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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.

Associate Editors:

RODNEY HITT, FREDERIC NICHOLAS, WALTER JACKSON.

News Editors:

G. J. MACMURRAY, FRANK J. ARMEIT.

CHICAGO OFFICE.....1570 Old Colony Building

CLEVELAND OFFICE.....1015 Schofield Building

PHILADELPHIA OFFICE.....Real Estate Trust Building

EUROPEAN OFFICE....Hastings House, Norfolk St., Strand, London, Eng.

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CONTENTS.

The Election Is Over.....	979
Car Delay Records.....	979
For the Information of the Public.....	980
Attempts to Limit the Use of School Tickets.....	980
Rhode Island and Connecticut Companies.....	980
Meeting Steam Railroad Competition at Boston.....	981
Car Maintenance Practice at Waltham, Mass.....	982
Ogden Rapid Transit Company.....	986
A Bulletin on Fuel Values.....	987
Shop Record in Richmond, Va.....	988
Power Plant Improvements at Portland, Maine.....	989
Inventory of Physical Railway Property of Toledo Company Given to City.....	990
Hearing on Boston Transit Matters.....	991
Arbitration in Philadelphia on "Loyal Men".....	992
New Brooklyn Transfer System.....	994
Control of Montreal Street Railway Passes to New Interests.....	995
Delays to Trains in the Hudson Tunnels.....	997
The Basis of Valuation in Case of Municipal Purchase of Street Railways.....	999
All-Metal Curtain Roller.....	1001
New Adjustable Pipe Wrench.....	1001
News Cars for the Oklahoma Railway.....	1001
Pay-Within Cars in Washington, D. C.....	1002
Asphalt Oil Timber Preservative.....	1002
News of Electric Railways.....	1003
Financial and Corporate.....	1005
Traffic and Transportation.....	1007
Personal Mention.....	1008
Construction News.....	1009
Manufactures and Supplies.....	1011

The Election Is Over

With the election excitement out of the way the business of the country will breathe more easily and that is an important consideration to the street railway industry. The issues before the public were complicated in many States by local questions and by the personality of the candidates or of those whom they were supposed to represent. Nevertheless the opposition party laid great stress upon the prevalent high cost of living, and the general rejection of the candidates of the dominant party was undoubtedly due in large part to the feeling—whether correct or not it is not necessary here to consider—that a change in national policies would have a material effect in lowering the cost of materials. If this result should be effected, no interests will benefit more than the railways which operate with fares whose rigidity it is frequently impracticable or impossible to disturb. It is too early to estimate the effect of the election upon public utility legislation in the various States, but there are signs in some States of a disposition to approach the question in a more reasonable way, and we hope that any resulting legislation will be sane and workable.

Car Delay Records

Records of time lost by trains arriving at important terminals have been kept for many years by progressive steam railroad companies. In electric railway practice such records are seldom as valuable when based upon ordinary running conditions into which no breakdowns of equipment enter, for the reason that so much margin has to be allowed in making up schedules for unforeseen delays due to street congestion. No urban electric railway system can operate its rolling stock with the precision which a private right-of-way affords, although in analyzing the efficiency of a given service it is most instructive to investigate the number of setback cars which have to be put in service at important terminal points in order to maintain an even headway at the starting points of the cars. A careful study of the work of setback crews immediately shows that it is very costly in relation to the car mileage covered by them, and so far as this class of service can be avoided much money will be saved. Any delay acts unfavorably all along the line, but the climax of unfavorable conditions is found in the work of the setback crew. Where a company keeps a careful record of the defects of cars causing delays or pull-ins, it is well worth while to determine regularly the hours and minutes lost on the street on account of equipment troubles. Such figures, tabulated by transportation divisions, give a check upon the efficiency of both emergency and operating forces; they enable the management to locate weak spots on the system, and tend to stimulate the car service force to clear troubles in the quickest possible time. On lines where car delays and their causes have been tabulated a material saving has been effected as a result.

For the Information of the Public

In the introductory note to the second annual report of the Board of Supervising Engineers, Chicago Traction, a brief statement is made of the reason for the publication of the valuable studies and records pertaining to the rehabilitation of the surface street railways in the second largest city of the country. It is that the public may be authoritatively apprised of the progress of the work. This principle may well be applied in other railway construction work and even in the routine problems of daily operation. "In our supervisory work we have had to deal with economic problems involving the welfare of the community; with the distribution of labor from its habitation to its place of occupation; with intersectional problems involving the through routes; with commercial problems involving the equitable and prompt distribution of shoppers, and in all respects we have striven to insure the building of a system of street railways that will enable the people to use the streets to the greatest possible advantage." For their recognition of a public interest in the subject, no less than for the technical value of the full accounts of their labors, the members of the board merit the commendation both of the community and of the electric railway industry.

Attempts to Limit the Use of School Tickets

Many electric railways, through either choice or necessity, sell school tickets at such reduced rates that any unauthorized extension of their original purpose becomes serious. Sometimes these tickets are sold in monthly books, valid only when presented by the person to whom they are issued, and sometimes they are sold in strips good for bearer until used. They are always, however, restricted to use on school days and by students only. With the former class of ticket abuse comes principally from the use of tickets at unauthorized times or by unauthorized persons. This evil can be corrected only by watchfulness on the part of the conductor. An attempt was made recently to correct the wrongful use of the second kind of tickets by a railway manager who found that in fair weather the riding from the school in the afternoon was far less than the riding to the school in the morning. The reasons for this were obvious, but as the tickets were sold at half rates the company was practically giving single rides during the morning peak for 2½ cents instead of round-trip rides, with the return trip in the early afternoon, for 5 cents. To correct this condition the plan was adopted of selling for 5 cents two-part round-trip school tickets instead of two, single tickets. One of the tickets was marked "Home to School" and every other one was marked "School to Home." The tickets were sold in book form and were so inserted in the covers that when a going ticket was detached the one next available was the return ticket. Consequently, those who walked home lost the use of the return half of the ticket and practically paid full fare for the morning ride. The change aroused such opposition that the management finally concluded to return to the usual method of selling books of school tickets good in either direction. Although in this instance the reform failed, the lesson is valuable because it teaches the importance of stopping this loss in the future. A provision for the sale of school tickets at reduced rates is often incorporated in electric railway franchises, but the company should always protect itself carefully by seeing that the tickets are properly used.

