering the highest thermo-dynamic efficiency, at the same time required an investment of at least 35 per cent more than an ordinary steam-turbine plant with a probable maintenance and operation account of from 4 to 10 times that of the steam turbine. The reciprocating-engine unit, of the same type as those already installed, was rejected in spite of its most satisfactory performance, on account of the high first cost and small range of economical operation. Reference to Fig. 1 will show that the economic limits of operation are between 3300 kw and 6300 kw; beyond these limits the water rate rises so rapidly as to make operation undesirable under this condition, except for a short period during peak loads.

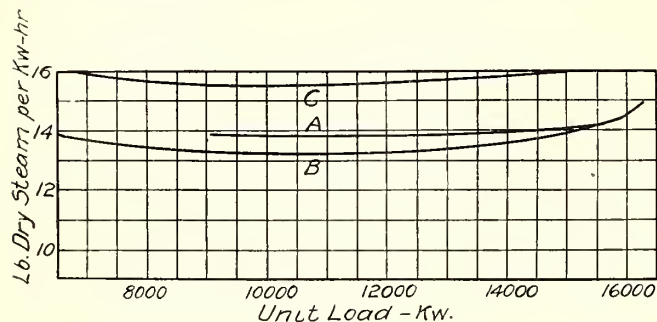
The choice was thus narrowed down to either the high-pressure steam turbine or the low-pressure steam turbine. There was sufficient space in the present building to accommodate three 7500-kw units of the high-pressure type, or a low-pressure unit of the same size on each of the nine engines, so that the questions of real estate and building were eliminated from the problem.

The first cost of a low-pressure turbine unit is slightly lower than that of a high-pressure unit, due to the omission of the high-pressure stages and the hydraulic governing apparatus, but the cost of the condensing apparatus would be the same in both cases. The foundations and the steam piping in both cases

* Abstract of paper presented at joint meeting of American Society of Mechanical Engineers and American Institute of Electrical Engineers, New York, March 8, 1910.

would not differ greatly. The economic results, so far as the first cost is concerned, would then be approximately the same, if we consider the general case only; but in this particular instance the installation of high-pressure turbines would have meant a much greater investment for foundations, flooring, switchboard apparatus, steam piping and water tunnels, amounting to an addition of not less than 25 per cent to the first cost.

The general case of displacing reciprocating engines and installing steam-turbine units in their place was also considered. The best type of high-pressure turbine plant has a thermal efficiency approximately 10 per cent better than the best reciprocating-engine plant, but the items of labor for operation



A. Constant nozzle pressure. B. Variable nozzle pressure. C. Recent guarantee for high-pressure turbine under the same plant conditions.

Variation of Unit Water Rate with Load

and for maintenance, together with the saving of about 85 per cent of the water for boiler-feed purposes and the 10 per cent of coal, reduce the relative operating and maintenance charges for the steam-turbine plant to 80 per cent, as compared to 100 per cent for the reciprocating-engine plant.

Assuming that the reciprocating-engine plant is a first-class one and has been well maintained, about 20 per cent of its original cost (for engines, generators and condensers) may be realized on the old plant and so credited to the cost of the high-pressure turbine plant. But on the other hand, if the high-pressure turbine installation is to receive credit for the second-hand value of the engines, it must also have a debit charge for 100 per cent of the original reciprocating-engine plant which it displaced. The relative investments, therefore, upon this basis would be approximately equal for the high-pressure or the low-pressure turbine; but 80 per cent of the cost of the original engine plant would have to be charged against the high-pressure turbine plant, as against an actual increase in value (to the owner) of the engine by reason of its improved thermal efficiency, due to the addition of the low-pressure turbine.

The preliminary calculations, based upon the manufacturers' guarantees for the low-pressure and high-pressure turbines, showed that the combined engine-turbine unit would give at least 8 per cent better efficiency than the high-pressure turbine unit, so that it was finally decided to place an order for one 7500-kw (maximum rating) unit, as by this means we would not only get an increase of 100 per cent in capacity, but at the same time give the engines a new lease of life by bringing them up to a thermal efficiency higher than that attained by any other type of steam plant.

The turbine installed is of the vertical three-stage impulse type having six fixed nozzles and six which can be operated by hand, so as to control the back pressure on the engine, or the division of load between engine and turbine. An emergency overspeed governor, which trips a 40-in. butterfly valve on the steam pipe connecting the separator and the turbine and at the same time the 8-in. vacuum breaker on the condenser, is the only form of governor used. The footstep bearing, carrying the weight of the turbine and generator rotors, is of the usual design supplied with oil under a pressure of 600 lb. per square inch, with the usual double system of supply and accumulator to regulate the pressure and speed of the oil pumps.

The condenser contains approximately 25,000 sq. ft. of cooling surface arranged in the double two-pass system of water

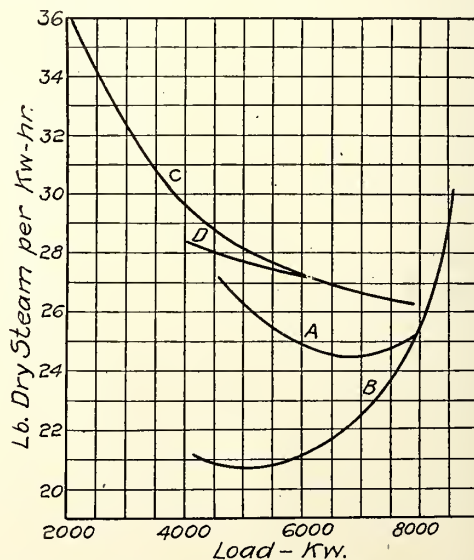
circulation with a 30-in. centrifugal circulating pump having a maximum capacity of 30,000 gal. per hour. The dry vacuum pump is of the single-stage type, 12 in. and 29 in. by 24 in., fitted with Corliss valves on the air cylinder. The whole condensing plant is capable of maintaining a vacuum within 1.1 in. of the barometer when condensing 150,000 lb. of steam per hour when supplied with circulating water at 70 deg. Fahr.

The electric generator is of the three-phase induction type, star-wound for 11,000 volts, 25 cycles and a speed of 750 r.p.m. The rotor is of the squirrel-cage type with bar winding connecting into common busbar straps at each end. This type of generator was chosen as being specially suited to the conditions obtaining in the plant.

With nine units operating in multiple, each one capable of giving out 15,000 kw for a short time, operating in multiple with another plant of the same size, it is evident that it is quite possible to concentrate 270,000 kw on a short circuit. If we proceed to add to this synchronous turbine units of 7500-kw capacity, which, owing to their inherently better regulation and enormous stored energy, are capable of giving out at least six times their maximum rated capacity, the situation might soon become dangerous to operate, as it would be impossible to design switching apparatus which could successfully handle this amount of energy. The induction generator, on the other hand, is entirely dependent upon the synchronous apparatus for its excitation, and in case of a short circuit on the busbars would automatically lose its excitation by the fall in potential on the synchronous apparatus.

The absence of fields leads to the simplest possible switching apparatus, as the induction generator leads are tied in solidly through knife switches, which are never opened, to the main generator leads. The switchboard operator has no control whatever over the induction generator, and only knows it is present by the increased output on the engine-generator instruments.

The method of starting is simplicity itself—the exciting current is put on the engine generator *before* starting the engine, and then the engine is started, brought up to speed and synchronized in exactly the same way as before. While starting in this way, the induction generator acts as a motor until sufficient steam passes through the engine to carry the turbine above synchronism, when it immediately becomes a generator and picks up the load. Three of these 7500-kw low-pressure turbine units have been installed and tests run on Nos. 1 and 2.



A. Water rate of engine with constant nozzle pressure. B. Water rate of engine with variable nozzle pressure. C. Water rate of turbine with variable nozzle pressure. D. Water rate of turbine with constant nozzle pressure.

Variation of Water Rate with Load

No. 3, having been just started, has not yet been tested.

Tables and curve sheets follow. Two tests on the combined

unit are given. The conditions of vacuum and quality of steam entering turbine nearly standard, so that corrections are small.

The net results obtained by the installation of low-pressure turbine units may be summarized as follows:

- a. An increase of 100 per cent in maximum capacity of plant.
- b. An increase of 146 per cent in economic capacity of plant.
- c. A saving of approximately 85 per cent of the condensed steam for return to the boilers.
- d. An average improvement in economy of 13 per cent over the best high-pressure turbine results.
- e. An average improvement in economy of 25 per cent (between the limits of 7000 kw and 15,000 kw) over the results obtained by the engine units alone.
- f. An average unit thermal efficiency between the limits of 6500 kw and 15,500 kw of 20.6 per cent.

DISCUSSION

Dr. Charles P. Steinmetz said that the combination of a low-pressure turbine with an induction generator was assuming high industrial importance. He wished to say something about the electrical side of this combination. The characteristics of the induction generator have been known for a long time, but only now have conditions arisen which make it preferable to the synchronous generator. There are two types of a.c. generators—synchronous and induction. Constructively, the stators of both types are practically the same, as they comprise a polyphase winding located in a laminated stationary structure. The difference is in the rotor, for the rotor of the synchronous generator has a revolving magnetic field excited by direct current, while that of the induction generator has a short-circuited or squirrel-cage winding similar to that of an induction motor, the rotation of which induces an electromotive force in the stationary generator winding. The magnetic field of the induction generator is produced by the reaction of the alternating currents issuing from it. In consequence of the difference between the two types, the synchronous generator must run in step with the frequency of the a.c. system, that is, the rotor must move exactly one pole for every reversal of current on the a.c. system; conversely the induction generator cannot run in step with the frequency, but only runs faster, exceeding synchronism by a percentage dependent upon the load. Synchronizing is not required in the induction generator. Furthermore, since the induction generator does not depend upon running in step with any other machine, the possibility of see-sawing from the step position or "hunting" cannot exist. Unlike the synchronous machine, the induction generator has no regulation and no magnetic field dependent upon the voltage at the terminals and on the load. It must be understood that the induction generator can generate current only when connected to a system in which there are synchronous machines, whether the latter are generators, motors or converters, for it has no voltage of its own. The regulation of such a combined system of synchronous and induction apparatus therefore means simply the regulation of the synchronous machines. Hence, the induction generator is merely a machine feeding power into the system but not participating in its regulation or control, that is, while the synchronous machine on open circuit has voltage at its terminals, the induction machine has none under the same condition. Nor has the induction generator any short-circuited current because the current dies out as naturally as it does in a reactive coil when the current is withdrawn. The synchronous generator can generate current of any character—energy, reactive, wattless, lagging or leading—the proportions of the different kinds depending upon the nature of the system to which it is connected and the power factor of the supply system. The induction generator can generate energy current only while on the other hand it continually consumes a certain amount of reactive, wattless current as required for its excitation by the synchronous machines in the system. Thus, the induction generator alone cannot supply a general a.c. lighting, power and railway distribution system. Where a combination of generators is used the synchronous units must supply all the lagging current. In a system requiring considerable lagging currents

a large percentage of induction generators would be a questionable advantage, as too much work would be thrown upon the synchronous generators; but for a system like that of the Interborough Rapid Transit Company, with its many rotary converters, the induction generator is of the greatest advantage. The induction generator is a typical converter of mechanical to electric power, giving straight conversion from one to the other. It is, therefore, an ideal machine to float upon an a.c. system for receiving mechanical power in any form, as from a low-pressure turbine, a water-wheel, etc.

Max Rotter asked Mr. Stott how he eliminated the oil from the exhaust steam. He also inquired whether with the efficiencies shown in comparison with other prime movers, Mr. Stott would recommend the described combination of a reciprocating engine and low-pressure turbine for an initial installation in preference to high-pressure turbines alone. He questioned the statement that the improvement in the case described by Messrs. Stott and Pigott was 13 per cent over the best high-pressure turbines. The figure of 8 per cent given elsewhere probably was more nearly correct. He thought that under the proper conditions the high-pressure turbine would show up just as well as the combination. The low-pressure turbine, of course, has to be operated under the unfavorable condition of a comparatively low speed. He was a little doubtful as to whether Mr. Stott had compared a 7500-kw high-pressure turbine with a 7500-kw low-pressure turbine or, more properly, with an engine and turbine having the combined capacity mentioned. What he wished to point out in this connection was that the cost of the condensing apparatus for high-pressure and low-pressure turbines of the same size differed considerably. In conclusion, Mr. Rotter said that the high-pressure turbine guarantees given by Mr. Stott were probably not as good as those attainable in practice owing to the tendency of the manufacturers not to guarantee more than they could safely perform. He thought that the figure of 15.6 lb. of steam per kw-hour quoted could be bettered by at least 2 lb.

Mr. Junggren, turbine engineer of the General Electric Company, quoted some figures from Messrs. Stott's and Pigott's paper to show that a high-pressure turbine working under the same conditions would not have adapted itself so readily to the variations in load. The high-pressure turbine could be expected to give excellent results at full load but was not as good as the combination on half loads. Of course, the cost of the single high-pressure turbine is less, but it could probably be improved if as much money could be spent upon it as on the combined reciprocating engine and low-pressure turbine. The vacuums obtained were remarkable, and show what can be done when a low vacuum is a necessity.

George R. Parker said that during the past year he had investigated several low-pressure turbine possibilities, that is, engine stations where the addition of low-pressure turbines might improve the results. He was frequently met by the statement, particularly from the owners of the smaller plants, that if one could get 80 per cent to 90 per cent more power in a non-condensing plant without any increase in coal consumption and with a much less proportional coal increase in a condensing plant, why were these turbines not installed in every condensing plant in the country. He thought that the manufacturers and engineers would be more successful in securing orders if they promised, say, 15 per cent to 20 per cent improvement only. He would not recommend changing over plants of less than 300-kw to 400-kw capacity because in these very small installations the actual cost of power production is not so important as the relatively high fixed investment and labor charges.

Mr. Samuelson, of the British Thomson-Houston Company, Rugby, Eng., said that during the last 12 months his company had been very busy manufacturing mixed-pressure turbines, for which the field was fully opened up in England. The low-pressure turbines employed abroad are of several types and have all been more or less successful. Many practical difficulties have been met and overcome, especially in the case of hoisting machinery, for which it was necessary to devise means of shutting off the supply from the engine when the pressure of the

steams falls to or below that of the atmosphere.

H. B. Carroll read a letter from W. L. R. Emmett, who pointed out that in many cases the question of first cost is not so important now as the cost of producing power from the fuel. There may be cases where it is better to install high-pressure turbines alone, but there are many reciprocating plants which could not afford to make such a change. Mr. Emmett wrote also that the difference between the guaranteed steam consumption figures of the low-pressure turbine and those actually obtained was due to the fact that the guarantees were based on dry steam operation only.

Dr. Steinmetz pointed out that the conditions described in the paper were hardest for the turbine and easiest for the reciprocating engine.

C. O. Mailloux expressed his regrets that so little had been said about improving power stations with poor reciprocating engines by using low-pressure turbines. He believed that very good results could be obtained, particularly if the engine were supplied with superheated steam. As to oil in engines, he had recently seen in London, Eng., an engine connected to a generator of 1500-kw or 2000-kw capacity which for over two years has been successfully lubricated with graphite. When oil was used the life of the piston rings was only about 550 engine-hours, whereas with graphite cylinder lubrication one set of piston rings had reached a life of 4000 engine-hours at the time he left London. This engine is lubricated by the injection of 0.1 oz. graphite every eight hours.

In summing up the discussion, Mr. Stott replied to Mr. Rodder's inquiry about the separation of the oil from the steam by saying that the separator specifications demanded that there should be no more than 0.4 grain of oil per gallon, an amount which he considered entirely harmless. The separator after some preliminary troubles soon came well within the specified limits, and the plant is using all the condensed steam that comes from the turbine. As to Mr. Rodder's query about what machines he would recommend for an initial installation, Mr. Stott laughingly replied that if one recommendation could be made to cover all conditions there would be little use for engineers. The answer to this question depended largely upon the power factor of the plant or, in other words, the ratio of the fixed charges to the operating charges. If the fixed charges are very high, one should not bother so much about the operating cost. For a plant with a 10-per cent peak load, he would not consider a highly expensive initial installation of any kind, particularly such machinery as gas engines. In these instances it was a fallacy to speak of low stand-by charges as the fixed charges were more important. As to Mr. Rodder's statement that the high-pressure turbines probably could do better than their guarantees, Mr. Stott said that he had not received much encouragement from the makers when he was investigating that point. He agreed with Mr. Mailloux that the principle of the low-pressure turbine also was applicable to stations with poor engines. In conclusion Mr. Stott pointed out that all the tests recorded in the paper of the evening were made under operating conditions with the loads varying 15 per cent plus and minus.

STORAGE BATTERY CAR POWER RECORDS MADE IN NEW YORK CITY

During the last week the Edison-Beach storage battery car, described in a recent issue of this paper, has been in operation on the Twenty-eighth and Twenty-ninth Street Crosstown line in New York. Tests were made March 1 to determine the power consumption of the car. Eleven runs, aggregating 52.47 miles, were made in ten hours and five minutes. The gross weight of the car is approximately 6 tons. The watt-hours used were 35,925, making the energy consumed per car-mile 684.6 and the per ton-mile 114.1. The Twenty-eighth and Twenty-ninth Street Crosstown line has few grades, but the track conditions are not very good, and there are several short double curves. The weather during the test was rainy.

THE PHILADELPHIA STRIKE

The refusal of the Philadelphia Rapid Transit Company on March 1, 1910, to arbitrate the differences between the company and its former employees, and that of Mayor Reyburn to intervene in behalf of the strikers, forced the labor leaders to declare effective on March 4, 1910, at midnight, the sympathetic strike with which they had threatened the city and which they claimed would paralyze business interests by throwing between 100,000 and 150,000 men out of work. As soon as the sympathetic strike had been declared, the committee representing the affiliated unions addressed an appeal to the working people of Philadelphia to assemble at Independence Square, on Saturday afternoon, March 5, at three o'clock, "to peaceably participate in a demonstration in behalf of the street-car men's union now on strike."