RHODE ISLAND AND CONNECTICUT COMPANIES

A comparison of the operations of the Connecticut Company and the Rhode Island Company for the fiscal year ended June 30, 1910, similar to that for the previous year which was published in the issue of the *ELECTRIC RAILWAY JOURNAL* for Nov. 6, 1909, page 962, shows results that are of interest because the properties are under common ownership. The figures which we give are taken, except so far as the mileage is concerned, from the last annual report of the New York, New Haven & Hartford Railroad, the controlling corporation, and were published in the *ELECTRIC RAILWAY JOURNAL* for Oct. 8, 1910.

In the present comparison it is better to depart a little from the method necessarily followed by the company because of corporate changes and to combine for our purposes the results stated for the Connecticut Company with those of the Housatonic Power Company. The latter company assumed control as of March 1, 1910, of the gas, light and water departments formerly operated by the Connecticut Company, and we assume that its operations for the last four months of the fiscal year are confined largely to these operations.

With the combination of results that we have outlined the total revenues (excepting only "other income") of the Connecticut and Housatonic companies for the last year were \$8,347,302. This is an increase of \$358,470, or 4.5 per cent, over the previous year. All the departments of the business did not contribute uniformly toward this increase. Passenger earnings gained \$359,107 and express earnings \$48,298. Mail earnings about held their own, chartered car earnings fell off a little, earnings from the sale of power showed a gain of \$7,148, and decreases were shown of \$12,968 on park operations and \$6,820 on advertising. Another decrease was in miscellaneous receipts, including gas, light and water. The revenues from these sources from the beginning of the fiscal year to Feb. 28, 1910, were \$740,436. By addition of the operating revenue, other income and \$39,977 revenue from outside operation of the Housatonic Power Company for the remainder of the fiscal year we have a total of \$1,153,108, representing a permissible calculation as to the approximate earnings from these sources for the full year. This sum is \$26,674 less than the total revenues from miscellaneous sources in the 1909 fiscal year.

The Housatonic Power Company has undoubtedly been organized to prosecute operations on a broader scale than was followed by the Connecticut Company in its incidental conduct of these utilities, and its revenues may be expected to increase materially.

Operating expenses of the Connecticut Company, plus those of the Housatonic company, were \$4,905,366 last year, an increase of \$599,762 over the preceding year. It may be observed that over one-half of this increase went into maintenance, indicating the pursuance of an improved standard. Expenditures for maintenance of way and structures increased \$261,941 and for maintenance of equipment \$68,169. Operation of power plants and of cars cost, respectively, \$31,580 and \$111,339 more than in the previous year. General expenses were increased \$20,302 and miscellaneous expenses were \$106,431 larger.

The net combined income of the two properties applicable to taxes, rentals, etc., was \$3,450,619, and this was \$232,609 less than the corresponding result for the preceding fiscal year. Taxes, rentals and interest amounted to \$474,882, an increase of \$435,969, and this heavy addition to these charges lessened still

further the net income remaining for the year. This income, for the combined properties, was \$2,975,738, or a reduction of \$668,577 from the surplus of the preceding year.

Results that were similar as to gross earnings, but different in net returns, are seen by comparison of the operations of the Rhode Island Company. In the 1910 fiscal year this company earned \$4,440,809 gross, or 6.7 per cent more than in the previous year. Its gain was largely in passenger earnings, which increased \$259,539. But there were also gains of \$14,240 in freight and express revenue, and increases in earnings from mail, chartered cars, sale of power and miscellaneous sources, with a small decrease in the revenue from advertising. Operating expenses were \$2,537,686 last year, an increase of \$223,732, and it is a feature of this statement also that the large part of the additional expenditure was put upon maintenance of way and structures. To this account \$118,278 more was charged than in 1909. The maintenance of equipment expenditure was \$947 smaller, operation of power plant cost \$7,169 more, operation of cars \$36,387 more, and general expenses \$62,845 more. The net earnings of \$1,903,123 in 1910, or \$56,292 above the record of 1909, were augmented further by an increase of \$29,941 in other income, making total income of \$1,965,237, or \$86,233 greater than in the preceding year. Taxes, rentals, etc., were \$1,391,671, or \$18,126 less than in 1909, so that the resulting net income was \$573,565, or \$104,358 greater than in 1909.

There does not appear to have been an increase in the mileage of either of the companies during the fiscal year. With 755 miles of track the gross earnings of the Connecticut Company, combined with the Housatonic results, averaged \$11,056 per mile, or \$475 more than in the preceding year. The Rhode Island Company averaged for its 319 miles of track \$13,921 per mile, or \$878 per mile more than in the previous year.

The operating ratio was 57.1 per cent for Rhode Island, and for Connecticut, with results reconstructed as explained, it was 58.8 per cent. In analysis of those operating expenses which appear to be applicable in almost their entirety to the transportation business we separate the corresponding earnings in the Connecticut Company results. That is to say, we apply the expenditures for maintenance, operation of cars and power plant and general expenses directly to all the earnings save those from miscellaneous sources, now chiefly part of the Housatonic property. From this standpoint it is found that the proportion of earnings expended for operation was divided as follows: Maintenance of way, 11.6 per cent; maintenance of equipment, 7.2 per cent; operation of power plants, 10.9 per cent; operation of cars, 24.1 per cent; general expenses, 8.1 per cent. The total, owing to the method of compilation, gives a ratio of 61.9 per cent. Ignoring in a similar way miscellaneous operations of the Rhode Island lines, the following proportions of revenues from operation were expended: Maintenance of way, 7.2 per cent; maintenance of equipment, 5.9 per cent; operation of power plants, 8.5 per cent; operation of cars, 23.7 per cent; general expenses, 12.2 per cent; total, 57.5 per cent.

It appears from these figures that the Connecticut Company's expenditures for maintenance were an appreciably larger proportion of what we assume to be the real street railway operating revenues than the corresponding outlay in Rhode Island, but that its costs of operation, both of power plant and cars, were greater. It is of additional interest to state that per mile of track the Connecticut Company expended \$1,105 for maintenance of way and the Rhode Island Company \$992.

MEETING STEAM RAILROAD COMPETITION AT BOSTON

The construction in large cities of fast transit routes to provide for the rapid entrance and exit of suburban traffic is growing to be an important factor in successful competition with steam railroads serving outlying territory. An excellent example of such a route is the new Forest Hills elevated line in Boston, whose opening followed the inauguration some years earlier of a distinctly competitive elevated service from Dudley Street and Sullivan Square into the business district. By these lines a considerable patronage which formerly utilized the steam railroads serving the nearer suburban areas of Roxbury, Dorchester, Malden and Everett has been diverted to the Boston elevated system.

Similar results are anticipated in the Cambridge subway, which the Boston Elevated Railway Company is now building between the Charles River and Harvard Square, and in the subway authorized by recent law under the Charles River embankment in the Back Bay district. In the Cambridge subway but three stops will be made en route, including the terminal, the line being distinctly designed to accommodate through traffic from outer suburbs into Boston with the establishment of extensive transfer facilities at each end of the route. The operation of cars in the form of train units in this subway will provide for a maximum carrying capacity and will cut 15 minutes from the running time between Harvard Square and Park Street. Without question this shortening of the schedule will deflect to the Boston elevated a large traffic at present depending upon a steam service reaching into the outer suburbs of Arlington, Belmont, Watertown, Waverley and Waltham. If the so-called Riverbank subway is built according to present plans it will provide an entrance and exit for large semi-convertible cars making through runs to suburbs lying from 5 miles to 7 miles west of the business district and will permit, according to estimates, a reduction of 10 minutes in the running time between points in Newton, Brighton, Allston and Brookline and the center of Boston. Even if the route of this subway as planned should be altered as a result of a discussion now pending, the line would still be designed for rapid transit through service. The number and location of stations remain to be determined, but presumably there will be but a few stopping points between Park Street and the Charlesgate district, where the line will be brought to the surface.

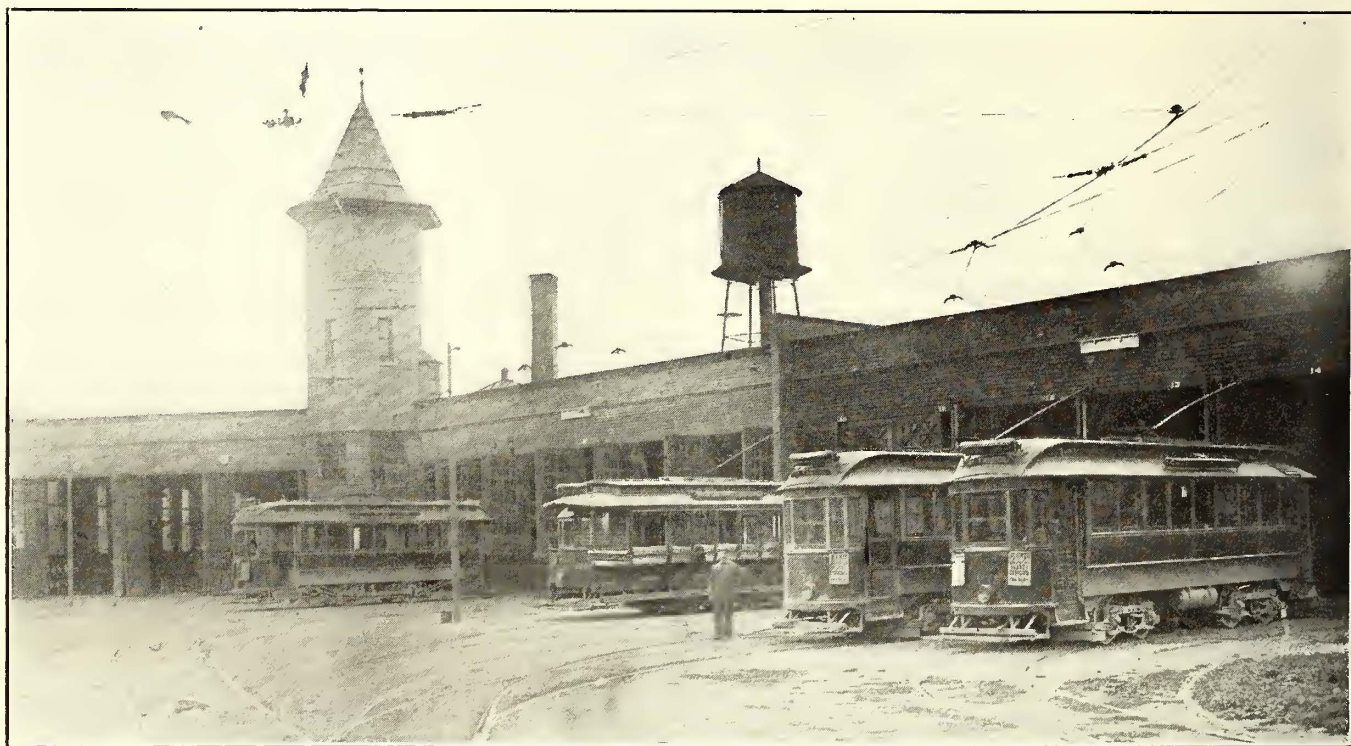
Reductions in running time of the amounts quoted between the business center and suburbs 5 miles to 10 miles distant are certain to shorten the total time of transit so much that unless close train connections of the express type are made in the immediate vicinity of a steam railroad station the suburban patron will save both time and money by utilizing the highly frequent trolley service available. The establishment of a rapid transit route through the last mile or two of the urban territory does away with the discomforts and delays due to slow movement on the streets, and thus persons who cannot afford to take any but the quickest cars and trains are led to patronize the traction system with its ramifying distribution facilities. In smaller cities, where a subway or elevated is not feasible on account of the cost, the results sought can be approximated by using a side street parallel and close to the main street of the city and thereby avoiding the difficulties of operation that are caused by the congestion of the main thoroughfare.

CAR MAINTENANCE PRACTICE AT WALTHAM, MASS.

Electric railway service in the western suburban territory immediately outside the transportation field of the urban lines centering in the heart of the city of Boston is performed by the Middlesex & Boston Street Railway Company and its affiliated lines. Beginning at Newton and Watertown the Middlesex & Boston lines provide a service extending westward through Wellesley, Waltham, Natick and the South Framingham district to Westboro, with various local branch-line facilities, while the Lexington & Boston affiliated system furnishes transportation from the Arlington district to Lexington, Bedford and Concord. The system covers a territory, roughly, 25 miles long by perhaps 15 miles in average width and, outside the larger centers of population which it serves, it meets the requirements of an efficient cross-country service carried on mainly upon the highways and characterized by a varied patronage and a normal car interval of from 10 to 30 minutes. On account of the extent of the system it has been found expedient to subdivide the rolling stock maintenance facilities and to rely upon the repairs which can be effected at several important

for car repairs and the storage of supplies, the latter being centralized on a large scale at Newtonville. All car repairs for the lines extending westward to the town of Westboro are handled at Natick. The Lexington car house takes care of car maintenance for the Lexington and Concord districts, including the through-car service between Boston and Lowell via Arlington Heights. The repair work at Waltham and Auburndale is under the immediate supervision of Joseph O. Gauthier, that at Natick is under the direction of John Hurlyck, and the Lexington shop work is under the supervision of John Waugh. Each of these executives reports, as a general foreman of car repairs, to the local division superintendent, who in turn is in close touch with the general manager of the different companies, Carl A. Sylvester, whose headquarters offices are at Washington Street, Newtonville.