Mayor Reyburn was prompt to act, and gave wide publicity through the newspapers to a proclamation urging the maintenance of order. He said that no application had been presented for a permit for the assembly, and that the intended assembly would be in violation of his proclamation of Feb. 20, and would endanger the public safety. He called attention to the decision of the Supreme Court defining the uses of highways. It is estimated by the police that 60,000 people congregated in the vicinity of Independence Hall in obedience to the call of the unions, and for the first time since 1776 Independence Hall was closed to American citizens.

The company has gone steadily ahead perfecting its plans for operating cars without the assistance of its former employees, and reported on March 6 that it had 810 cars in operation out of about 1400 cars operated ordinarily on Sunday. The record of cars operated since the beginning of the strike, as published in the *ELECTRIC RAILWAY JOURNAL* of March 5, 1910, showed that on March 1 925 cars were operated, and that the company had 3960 men available. Since then the company has operated the following cars: March 2, 1000; March 3, 994; March 4, 1113; March 6, 810 and March 7, 1156. The record of passengers carried since Feb. 23 follows: Feb. 23, 201,440; Feb. 24, 250,658; Feb. 25, 389,000; Feb. 26, 476,651; Feb. 27, 199,827; Feb. 28, 450,000; March 1, 560,312; March 2, 760,312; March 3, 750,000; March 4, 800,000; March 5, 725,000; March 6, 300,000; March 7, 820,000. On March 9 the company reported that on March 8 it had operated 1090 cars and carried 925,000 passengers. The company is receiving many applications for employment at its Philadelphia offices. Branch employment offices have also been opened in Washington, D. C., Wilmington, Reading, Cincinnati and St. Louis. The company by the end of next week expects to have its full complement of men. In the meantime it is offering to board and provide rooming accommodations for the new men until they can secure permanent quarters.

The labor leaders declared on March 8 that more than 100,000 men were on strike in sympathy with the car men, but according to a police canvas made by Director Clay, of Public Safety, there were less than 20,000 workmen on sympathetic strike. He said that factories employing 121,239 men were not in the least affected by the strike, and in substantiation of the figures which he prepared he issued a statement showing the number of men employed in the principal establishments in the city that had responded to the call of the unions. Such large employers of labor as the Baldwin Locomotive Works, the J. G. Brill Company, the Cramp Ship Building Company and William Sellers & Company reported that the normal number of men was at work in their shops and plants. If more men responded to the call for the sympathetic strike than was indicated by the figures made public by Director Clay, the labor leaders up to March 8 had not issued any statement to refute the figures made public by the director. On March 9, Mr. Clay reported that 3200 of those on general strike had returned to work.

It is generally admitted that the strike is fast petering out, and that the unions were put severely to the test when the company and the Mayor refused to consider arbitration and thus compelled the labor leaders to show the extent of the sympathy of labor itself with the misguided strikers.

In a letter addressed to J. Burwood Daly, attorney for the strikers, dated March 6, 1910, the company, through Mr. Kruger, acknowledged Mr. Daly's letter of March 3, 1910, in which the company was asked to join him in an appeal under the Act of 1893 to the court to settle what Mr. Daly had referred to as serious differences between Division 477 of the Amalgamated Association and the company. Mr. Kruger quoted the statement of one of the representatives of the men on strike to the effect that he knew of no such law. This man had said that he was not surprised that "the company and its City Hall allies

tlement with the union was going to take place, the directors have extended the time within which application may be made under the order of Feb. 25 to midnight of March 7, and warn them not to be further misled by rumors to the same effect, which will be doubtless circulated, but which will not be true.

"After these men have again become our employees we will confer with them with respect to the differences which were being considered when broken off by the strike, with the distinct understanding, however, 'that employees shall be free to join or not to join any organization and may present their grievances to the company individually, or if members of any organization of employees by a committee or the representatives thereof, and there shall be no intimidation or discrimination against any employee so doing by any officer of the company or their subordinates.'

"The strike called by your association was notice that the men affiliated with that association would not agree to this clause or permit any recognition by our company of non-union men, and this is the real issue between the company and the strikers.

"The question, however, has now passed beyond this point and the paramount issue to be determined by the outcome of this strike is whether law should rule and business be conducted in a legal manner under the protection of law.

"As a particular method of treating with our employees as above set forth we suggest that a committee of employees, say, of nine, be selected—three from those hereafter re-employed from those now on strike, three from those who have remained in service during the strike; these six to select three from the whole body of employees in service after March 7. Such a committee would be representative of the whole body of our employees."

On March 3 the company posted up the following notice in all of its depots:

"To Our Loyal Men:

"To quiet any misapprehension that may exist among our loyal men, the management wishes to inform them that they need have no fear that they will be asked to surrender their runs or positions to any man or set of men returning to the



Disabled Car in Philadelphia

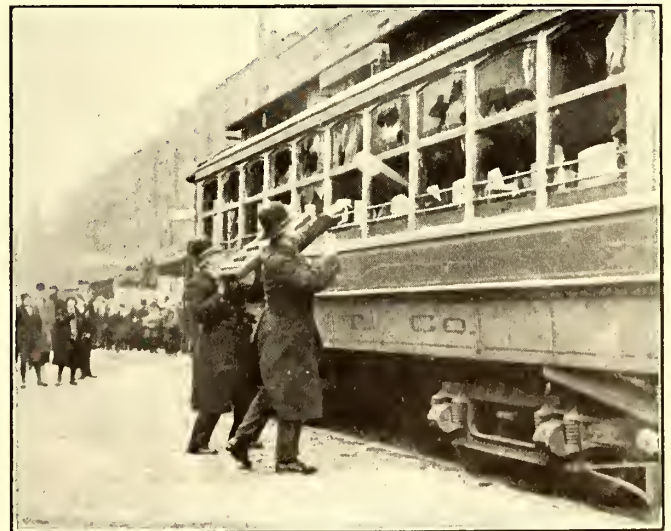
should want to bring this controversy into the politically directed courts, where they are so fond of bringing individuals who oppose them." In his letter Mr. Kruger said, in part:

"Passing over your attempt to force a recognition of an association officered and controlled by people not citizens of this commonwealth, which attempt has now twice within one year paralyzed the business interests of this city, I beg to point out to you that whatever benefit could have been derived from the act in question has been rendered impossible by the action of your association.

"You precipitated a strike at a time when questions between this company and its employees were being adjusted, and so severed the relationship of employer and employee, which is a prerequisite to jurisdiction under the act of 1893. This action on your part puts the question at issue between this company and its former employees beyond the reach of this legislation. The men who were formerly employees of this company, and who gave up that employment at the command of your association, are no longer its employees. They left the company's service on Feb. 19, 1910, thus breaking the yearly contract which their accredited representatives had made with the company on June 5, 1909. Their action in severing the relationship of employer and employee was accepted by the board of directors of this company on Feb. 25, when it notified them that they must return if at all on or before March 1.

"As a reply to the official representative of the Amalgamated Association this letter ends here. However, in order that the attitude of this company may be plainly understood by its former employees and by the public, and in order to show our willingness to adopt any legal method of settlement that promises lasting peace, we here reiterate what we stated in our answer to the Ministers' Association a week ago, viz.: That if our former employees will apply for work we will take back into our employment so many of them as we have room for, giving them such runs as are open, and taking those only whose past records have been satisfactory to the officials of the company; this, however, will cover a very large majority of those on strike.

"Inasmuch as very many of our former employees have been deterred from applying for reappointment under the false and malicious rumors constantly circulated that some form of set-



Police Removing Obstructions in Philadelphia

service of the company. Men who have remained loyal to the company will certainly receive every preference, in respect to the giving of runs and otherwise. Men who have worked during the strike will not be expected to give way to, nor asked to endure, the abuse that, we are informed, they have heretofore suffered from former employees now on strike.

"The officials and board of directors take this opportunity to thank the men who have remained on their cars during the past 10 days; we appreciate your loyalty and devotion and shall not be slow to recognize by every means that lies in our power your faithfulness to the interests of this company."

TEN-CENT FARE TO CONEY ISLAND UPHELD BY PUBLIC SERVICE COMMISSION

An order of the New York Public Service Commission, First District, was issued on March 8, dismissing the complaints against the fare of 10 cents to Coney Island charged by the Brooklyn Rapid Transit system. Although the effort to force reduction of the fare to 5 cents thus fails, the commission was divided on the subject. Commissioners McCarroll, Bassett and Eustis voted for the order. Commissioner Maltbie voted against the order and Chairman Wilcox voted against the order, making the following statement: "I am in favor of dismissing the complaints so far as they affect lines other than the Brighton Beach line operated by the Brooklyn Union Elevated Railroad Company and as the order affects that line I wish to be recorded against the order." Commissioner McCarroll, who presided at the hearings on these complaints, submitted a long opinion. Commissioners Bassett and Maltbie also submitted opinions. The two complaints which led to the consideration of the fare to Coney Island were made by Jonas Monheimer and Scott MacReynolds, who contended that the rate of 10 cents was unlawful, unreasonable and excessive.

Opinion of Commissioner McCarroll:

The opinion of Commissioner McCarroll describes the four elevated routes and seven surface routes of various subsidiary railroads of the Brooklyn Rapid Transit Company which are involved in the proceeding. Mr. McCarroll states in part:

"The contention of the complainants that the 10-cent fare charged is unlawful appears to be without foundation in the light of the decision by the Court of Appeals in the case of *People vs. Brooklyn Heights Railroad Company*, 167 N. Y., 48.

"There has been no change in the situation since that decision was rendered, except that the unified plan of operation has been broken up and the separate companies are in most instances operating their own sections of the respective routes. This makes a less favorable case for bringing the several routes within the terms of the statutes because in the state of facts before the Court of Appeals the entire system was operated, under various leases and agreements, by a single street surface railroad company, the Brooklyn Heights Railroad Company, whereas at present substantially all of the elevated routes and a considerable portion of each of the surface routes are operated by companies holding either an elevated franchise or a steam surface franchise.

"On the question whether the 10-cent fare is excessive or unreasonable the complainants also fail to make out a case against any of the defendant companies.

"The complainant MacReynolds, who took the active part in presenting the complainants' case, directed most of his attention to the subject and method of operation of the several lines, in an endeavor to establish that the respective lines were operated through to Coney Island by a single company. The evidence failed to establish this contention except in the case of the Brighton Beach line and the Coney Island and Gravesend line. The fact of through operation by a single company is not sufficient to invoke the statutory provisions in regard to a single fare, as to either of the two routes last named, and it would not have been sufficient in the case of any of the other routes if the complainant had established such fact of through operation as to them. Neither would the fact of through operation by a single company be a sufficient ground for an order of this commission reducing the fare, without conclusive evidence that the existing fare was unreasonable or excessive. On this point the complainants offered no evidence whatever.

"The only evidence produced by either of them, except on the question of joint or single operation, had reference to the question of over-capitalization of some of the companies, chiefly the Brooklyn Union Elevated Railroad. So far as the evidence adduced by either party is concerned the record tends to indicate a considerable retrenchment by the Brooklyn Union Elevated Railroad Company and some of the other companies through a decapitalization of the securities of some of their predecessors in title. Even if the complainant had established

over-capitalization such fact would not necessarily sustain a reduction of fare without some evidence either (1) that a charge of 10 cents is inherently excessive for the length of ride involved or (2) that the total business of the particular companies is unreasonably profitable and that the earnings of the Coney Island business could be reduced without imposing an unfair burden on the traffic of the remaining portion of the company's line. On all of these points the evidence offered by the complainants is silent. Such evidence as was presented by the complainants could not be regarded as establishing anything upon which reliance could be placed in regard to the cost or value of the properties of the several companies nor anything in regard to the cost of operation nor as to the burden of excessive capitalization."

As tending to show that the 10-cent fare is not excessive Commissioner McCarroll included in his opinion the following table showing the distances in miles which the companies carry passengers for a 5 and a 10-cent fare:

Route.	Distance for 5-Cent Fare.	Distance for 10-Cent Fare.
Brighton Beach Line.....	8.763	11.878
West End Line.....	9.879	11.527
Sea Beach Line.....	8.986	11.353
Culver Line.....	9.027	11.393
Nostrand-Culver Line.....	9.846	12.353
Tompkins-Culver.....	10.462	12.968
Reid Avenue Line.....	11.314	13.814
Vanderbilt Ave. Line.....	8.544	11.051
Union Street Line.....	8.620	10.927
Fifteenth Street Line.....	6.087	8.394

These distances are compiled without reference to extensive transfer privileges, which make the distances susceptible of very significant increases. On each of the routes transfers are given which make a total ride of more than 18 miles for five cents in some cases and of more than 21 miles to Coney Island for 10 cents in some cases.

"It is evident," Commissioner McCarroll says, "that the conditions of travel on the lines of the defendant companies involve very wide variations in the ratio of fare to distances traveled by the individual passenger. Variations of this character occur on the lines of nearly all urban companies in this country, but the conditions prevailing in this city and especially in the Boroughs of Brooklyn and Queens seem extreme and unique. In the case before us the system of fare makes it possible for the great majority of users of the lines in question, on normal and actual routes of transit, to travel 8, 10 and 11 miles, and by transfer even further, as has been shown, for a single fare of five cents. While it is possible that an occasional passenger might have to pay 10 cents for a comparatively short ride in case he boarded a car just before entering a fare zone and left it just after leaving the fare zone, the commission is not cognizant of any complaint that the boundaries of the fare zone are improperly placed. The average length of the fare zones on the several lines is more than three miles, and the boundaries of the zone appear to be so fixed with reference to the business and residential section that few passengers confine their journey to the territory adjacent to the fare zone."

As to whether the 10-cent fare is unreasonable the commissioner says it is necessary to ascertain values, earnings and the relation between the two. The officials of the several defendant companies offered voluminous evidence on the subject of original cost of properties, reductions of capitalization and results of operation "freely and with apparent frankness." After a careful study of the record the commission became convinced that an investigation and valuation of the physical properties would be necessary. Commissioner McCarroll refers to the engagement of Bion J. Arnold in this connection and the resulting appraisal as follows:

"Mr. Arnold is an engineer of wide experience and distinguished reputation in the construction, operation and valuation of electrical railroads. He and a large staff of assistants were engaged for several months in a detailed examination of the properties of the several defendants. The complexity of the examination was greatly increased by the fact that the defendants are separate companies and must be dealt with as

such. Owing to the fact that the Brooklyn Rapid Transit Company owns or controls each of the companies it is generally supposed that the entire system is merely one company.

"This impression is strengthened by the close administrative and operating relations between the various subsidiary companies and a confusion has undoubtedly been fostered by the illogical action of the various companies in marking their cars 'Brooklyn Rapid Transit,' and adopting a standard Brooklyn Rapid Transit uniform for employees. The fact remains, however, that the parties with which the commission is concerned are the various separate defendant companies.

"Mr. Arnold presented sworn statements as to the values of the properties of the separate companies as he found them. These values in the case of real estate are based on the assessed valuation, and in the case of other tangible property are based on the actual cost to reproduce the property, making allowance for reasonable expenses for contractors' profit, surveying, planning and other engineering charges and various incidental items, which although intangible are essential disbursements in the creation of any property such as a street railroad or elevated railroad. The following table contains a summary of the values of the properties of the several companies as testified to by Mr. Arnold and also shows the operating income of the several defendants for the fiscal year ending June 30, 1909, and also the ratio in percentage, which the operating income bears to the value of the property used in operation:

Company.	Value.	Income.	Percentage.
Bklyn. Un. El. R. R. Co.....	\$25,262,154.18		
Canarsie R. R. Co. (leased to Bklyn. Un. R. R. Co.).....	3,283,672.57		
	<u>\$28,545,826.75</u>	\$2,416,374.90	8.46
Bklyn. Hgts. R. R. Co.....	\$510,726.65		
Bklyn. City R. R. Co. (leased to Bklyn. Hgts. R. R. Co.).....	25,066,297.00		
	<u>\$25,577,023.65</u>	1,949,086.52	7.62
Nassau Elec. R. R. Co.....	11,924,049.18	902,452.30	7.56
Bklyn. Q. Co. & Sub. R. R. Co..	4,962,498.70	325,964.10	6.57
So. Bklyn. Ry. Co.....	2,799,279.24	31,024.48	1.10
Sea Beach Ry. Co. (deficit)....	1,489,519.32	7,766.88	...
C. I. & Gravesend Ry. Co.....	463,511.95	7,032.53	1.51
	<u>\$75,761,708.79</u>		

"In the table the value of the property of the Carnarsie Railroad used by its lessor, the Brooklyn Union Elevated is added to the value of the property of the Brooklyn Union Elevated Railroad, in order to get the proper figure of value compared with the corporate income of the Brooklyn Union Elevated Railroad. Similarly, in the case of the Brooklyn Heights Railroad, the value of the Brooklyn City Railroad property is added to that of the Brooklyn Heights Railroad, as the corporate income of the latter company is made up in large part of earnings of the Brooklyn City Railroad.

"From the total valuation as given above there might be deducted the sum of \$797,000 which represents the amount contributed by the city toward the cost of improvements—bridges, crossings, etc.—of the Brighton Beach road of the Brooklyn Union Elevated Railroad. But that affects the percentage figure as stated to such a fractional degree that the change is inconsiderable.

"The foregoing items of valuation do not include any allowance for assessments or for other real estate values in excess of assessed valuation. Neither do they make any allowance for franchise values nor for a considerable amount of development expenses, as for example, interest during period of construction on capital used in construction, reasonable profits of promoting the enterprise, preliminary legal expenses or organization and other legal preliminaries, cost of complying with various preliminary requirements of law. All of these items would be absolutely essential disbursements in the reproduction of any existing railroad, and they would add considerably to the figures of valuation given in the foregoing estimate if proper allowance were made for them.

"Neither has any deduction been made from the income for amounts that would be properly chargeable to reserves and similar accounts. Were these made there would, of course, be a

decrease in the amount of net income or earnings from that shown in the table, and a corresponding deduction in the percentage of profit given. Attention should perhaps here be called to the testimony by the expert as to the excellent standard of efficiency in which the equipment has been constantly maintained, which is highly creditable to the management of the company. He testified that the properties of the companies were in excellent condition and hence any allowance for depreciation would be the minimum usually made, the margin of which varies in such computations from 15 to 20 per cent or more, according to the conditions, 85 per cent is regarded as an average standard of good condition."

The commission reaches the conclusion after examination of the percentages of corporate income, that the figures do not indicate unreasonable earnings on the part of any of the companies. Disturbance of fares of some of these companies would constitute confiscation of the property and therefore be unconstitutional and unlawful. * * * The dividends paid have been infrequent in most cases and small in all cases except that of the dividend paid by the Brooklyn Heights Railroad on the stock of the Brooklyn City Railroad. These dividends to the Brooklyn City Railroad have been relatively small for the reason that the total capitalization of the Brooklyn City Railroad amounts to less than \$19,000,000, as against a present value of approximately \$25,000,000, for its property used in operation. The total payments to holders of securities of the Brooklyn City Railroad at present represent as a consequence only about 6 per cent on the value of the Brooklyn City Railroad property. On a small capitalization of its own the Brooklyn Heights Railroad has very greatly increased the efficiency and serviceability of the Brooklyn City Railroad as it existed at the time of the lease. Neither this commission nor the Legislature could invalidate the lease as it exists, and it would seem that the Brooklyn Heights Railroad is entitled to earn some return on the value which it has added to the property leased.

"While the figures of valuation upon which the foregoing percentages are based, are not complete appraisal of the property, the expert employed by the commission has stated that he is satisfied that there is property of at least the value given in each case and that a more detailed examination would increase the estimate. It is evident, therefore, that the valuations are extremely conservative and that further study of the subject would only have the result of decreasing the percentages of income which have been set forth above.

"It is to be borne in mind in this connection that physical assets are not the only real and valuable properties of a company upon which it is entitled to a fair return. There are numerous other elements which may be properly regarded as capital charges to be considered. We have not dealt with these. It is, of course, true that when existing physical properties closely approach in value the capitalization of a company and the income on the value of these alone is not shown to be an undue, or more than a reasonable, profit, there would be no ground upon which any action could be taken that would look to a reduction of income. The case would be conclusive without going further. That is shown to be the fact in this case."

Certain other general conditions along the line of public policy tend to confirm the opinion of the commission.

"It may well be anticipated," Commissioner McCarroll adds, "that the growth of population in the now so-called 'outlying sections,' will produce a volume of local and short riding travel as will be remunerative to the company, and justify a commensurate reduction in fare. In the meantime, the fact is that the travel in these outlying sections is mostly of long distance riders without compensating short distance travel.

"It is important to bear in mind that almost all the Coney Island travel is peculiarly expensive to the carrying companies as compared with regular residential or business traffic in more settled parts of the city. Aside from the length of the ride, the handling of the Coney Island business is expensive by reason of its extreme fluctuations in volume. While the or-

inary traffic of the company contributes a steady income and involves a regular demand upon its facilities, the Coney Island business requires the company to be prepared to handle enormous numbers of passengers in a single day at irregular intervals during a short period in the summer months. This large volume of travel is most uncertain, varying with the weather and other conditions, but nevertheless, it requires the companies to maintain a large power capacity and equipment useful only when the demand is at its height. This necessarily occasions the investment of an abnormal amount of capital idle during a large portion of the time.

"Testimony upon this point was offered by the defendants going to show that by reason of this peculiar nature of the operations of those lines, the Coney Island business, even at a 10-cent fare, was not profitable. It was testified that a loss upon it was shown on the books of the company for the year 1907 of \$463,443.98. The weight to be given to this statement of loss must be qualified by the fact, also disclosed in the testimony that figures which could be regarded as strictly accurate could not be reached showing the results of the Coney Island business itself, because this has not been segregated in the system of accounting. It must, therefore, be regarded largely in the nature of an estimate. Under the new accounting required by the commission the actual results of this, as well as each of the other branches of the business, will be shown in the future.

"But in the meantime the trend of the testimony offered would indicate that this Coney Island business is not profitable to the companies and there is nothing that would justify the commission in ordering a 5-cent fare. This is more apparent when it is also borne in mind that companies in a solvent and prosperous condition best serve the welfare of the public, both as travelers and investors, and it is in their interest as well as that of their many employees that they should be maintained in this condition."

OPINION OF COMMISSIONER MALTBIE.

Commissioner Maltbie wrote that he opposed "the dismissal of these complaints at this stage of the proceeding. The evidence thus far taken does not warrant such action; upon the contrary, it indicates that the fare should be reduced below 10 cents upon certain lines at least.

"It is probable that the wisest solution of these cases would be a reduction of fares from 10 cents to 5 cents upon the surface lines of the Brooklyn Rapid Transit system running to Coney Island. A 10-cent fare for rapid transit and a 5-cent fare for slower transit not only would be equitable but would tend to distribute the traffic more evenly among the various lines. Those who wish a rapid transit to Coney Island would use the 10-cent lines; those who wish to travel more leisurely, who prefer the surface lines or to whom a 10-cent fare is objectionable financially, would use the 5-cent lines. The net result to the Brooklyn Rapid Transit Company, which controls the various surface and rapid transit lines and to which all net earnings ultimately go, would thus be a gain through the equalization of traffic; and even if a single line did lose thereby, the added profits from other lines would more than offset this loss. Common carriers have long recognized this principle and often have different rates between points varying according to the comfort and rapidity of the service.

"Owing to the doubtful jurisdiction of this commission over the Brooklyn Rapid Transit Company, it is possible that the commission could not force the company to adopt such a plan, however desirable it might be. The only other course apparently open to the commission is to consider separately each of the constituent companies of the Brooklyn Rapid Transit system and to determine whether the 10-cent fare to Coney Island upon its lines should be reduced and by what amount. Such a course might compel a reduction of fare upon the very line which gave the best and most rapid service, and thereby attract to it a still greater number of persons, leaving the other (10-cent) lines with less to do; for if the fare is the same and a passenger has a choice, he will prefer the best and most

rapid line. But no matter how illogical it may be, the position of the Brooklyn Rapid Transit Company and the working of the statutes have forced the commission to consider each company by itself."

After discussing some of the figures of the valuation, Commissioner Maltbie adds: "Financial factors, however, are not the only ones to be considered in this case. Coney Island is virtually a large public park for the Greater City. It is one of the few ocean breathing spaces which are accessible to the masses of our citizens, thousands of whom go there daily during the summer to enjoy the seashore and to secure relief from the heat of the over-crowded city. The dwellers in the congested tenement-house districts of Manhattan and Brooklyn find their only vacation in such trips, and to them the charge of 20 cents for a round trip is a factor of no small importance. Everything that is done, therefore, to bring Coney Island nearer to these crowded districts has a direct effect upon the well-being of the city, and it is in the public interest that fares should be as low as consistent with a fair return upon the capital actually represented in the enterprise.

"It should not be inferred that I favor free or cheap riding at the expense of the stockholders, or that it would be wise to require the companies to carry people at less than a fair return even to parks. I merely wish to point out that in this case there are factors which do not appear in the ordinary fare case having to do with rates from one business or residential district to another.

"Further, the companies in the Brooklyn Rapid Transit system have virtually been given the use of the Brooklyn and Williamsburg bridges.

"In my opinion the evidence so far presented does not warrant a refusal to lower fares, but does indicate that fares can be reduced upon certain lines."

MEMORANDUM OF COMMISSIONER BASSETT.

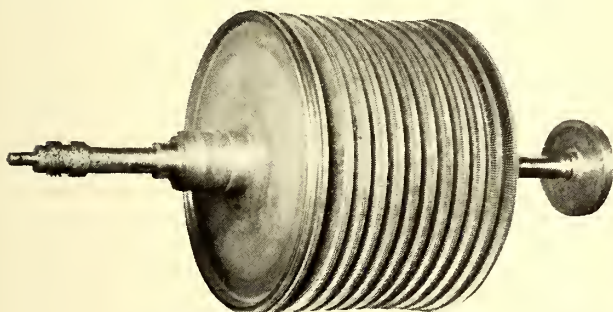
A memorandum filed by Commissioner Bassett says in part: "If a railroad company from its beginning maintains reserves so that at all times it has its entire capital either in its reserves or its depreciated property, its total earnings will be represented by its income from fares and from its reserves. A reasonable rate can then be predicated on its entire income. But if, as in the case with the Brooklyn Union Elevated Railroad, no reserves representing depreciation have been maintained, then the rate must be predicated on the depreciated value of its property. In the case of this railroad, however, if we add all existing elements of value other than franchises to the depreciated value of its property, my opinion is that a total figure is found equal to or greater than that used by Commissioner McCarroll. The rate now earned on this capital is not unreasonable, and if the non-earning years of the company are taken into account it is difficult to say with certainty that present fares should be reduced.

"Even if it were found that present earnings of the Brooklyn Union Elevated Railroad were excessive, it would probably be impossible under existing law to compel a rational fare reduction on the Brooklyn Union lines to Coney Island. Only one line, the Brighton Beach, runs all the way. Parts of the other lines are operated by companies whose returns plainly show that they are not earning an excessive income.

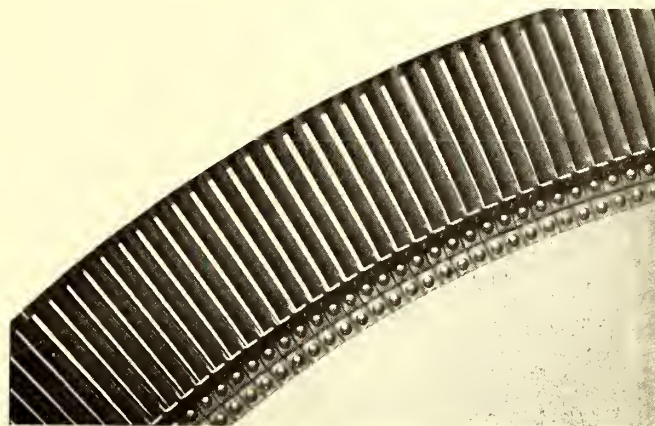
"The accounts of all the companies controlled by the Brooklyn Rapid Transit Company should be so kept that the commission could obtain statistics actually independent instead of fictitiously independent. It is possible that the Public Service Commissions law will be perfected so that the commission can compel a correct practice in this regard. It is also possible that the through route and joint rate provisions of the law will be made more clearly applicable to urban passenger service. Then when the commission finds from statistics, yearly made more perfect, that a lower rate will be a reasonable rate it will be able to prescribe it effectually, regardless of multiplicity of franchises, owners and operating companies."

A NEW HORIZONTAL IMPULSE TURBINE

The accompanying illustrations show the details of the Bergman turbine, as built by Dick, Kerr & Company, Limited, London. This machine is of the impulse type and from five to fifteen pressure stages or chambers, with the same number of wheels, are employed, according to the size of the turbine. In the first chamber the principle of velocity stages has been adopted. Here the steam is allowed to expand from a working pressure of 150 lb. to a pressure of from 15 to 45 lb. The wheel moving in this chamber carries two series of blades separated by a set of stationary reversing blades. This construction eliminates high pressures and temperatures from the rest of the turbine body and simplifies the problem of sealing the turbine from the atmosphere and between the stages. An ingenious "labyrinth" device is employed as a seal in the first chamber.



Rotor for Dick, Kerr Turbine

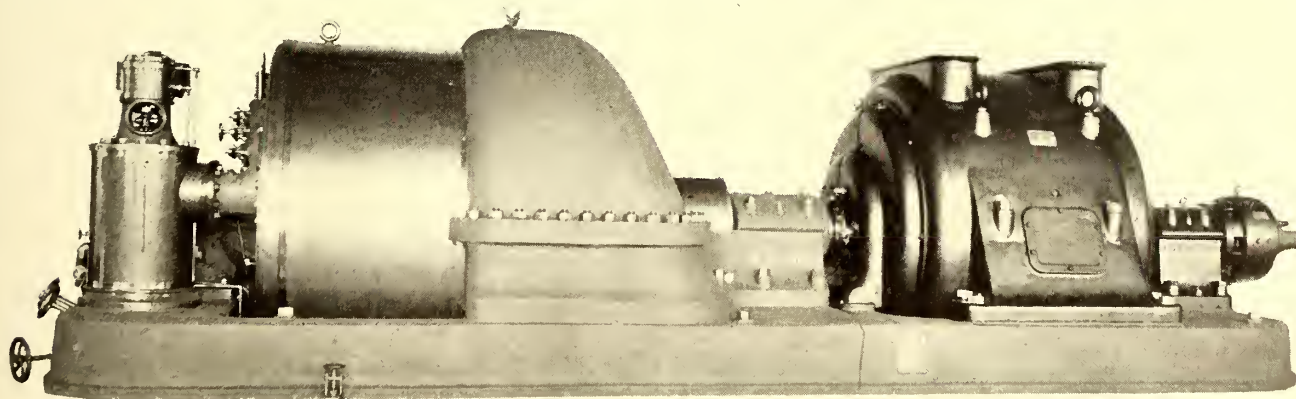


Segment of Low-Pressure Wheel

The body of the turbine consists of a single cast iron cylinder, split horizontally in the center. At the admission end the cylinder is closed by a cover in one piece, which in the case of the smaller sizes of machines is made of cast iron, and in the larger machines of cast steel. No special cover is required on the exhaust end. The body is supported freely on one support, which surrounds the vacuum end of

ing the valves are carried forward in front of the throttle valve and governor, so as to be clear of the parts which are mounted on the end cover. A suitable opening is made in the end cover to carry the complete inlet apparatus.

The guide blades for the remaining stages are of a much simpler construction. The steam channels have the same section throughout their length, and are made of vanes of



6000-HP Turbine Direct Connected to 4800-KVA Alternator, 1500 R.P.M.

the lower cylinder and the exhaust flange. This pedestal bears the entire weight of the cylinder, and is at the same time a support to the turbine and generator bearings. A special pedestal support at the high pressure end of the body is unnecessary. The outer bearing pedestal is provided with a flange bolted to the end cover, near the center, so as to insure correct alignment, and at the same time offer no resistance to expansion. This end bearing pedestal also carries the governor, oil pump and guide block.

The stationary vanes, or guide wheels, are built in two halves, with an annular space in the middle through which the turbine shaft passes. At this point special sealing rings of white metal are fixed, which enclose the shaft without rubbing, and are provided with grooves to reduce the steam leakage between the neighboring chambers to a minimum.

The physical conditions which govern the expansion of steam in the first set of guide blades necessitate nozzles,

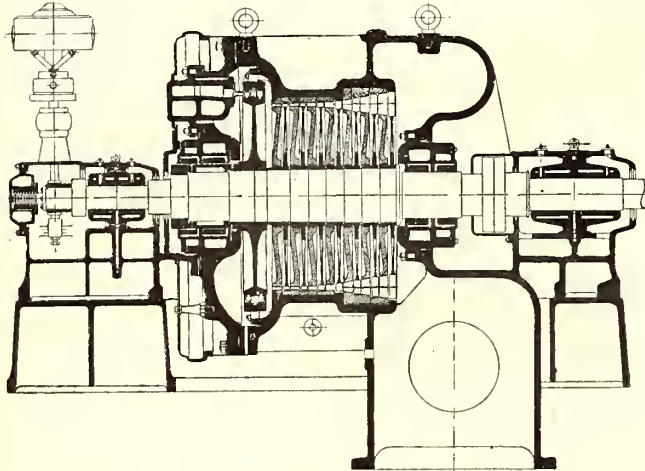
sheet nickel cast into an iron ring which forms the periphery of the guide wheel. The first stage and the following two or three pressure stages have partial admission, and the remaining stages have all-round admission. The guide wheels, as stated, are in halves fitted together with a steam-tight joint.

The rotating wheels of all stages are complete discs of Siemens-Martin steel, and are cast with a thickened hub bored to provide a firm seating on the shaft. The first wheel, which is of the design characteristic of a wheel of uniform strength, is provided with a bulb-shaped rim in which two slots are turned to carry the two series of blades already mentioned. The slots are dovetailed to fit the base of the blades, which are composed of special nickel steel. The high steam velocity in the first stages necessitates a channel of constant area, in order to avoid wasteful steam eddies. This is attained by the blades having a special pro-

file, but in the normal pressure stages this channel is not required.

The ends of the blades of the velocity wheel are closed by means of a band, whose function is to form a confined passage. No forces act upon the band except the centrifugal force due to its own weight. A band similar to that used for the velocity wheel is carried on the ends of the blades of the low-pressure wheel, and after completion the wheels are balanced separately and tested mechanically by running them at a speed corresponding to twice the normal strains.

The bearings which support the shaft are provided with water-cooled oil-pressure lubrication. Oil rings and dividing partitions seal the bearings from the interior of the tur-



Cross-Section of Turbine

bine, so that oil is excluded from the latter and the condensation can be employed for boiler feeding without preparation. A small geared pump, which is driven direct from the turbine shaft, keeps the oil in circulation under a pressure of from 15 to 30 lb. per square inch. After passing through the whole length of the bearings, the oil is pumped to an oil reservoir, where it is cleaned and simultaneously cooled.

The turbines are usually direct connected to electric generators, and, both machines being made in the same factory, the unit is designed as a whole. In the smaller units three bearings permit a rigid coupling between the generator and the turbine shaft. In the larger units four bearings are provided, two for the turbine and two for the generator. In this case a flexible coupling is used, consisting of a number of fine steel wires, which allow for any small inaccuracies in the alignment of the shafts and insure quiet running.

The governor is spring controlled and of the "Hartung" type. It is driven by means of a worm from the turbine shaft, and controls by means of a connecting rod and a guide valve, which directs the flow of the pressure oil into one of two channels. From here the oil passes through into the top or bottom of the cylinder and moves the piston accordingly. The piston rod is direct connected with the throttle valve on the steam supply, so that the latter follows the pressure exerted on the piston by the oil. The operation of the governor is rapid, and lasts but a few seconds. It is, moreover, entirely independent of the pressure of the steam supply, so that it is possible to run the turbine without adjustment with a steam pressure which is much less than normal.