The Waltham shops are an integral part of a car house plant near the business center of the city and are located centrally with respect to the operation of the various routes dependent upon its facilities. The property consists of a group of frame buildings with twelve car-storage tracks in the operating side and three shop tracks, offices of the superintendent of the divi-



Middlesex & Boston—Exterior View Waltham Shops

division centers, rather than to attempt to concentrate all maintenance work in a single large shop. The resulting costs of car maintenance compare favorably with those of other Massachusetts systems serving thinly populated districts outside a few large centers. The average cost of car and car equipment repairs for the year ended Sept. 30, 1909, was approximately 2.4 cents per car mile on the Middlesex & Boston lines.

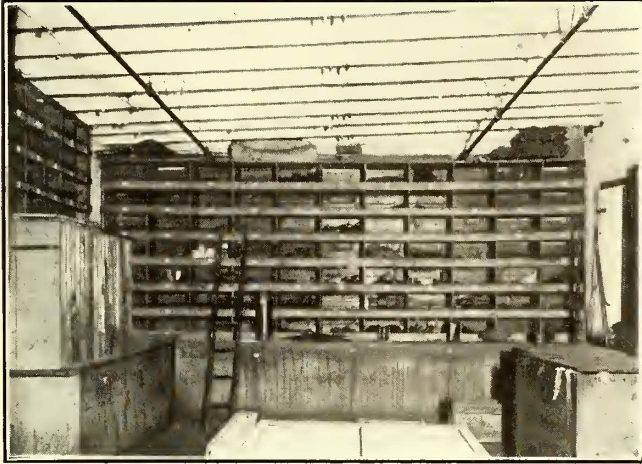
A representative maintenance installation of the company is located at its car houses in upper Main Street, Waltham. At this point are repaired the cars operated in the Newtons, Waltham and Waverley. Another local repair shop which is under the same supervision is located at Auburndale, in the western part of Newton, at Norumbega Park. Cars operated in Newton, Wellesley, Natick, South Framingham, Needham and Watertown are in general repaired at Auburndale. As the Auburndale and Waltham car houses are only about 4 miles apart, the company has lately taken up the work of centralizing the heavier repairs at Waltham, with the exception of truck maintenance and winding, which are principally handled at Auburndale. At Natick, Homer Street, Newtonville and Lexington the associated companies maintain additional facilities

and his assistant, lobby for trainmen, boiler house, paint, oil, inspection, machine and sub-storage quarters. The car house proper is divided into two sections separated by a brick fire wall, the outer section being 200 ft. long, and the next section, with the shop, being 180 ft. in length. The total length of trackage in the car house is 1740 ft. and in the shop 540 ft. The outer walls of the car house and shop are of timber and wooden sheathing construction. The operating offices are located in a tower between the car house and the repair shops and, at the rear, a lobby for trainmen is in regular service, with locker and exceptionally good lavatory facilities. Access to the various storage and shop tracks from the main line outside the yards is had by two entrance and exit tracks of short length from which switches are run to the subdivided tracks of the buildings. The central tower is 60 ft. in height and provides excellent observation facilities for the operating officer in charge of car movements.

FIRE PROTECTION

Every track in the buildings is equipped with a pit, and an installation of over 1100 automatic sprinkler heads manufactured by the General Fire Extinguisher Company has been made. The

water supply is drawn from the mains of the city, and the immediate service for the sprinkler heads is taken from a wooden tank of 20,000-gal. capacity mounted on a steel framework about 80 ft. above the track level. This tank is served with water under normal city pressure of 70 lb. per square inch and is provided with a 1½-in. intake pipe and a 6-in. delivery pipe, with 1¼-in. steam line operated under cold-weather conditions to prevent the contents of the tank from freezing. The delivery



Middlesex & Boston—Sub-Store Room in Waltham Shops

pipe is carried downward from the tank to the ground in a wooden box lining, with inside paper surfacing to preserve the flow in the winter season. Sprinklers are installed in all pits about 15 in. above the pit flooring, which is of concrete construction. The pit sprinkler heads are about 4 ft. apart horizontally, and are supplied with water through ¾-in. piping. The rest of the sprinklers are installed over the tracks near the roof, a clear space of about 17.5 ft. being allowed above the rail and about 6 in. below the roof timbers. The main lines serving the overhead sprinklers are 1¼ in. in diameter, and in the car house proper the system is maintained under pressure by compressed air furnished by an automatic compressor driven by a 1½-hp. 500-volt direct-current Crocker-Wheeler motor. There are no side sprinklers in the plant. Three electric gongs are installed in connection with the sprinkler system and a private fire-alarm box is located on the property. Chemical extinguishers of the hand type, sand pails and fireproof doors of the self-closing type are also installed in the different divisions of the property. Skylight windows are in general of wired-glass construction. There are three hydrants on the grounds, and three stands of hose with about 200 ft. in each. The oilroom, containing combustible material, and the paint storage room are built of brick and, in the case of the former, the walls are carried up above the adjoining roof structure to a height of about 4 ft. Monthly fire drills are held and about 30 seconds is required for the force to attach the hose and turn on the water after the gong sounds.