To avoid a great increase in the relative steam consumption at light loads, a second method of governing is provided for the high pressure turbines. The first set of guide blades is divided into several groups, each of which is controlled by means of a hand-operated valve. The single valves can be opened and closed according to the load, and thereby the admission to the first wheel so chosen to obtain the minimum steam consumption. As soon as normal pressure

is raised more than 10 per cent a safety device closes the steam inlet valve. The exhaust outlet is made of exceptionally large dimensions, so as to reduce the pressure drop between the rotor and the condenser to the lowest possible figure.

VALUATION OF THE CONEY ISLAND & BROOKLYN RAILROAD PROPERTY.

A hearing in the fare case involving valuation of the Coney Island & Brooklyn Railroad, took place before the New York Public Service Commission, First District, on Feb. 17.

E. G. Connette, transportation engineer of the commission, testified that he had had 10 years' experience with steam railroads and about 19 years as superintendent or manager of street railways in Nashville, Tenn., Syracuse, N. Y., and Worcester, Mass. With a staff of engineers and other assistants, acting under his direction, he had made an appraisal of the property changes in the Coney Island & Brooklyn Railroad from Feb. 1, 1909, to Feb. 1, 1910, supplementing the valuation made by Bion J. Arnold, as of Feb. 1, 1909.

Mr. Connette offered in evidence a statement showing the result of the supplementary appraisal. W. M. Dykman of counsel for the company, objected on the ground that the statement was not sufficiently authenticated. The objection was overruled by Commissioner Bassett.

Concerning the method which was followed in making the supplementary appraisal Mr. Connette testified that the value of the betterments which were made during the 12 months ended Feb. 1, 1910, was added to the reproduction value as of Feb. 1, 1909, together with three other items, which appeared to have been omitted from the original appraisal. The three items were: Real estate, not used in the operation of the property, \$27,400; buildings not used in operation, \$70,048; feeder wires omitted by mistake, \$3,105.53. The value of the betterments was \$81,206.82. After the value of the betterments was added, a deduction was made from the total amount to cover depreciation under the rules for depreciation followed in the original appraisal. The cost to reproduce the property as of Feb. 1, 1909, as figured by Mr. Arnold, was \$5,877,661.69. The reproduction value on Feb. 1, 1910, was \$5,958,858.48. After a deduction for depreciation accrued during the 12 months of \$42,941.43, the present value of the property as of Feb. 1, 1910, was fixed at \$5,861,122.67.

In making the appraisal a statement from the company of its claims as to additions made to the property was checked and every item allowed except one for paving, which was reduced \$1,000, as it was found, after the pavement was opened, that no concrete base existed. The records of the commission showed a concrete base.

The witness had checked a statement presented by Frank R. Ford, of Ford, Bacon & Davis, concerning additions and betterments which would be needed within the next three years. In this statement allowances of 10 per cent for contractors' profits and 15 per cent for incidentals were made. Mr. Connette and his engineers thought that the latter allowance was rather high for an existing company and had accepted the statement of improvements which Ford, Bacon & Davis said would be necessary, allowing, however, 10 per cent for contractors' profits and but 10 per cent for incidental expenses. The elimination of allowances for State or city permits and fees on property and local consents for doing this work, which Mr. Connette thought would not involve any expense in this instance, would about make up the 5 per cent difference.

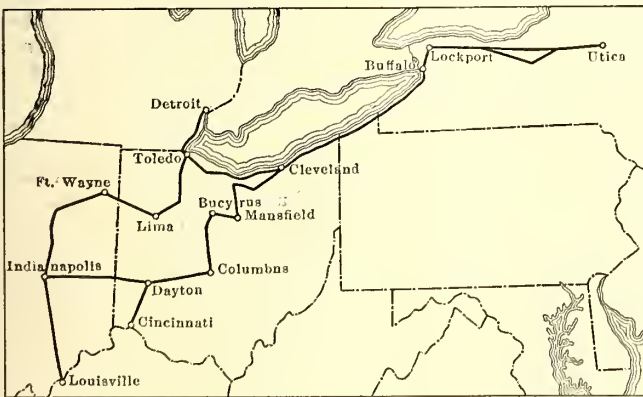
Cross-examination of the witness was deferred until Feb. 24. Mr. Connette took the stand on Feb. 24 and March 2 for cross-examination by William N. Dykman, of counsel for the Coney Island & Brooklyn Railroad. He was followed by Frederick A. Delatour, of Dykman, Oeland & Kuhn, counsel for the company, and James A. Emery, of Ford, Bacon & Davis. Another hearing was held on March 9.

LONG TRIP BY TROLLEY

The trip by trolley from Utica, N. Y., to Indianapolis, Louisville, Toledo, Detroit and Cleveland, planned by business men of Utica, N. Y., and vicinity, as mentioned in the *ELECTRIC RAILWAY JOURNAL* of March 5, 1910, page 426, will be made some time before May 3, 1910, according to arrangements made at a meeting of those interested in Utica recently. At this meeting the following chairmen of the various committees were selected: Entertainment, Lieut. W. G. Mayer; publicity, J. Soley Cole; finances, F. W. Bensberg; hotels, T. W. Johnson; invitation committee, E. B. Odell, F. W. Sessions, P. J. McQuade, W. I. Taber, John L. Maher, Dr. E. H. Douglas and F. J. Baker. The figures secured from the various companies over whose lines the party will travel show that the aggregate distance of the round trip will be 2049.82 miles and that the running time, as made by the cars regularly in operation over those lines, is 81 hours and 48 minutes. Cars of the Oneida Railway will be used for the trip. The summary of the daily runs, the distance and running time follow:

First day, Utica to Rochester, 134.82 miles, 4 hours, 18 minutes; second day, Rochester to Erie, Pa., 169 miles, 7 hours, 33 minutes; third day, Erie, Pa., to Mansfield, Ohio, 202.50 miles, 9 hours, 46 minutes; fourth day, Mansfield, Ohio, to Columbus, Ohio, 98 miles, 4 hours, 35 minutes; fifth day, Columbus, Ohio, to Cincinnati, Ohio, 131 miles, 5 hours, 10 minutes; sixth day, Cincinnati, Ohio, to Indianapolis, Ind., 163.66 miles, 6 hours, 53 minutes; seventh day, Indianapolis, Ind, to Louisville, Ky., 117 miles, 4 hours; eighth day, Louisville, Ky., to Fort Wayne, Ind., 251.50 miles, 8 hours, 40 minutes; ninth day, Fort Wayne, Ind., to Toledo, Ohio, 148 miles, 5 hours, 22 minutes; tenth day, Toledo, Ohio, to Detroit, Mich., 56 miles, 2 hours; eleventh day, Detroit, Mich., to Cleveland, Ohio, 172 miles, 6 hours, 35 minutes; twelfth day, Cleveland, Ohio, to Buffalo, 190.50 miles, 9 hours, 35 minutes; thirteenth day, Buffalo to Utica, 215.82 miles, 7 hours, 21 minutes.

In making the trip the party will pass over the lines of different companies in the following order: Oneida Railway; Buffalo, Lockport & Rochester Railway; International Railway; Buffalo & Lake Erie Traction Company; Cleveland & Erie Railway; Pennsylvania & Ohio Railway; Cleveland, Painesville & Eastern Railway; Cleveland, Southwestern & Columbus Railway; Sandusky, Norwalk & Mansfield Electric Railway; Mansfield Railway, Light & Power Company; Columbus, Marion & Bucyrus Railway; Columbus, Delaware & Marion Railway;



Route of Electric Railway Trip

Columbus Railway & Light Company; Ohio Electric Railway; Terre Haute, Indianapolis & Eastern Traction Company; Indianapolis & Louisville Traction Company; Indiana Union Traction Company; Fort Wayne & Wabash Valley Traction Company; Ohio Electric Railway; Western Ohio Railway; Toledo, Bowling Green & Southern Traction Company; Toledo Railway & Light Company; Detroit United Railway; Lake Shore Electric Railway. The itinerary for the trip was arranged by C. Loomis Allen, general manager of the Oneida Railway, and Charles R. Gowen, secretary to Mr. Allen.

A STREET RAILWAY STEAM MOTOR CAR

The accompanying illustration shows a steam motor car built by H. K. Porter Company, Pittsburgh, Pa., for the Uvalde Street Railway Company, Uvalde, Tex. This machine is simply an entirely enclosed light locomotive, not intended to carry passengers, but to haul one or more light passenger cars. The entire locomotive was built by the Porter company. It is designed for operation on a standard-gage track.

The cylinders are 8 in. x 14 in.; diameter of driving wheels, 30 in.; weight in running order, 28,500 lb.; weight on drivers, 20,000 lb.; boiler pressure, 105 lb.; tractive force 4174 lb.;



Enclosed Steam Locomotive for Street Service

straight-type boiler, diameter, 32 in.; number of tubes, 67; diameter of tubes, 1 3/4 in.; length of tubes, 4 ft. 9 in.; length of firebox, 37 in.; width of firebox at top and bottom, 26 3/4 in.; heating surface of tubes, 143.2 sq. ft.; heating surface of firebox, 32.5 sq. ft.; total heating surface, 175.5 sq. ft.; water capacity, 300 gal.; coal capacity, 300 lb.

COMMITTEE ON RAILWAY MAIL PAY

The committee on railway mail pay, the chairman of which is J. Kruttschnitt, vice-president and director of maintenance and operation of the Union and Southern Pacific systems, has issued a circular and a primer discussing the subject which the committee was organized to investigate. The primer states that the committee represents 139 railroads with 192,808 miles of road. The circular says in part:

"Postal revenue has been increasing at the rate of \$10,000,000 annually and if postal expenses are controlled they should increase much more slowly and in two or three years the deficit should disappear, unless the greater revenue is used for further improvements in service, and, if it is, the public should be willing to foot the bill. The railroads are now underpaid and are receiving less and less of the postal revenue for greater measures of service rendered. Ten years ago, in 1899, of each dollar of postal revenue, 38 cents was paid to the railroads; in 1909 only 24 cents, a decrease of 14 cents, or 37 per cent. The 1909 postal deficit was 8 cents per dollar of revenue, so that had the 14 cents saved from the railroad proportion (or the equivalent of \$29,000,000 on basis of 1909 revenue) been used to reduce expenses instead of further serving the public, it would have wiped out the deficit and left a surplus of 6 cents per dollar, or \$12,000,000. Instead, however, the \$29,000,000 wrung from the railroads was applied to various purposes with the resulting deficit.

"Whether the service shall be improved with an annual deficit or remain stationary with no deficit, or with a surplus, depends on whether further improvement of the service or a favorable financial showing is to be the paramount consideration. The able men in charge of our postal service can easily bring about either result. It is for the public to decide which they want, but in deciding we appeal for justice and a square deal for the railroads."

News of Electric Railways

Tenth Annual Meeting and Banquet of the New England Street Railway Club.

The tenth annual meeting and banquet of the New England Street Railway Club will be held at the Hotel Somerset, Boston, Mass., on March 24, 1910. The regular meeting will convene at 3 p. m. The polls for balloting for officers will open at 3 p. m. and will be closed at 5 p. m. At 6 p. m. there will be a reception and at 6:30 p. m. the banquet will be held.

E. S. Draper, Governor of Massachusetts; Frank B. Weeks, Governor of Connecticut; H. B. Quinby, Governor of New Hampshire; A. J. Pothier, Governor of Rhode Island; G. H. Prouty, Governor of Vermont; Bert M. Fernald, Governor of Maine; Joseph T. Robinson, Arkansas, Congressman from the Sixth District; James F. Shaw, president of the American Street & Interurban Railway Association; P. F. Sullivan, president of the Boston & Northern Street Railway and the Old Colony Street Railway, and William A. Murphy, private secretary to Governor Draper of Massachusetts, have accepted invitations to make after-dinner speeches. Should all the Governors of the New England States attend it will be the second occasion of the kind in the history of New England when the Governors have appeared together on a public occasion.

The price of the banquet tickets is \$3.00 each. As the number of seats is limited, members are requested to make early application for tickets to J. J. Lane, 12 Pearl Street, Boston, secretary of the club, sending the names of the parties who are to use the tickets so that it will be possible to prepare and print a diagram of the seating arrangements.

Program of Central Electric Accounting Conference.

The twelfth regular meeting of the Central Electric Accounting Conference is to be held at the Anthony Hotel, Ft. Wayne, Ind., on March 12, 1910, at 1 p. m. The program of the meeting follows:

Paper—"The Auditor's Relation to the Operating Executive," by A. J. Lamb, of Toledo Railways & Light Company.

Discussion—"Passenger Fare Collections."

Discussion—"Affiliation with Central Electric Railway Association."

Transit Affairs in New York

Mayor Gaynor of New York and his associates on the Board of Estimate have voted to grant a franchise to the Manhattan Bridge Three-Cent Line, which desires to operate cars between the Desbrosses Street ferry, Manhattan, and the Fulton Street shopping district in Brooklyn. This is the route of the proposed new line: Start at Desbrosses Street ferry in West Street, Manhattan; through Vestry Street to Canal Street and by Canal Street to the Manhattan Bridge; over the bridge to Fulton Street, Brooklyn, by way of the Flatbush Avenue extension; then one block up Fulton Street to Rockwell Place; through Rockwell Place to Flatbush Avenue; loop there into Fourth Avenue, and thence by way of Livingston Street to Hoyt Street to Fulton Street, to Bridge Street and, by way of the Flatbush Avenue extension and Manhattan Bridge, back to Manhattan. There the cars will run westward in Canal Street to Vestry Street, and loop around the Desbrosses Street ferry by a short spur through Greenwich Street, which will complete the loop at that end.

John C. Brackenridge, vice-president of the Manhattan Bridge Three-Cent Line, has estimated that it will cost \$850,000 to build and equip the line. He estimates the gross earnings of the company at \$900 a day.

Mayor Gaynor, President Mitchell of the Board of Aldermen, and Controller Prendergast, constituting the special committee on transit of the Board of Estimate, held another conference with the members of the Public Service Commission on March 7, 1910. Chairman Willcox of

the commission informed those present that the preparations for holding hearings on the form of the new subway contracts would soon be completed. Both the Mayor and Mr. Willcox said that President Shonts of the Interborough Rapid Transit Company had not signified whether the company would submit bids on this subway. The impression prevails that the company will shortly present a new proposal to the commission.

The New York Central & Hudson River Railroad has awarded contracts for the construction of two buildings to cover the blocks between Lexington Avenue and Depew Place, Forty-sixth Street and Forty-eighth Street, to be 12 stories high and cost about \$4,000,000. Each building will cover about 16 city lots and will be connected by a series of bridges, which will be built over Forty-seventh Street. The structures will be built by James Stewart & Company, from plans by Reed & Son. The Merchants & Manufacturers' Exchange, organized in St. Louis in 1909, and including in its membership about 300 manufacturers throughout the country, has arranged for a lease of the buildings which will provide space for trade conventions and the exhibitions of merchandise and machinery.

D. Cady Herrick, referee appointed by the Supreme Court in the suit of the New York Central & Hudson River Railroad against the City of New York to prevent the removal of its tracks in Eleventh Avenue and in the west side of Manhattan, has decided in favor of the company on every point. It has been suggested that the company build a tunnel on Eleventh Avenue and electrify its line.

Judge Coxe, of the United States Circuit Court, has directed the return of the suit brought by the people of the State of New York against the Bleecker Street & Fulton Ferry Railroad and others to the State Supreme Court. The action is for the forfeiture and annulment of franchises granted to the company by the Legislature in 1860 and 1873, and for noncompliance with the resolution of the Board of Aldermen adopted Dec. 20, 1883. It was claimed that the company had failed to construct connecting tracks on Mail Street and other streets in New York, and had therefore abandoned all the rights and privileges granted by the franchises.

Electric Locomotives in the Cascade Disaster.—The avalanche which crushed the two trains of the Great Northern Railroad at Wellington, Wash., near the west portal of the Cascade tunnel on March 1, 1910, carried with it three locomotives and four electric locomotives, the passenger station and the water tank. The service will be conducted temporarily with steam.

New Elevated Station Petitioned for in Boston.—A petition has been filed with the Massachusetts Railroad Commission asking that the commission require the Boston (Mass.) Elevated Railway to build an elevated station on its recently completed Forest Hills extension at Green and Washington Streets, in the Jamaica Plain district. The petition raises the issue of the relative ability of the surface and elevated lines to handle the traffic, working in conjunction as at present, with local service by the former and express service by the latter, and the plan of multiplying elevated stations in the outlying districts.

Fenders in San Francisco.—The special committee of the Board of Supervisors of San Francisco which has had under consideration the matter of prescribing a type of fender for use in San Francisco, and which was largely responsible for the passage of the ordinance fixing the type of fender described in the *ELECTRIC RAILWAY JOURNAL* of Dec. 25, 1909, page 1278, agrees with C. N. Black, vice-president and general manager of the United Railroads of San Francisco, that the fender described in the ordinance has too much overhang to be serviceable, and has granted the company a continuance until a test can be made with a new type of Eclipse fender.

Spokane Transportation Club.—More than 50 representatives of steam and electric railways doing business in Spo-

kane met in that city recently and organized the Spokane Transportation Club to promote friendship and sociability among railway officials. It was decided to admit all railway officers, including chief clerks, to membership. The club will meet at luncheon the second and fourth Saturdays of the month. Officers were elected as follows: Waldo G. Paine, Spokane & Inland Empire Railroad, president; J. T. Andrus, North Coast Railroad, first vice president; H. N. Kennedy, Northern Pacific Railroad, second vice president; J. W. McIntosh, Spokane & Inland Empire Railroad, secretary; R. L. Ford, Chicago, Milwaukee & St. Paul Railroad, treasurer.

New President in Kansas City Outlines Policy.—John M. Egan, whose election as president of the Kansas City Railway & Light Company, Kansas City, Mo., was announced in the *ELECTRIC RAILWAY JOURNAL* of March 5, 1910, has issued through the newspapers a statement to the public in which he said in part: "It gives me great pleasure to become once more a resident of Kansas City. My best effort will be used to forthwith familiarize myself with the properties and to furnish to patrons of its lines the best street car service possible. I fully understand the difficulties in furnishing the service that an impatient public may demand. The interests of the companies and the public being largely in common, with mutual aid and forbearance, nothing but good results should follow. My past experience here will, I trust, cause the citizens to have confidence in the statement that the interest of the patrons of the lines and of the cities at large will occupy first place in my mind. The office of the president will be always open to receive suggestions that will have for their object improvement of the service and development of the cities' resources. In speaking of Kansas City I include both cities of that name, as well as the adjacent cities that are served by the companies. The employees can rely on fair treatment and their loyalty to the company's interest and their consideration of the public will be duly recognized."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Maryland.—George R. Gaither, representing the Western Maryland Railway and other companies, appeared before the judiciary committee recently and severely arraigned the advocates of the Strauss public utility bill for their lack of judgment in proposing a measure which he characterized as expensive and unnecessary. The bill, he said, if enacted as it is now drawn will injure the best interests of the State, as Maryland occupies a peculiar position economically when compared with other States, and there has been no real demand for a public utilities commission. Mr. Bryan, the former Attorney-General of Maryland, after explaining that the Pullman Company should not be subject to the commission, said that the Legislature cannot delegate legislative functions to an executive department. Those who demand a public utilities act have permitted four bills to be prepared. There is, first of all, the public utilities bill prepared by Attorney-General Strauss in response to the pledge of the Democratic platform. This bill is now in the judiciary committee of the House of Delegates, whence it will probably be reported very soon. Next is the Pairo bill, which the Republican leaders have drawn up. Both of these bills conflict with a bill prepared by the Reform League. Mr. Gaither has also presented a public utilities bill. A further complication is the appearance in the House of the gas and electric repeal bills, which have diverted attention temporarily from the general public utilities question and also opened up the question of control through competition.

Massachusetts.—The committee on metropolitan affairs has reported a resolve in the House providing that the Massachusetts Railroad Commission and the Boston Transit Commission, sitting as a joint board, shall investigate the subway proposed for the West End district of Boston by the Codman petition and resulting bills recently heard by the committee. The decision rendered by the Transit Commission some months ago was in favor of terminating the Cambridge subway at Park Street, in accordance with the suggestion of the public authorities and the Boston Elevated Railway. The new bills are designed to accommodate

the representation which favored the Scollay Square terminus by the construction of a loop from Cambridge Street to Bowdoin and Scollay Squares and Park Street. The committee on railroads has voted to withdraw the bill providing for the election of the Railroad Commission by the people, and the prospects are that both branches will sustain this view.

The committee on street railways gave a hearing on March 1 upon the bill to require the Boston Elevated Railway to establish a free transfer station at the intersection of Huntington and Massachusetts Avenues, in the Back Bay. Frederic E. Snow, counsel for the company, stated that the matter was one which should be passed upon by the Railroad Commission. It was only natural for passengers to desire to be transferred up and down Huntington Avenue from Massachusetts Avenue cars, but there was no way of confining travel within the limits desired by the petitioners. On account of the abuse of the transfer system, the company felt obliged to refuse to grant any more transfer points than were absolutely necessary. The company was doing all it could to meet the situation by running extra cars direct to the educational institutions concerned, and by giving extra service between the Boston Opera House and the suburbs. The time for final committee reports expired on March 9, but by concurrent vote the time may be extended a month on measures which have still to be discussed and reported.

The committee on street railways has so far reported its conclusions upon only one bill, an unimportant measure concerning the Mt. Sugar Loaf reservation. The committee heard the bill recently to prohibit persons from riding on the running boards of open cars. C. S. Sergeant, vice-president of the Boston Elevated Railway, said it would be impossible to observe the provisions of the measure. The committee on metropolitan affairs has had the various Boston electrification bills referred to it by request of the committee on railroads. The former committee brought in a resolve recently that the railroad corporations operating within the metropolitan district of Boston be requested to prosecute studies with reference to electrifying their passenger and freight service within the district, and to report the results of their studies before Sept. 1, 1910, to the joint board on public improvements for the district created by the Acts of 1909, Chap. 113. At a hearing on the bill to provide for a better connection between the North and South Stations at Boston on March 7, T. E. Byrnes, vice-president of the New York, New Haven & Hartford Railroad, stated that the company desired to build a tunnel for electrified service between the two terminals, and that the suburban lines could be electrified at the same time. The tunnel construction would require about three years and cost \$16,000,000. Mr. Byrnes recommended that a four-track tunnel be built, and stated that if the public authorities are to handle the construction, the company would prefer to have the State rather than the city of Boston do the work.

Ohio.—Although the Woods bill, providing for a public utilities commission, was reported upon favorably by the railroad committee of the House on March 1, indications point to the defeat of the measure in its present form, at least. The passage of the Langdon bill, which creates a State tax commission and extends the provision of the Nicholas law to steam and electric railways, is reported to depend upon the opinion of the Attorney-General regarding the constitutionality of the Cole excise law, which imposes a tax of 2 per cent on the gross earnings of corporations. The Winters bill, which extends the authority of the State Railroad Commission, has not made much progress. A bill has been introduced to require gates at all places where steam and electric railways cross at grade. This would mean the employment of watchmen at all crossings. The Mather bill, which would give electric railways the right of eminent domain outside of municipalities, was passed by the Senate on March 1. A bill introduced by Senator Matthews of Cleveland provides that a franchise for a street railway shall not be operative after a petition for a referendum is signed by 15 per cent of the electors until a vote is taken upon the question. The purpose of this bill is to remove the doubtful point in the Schmidt referendum law.

Financial and Corporate

New York Stock and Money Market

March 8, 1910.

Wall Street seems to have recovered, in a measure, from its uneasiness and to have lost its dread of adverse legislation. There was a steady advance during the week on fairly active trading, with considerable evidence of outside buying. To-day there were signs of profit taking, but not enough to cause noticeable price recessions. Traction shares have been active and Interborough and Brooklyn Rapid Transit have advanced. Third Avenue in only traded in speculatively, the price being about 8.

The money market continues to be easy with quotations at former rates. Quotations made to-day were: Call, 2 3/4 to 3 per cent; 90 days, 3 3/4 per cent.

Other Markets

The labor troubles in Philadelphia are not having the depressing effect upon traction shares that was anticipated. Rapid Transit has declined 2 points during the week, but Union Traction has held its own.

In the Boston market there has been some trading in Boston Elevated and in the shares of the Massachusetts Electric Companies. Prices have advanced only fractionally.

In the Chicago market last week a sale was made of three shares of Chicago City Railway Company's stock at 185. This is the first sale of this stock for many months, and is an advance of 5 points over the last sale. Trading in other tractions was unimportant.

There have been no trades recorded in traction stocks in the Baltimore market during the past week. Sales of the bonds of the United Railways Company continue liberal at former prices.

Quotations of various traction securities as compared with last week follow:

	Mar. 1.	Mar. 8.
American Railways Company.....	a47	a45 3/4
Aurora, Elgin & Chicago Railroad (common).....	a59	a57 3/4
Aurora, Elgin & Chicago Railroad (preferred).....	a94 1/4	a94 1/4
Boston Elevated Railway.....	130 1/2	130 3/4
Boston & Suburban Electric Companies.....	a16 1/2	a16 1/2
Boston & Suburban Electric Companies (preferred).....	a75	a76
Boston & Worcester Electric Companies (common).....	a11	a11
Boston & Worcester Electric Companies (preferred).....	a44	a44
Brooklyn Rapid Transit Company.....	75 7/8	77 3/4
Brooklyn Rapid Transit Company, 1st pref. conv. 4s.....	84	84
Capital Traction Company, Washington.....	a134	a133 1/2
Chicago City Railway.....	a190	a195
Chicago & Oak Park Elevated Railroad (common).....	*2	*2
Chicago & Oak Park Elevated Railroad (preferred).....	*10	*10
Chicago Railways, pteptg., ctf. 1.....	a106	a106
Chicago Railways, pteptg., ctf. 2.....	a34	a33
Chicago Railways, pteptg., ctf. 3.....	a18	a18
Chicago Railways, pteptg., ctf. 4s.....	a9 1/2	a9 1/2
Cleveland Railways.....	*91 1/2	*91 1/2
Consolidated Traction of New Jersey.....	a76 1/2	a76 1/2
Consolidated Traction of New Jersey, 5 per cent bonds.....	a105 1/2	a105 1/2
Detroit United Railway.....	*62	*62
General Electric Company.....	155 1/4	157
Georgia Railway & Electric Company (common).....	a107	a107 1/2
Georgia Railway & Electric Company (preferred).....	a88	a88
Interborough-Metropolitan Company (common).....	23 1/4	23 1/2
Interborough-Metropolitan Company (preferred).....	55 1/2	58 1/4
Interborough-Metropolitan Company (4 1/2s).....	87 1/2	82 1/2
Kansas City Railway & Light Company (common).....	a30	a30
Kansas City Railway & Light Company (preferred).....	a69 1/2	a71
Manhattan Railway.....	137	139
Massachusetts Electric Companies (common).....	a18 1/4	a18 1/2
Massachusetts Electric Companies (preferred).....	a83	a84 1/2
Metropolitan West Side, Chicago (common).....	a16 1/2	a16
Metropolitan West Side, Chicago (preferred).....	a53	a55
Metropolitan Street Railway.....	16	15
Milwaukee Electric Railway & Light (preferred).....	*110	*110
North American Company.....	80	81 1/4
Northwestern Elevated Railroad (common).....	a17	a17
Northwestern Elevated Railroad (preferred).....	a70	a70
Philadelphia Company, Pittsburg (common).....	a51 1/4	a51 1/4
Philadelphia Company, Pittsburg (preferred).....	a45	a44 1/2
Philadelphia Rapid Transit Company.....	a24 3/8	a23 3/8
Philadelphia Traction Company.....	a89	a89
Public Service Corporation, 5 per cent col. notes.....	*100 1/2	*100 1/2
Public Service Corporation, ctf. s.....	a105	a105
Seattle Electric Company (common).....	a115 1/4	a115
Seattle Electric Company (preferred).....	105	a106
South Side Elevated Railroad (Chicago).....	a54	a54
Third Avenue Railroad, New York.....	8 1/2	8 3/8
Toledo Railways & Light Company.....	11 3/4	*11 3/4
Twin City Rapid Transit, Minneapolis (common).....	*113 3/4	114
Union Traction Company, Philadelphia.....	a50 1/2	a50 1/2
United Rys. & Electric Company, Baltimore.....	a14	*14
United Rys. Inv. Co. (common).....	37	*37
United Rys. Inv. Co. (preferred).....	67	*67
Washington Ry. & Electric Company (common).....	a37 1/2	38
Washington Ry. & Electric Company (preferred).....	a90	a89 1/2
West End Street Railway, Boston (common).....	a95	a95
West End Street Railway, Boston (preferred).....	a106	a105
Westinghouse Elec. & Mfg. Company.....	71	75 7/8
Westinghouse Elec. & Mfg. Company (1st pref.).....	*120	125

a Asked.

* Last Sale.

Quarterly Earnings of New York City Companies

The New York Public Service Commission, First District, has issued a statement comparing the earnings of the New York City railways for the quarters ended Sept. 30, 1908 and 1909. Following are the principal operating figures for several of the large properties:

Quarters Ended Sept. 30, 1908 and 1909.

System or company and year.	Railway operating revenue.	Railway operating expenses.	Net revenue, railway operations.	Gross income for corp. and leased prop.
Hudson & Manhattan (a):				
1909.....	\$374,399	\$196,096	\$178,302	\$327,428
1908.....	128,666	134,239	D 5,632	99,011
Interborough Rapid Transit:				
Elevated division—1909.....	3,469,626	1,445,486	b 2,024,140	b3,437,609
Subway division—1909.....	2,826,940	1,086,910	b 1,740,030	
Both divisions—1908.....	5,597,316	2,675,709	2,831,606	2,680,821
Brooklyn Rapid Transit:				
1909.....	5,773,538	3,239,020	2,534,518	2,326,886
1908.....	5,165,990	3,085,552	2,080,438	1,941,400
Metropolitan Street Railway:				
1909.....	3,743,738	2,391,338	1,352,400	1,052,543
1908.....	3,609,953	3,343,252	266,701	D 58,448
Third Avenue Railroad:				
1909.....	2,107,329	1,148,281	959,048	867,734
1908.....	1,864,955	1,258,997	605,958	538,409
Coney Island and Brooklyn:				
1909.....	482,064	265,472	b 216,592	b 197,306
1908.....	485,553	326,976	158,577	146,348
Grand total, all companies:				
1909.....	\$19,506,782	\$10,235,501	\$9,271,281	\$8,459,839
1908.....	17,434,165	11,296,314	6,137,850	5,544,447

N. B.—Deficits and losses are designated by the prefix D. (a) Operation of the lower tunnel (from Jersey City to Cortland Street Station), began July 19, 1909; the length of line operated Sept. 30, 1908, was 3.10 miles; on Sept. 30, 1909, 6.44 miles. (b) Amounts shown above are subject to deductions for depreciation of way and structures and equipment which were not charged to operating expenses.

Boston & Worcester Street Railway, Boston, Mass.—

The Railroad Commission of Massachusetts has approved an issue of 4370 shares of additional stock by the Boston & Worcester Street Railway at \$100 a share. The proceeds of 1580 shares are to pay floating debt; the proceeds of 370 shares, land damage; the proceeds of 1400 shares for permanent additions and 1020 shares for working capital. The company has also applied for permission to issue \$360,000 of additional 4 1/2 per cent bonds for improvements and to retire floating debt.

British Columbia Electric Railway, Vancouver, B. C.—

A private underwriting prospectus issued in London recently offered holders of preferred and deferred stock of the British Columbia Electric Railway £530,000 of 4 1/2 per cent perpetual consolidated debenture stock, ranking pari passu from March 31, 1910, with the existing £800,000 of 4 1/4 per cent perpetual consolidated debenture stock.

Chicago (Ill.) City Railway.—

The Chicago City Railway has declared a quarterly dividend of 2 1/2 per cent, payable on March 30, 1910, to stock of record on March 4, 1910. This dividend is the first for the fiscal year, and hereafter quarterly declarations will be at the same rate, or 10 per cent annually, without extra disbursements as heretofore. In 1909 four quarterly dividends of 1 1/2 per cent each were declared and 4 per cent extra, making 10 per cent, as compared with 9 per cent for 1908.

Chicago (Ill.) Railways.—

The report of the Chicago Railways for the year ended January 31, 1910, compares as follows with the report for the year ended January 31, 1909: Gross receipts for 1910, \$12,438,052, as compared with \$11,037,071 for 1909; expenses for 1910, \$8,706,637, as compared with \$7,725,966; net income for 1910, \$3,731,415, as compared with \$3,311,105 for 1909; interest for 1910, \$2,275,718, as compared with \$1,739,684 for 1909; surplus for 1910, \$1,455,697, as compared with \$1,571,421; city's 55 per cent for 1910, \$800,633, as compared with \$864,270 for 1909; company's 45 per cent for 1910, \$655,064, as compared with \$707,147 for 1909.

Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.—

The Fort Wayne & Wabash Valley Traction Company has sold to Gavin L. Payne, Indianapolis, Ind., an issue of \$100,000 of 5 per cent equipment notes dated March 1, 1910, and due \$10,000 semi-annually to March, 1915, inclusive. The Fidelity Trust Company, Philadelphia, Pa., is trustee of the issue. The notes are secured by a first lien on 26 closed city passenger cars, four interurban cars,

which cost \$11,000 each; two motor express cars and four double-truck trailers for interurban service. The total cost of the equipment was \$135,800, of which \$35,800 was paid in cash.

Lake Shore Electric Railway, Cleveland, Ohio.—The directors of the Lake Shore Electric Railway have asked the holders of the \$3,000,000 of 5 per cent preferred stock of the company to deposit their stock with the Citizens' Savings & Trust Company, Cleveland, Ohio, for exchange for a new issue of \$1,000,000 of 6 per cent cumulative preferred stock and \$2,000,000 of 5 per cent non-cumulative preferred stock on the basis of one share of the new 6 per cent cumulative stock and two shares of the new 5 per cent non-cumulative stock for three shares of the original 5 per cent preferred stock. The \$3,000,000 of 5 per cent preferred stock was issued in two lots of \$1,500,000, with a year and a half intervening. About 7.083 per cent more is due in dividends on the first lot than on the later issue. This difference in the accumulation of dividends will be cared for by the payment of 7 per cent in new stock in the proportion of one-third in the 6 per cent cumulative and two-thirds in the 5 per cent preferred, or in the payment of 3½ per cent in cash if that is desired. About 75 per cent of the stock is owned by investors represented by the Everett-Moore interests.

Meadville & Conneaut Lake Traction Company, Meadville, Pa.—The sale of the property of the Meadville & Conneaut Lake Traction Company under foreclosure has been ordered for April 12, 1910. The company controls the Meadville Traction Company and the Meadville, Conneaut Lake & Linesville Railway and operates between Meadville, Harmonsburg and Linesville, a distance of about 30 miles.

Menominee & Marinette Light & Traction Company, Menominee, Mich.—The Railroad Commission of Wisconsin has authorized the Menominee & Marinette Light & Traction Company to issue \$200,000 of 5 per cent bonds of the denomination of \$1,000 and \$500, dated March 1, 1910, and due March 1, 1925, to provide for the completion of the company's power development and the payment of outstanding floating debt.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—The Railroad Commission of Wisconsin has authorized the Milwaukee Electric Railway & Light Company to issue \$1,000,000 of additional refunding and extension mortgage 4½ per cent bonds. The proceeds of the issue are to be used for extensions and improvements. This will make \$7,728,000 of the issue outstanding.

Philadelphia (Pa.) Rapid Transit Company.—The Philadelphia Rapid Transit Company has arranged with Drexel & Company, Philadelphia, to purchase at par and interest the \$250,000 of second mortgage 5 per cent bonds due on March 1, 1910, and extend them at 4 per cent till 1960 without the right of prior redemption.