HEATING AND LIGHTING

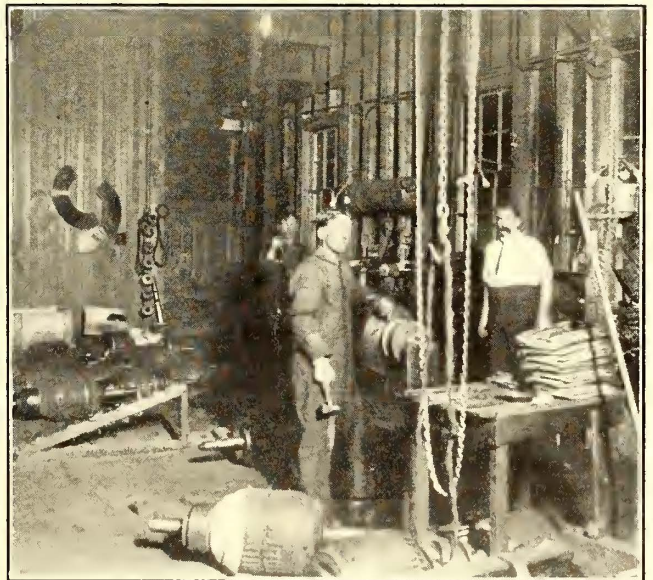
The car house and shops are heated by steam coils in the pits, three coils of pipe being run longitudinally on each wall of each pit and supplied with live steam from two Kendall boilers of about 150 hp combined rating through appropriate reducing-valve connections. Draft is provided by a brick stack 70 ft. high and 4 ft. square inside. The boilers are run at 40 lb. pressure, and the steam distribution for heating is carried out at about 4.5 lb. A Warren duplex feed pump delivers city water and drips to the boilers. Soft coal is burned and two firemen are required, one being on day and the other on night service. Large swinging doors are provided at every track entrance. Radiators are installed in the office, lobby and lavatory.

The shop section is lighted with 12 inclosed-arc lamps run in three circuits of four each, in series off the railway supply. There are also numerous 16-cp incandescents in use, three-light clusters being common in the shop and single-light fixtures

along the car-house walls. As no inspection or repair work is normally done at night no special electric lighting has been installed in the pits. When pit work has to be done under unfavorable conditions of illumination small portable oil lamps are used.

MACHINE SHOP AND INSPECTION DIVISION

The machine shop and inspection division occupies a space of about 110 ft. long by 50 ft. wide at the southern end of the building. The first 40 ft. of the shop is devoted to car washing and surface repairs and adjustments, a concrete floor being provided with a slight pitch leading to five catch basins at the sides of the three tracks which enter this section of the property. Stand pipes and hose connections facilitate washing at this point and the drains are collected in an 8-in. tile pipe and discharged into a brook at the rear of the property, after a run of about 80 ft. Beyond the car-washing division the shop tracks are carried over pits, with wooden floors between and concrete pit bottoms. At the rear of the machine shop the tracks are carried into a carpenter and paint shop about 80 ft. long, where all the woodwork and painting for the Middlesex & Boston lines are performed. The power-driven equipment of the shop is rather limited on account of the subdivision of repairs referred to in the first paragraph of this article. It consists of an engine lathe, grinder, drill press and grindstone, all driven by belt from a single line shaft belt-driven by a 5-hp 500-volt Westinghouse direct-current shunt motor running at 1500 r.p.m. This equipment is mounted close to the wall on the south side of the shop and takes up remarkably little space considering the number of cars which depend upon it for service. A Cutler-Hammer motor-starter is in service and ample facilities for bench work are a feature of the shop. The pit tracks in the shop are served by eight 2-ton and two 1-ton Triplex hoists. For removing armatures in pit work a portable jack mounted on a carriage is used, the armature body being arranged to rest on rollers having exactly the shape of the field poles of the same size of motor. A convenient feature of the bench work is the provision of a zinc sink used in the cleaning of motor and axle bearings. This is recessed into a bench to a depth of 1½ in., and is 7 ft. long and 3 ft. in width. By its use all oily drips



Middlesex & Boston—Electric Winding Department in Auburndale Shops

from journal boxes during cleaning or dismantling can be saved, and when desired a pan can be utilized so that the oil can be in part at least used twice. This simple arrangement adds much to the cleanliness of the shop work. A similar plan is utilized in the lamproom of the shop, in connection with the filling of oil lamps. A view of the zinc sink used in the machine shop is published on page 984. Round-bottomed sand pails are hung over the bench for fire protective uses.

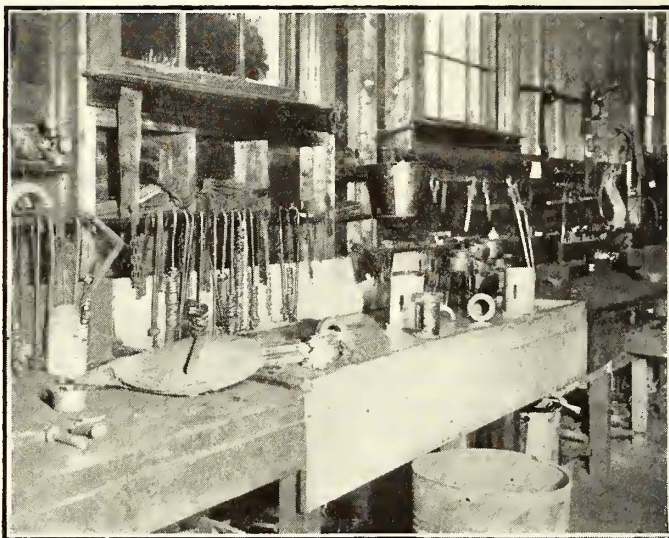
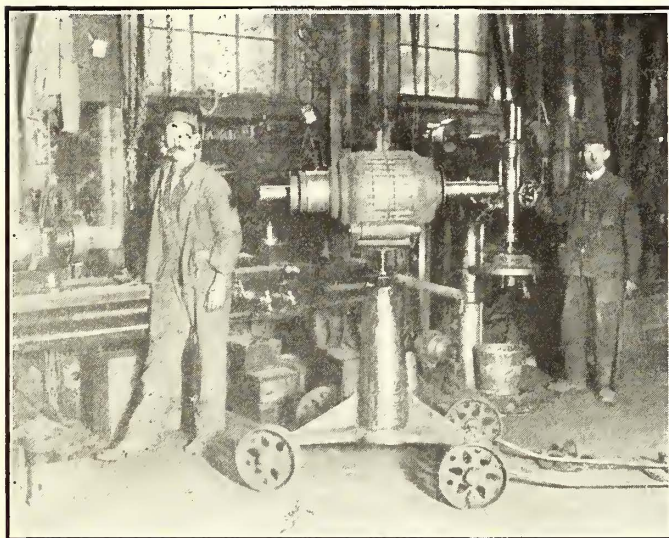
CARPENTER SHOP, PAINT SHOP AND STORAGE ROOM