Twenty-eighth & Twenty-ninth Streets Crosstown Railroad, New York, N. Y.—The property of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad will be sold under foreclosure on March 23, 1910, by Jos. P. Day, auctioneer, at 14 and 16 Vesey Street, New York. The upset price is \$50,000.

Washington, Baltimore & Annapolis Electric Railway, Washington, D. C.—Judge Morris in the United States Circuit Court at Baltimore on Feb. 28, 1910, signed an order extending the time of the receivers of the Washington, Baltimore & Annapolis Railway 90 days to pay the coupons due on March 1, 1910, on the \$1,703,000 of guaranteed 5 per cent bonds of the Baltimore Terminal Company.

The Washington (Ind.) Street Railway, operating three miles of line in Washington, suspended service on Feb. 28, 1910, on account of a disagreement with the City Council on the price to be paid for power furnished by the municipal light plant. The contract for power had expired. The company wanted power at 1¼ cents per kw, while the members of the Council were opposed to selling power for less than 3 cents per kw. Service was restored on March 3, 1910, pending an agreement between the city and the company.

Traffic and Transportation

Increase in Wages in Roanoke

The Roanoke Railway & Electric Company, Roanoke, Va., increased the wages of its conductors and motormen in some instances 2 cents an hour on Feb. 1, 1910. The statement of the company concerning the increase was signed by J. W. Hancock, general manager, and is as follows:

"1. The following rates of pay for conductors and motormen will be in effect beginning Feb. 1, 1910: First year, 17 cents per hour; second year, 19 cents per hour; third year, 20 cents per hour; fourth year and thereafter, 21 cents per hour. For work on regular schedule cars on the Salem division, running through to Salem, and on extra cars running through to Salem on which fares are collected, 1 cent per hour in addition to the above schedule will be paid. This will not apply on chartered cars or extra cars to Fairview.

"2. Any employee or any number of employees who have a complaint will be given a hearing by the superintendent in accordance with the rules, and in the event that the action of the superintendent in reference to any complaint is deemed unsatisfactory, it may be referred to the general manager; and should the general manager find a suspended or dismissed employee not guilty of the offence for which he was suspended or dismissed he will be reinstated without deduction from his wages for the time lost by reason of such suspension or dismissal.

"3. Conductors and motormen will be provided with badges entitling them to transportation, and a reasonable amount of transportation will be given them for their immediate families upon proper request.

"4. Crews will be assigned to runs according to length of service, the men who have been longest in the service of the company being given preference, with regular runs as nearly 10 hours as possible, except on Sunday.

"5. Crews will be paid from the time they report for work under orders previously given until relieved, and when held on duty for emergency will be paid for the time so held, following the custom heretofore existing, and for not less than one hour unless relieved by request."

Order Regarding Service to Lake Park, Milwaukee

In the decision by the Railroad Commission of Wisconsin regarding service over the Lake Park line of the Milwaukee Electric Railway & Light Company it is held that no vested rights exist which may be urged by citizens to resist the discontinuance of street railway service on any line when the change would be more beneficial to the general public. The commission says in part:

"We do not believe that the testimony would warrant us in ordering such service for 12 months in the year. We think that an improved service from June 1 to September 30, inclusive, of each year, as long as the conditions remain as they are today, will meet the requirements; nor does it appear to us necessary to provide an additional direct line into Lake Park during all the hours of the day during which the street car system is being operated. We think that direct service over the Farwell Avenue line into the park between the hours of 9 a. m. and 9 p. m. will be sufficient to overcome the objections which have been raised in the testimony against the existing service. In other words, it must be inferred from the testimony that at least some of the residents of Prospect Hill believe that as property owners there they have a vested right in a certain part of the line of the street railway and the service furnished over that line. We doubt whether this position is well founded either in ethics or in law. Even a casual examination of the entire street railway system of Milwaukee shows quite conclusively that in many sections of the city inhabitants are obliged to walk greater distances than the residents of Prospect Hill in order to reach a street car line. If we should hold in this respect that the street railway service on Prospect Hill is inadequate we should by the same process of reasoning, be compelled to declare the street railway service furnished to many other sections of the

city of Milwaukee inadequate. There may be inadequacy of service in some sections of the city. At the present time we are not discussing that."

Bulletin on Courtesy

J. F. Roach, chief dispatcher of the Oregon Water Power Division of the Portland Railway, Light & Power Company, Portland, Ore., who has been addressing a notice daily to the employees under his jurisdiction concerning some phase of their work issued substantially the following communication to the conductors recently.

"You are urged to be as courteous as possible to your passengers and persons asking for information, and you should use your best efforts to show your willingness to do this. Numerous cases could be quoted where a facetious or discourteous answer has been directly responsible for the adverse criticism of the company and its agents by parties seeking information. It is not fair to assume that every one is as fully acquainted with the various phases of operation as you are, and persons who ask what may appear to you a foolish question, generally do so because they are confused at the time and have not stopped to think. In cases of this kind, the conductor, above all persons, should be the one to assist them. He should make allowances for the shortcomings of those with whom he is thrown in contact daily, rather than hold them up to ridicule. Courteous attention should be given to cases of this kind and to those who are disposed to cause trouble. No matter how caustic or insinuating a remark may be, the person who utters it generally finds his match in the conductor who is civil. Civility is the best weapon that a conductor can use and it seldom misses the mark. While this is addressed to conductors on account of their coming into very close contact with the public, motormen will do well to follow the advice given."

Freight Rights Asked in Evansville.—The Evansville (Ind.) Terminal Railway has applied to the Board of Public Works of Evansville for permission to carry freight in Evansville.

West Penn Railways Resumes Trolley Talk.—The West Penn Railways, Connellsville, Pa., has resumed the publication of *Trolley Talk*, a four-page circular devoted to the interests of the company.

Service on the Oregon Electric Railway.—The Railroad Commission of Oregon has ordered an investigation of the accommodations provided passengers by the Oregon Electric Railway, Portland, Ore.

Fender Ordinance Passed in Roanoke.—The Common Council of Roanoke, Va., has adopted an ordinance requiring the Roanoke Railway & Electric Company to equip its cars with fenders by May 1, 1910.

Convention of the Southwestern Electrical & Gas Association.—The sixth annual convention of the Southwestern Electrical & Gas Association will be held in Beaumont, Texas, on May 12, 13 and 14, 1910.

Pay-as-You-Enter Cars in Cincinnati.—The Cincinnati (Ohio) Traction Company placed three pay-as-you-enter cars, built under license from the Pay-As-You-Enter Car Corporation, New York, N. Y., in operation on its lines on March 1, 1910. Others will follow.

Snow Cost in Boston.—Up to March 1, 1910, the snow expense of the Boston (Mass.) Elevated Railway for the winter of 1909-1910 was \$170,000, or \$145,000 more than the winter of 1908-1909. The snow expense for 1909-1910 is the heaviest since 1904-1905, when the expense was \$190,104.

Conference with Employees of Connecticut Company.—Representatives of the employees of the Connecticut Company conferred in New Haven on March 3, 1910, with Calvert Townley, vice-president of the company, and J. K. Punderford, general manager, regarding the readjustment of the terms of service. Another conference will be held.

Toledo & Chicago Interurban Railway Increases Facilities.—The Toledo & Chicago Interurban Railway, Kendallville, Ind., is extending its telephone line to the interurban station in Ft. Wayne so that connections may be arranged

for through passengers if cars of the initiating line are late. The company has increased its Saturday train service out of Indianapolis.

Buffalo & Lake Erie Traction Company Commutation Ticket.—The Buffalo & Lake Erie Traction Company, Buffalo, N. Y., on March 30, 1910, will begin the sale of a 54-trip individual non-transferable ticket at the rate of 1 cent per mile or fraction thereof per trip. No ticket will be sold for a distance of less than 5 miles. This is a reduction over the regular rate of one quarter of a cent per mile.

Ticket Books in Poughkeepsie.—On March 28, 1910, the Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., will place on sale ticket books containing 15 tickets, for \$1.00, each ticket good for one fare in either direction between any point within the 5-cent zone of the company and the Fulton Street station of the Central New England Railroad at Poughkeepsie. This is a reduction from the combination of local fares.

Freight Service Desired in Montreal.—The Montreal (Que.) Street Railway has asked the City Council of Montreal to grant the company a 10-year franchise for the transportation of freight in the city, provided the company pays the city 5 per cent of its gross annual earnings above \$100,000 from the operation of the freight service. Freight cars would not be run between 5 p. m. and 7 p. m. The Board of Control has been asked to report to the Council on the matter.

Extension of New York Central Electric Service.—The New York Central & Hudson River Railroad has announced that service with electric trains will be begun over its Harlem division to White Plains on March 14, 1910. An advertisement of the company published in the daily newspapers recently which called attention to this feature of the company's service was reprinted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 19, 1910, page 333. The new service will practically double the mileage served by the electrified lines of the company.

Advertising Department Office of Illinois Traction System in Peoria.—The advertising department of the Illinois Traction System, which has been located at Springfield, Ill., in the offices of the traffic department, has been moved to Peoria and the routine work consolidated with that of the department of publicity, located in the general offices of the Illinois Traction System and the Western Railways & Light Company. J. H. Ryan will continue his duties as advertising manager under the direction of the department of publicity, which is in charge of Fred G. Buffe.

Clubhouse for Subway and Elevated Employees in New York.—The Interborough Rapid Transit Company, New York, N. Y., opened on March 2, 1910, at the Bronx Park terminal of its elevated lines the first of six clubhouses which are being built for the exclusive use of its employees at the terminals of the subway and elevated lines. Each of the houses is being fitted with shower baths, kitchens, billiard and pool tables and a library. Good, wholesome food will be served to the men at cost. The directors of the company set aside \$50,000 for building and equipping the clubhouses, and August Belmont, chairman of the board of directors of the company, gave \$10,000, which will be used for special furnishings, newspapers and periodicals.

Unsanitary Cars Caused by Thoughtless Passengers.—T. F. Grover, general manager of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has asked the State Board of Health to assist that company in a crusade against unsanitary cars. In a letter to the board Mr. Grover stated that the patrons of the company were largely responsible for the unsightly and unsanitary condition of many cars and assured the board that the company would be glad to accept any recommendation that would tend to improve these conditions. Secretary Hurty of the board thought Mr. Grover's attitude a commendable one. According to Mr. Hurty the board will take the matter up with railways with a view to adopting measures to restrain passengers from abusing the privileges which they now enjoy.

Interchangeable Coupon Ticket Books on the Buffalo, Lockport & Rochester Railway.—On February 22, 1910, the

Buffalo, Lockport & Rochester Railway, Rochester, N. Y., with the approval of the Public Service Commission of the Second District of New York, placed on sale at \$10 each interchangeable coupon ticket books containing transportation of a face value of \$12, good for the passage of the purchaser and family for one year from the date of sale between all local stations on the Buffalo, Lockport & Rochester Railway and over the lines of other electric railways as specified in the tariff. Local mileage books are to be sold at the following prices: for books of 300 miles, not heretofore sold, \$5; for books of 500 miles, \$8.33, a reduction of \$1.66; for books of 1000 miles, \$16.66, a reduction of \$3.34.

Near Car-Stop Rule in Chicago.—The railway and police officials in Chicago are reported to have decided on a traffic zone bounded by Halsted Street on the west, Chicago Avenue on the north, Lake Michigan on the east and Twelfth Street on the south inside of which, beginning on April 1, 1910, street cars will stop on the near side of the street. On corners where cars pass around curves, however, they will be permitted to stop at the far end of the curve at the request of the railway officials. It is expected that the near-crossing rule will aid in relieving congestion in the business district, as the cars will be required to make only one stop at street intersections. Preliminary arrangements for this change in operation were made in December, 1909, but the date of inaugurating the plan was postponed until April 1, 1910, so as to avoid the holiday congestion and any inconvenience which snow-covered streets might cause.

New Folders of the Terre Haute, Indianapolis & Eastern Traction Company.—Two folders of similar typographical design have just been issued by the Terre Haute, Indianapolis & Eastern Traction Company. One contains a list of 300 towns and cities in Indiana, Ohio and Illinois, between which express service is offered at freight rates. The freight pamphlet contains a map of the system and an excellent illustration of a large express car. The passenger pamphlet contains an alphabetically arranged list of 425 passenger stations in Ohio, Indiana and Illinois reached by the railway; an illustration of one of the 62-ft. limited passenger cars; an announcement of special and chartered cars; the connections with intersecting steam railroads and a map of the system. It is stated that passengers can secure through tickets at all principal stations to points reached by electric railways in Indiana, Ohio, Kentucky and Illinois. The Central Electric Traffic Association 1000-mile book, good over interurban railways in Ohio and Indiana which operate more than 2000 miles of line, is accepted by the Terre Haute, Indianapolis & Eastern Traction Company on its limited trains.

Service in the New York Subway.—Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, submitted a plan for improvement of the express service in the subway which may be substituted for the order issued by the commission on Feb. 18, 1910, and published in the *ELECTRIC RAILWAY JOURNAL* of Feb. 26, 1910, page 356. The plan went into effect on March 8, and will be continued until March 17. The commission has suspended its order until that time, when Mr. Hedley's plan will be substituted if it has proved satisfactory. The order required the operation of both express and local trains at maximum capacity during the rush hours, and at two-minute headway during the rest of the day, except after 8:30 at night, when a three-minute headway was to be allowed. The schedule proposed by Mr. Hedley follows: From 7 a. m. to 10 a. m., headway of 1 min. and 48 sec.; from 10 a. m. to 10:30 a. m., headway of 2 min.; from 10:30 a. m. to 2:53 p. m., headway of 2½ min.; from 2:56 p. m. to 3:40 p. m., headway of 2 min.; from 3:40 p. m. to 6:10 p. m., headway of 1 min and 48 sec.; from 6:10 p. m. to 6:40 p. m., headway of 2 min.; from 6:40 p. m. to 12 o'clock midnight, headway of 3 min. Between the hours of 10:30 a. m. and 2:56 p. m., under the 2½-min. headway, the company proposes to run eight-car trains on the Lenox Avenue branch and five or six-car trains on the Broadway branch. The schedule of the local trains of the company will not be changed until a thorough trial has been had under the new plan which has gone into effect on the express lines of the company.

Personal Mention

Mr. S. P. Bradshaw, master mechanic of the Berkshire Street Railway, Pittsfield, Mass., has also been appointed master mechanic of the Pittsfield Electric Street Railway.

Mr. Alexander Shaw, one of the superintendents of the Berkshire Street Railway, Pittsfield, Mass., has also been appointed superintendent of the Pittsfield Electric Street Railway.

Mr. J. C. Elberson, formerly chief engineer of the Philadelphia & Western Railway, Philadelphia, Pa., has become connected with the sales department of the Electric Storage Battery Company, Philadelphia, Pa.

Mr. H. S. Kneedler, who for five years was in charge of the publicity department of the Pacific Electric Railway, Los Angeles, Cal., has been appointed secretary of the Commercial Club, of Caldwell, Idaho.

Mr. Gustaf Holmgren, formerly chief engineer of the alternating-current department of the All. Svenska Elektriska Aktiebolaget (Swedish General Electric Company) at Westeros, Sweden, is on a visit to the United States.

Mr. J. B. Crawford has resigned as superintendent and purchasing agent of the Winona Interurban Railway, Warsaw, Ind. Mr. Crawford will reside in Warsaw for the present, but has not yet announced his plans for the future.

Mr. John C. Parker, mechanical and electrical engineer of the Rochester Railway & Light Company, Rochester, N. Y., has been appointed non-resident lecturer on electric power transmission at the University of Michigan, Ann Arbor, Mich.

Mr. C. B. Baker, who has been connected with the Western Ohio Railway, Lima, Ohio, for some time, has been appointed auditor of the Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, to fill the vacancy caused by the death of W. I. McClure.

Mr. Clyde J. Furlong, for three years car house foreman of the Detroit, Jackson & Chicago Railway at Ypsilanti, Mich., has been appointed division superintendent of the Detroit (Mich.) United Railways, with headquarters at Flint, to succeed Mr. George Ferguson, resigned.

Mr. Waldo G. Paine, second vice president and traffic manager of the Spokane & Inland Empire Railroad, Spokane, Wash., has been elected president of the Spokane Transportation Club, recently organized by representatives of steam and electric railways doing business in Spokane to promote sociability among the officials of the companies.

Mr. D. Van Dermei, who has been employed with the Illinois Traction System, Peoria, Ill., as superintendent of overhead lines for the last six years, has resigned from the company to become superintendent of the electrical department of the Muskogee Gas & Electric Company, Muskogee, Okla. Mr. Van Dermei was formerly connected with the Kalamazoo Valley Electric Company.

Mr. C. Nelson Ryan, who has been assistant secretary and assistant treasurer of the Eastern Pennsylvania Railways, Pottsville, Pa., for two years, has accepted the position of auditor of the Albany & Southern Railroad, with headquarters at Albany, N. Y. Prior to his connection with the Eastern Pennsylvania Railways Mr. Ryan was traveling auditor for J. G. White & Company, Inc., of New York, N. Y. His associates at Pottsville presented him a handsomely engraved gold watch as a token of their esteem.

Mr. Thomas A. Leach, whose appointment as superintendent of employment and inspection of the Worcester (Mass.) Consolidated Street Railway was announced in the *ELECTRIC RAILWAY JOURNAL* of Feb. 19, 1910, began his railway career as a switchboy on the Metropolitan Street Railway in Boston in 1869. He subsequently became a starter, and in 1881 and 1882 served as inspector. From 1884 to 1887 Mr. Leach was connected with the South Boston Railway and the Highland Railway. In July, 1887, he became connected with the street railways in Worcester under Mr. J. N. Akarman, superintendent. He was subsequently appointed inspector of the Worcester Consolidated Street Railway and, when Mr. R. T. Laffin was general manager of the company, he was appointed superintendent of Division 1 of the company.

Mr. H. B. Kamschulte has resigned as engineer of way of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to become associated with Mr. G. Pickhardt in the Kamschulte-Pickhardt Engineering & Construction Company, Milwaukee, Wis. Mr. Kamschulte was connected with the Milwaukee Electric Railway & Light Company more than 10 years, and located all the lines of the company. Mr. Pickhardt was also connected with the Milwaukee Electric Railway & Light Company, and assisted in building the Milwaukee Western Electric Railway, now under construction from Beaver Dam to Milwaukee, and also helped to electrify and extend the Salt Lake & Ogden Railway. Mr. Kamschulte is president of the Kamschulte-Pickhardt Engineering & Construction Company, and Mr. Pickhardt is secretary-treasurer of the company.

Mr. C. Ernest Calder, chief clerk of the Eastern Pennsylvania Railways, Pottsville, Pa., for the last two years, has been elected assistant secretary and treasurer of the company to fill the vacancy created by the resignation of Mr. C. N. Ryan, who has accepted the position of auditor of the Albany Southern Railroad, Hudson, N. Y. Mr. Calder's railway experience covers a period of more than eight years. In 1902 he was employed in the construction department of the Choctaw, Oklahoma & Gulf Railway, with headquarters at Little Rock, Ark. He resigned this position to become revision clerk with the Cincinnati, Hamilton & Dayton Railroad and the Pere Marquette Railway at Cincinnati, Ohio. After serving in that capacity for two years he resigned to accept the position of assistant cashier for the J. G. White Construction Company, which had charge of the extensive construction work for the Tri-City Railway & Light Company, Davenport, Ia. In 1906 he was appointed cost analysis engineer by the J. G. White Construction Company, and in 1907 resigned to accept the position of chief clerk of the Eastern Pennsylvania Railways. Mr. Calder was instrumental in introducing many new and important features in the accounting department of the company, and in recognition of his valuable services was elected assistant secretary and treasurer.

Mr. George L. Radcliffe, whose appointment as superintendent of the Cleveland (Ohio) Railway to succeed Mr. W. T. Cook was announced in the *ELECTRIC RAILWAY JOURNAL* of March 5, 1910, has been superintendent of the Schenectady (N. Y.) Railway since July 18, 1908. Mr. Radcliffe, however, for many years was general superintendent of the Cleveland (Ohio) Electric Railway, and accepted the appointment to the Schenectady Railway following the turning over of the management of the lines in Cleveland to the Municipal Traction Company. Mr. Radcliffe first served as a clerk under Mr. J. J. Stanley with the Broadway & Newburg Railway, in Cleveland. He was advanced gradually in the service and finally became superintendent of the Cleveland Electric Railway. When Mr. H. A. Everett and his associates secured control of the company, Mr. Radcliffe became connected with one of the companies which now is part of the Utica & Mohawk Valley Railway and remained in Utica for three years. Following the embarrassment of the Everett-Moore syndicate and the taking over of the Cleveland Electric Railway by Mr. Horace E. Andrews and Mr. J. J. Stanley, Mr. Radcliffe returned to the company as superintendent. After the consolidation of the Cleveland City Railway and the Cleveland Electric Railway, Mr. Radcliffe became general superintendent of the consolidated system, controlling all the lines in the city.

Mr. E. B. Kirk has resigned as general manager and purchasing agent of the Atlantic Shore Line Railway, Kennebunkport, Maine, and sailed for London, Eng., on the *Kaiser Wilhelm der Grosse* on March 8, 1910, to become connected with the operating department of J. G. White & Com-

pany, Inc., in charge of their railway and electric light properties at Para and Manaos, Brazil. Mr. Kirk was born in Chicago, Ill., on Aug. 29, 1874, and was graduated from Purdue University, Lafayette, Ill., in 1897 with the degree of electrical engineer. In July, 1897, he took charge of a small lighting station at the State Hospital, Jacksonville Ill., and in July, 1898, he entered the service of the Jacksonville (Ill.) Railway as working foreman in the repair shop. In January, 1899, Mr. Kirk was made superintendent of the Jacksonville Railway. He next entered the commercial field as engineer of tests of the Milwaukee Electric Company, but in October, 1903, he became electrical engineer and master mechanic of the Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., in charge of the power house, substations and repair shops. In December, 1904, Mr. Kirk was appointed vice-president and general manager of the Winnebago Traction Company, Oshkosh, Wis. In July, 1907, Mr. Kirk was appointed general manager of the Sterling, Dixon & Eastern Railway and the Lee County Light Company. He remained with these companies until March, 1908, when he accepted the position of general manager of the Atlantic Shore Line Railway, operating 95 miles of electric railway in Southern Maine.

OBITUARY

Allen P. Scovill, for 40 years connected with the Alton, Granite & St. Louis Traction Company, and the East St. Louis & Suburban Railway, East St. Louis, Ill., is dead. For the last 10 years Mr. Scovill had charge of the construction and reconstruction work on the company's lines.

Albert Stetson, who with James N. Stetson, his cousin, controlled the California Street Cable Railroad, San Francisco, Cal., is dead. Mr. Stetson was born in Kingston, Mass., in 1834, and was graduated from Harvard. Among his associates were Ralph Waldo Emerson, Oliver Wendell Holmes and Horace Mann.

Lazarus F. Minzesheimer, attorney for the Chicago (Ill.) City Railway, died on March 2, 1910, following an operation for the removal of a tumor. Mr. Minzesheimer was born in New York in 1861. Early in his career he was connected with Judge Julius S. Grinnell, and in 1887, was associated with Mr. Lazarus Silverman in the banking business. During the negotiations for the rehabilitation franchises for the street railways in Chicago in 1907 Mr. Minzesheimer took an important part in the deliberations before the local transportation committee of the Chicago City Council and is credited with having made many suggestions which led to the completion of the final franchises.

NEW PUBLICATIONS

Kalender für Betriebsbeamte Elektrischer Bahnen (The Electric Railway Operator's Annual). By Arthur Ertel. Published in Hanover, Germany, by Dr. Max Jänecke; 168 pages; illustrated. Price in paper covers 4.20 marks (\$1.05), and in cloth, 5 marks (\$1.20).

Engineering annuals are very popular in Germany, but this appears to be the only one prepared for railway managers. The idea of the author is to give illustrated descriptions of the principal apparatus in each department, together with digests of operating rules, legal regulations, transportation methods, etc., and a diary to cover entries for one year. The book is revised annually. In general, the text is very readable although rather elementary from the standpoint of the experienced operator.

Metal Statistics for 1910. New York: The American Metal Market Company. Cloth, 175 pages.

This is the third annual edition of this work, which is a compilation of reliable statistics relating to the production, consumption and price movements of iron and steel, copper, tin, spelter, lead, antimony and other metals. The iron and steel statistics cover 50 pages, and give a wide range of useful information concerning iron ore, pig iron and also the various finished steel products. Owing to the special interest that has been taken in the copper market during the past year, the section devoted to copper statistics has been considerably enlarged, and in it are presented all the more important facts relating to this metal. The tables are so arranged that comparisons can be made over a period of 25 years. The other metals are treated with space commensurate with their importance, and several diagrams of price fluctuations are given.



G. L. Radcliffe

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Illinois Oil & Coal Belt Railway, McLeansboro, Ill.**—Incorporated in Illinois to build a 190-mile electric railway to connect Terre Haute, Ind., Robinson, Olney, Fairfield, McLeansboro and Cairo, Ill. Capital stock, \$1,000,000. Headquarters, McLeansboro. Officers: J. R. Campbell, McLeansboro, president; Joseph W. Crowley, Robinson, vice-president; Isaac H. Webb, McLeansboro, secretary; J. H. Lane, McLeansboro, treasurer; Allen G. Russell, Chicago, chief engineer.

***Springfield (Ill.) Traction Company.**—Incorporated in Illinois to build an electric railway from Springfield to Vandalia via Pawnee, Harvel and Hillsboro. Capital stock, \$10,000. Headquarters: 402 Booth Building, Springfield. Incorporators: C. E. Hazelett, Rochester, president and general manager; Ernest H. Helmle, A. M. Fitzgerald, George B. Gillespie and Dixon Grant, Springfield.

***Oklahoma-Kansas Railway, Baxter Springs, Kan.**—Incorporated in Kansas to build a 23-mile electric railway from Galena, Kan., to Hattonville, Okla., via Baxter Springs. Capital stock, \$2,000,000. Incorporators: Dr. Charles M. Jones, E. B. Morgan, M. C. Harper and Charles L. Smith.

Louisville, Lincoln Farm & Mammoth Cave Traction Company, Glasgow, Ky.—Incorporated in Arizona to build a 50-mile electric railway between Hodgenville and Glasgow, Ky. Incorporators: L. W. Preston, J. C. Preston, J. A. McDaniel, J. F. Taylor and J. L. Williams. [E. R. J., Jan. 29, '10.]

Eastern Oklahoma Traction Company, Muskogee, Okla.—Incorporated in Oklahoma to build an electric railway from Muskogee to Tulsa, 48 miles; a branch to Wagoner, 9 miles; from Wagoner to the Grand River, 10 miles; Tulsa to Sapulpa, 14 miles; Muskogee to Webber's Falls, 23 miles; Muskogee to Checotah, 21 miles; Muskogee to Okmulgee, 39 miles; Okmulgee to Oklahoma City, 87 miles. Total, 251 miles. Capital stock, \$100,000. Headquarters, Muskogee. Directors: H. B. Spaulding, R. N. Eggleston, J. W. Mattox, L. B. Kershaw, W. L. Tull, J. B. Furry and Guy Bowman, Muskogee. An auxiliary company, to be known as the Railway Construction Company, was also chartered. Capital stock, \$50,000. Headquarters, Muskogee. Directors: R. N. Eggleston, W. R. Robinson, L. R. Kershaw and J. B. Furry, Muskogee, and W. P. Keegan, Tulsa. [E. R. J., Jan. 29, '10.]

***Montreal Underground & Elevated Railway, Montreal, Que.**—Application for a charter has been made by this company to build and operate, by electricity or other motive power, underground and elevated railways through the city and island of Montreal. Capital stock, \$20,000,000. A number of Canadian and American capitalists are said to be back of the scheme. This company will absorb the Montreal Street Railway, Montreal Light, Heat & Power Company and the Shawinigan Light & Power Company, all of which are operating in Montreal. T. B. Butler is attorney for the applicants.

***Brownwood Southwestern Railway, Brownwood, Tex.**—Chartered to build a 30-mile railway from Brownwood through Brown and Coleman Counties to a point 4 miles north of Colorado River. Capital stock, \$30,000. Headquarters, Brownwood. Incorporators: R. A. Love, Kansas City, Mo.; H. T. Love, Brooke Smith, B. E. Hurlbert, D. F. Johnson, Brownwood; J. C. Kerby, John L. Smith, A. J. Eilers, Louis Davis and F. M. Covert, Austin.

***Fairmont & Pittsburgh Railway, Fairmont, W. Va.**—Incorporated in West Virginia to construct an electric railway from Fairmont to Blacksville, Waynesburg and Pittsburgh; also a line from Fairmont to Mannington, Blacksville, Morgantown and along the Monongahela River back to Fairmont. Capital stock, \$1,000,000. Incorporators: William M. Laws, Jersey City, N. J.; H. F. Smith, J. R. Linn, S. E. Miller, Fairmont, and J. F. Beatty, Mannington.

FRANCHISES

***Los Angeles, Cal.**—The City Council granted a franchise to Messrs. Edwards & Willey for \$100 to build a street railway on Melrose Avenue, Los Angeles.

Lewiston, Idaho.—M. A. Means, president of the Lewiston Terminal Company, has again applied to the Council for a franchise to operate cars over the tracks which were constructed in Lewiston last year by the company. [E. R. J., Aug. 7, '09.]

Bryant, Ind.—The Town Board has granted a franchise to the Fort Wayne & Springfield Railway, Decatur, to build an electric railway in Bryant. This completes the necessary franchises for the proposed railway between Decatur and Portland. Construction work will begin early in the spring.

Covington, Ky.—The Covington & Big Bone Traction Company has applied to the Board of Aldermen for a perpetual franchise to build an electric railway in Covington. This is part of a plan to build a 22-mile line from Covington to Big Bone Springs. [E. R. J., Dec. 4, '09.]

Saginaw, Mich.—The Common Council has granted a 13-year franchise to the Saginaw Valley Traction Company for the construction of a loop in the downtown district. This franchise expires in 1923 with the rest of the franchises of the company.

Fremont, Neb.—The City Council has granted a franchise to the Nebraska Transportation Company, Omaha, to build an electric railway in Fremont. The proposed railway is to connect Fremont and Omaha. The franchise calls for the completion of the line in 1912. C. W. Baker, president. [E. R. J., March 5, '10.]

Brooklyn, N. Y.—The Board of Estimate on March 4 voted to grant a franchise to the Manhattan Bridge Three-Cent Line, Brooklyn, to operate cars across the Manhattan Bridge from the terminal of the Long Island Railroad at Flatbush Avenue and Atlantic Avenue, Brooklyn, to the foot of Canal Street, on the North River. John C. Brackenridge, vice-president. [E. R. J., Feb. 5, '10.]

New York, N. Y.—Application will be made to the Board of Estimate and Apportionment on March 18 by the Interborough Rapid Transit Company, the Bronx Traction Company and the Union Railway for franchises to build several extensions in Manhattan and the Bronx. The Interborough Rapid Transit Company plans to build two extensions, one in the Hunt's Point section and the other from Intervale Avenue, on Dougan Street, to Washington Avenue. The Bronx Traction Company plans to build several extensions and the Union Railway will construct a double-track extension from the intersection of Southern Boulevard and Pelham Avenue to the Eastern Boulevard.

Columbus, Ohio.—The County Commissioners have granted to the Ohio & Southern Traction Company a 20-year franchise to build a 2½-mile extension from Hartmann Farm to Shadeville.

***Brownsville, Tex.**—B. G. Stegman and associates have applied for a 30-year franchise to operate an electric railway over the principal streets in Brownsville.

Provo, Utah.—The City Council has granted a 100-year franchise to Jesse Knight to build an electric railway over some of the principal streets in Provo. With the exception of Springville, all franchises have now been secured to build the projected railway through Utah County. [E. R. J., March 5, '10.]

Morgantown, W. Va.—H. R. Warfield will apply to the County Court on April 4 for a franchise to extend the Sabraton Railway, Morgantown, from its present terminus to the State line near Cheat Haven and there connect with the McKeesport Belt Line Street Railway, thus giving a trolley connection between Morgantown and Pittsburgh.

Wellsburg, W. Va.—Application for a franchise will be made on March 16 to the City Council by the Wellsburg, Bethany & Washington Railway, Wellsburg, for the right to extend its electric railway in Wellsburg. Jos. West, general manager. [E. R. J., April 2, '00.]

TRACK AND ROADWAY

Fort Smith & Interurban Railway, Fort Smith, Ark.—This company advises that construction will soon begin on

the proposed 25-mile electric railway between Fort Smith, Bonanza, Jenny Lind and Greenwood. George Sengel, Fort Smith, president, and Jerome Sengel, secretary and treasurer. [E. R. J., Feb. 29, '10.]

Pacific Electric Railway, Los Angeles, Cal.—This company has secured the right-of-way for a 6-mile extension of its La Habra line from the present terminus at Pillsbury via Olinda to Riverside. Construction will start at once.

Modesto (Cal.) Interurban Railway.—Work has been started on this 4-mile railway which will connect Modesto with the main line of the Atchison, Topeka & Santa Fé Railroad. The Modesto Interurban Railway was financed entirely by local capital, and the promoters are now considering the extension of the railway west to Newman and east to Waterford, Oakdale, La Grange and other towns in the eastern part of Stanislaus County. W. A. Cooper, 1370 Franklin Street, Oakland, chief engineer.

Southern Pacific Company, San Francisco, Cal.—Press report states that this company will soon extend its Alameda electric service to Elmhurst and Melrose over the old right-of-way through Bay Farm Island, joining the mainland in Eden Township and connecting with the main line at either Melrose or Elmhurst.

Norwich, Colchester & Hartford Traction Company, Norwich, Conn.—It is reported that the directors of this company have decided to start work about April 1 on the proposed 40-mile electric railway which will connect Hartford and Norwich. Construction will begin at the Hartford end of the line. Nearly all of the \$300,000 has been subscribed. [E. R. J., Jan. 29, '10.]

Fitzgerald & Ocilla Electric Railway & Power Company, Fitzgerald, Ga.—This company has begun work in Fitzgerald on its 12-mile electric railway between Fitzgerald and Ocilla. C. A. Holtzendorf, Fitzgerald, general manager. [E. R. J., May 22, '09.]

La Grange, Ga.—C. M. Awtrey, La Grange, confirms the report that he and associates have been granted a street railway franchise in La Grange and states that this is only a preliminary step in the plans the promoters have in view. Application will be made for a charter as soon as a company is organized.

Chicago, Bloomington & Peoria Railway, Chicago, Ill.—It is stated that surveys have been completed and most of the right-of-way purchased by this company for its projected electric railway from Chicago to Bloomington and Peoria. [E. R. J., Jan. 15, '10.]

Evansville (Ind.) Railways.—This company is actively interested in a plan to build a combination highway and railroad bridge across the Ohio River at Evansville. If the bridge is built the company will probably construct an electric railway across the bridge to Henderson and Owensboro, Ky. The present plan is to organize a company to build the bridge in which the county would take 1 per cent of the stock and hold preferred stock for its contribution. If the county votes against the project, the chances are that the bridge will not be built.

Evansville & Eastern Railway, Evansville, Ind.—This company has completed plans for the extension of its electric railway from Rockport to Grandview, a distance of 6 miles. [E. R. J., Sept. 12, '09.]

Kokomo, Frankfort & Terre Haute Traction Company, Frankfort, Ind.—Oliver Gard, J. V. Kent, M. B. Thrasher and Albert Alter, of this company, who owned franchises in Frankfort and Kokomo and 80 per cent of the right-of-way for the proposed electric railway between the two cities have sold their interest to Judge Kirkpatrick and J. C. Reynolds, Kokomo, George Marott, Indianapolis, and Messrs. Carter and Hall, Marion. [E. R. J., Feb. 6, '09.]