The woodworking department contains no machine tools, all this kind of maintenance being done outside, together with the manufacture of truck springs, the removal and replacement of car wheels, manufacture of trolley wheels and miscellaneous brass and iron foundry work. Excellent natural lighting is provided in the carpenter and paint shop. At the side of the carpenter shop is located a sub-storeroom containing about 200 stock bins, compartments for window-glass storage, cupboards and boxes. The bins are installed against the walls, and half are 18 in. x 18 in. x 11 in. in size and the balance 12 in. x 12 in. x 11 in. in dimensions. The sub-storeroom is provided with an automatic fire door and a chemical fire extinguisher equipment, with sprinklers as shown in the accompanying illustration. The stock kept here includes lamps, tape, trolley wheels, glass, bolts, truck and motor fittings, brushes, fuses, switches, bearing metals, brake parts, and miscellaneous car-body fittings. The contents of this storeroom are regularly charged against the shop in connection with periodical trips of a stock car to and from the main storage department at Newtonville and no attendant is maintained at Waltham. There is also a fireproof room for cleaning and filling lamps, as men-

tures to be carried diagonally across the winding room to the repair benches. The company does not manufacture armature coils, but makes its own field coils and winds magnet coils and miscellaneous equipment of small capacity. The company has installed fiber shields in its controllers, one being placed horizontally above the contact cylinder and fingers and the other vertically around the outside of the contacts to prevent flashing to the case. The fiber thickness is 1/16 in. and this arrangement has been most successful in preventing short circuits of the kind which are disastrous in their effect on passengers.

CAR CLEANING

For car cleaning the company uses an old eight-bench open car fitted up with a motor-driven air compressor. The car is driven by a WP-50 motor with rheostatic control and a double-contact switch enables the rheostat to be used in connection with the compressor motor, which is a GE-800. The motor, compressor and storage tank are all mounted on old wooden ties and the motor drives the compressor by a belt which connects a 5-in. pulley with a 42-in. flywheel mounted on the latter, which is of Rand manufacture and of the duplex type with vertical cylinders. Cooling water for the compressor cylinder jackets is provided by a single barrel of water connected with



Middlesex & Boston Street Railway—Armature Lift and Zinc Sink for Cleaning Armature Bearings

tioned above, and adjacent to it are an oilroom and a paint storage room. A coal bunker of 100 tons capacity completes the auxiliary shop compartments. The lamproom is provided with a wired-glass skylight, and the oilroom has an arched brick ceiling without opening at its top. Double fusible link fire doors are installed in the oil room and both oil and lamp rooms have concrete floors.

FORGE AND BLACKSMITH SHOP

A small forge shop is in service at Waltham in connection with the relining of bearings and light repair on trucks. The shop is equipped with one forge, with a blower driven by a 1/2-hp direct-current motor which forces air into the fire through a 3-in. pipe. Bearing metal is poured into shells on a bench near the forge and no scraping is required to secure the ordinary fit.

At Auburndale a central blacksmith shop 18 ft. long by 10 ft. wide is in service for all the heavier forging, including that required for line and power station repairs, ironwork for the road department, horse shoeing, etc. The forge blower is driven by a 1/2-hp motor, and arrangements are made for hand-driving in case of a failure of the electric supply. The forge is of home-made timber construction, filled with earth, and supplied with air by a Champion blower. One man and, when necessary, a helper handle the forge work at Auburndale. At these car houses is also an armature-winding room, equipped with a drying oven operated by car-heating coils and the usual winding lathes and benchwork facilities. This department is run six days a week and utilizes the services of three winders. A 1-ton hoist with overhead runway is provided to enable arma-

the cylinders by a 1/2-in. pipe at top and bottom. The flow is secured by gravity and maintained by the heating of the water outside the barrel contrasted with that inside. About 18 in. difference in height exists between the supply and receiving ends of the cooling water pipe. The storage tank is 42 in. in diameter and 6 ft. long. In addition to blowing out cushions and controllers, this equipment is used as a vacuum cleaner by the addition of a simple Y in the piping near the nozzle of the air delivery line. The air compressor delivers at a pressure of 100 lb. per square inch. Attached to one end of the Y is a flexible pipe terminating in a flat copper nozzle with a 1/4-in. slot, which is passed over the surface to be cleaned in the manner of an ordinary brush. The stream of air passing the Y in the delivery pipe establishes a suction after the manner of an injector pump.

MAINTENANCE OF SMALL PARTS

The company manufactures its own rheostat frames and assembles its grids and mica washers upon them. In this way a saving of about half the cost of each resistance box is effected. The grid frames are made of sheet steel, bent and drilled in the blacksmith shop. The total cost per box complete is about \$4.50. Another recent practice which has resulted in the saving of considerable labor and material is the use of case-hardened steel bushings in all brake rigging and truck castings at the wearing parts where attachments are made. Shelby seamless steel tubing is cut to the proper lengths and the hole in the lever or other member is drilled 1/64 in. smaller than the bushing and forced into it by a driving fit. The life

of the wearing part is raised to about two years by this means and a saving of about \$8 per car per year is effected in the case of brake-shoe head hangers. Under the old plan the company plugged the holes with soft steel and then drilled them, but the fit was never as lasting. The hangers cannot be heated for an expansion fit of the bushings without danger of cracking them. The life of the material is so much increased by this method of using bushings that the company is applying it to new hangers as well as old ones. The life of brake-shoe heads is now about two years on these lines. The company uses hard and soft types of Taylor brake shoes and obtains a life of about 10,000 miles with the former. It also employs a soft Bemis shoe and is now getting a life of about 4000 miles from it. The standard trolley wheel is now the 4½-in. Hall and a life of 7000 miles is obtained. Griffin cast-iron car wheels 33 in. in diameter are employed and the present average life is 38,000 miles. A life of 9000 miles is now being obtained from motor brushes and from 15,000 to 20,000 miles are being secured from pinions. The life of the few steel-tired wheels that the company employs runs to approximately 100,000 miles, with a reduction in diameter from 33 in. to 31½ in. The life of bearings of the axle type is about 20,000 miles. Armature bearings, commutator end, are giving a life of 60,000 miles and at the gear end a life of 20,000 miles is being obtained.

Cars are inspected thoroughly, but without dismantling, every 350 miles, or about once in three days' run. This inspection includes oiling and about 18 cars per day are thus inspected at Waltham and Auburndale. The company uses "Perfection" waste saturated with oil, but puts no oil into the journal box. Controller fingers are renewed every two years, when the controller is taken entirely apart, the contacts being scraped and shellacked. The old segments are cut down and used in the smaller cars. The only night work done in the shop except in emergencies is car cleaning and the filling of sand boxes, all sand being screened before being put in the box. The company is using a type of box in which all the working parts are above the level of the car floor. The standard axle used by the company is 4 in. in diameter except in the case of cars having WP-50 and GE-800 motors, when the diameter is 3¾ in. The standard journal on the majority of the cars is now 4 in. x 8 in. in dimensions. Most of the controllers are the K-10 type. Resistances are thoroughly overhauled on box cars every three years.

sand cars are maintained at each shop. Besides the motors already named, the company uses the GE-67 and GE-1000 and the Westinghouse 12-A and 101-B. An 18-ton coal car and the compressor car above noted are also assigned to Waltham.

RECORDS

At Waltham complete records are kept of the date of all major repairs on each car, motor armature, etc., the life of motor bearings, pinions, mileage of trolley wheels, brake shoes, car wheels, etc. There is also in operation a system of keeping watch of car defects which has been productive of much good. Motormen are required to make out daily reports of the condition of cars which they operate, as shown in the accompanying blank, which has space for the recording of about 75 troubles. These defect slips are turned in to the foreman of repairs and upon them are based

Form 473, 7-109 C. Pr. 1014.

St. Ry. Company

MOTORMAN'S DAILY CAR REPORT

19

Cars in Good Condition: No.

CAR BODY	GE NO.	CAR BODY	GE NO.	MECHANICAL	GE NO.
Bell		Signs		Snow Scraper	
Co. Card		Step or Hanger		Snow Scraper Hook	
Cards, Adv. & Pub.		Tr. Catcher		Spring Journal	
Curtain		Tr. Cord		Squealing	
Cushion		Tr. Pole		Wheel	
Dasher		Tr. Springs		ELECTRICAL	
Door, Car		Tr. Wheel		Bucking	
Door Hook		Ventilators		Cable	
Door Ventilator		MECHANICAL		Charged	
Draw Bar & Cage				Cir. Breaker	
Draw Bar Rest		Air Brake Fuse		Controller	
Fender		Air Brake Switch		Fuse Box	
Fender Castings		Air Gauge		Fuses	
Floor		Air Comp.		Head Light	
Glass		Air Pipe Leaking		Heater or Switch	
Gong		Air Valves		Overhead Switch	
Grab Handle		Axle		Motor	
Hand Strap or Rail		Brake Dog		Motor Flash	
Lifeguard		Brake Handle		Motor Suf.	
Register Rod		Brake Rod		Lamp	
Register Rod Handle		Brake Shoe		Lead Wires	
Roof Ladder		Brake Staff		Light Sw or fuse	
Running Board		Brake		Pump Gov.	
Sand Box or Spout		Gear and Casing		Resistance	
Seats		Hot Box		Reverser	
Side Bar		Shaking		Sign Lights	
Car Details		Car Dirty			

Motorman No.

Motormen will make out the above report at the close of each day and deposit same in box provided at superintendent's office at the same time as Conductor deposits his work, noting car numbers opposite the description of condition of each car

The above cars have been examined and put in proper condition.

19

Foreman

Motorman's Daily Car Report

daily reports of cars in service which are sent to the office of the general manager, including a separation of troubles causing pull-offs and those which do not tend to interrupt the con-

DEFECT RECORD—MIDDLESEX & BOSTON STREET RAILWAY COMPANY—PULL-INS FROM NOV. 1, 1909, to JULY 31, 1910

	DIVISION NO. 1 (WALTHAM)								DIVISION NO. 2 (AUBURDALE)									
	1909		1910						1909		1910							
	Nov.	Dec.	Jan.	Feb.	March.	April.	May	June.	July.	Nov.	Dec.	Jan.	Feb.	March.	April	May.	June.	July.
Air brake	0	2	7	3	4	1	1	5	4	9	17	10	9	2	4	1	6	4
Brake	6	5	5	8	4	4	9	3	1	13	10	14	15	16	9	5	5	3
Motor	8	8	15	17	14	12	13	11	6	17	11	12	11	17	29	29	23	17
Lamp circuits	1	2	0	2	1	1	3	1	1	7	4	5	10	6	5	3	1	3
Arc light	1	1	2	1	1	2	1	0	0	0	0	0	0	1	3	0	1	0
Trolley	1	1	3	1	3	1	0	2	2	19	6	1	2	3	6	0	4	6
Glass	1	1	1	2	2	1	4	0	0	2	4	2	6	3	3	0	0	0
Gong	1	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
Body	4	5	3	3	4	4	3	1	1	7	11	4	4	3	4	5	4	1
Gear	1	2	0	4	4	2	1	2	1	0	4	4	2	0	1	1	1	1
Hot journal	1	5	5	1	9	1	1	2	1	12	9	11	11	4	2	3	1	0
Controller	0	3	3	2	3	4	5	0	1	19	16	6	2	6	6	7	3	3
Resistance	2	1	1	0	1	0	0	0	1	1	2	2	0	1	0	0	2	2
Brake staff	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heater	0	1	0	1	0	0	0	0	0	1	3	3	7	1	1	0	0	0
Register	0	1	1	2	0	4	3	1	6	3	0	0	0	0	1	8	8	2
Fuse box	0	0	0	0	0	0	0	0	0	1	0	2	4	0	0	0	0	0
Circuit breaker	0	0	1	0	1	0	0	0	0	1	4	2	0	0	2	2	0	0
Journal box	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Broken axle	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Split switch	0	0	0	0	0	0	0	0	0	0	2	2	0	0	2	0	0	0
Truck	0	0	2	3	0	1	0	0	1	0	0	3	2	2	1	1	0	0
Sand box	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
Cable	0	0	0	0	0	1	0	1	0	0	0	14	17	0	6	1	1	0
Total pull-in	30	41	53	52	52	39	45	29	27	112	108	97	106	67	82	66	61	42
Cars in service	849	871	835	841	867	915	1,120	1,127	1,124	724	733	732	733	711	712	1,078	1,241	1,351
Per cent pull-in	.03½	.04¾	.06½	.06½	.06	.04¾	.04	.01½	.02½	.15½	13½	.13	.14½	.01½	.11¼	.06½	.04	.03½

The Auburndale shop has specially assigned to it for maintenance 27 box cars, 22 of which are double-truck units, and 50 open cars, 46 being equipped with double trucks. At Waltham there are 18 double-truck and 17 single-truck box cars and 24 double-truck and 10 single-truck open cars. Five snow plows are assigned to Waltham and seven to Auburndale and two

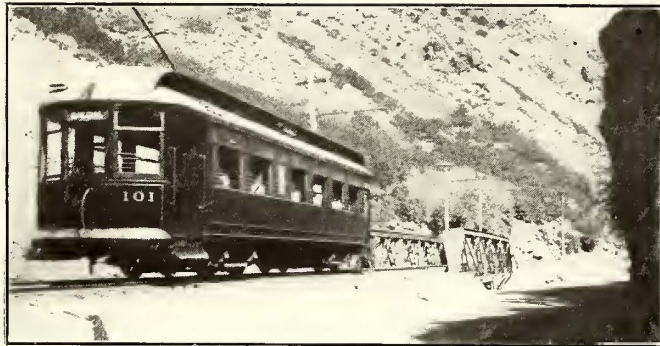
tinuous service of a car. A monthly summary is also made of the defects causing pull-offs. The record of defects and their classification is kept in the office of the shop foreman, where it can be seen at all times, and the improvement in car operation is evident from the accompanying figures from November, 1909, to August, 1910.