Iowa City, Ottumwa & Southwestern Electric Railway, Iowa City, Iowa.—This company is said to have partly secured funds for building its proposed 74-mile electric railway between Iowa City and Ottumwa via Sharon Center, Frytown, Amish, Wellman, Keota and Ollie. Surveys have been made and most of the right-of-way has been obtained, Frank Tanner, Iowa City, vice-president and general manager. [E. R. J., Dec. 18, '09.]

Lansing & Northeastern Electric Railway, Lansing, Mich.—This company has awarded the contract for building the

proposed 25-mile electric railway from Owosso to Lansing to W. E. Tench & Company, 210 John R. Street, Detroit. Headquarters have been established in Morrice. This new line between Owosso and Lansing will be virtually an extension of the Michigan United Railways, Lansing. [E. R. J., March 5, '10.]

Duluth (Minn.) Street Railway.—This company announces that it plans to make several improvements to its West End lines this year. The Piedmont Avenue extension will be built and Garfield Avenue tracks will be relaid from the viaduct to interstate bridge. Herbert Warren, Duluth, general manager.

Kansas City, Lawrence & Topeka Electric Railway, Kansas City, Mo.—This company has obtained an order from the Commissioners of Johnson County for a condemnation of a right-of-way from its present terminus at Shawnee to Zarah, 6 miles west. Work will be started as soon as the weather permits.

Montana Rapid Transit Company, Helena, Mont.—Press reports state that this company has been successfully financed and that early in the spring work will be commenced on the 75-mile electric railway between Helena and Butte via Jefferson City, Corbin, Wickes and Amazon. The route will be over the old grade of the Northern Pacific Railroad. Power will be obtained from the United Missouri River Power Company. Jos. K. Toole, president. [E. R. J., June 5, '09.]

Whitefish & Polson Electric Railway, Kalispell, Mont.—This company has completed its surveys for its projected electric railway from Kalispell to Whitefish. [E. R. J., Feb. 19, '10.]

Long Island Railroad, Long Island City, N. Y.—This company has secured all property necessary for double-tracking its North Shore division from Winfield Junction to Port Washington. Engineers who have charge of the electrification and double-tracking have finished the profiles and maps and contracts for grading have been awarded to the John F. Dolan Contracting Company.

Isothermal Traction Company, Rutherfordton, N. C.—This company, which proposes to construct a 50-mile electric railway from Rutherfordton to Gastonia, has effected a permanent organization by the election of the following officers: K. S. Finch, president and general manager; John C. Mills, vice-president; J. F. Flack, secretary and treasurer. Other promoters are W. H. Harrill, E. B. Harris, C. F. Geer and Dr. Young. [E. R. J., March 5, '10.]

Ohio Electric Railway, Cincinnati, Ohio.—Negotiations are under way for a franchise in Dayton which will make possible the reconstruction of the interurban tracks of the Ohio Electric Railway on South Main Street. This route now serves the factory of the National Cash Register Company, but only with the regular interurban schedule. It is proposed to provide for a 10-minute local service in addition to the interurban cars. The reconstructed tracks also will lead to a flat-iron shaped property on which the Ohio Electric Railway Company soon will build a freight terminal.

Ohio & Southern Traction Company, Columbus, Ohio.—This company has filed amended articles of incorporation to permit the building of an electric railway in Franklin County from intersection of Columbus and Chillicothe Pike south 6.82 miles to Lockbourne Road.

Dayton & Troy Electric Railway, Dayton, Ohio.—This company, it is said, contemplates extensive improvements on its right-of-way. The work is to include the eliminating of several sharp curves, reballasting of a considerable amount of track and the overhauling of overhead construction.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—This company has obtained the approval of the Railway Commission for the route of its projected electric railway from Welland to Bridgeburg via Port Colborne. Construction has begun between Welland and Port Colborne. When this line is completed the company will have a through line from Port Dalhousie on Lake Ontario to the Niagara River.

Johnstown & Altoona Railway, Johnstown, Pa.—Negotiations are in progress whereby this company may effect

an agreement with the Southern Cambria Railway, Johnstown, to run its cars into Johnstown over the latter company's tracks. Wallace Sherbine, Wilmore, president. [E. R. J., Feb. 19, '10.]

New Wilmington & New Castle Railway, New Castle, Pa.—Promoters of this company have been notified that J. G. White & Company, New York, N. Y., will provide \$500,000 of the amount necessary to construct and equip this proposed electric railway from New Castle to West Middlesex, via New Wilmington, provided the remaining \$130,000 will be taken by local capitalists. About \$300,000 has been issued in preferred stock, and \$300,000 will be issued in bonds.

West Penn Railways, Pittsburgh, Pa.—This company is reported to have completed plans for building a 10-mile extension from Greensburg to Latrobe via Jamison. W. E. Moore, Connellsville, general manager.

Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C.—This company advises that it will soon place contracts for building 4 miles of track. P. H. Gadsden, Charleston, president.

La Crosse & Winona Traction Company, La Crosse, Wis.—It is stated that this company will expend about \$30,000 in double-tracking some sections of its lines in La Crosse. [E. R. J., Dec. 25, '09.]

SHOPS AND BUILDINGS

Phoenix (Ariz.) Railway.—This company is rebuilding its car house at Phoenix, which was recently destroyed by fire. The new structure will be of the same general type as the old one, but larger and with more modern arrangements. It is to be built of wood and corrugated iron. S. H. Mitchell, Phoenix, superintendent. [E. R. J., Feb. 19, '10.]

Pacific Electric Railway, Los Angeles, Cal.—Plans are now being prepared by this company for the erection of a three-story concrete and steel station to be built on the Oxford property of the company in Los Angeles. [E. R. J., March 1, '10.]

North Carolina Public Service Company, Greensboro, N. C.—This company has purchased a tract of land on South Main Street, High Point, on which it expects to build a car house. J. K. Russell, Greensboro, manager.

Cincinnati (Ohio) Traction Company.—This company has recently purchased 7 acres of land as an addition to its 5-acre Winton Place. Repair shops and storage houses will be built so that part of the buildings now occupied by the company can be used by the Cincinnati Car Company, which proposes practically to double its facilities.

POWER HOUSES AND SUBSTATIONS

Brooklyn (N. Y.) Rapid Transit Company.—This company has asked for bids for about 9000-kw equipment in rotaries and transformers for use in its substations. It is probable that the contract for this apparatus will be let before the end of the present month.

Toledo Railways & Light Company, Toledo, Ohio.—It is announced that this company has decided to build and equip a new power house at a cost of about \$300,000.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—It is stated that this company is considering plans to double the size of its power plant at Waynesboro, and to build a substation on the mountain similar to the one now in use at Marion. R. D. Sefton, Waynesboro, general manager.

Winchester & Washington Railway, Winchester, Va.—This company has awarded a contract to Henry S. Rippel, 1-7 Clay Street, Baltimore, Md., for the construction of a steam-power plant in Winchester. P. O. Keilholtz, Continental Building, Baltimore, Md., engineer. [E. R. J., Jan. 1, '10.]

Chippewa Valley Railway Light & Power Company, Eau Claire, Wis.—This company has ordered from the Allis-Chalmers Company, Milwaukee, the complete hydraulic equipment for its Red Cedar plant, comprising one 3600-hp generator operating under 48-ft. head and placed in a hollow dam of the Ambursen Hydraulic Construction Company's build, with complete hydraulic governor and 170-hp exciter unit, also head gates, trash racks, etc., for the plant. [E. R. J., Jan. 29, '10.]

Manufactures & Supplies

ROLLING STOCK

Danbury & Bethel Street Railway, Danbury, Conn., is in the market for two cars.

Scranton (Pa.) Railway will probably purchase 10 or 20 new cars in the near future.

Pittsburgh (Pa.) Railways is reported to be receiving bids on 150 double-truck city cars.

Roanoke Railway & Electric Company, Roanoke, Va., is in the market for four interurban cars.

Fitchburg & Leominster Street Railway, Fitchburg, Mass., is reported to contemplate the purchase of two cars.

Washington Railway & Electric Railway, Washington, D. C., is reported to be in the market for several baggage cars.

Public Service Railway, Newark, N. J., has ordered 10 class 70-18 A motor trucks from the Baldwin Locomotive Works.

Jersey Central Traction Company, Keyport, N. J., has ordered four double-truck, semi-convertible cars from The J. G. Brill Company.

Houghton (Mich.) County Traction Company has purchased two cars from the G. C. Kuhlman Car Company through Stone & Webster.

Morris County Traction Company, Morristown, N. J., has ordered six large interurban cars from MacGovern, Archer & Company, New York, N. Y.

Great Falls (Mont.) Street Railway has ordered two 10-bench, open cars and two 20-ft. closed cars from the American Car Company for May 1, 1910, delivery.

Rhode Island Company, Providence, R. I., has purchased 31 15-bench, open cars from the Bradley Car Works, Worcester, Mass. Standard type O-50 trucks have been ordered for use under these cars.

Athens (Ga.) Electric Railway, reported in the ELECTRIC RAILWAY JOURNAL of Dec. 4, 1909, as expecting to be in the market for three or four cars, has ordered six cars. Three of these cars will be built by the American Car Company.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., has ordered five cars to be equipped with Consolidated heaters and to be duplicates of the five cars ordered in June, 1909, from the McGuire-Cummings Manufacturing Company.

Puget Sound Electric Railway, Tacoma, Wash., has ordered two cars from the Cincinnati Car Company, Cincinnati, Ohio, through Stone & Webster. Mention of this contemplated purchase was made in the ELECTRIC RAILWAY JOURNAL of Feb. 26, 1910.

Houston (Tex.) Electric Company, reported in the ELECTRIC RAILWAY JOURNAL of Feb. 26, 1910, as contemplating the purchase of some cars through the Stone & Webster Engineering Corporation, has placed an order for 15 cars with the American Car Company.

Worcester (Mass.) Consolidated Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of Jan. 29, 1910, as being in the market for 10 12-bench, open cars, has ordered 15 cars from the Bradley Car Works, Worcester, Mass., to be mounted on Standard type O-50 trucks.

Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C., chronicled in the ELECTRIC RAILWAY JOURNAL of Dec. 11, 1909, as having ordered four 20-ft. 8-in. cars from The J. G. Brill Company, has also purchased four double-truck cars from the same car builder.

Northern Texas Traction Company, Fort Worth, Tex., has ordered 10 cars from the American Car Company through the Stone & Webster Engineering Corporation. That these cars would be bought was mentioned in the ELECTRIC RAILWAY JOURNAL of March 5, 1910.

Hudson & Manhattan Railroad, New York, N. Y., recently mentioned in the ELECTRIC RAILWAY JOURNAL as having ordered 50 cars from the American Car & Foundry Company, has purchased 50 Baldwin trail trucks, class 66-30-S, and 50 Baldwin motor trucks, class 78-30-S, on which to mount these car bodies.

Whatcom County Railway & Light Company, Bellingham, Wash., mentioned in the *ELECTRIC RAILWAY JOURNAL* of Dec. 18, 1909, as receiving bids on three 47-ft. double-truck city cars, has purchased these cars through Stone & Webster from the American Car Company. Standard Motor Truck Company's type O-50 trucks were specified.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y., mentioned in the *ELECTRIC RAILWAY JOURNAL* of Feb. 19, 1910, as considering the purchase of five suburban cars, has ordered these cars from the Cincinnati Car Company, Cincinnati, Ohio. Hale & Kilburn Manufacturing Company's seats and Baldwin Class 78-22A trucks were specified.

Connecticut Company, New Haven, Conn., has ordered 89 cars from the Bradley Car Works, Worcester, Mass., to be mounted on Standard Motor Truck Company's type O-50 trucks, for service as follows: New Haven, 31; Bridgeport, 17; Waterbury, 14; Hartford, eight; Meriden, four; Port Chester, six; New Britain, two; South Norwalk, four; Middletown, three.

TRADE NOTES

Holland Trolley Supply Company, Cleveland, Ohio, has opened an office in Chicago at 704 Fisher Building. C. J. Albert is the representative of the company for the West.

Messrs. Davis, Keyes and Jackson, of the office of Sprague, Keyes and Jackson, consulting engineers, Boston, Mass., recently visited the plant of the Pittsfield (Mass.) Electric Street Railway to investigate the physical condition of the property, and have completed a report with recommendations as to the changes necessary for improving the physical and operating conditions of the property.

David Lupton's Sons Company, Philadelphia, Pa., has appointed George P. Heinz & Company, Denver, Col., Western selling agents, with headquarters in Denver, for the territory west of the Missouri River. Messrs. Heinz & Company will handle the sale of David Lupton's Sons Company's specialties, viz.: Lupton steel sash, Lupton rolled steel skylight, Pond operating device and the Pond continuous sash.

Whipple Supply Company, New York, N. Y., is pleased with the behavior of the Hedley anti-climber in the Hudson & Manhattan Railroad's tunnels on March 1. W. G. McAdoo, president of the railroad, was quoted in the newspapers as stating that these anti-climbers greatly minimized the serious consequences of the accident. This device is the invention of Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company.

Robins Conveying Belt Company, New York, N. Y., will move its main offices to the twenty-sixth and twenty-seventh floors and both towers of the Park Row Building, 13 Park Row, New York, on March 12. These offices were occupied by the company up to two years ago, when the offices were removed to the works at Passaic, N. J., and a branch office opened at 30 Church Street. The offices at Church Street will now be discontinued and combined with the office in the Park Row Building.

Pay-Within Car Company, Philadelphia, Pa., reports that it has recently closed a contract with the Public Service Railway, Newark, N. J., for apparatus and license under pay-within patents covering 1250 cars. This covers all of the cars now operated by the Public Service Railway, and includes 103 cars with short platforms, converted for pay-within operation by the removal of bulkheads and installation of manually operated platform doors. Other prepayment cars operated in Newark and Jersey City are being equipped with folding platform gates, manually operated by patented apparatus furnished under this contract. One hundred new cars are also being constructed under pay-within license by the Cincinnati Car Company for the Public Service Railway, the door-control apparatus being furnished by the Pay-Within Car Company.

MacGovern, Archer & Company, New York, N. Y., have disposed of part of the electrical machinery which they took over from the United Railroads of San Francisco recently and which included the equipment of six substations, consisting of 25-cycle rotary converters and transformers. In all there were about 36,000 kw, in detail as follows: Five 1500-kw Westinghouse rotaries, 5 1650-kw Westinghouse air blast transformers, 5 1000-kw General Electric rotaries, 5

1100-kw General Electric air blast transformers, 1 750-kw Westinghouse rotary, 1 825-kw Westinghouse air blast transformer, 6 750-kw General Electric rotaries, 5 500-kw General Electric rotaries, 9 185-kw General Electric transformers and 3 275-kw General Electric air blast transformers. A large portion of this apparatus is said to be entirely new, and some of it had never been installed. The original cost of the equipment was about \$300,000, and MacGovern, Archer & Company are able to make immediate deliveries. All of this apparatus was sold because the United Railroads of San Francisco is standardizing its apparatus by changing from 25 cycle to 60 cycle, in order to conform with the new power plants purchased when the Stanislaus River hydro-electric developments were taken over. Among the equipment which MacGovern, Archer & Company have sold are 5 1500-kw rotaries and 5 1650-kw transformers.

Buffalo Foundry & Machine Company, Buffalo, N. Y., has placed orders for buildings, equipment, etc., required for its large new machine shop. Several years ago this company took up the manufacture of vacuum drying machinery and all the various appurtenances connected with vacuum drying apparatus, and also absorbed the David Bell Engineering Company, continuing to manufacture the famous Bell steam hammers as one of its specialties. These lines have now grown to such an extent that the company has decided to build a machine shop north of the company's present foundry, on property lying between Scajaquada Creek and the New York Central Belt Line. Approximately \$200,000 will be spent at the present time on the machine shop. The building will be of concrete and steel construction, with traveling cranes in the bays and galleries to lift individual pieces weighing as much as 200 tons. Orders have been placed for exceptionally large machine tool equipment, all the tool equipment having been ordered special so as to obtain the highest production and get an exceptionally large range of work. All the tools will be motor driven, the motors being twice the size ordinarily used on the same machines. The entire plant will be operated by Niagara Falls power. The company is about to take up several other lines of manufacture.

ADVERTISING LITERATURE

Liberty Manufacturing Company, Pittsburgh, Pa., is mailing a postal card calling attention to its Cyclone boiler cleaners.

Jeffrey Manufacturing Company, Columbus, Ohio, has issued Bulletin No. 35, descriptive of its rubber belt conveyors. Illustrations are presented which show several types of rubber belt conveyors installed in different parts of the country. The bulletin also contains price lists covering the separate parts of the conveyor. Attention is also called to the company's different types of belt trippers.

Fairbanks, Morse & Company, New York, N. Y., have issued Catalog 109B on hydraulic, ball and roller bearing and compound jacks, in which the company's new forged steel hydraulic jacks, their construction and adaptability to various classes of work are described in detail. Many other types of jacks manufactured by the company are fully described. There are also price lists. The publication is 6 in. x 9 in. and contains 48 pages.

Canton Culvert Company, Canton, Ohio, has issued several booklets known as series "M. R. & C.-3," in which are included its 1910 general catalog of Acme nestable corrugated metal culverts, a special railway brochure entitled "Acme Culverts for Steam and Electric Railways," a booklet on "No-Co-Ro Metal," also a bulletin and a folder printed in Spanish. The series describes the company's corrugated metal culverts and contains numerous half-tone engravings which show these culverts in use.

Gisholt Machine Company, Madison, Wis., has issued an attractive 64-page catalog entitled "Gisholt Turret Lathes." It contains detailed descriptions and illustrations of the various types of lathes manufactured by the company, and descriptions of finishing a few different parts. The catalog is profusely illustrated with views of the company's plant, and of machine shops where its apparatus has been installed. An interesting feature of the publication is a series of engravings which show the progress made in the past 25 years on the company's lathe. Attention is also called to the company's boring mills and tool grinders.