The shops at Waltham are at present provided with one assistant foreman, two car washers, five pitmen, five men employed in general overhauling and two night men with one fireman. At Auburndale an assistant foreman, five pitmen, one car washer, three armature winders and one blacksmith constitute the force. The general foreman at Waltham has charge of both shops.

OGDEN RAPID TRANSIT COMPANY

The railway system of the Ogden Rapid Transit Company at Ogden, Utah, is an interesting example of a combination of city lines, branches to pleasure and scenic points and lines for handling freight and produce from the surrounding country. The system at present comprises 36 miles of track, of which that on Washington Avenue and Twenty-fifth Street, the two principal streets of Ogden, is double-tracked.

The most interesting portion of the system is the line that



Ogden Rapid Transit—Ogden Canyon Line, Showing Steel Truss Bridge and Roadbed Construction

was placed in operation a year ago last summer in the canyon of the Ogden River. This canyon has long been famed among tourists as well as among the residents of Utah for its exceptional scenic features. The lower end of the canyon is particularly rugged and picturesque, and the few spots where it widens out have been utilized for resorts, camping sites and summer homes. The county commissioners have for several years maintained an excellent wagon road in the canyon, but about two years ago the officials of the Ogden Rapid Transit Company, realizing the possibilities of the canyon as a revenue producer, began the construction of an electric line to "The Hermitage," a popular hotel and resort in the canyon.

The company was already operating a branch to a sanitarium near the mouth of the canyon. This line was extended along the bank of the river and for the most part on the side opposite the wagon road. For the greater portion of the distance the roadbed had to be blasted out of solid rock, and concrete banks and walls had to be built to hold the grade. Nearly all the post holes for the trolley line also had to be prepared by blasting. A fair idea of the heavy construction necessary may be gained from the fact that the 3 miles of line in the canyon cost \$100,000.

The total length of the line from the union depot in Ogden is 7 miles, and in that distance the road rises 700 ft. to a 5000-ft. elevation at the upper end. The maximum grade is 4 per cent, and this extends for a distance of about 2000 ft. The prevailing grade is $2\frac{3}{4}$ per cent, and the maximum curvature is 30 deg. There are not many cuts on the line, but such as have been made have also required fills of rock, the deepest of them being about 16 ft. The line crosses the river three different times in the canyon, at one point by means of an 80-ft., steel plate-girder bridge. Rails weighing 48 lb. are used, and five sidings are provided so that a 10-minute headway can be maintained if desired.

Side-bracket suspension is used for the trolley with Ohio Brass fittings and Roebing's No. 00 trolley wire. The line is fed from the central station in Ogden by means of five No. 0000 feeders, three of which run through to the end of the line.

The heaviest traffic which has been handled by the road dur-

ing any single day was on July 4 last, when 7000 passengers were carried. The average Sunday and holiday travel numbers about 1800 passengers, with half that number during weekdays. These figures apply to the months of June, July and August, during which a 20-minute headway is maintained. During the winter months the schedule is extended to 1 hour and 20 minutes.

It is planned next year to extend the line 8 miles farther up the canyon to Ogden Valley, touching the Idlewild and Oaks resorts, and reaching the towns of Huntsville, Eden and Liberty in the valley above. This extension will entail nearly as heavy construction as that of the part now in operation.

The company is now completing an extension north from the city to Brigham City, 22 miles from Ogden, which will add $12\frac{1}{4}$ miles to a line that already extends north to Utah Hot Springs. In Brigham City a branch 1 mile long will be built to connect with the Oregon Short Line depot. The construction of the extension will be of the side-bracket type, with Ohio Brass and



Ogden Rapid Transit—Ogden Canyon Line

Roebing's fittings and wire and with 50-lb. rails. It is planned to maintain an hour-and-a-half service on this line, the distance between Ogden and Brigham City being covered in 1 hour, including stops at Willard, Parry and Utah Hot Springs en route. It is planned eventually to extend this line to Logan, about 20 miles farther on, and connect there with the line of the Logan Rapid Transit Company, owned by the same interests, which is now operated between the railroad depot and the State Agricultural College.

POWER EQUIPMENT

The company receives its power from a central steam station in Ogden and also from a water-power plant located at Willard, 13 miles north of the city. The Willard plant consists of a 450-hp Allis-Chalmers turbine operating under an effective head of 1200 ft., the water being taken from a conduit $1\frac{1}{4}$ miles in length. A 300-kw, 2300-volt generator furnishes light for Willard City and power for the railway system, the latter being transformed to 20,000 volts for transmission to Ogden, where it

is converted to railway voltage by means of a 300-kw motor-generator. A 450-hp steam plant in Ogden is used to supplement the water-power current.

ROLLING STOCK

The company has a total of 37 cars, several of which have been recently purchased. Six of the new cars are of St. Louis manufacture, 46 ft. over all, equipped with four GE inter-pole motors and K35D controllers, operating at 700 volts. Four of



Ogden Rapid Transit—Ogden Canyon Line Terminal

these are provided with smoking compartments and toilets, and seat 46 passengers. The other two cars are of the semi-convertible type, seating 48 passengers. They have a rated speed of 38 m.p.h. The equipment also includes three inclosed trailers from the American Car Company, 40 ft. over all, seating 40 passengers and provided with electric heaters. These, with the new motor cars, are used on the Canyon and Brigham City lines. The company's rolling stock also includes a McGuire-Cummins snow sweeper and a 32-ton GE-St. Louis electric locomotive equipped with four 60-hp motors.

TRAFFIC

The company has developed a considerable freight business on its lines to the north of the city, where one of the richest



Ogden Rapid Transit—Ogden Canyon, Showing Construction Adjoining County Road

fruit and agricultural sections of Utah is tapped. In the past season there were handled over the system from North Ogden and the fruit-raising settlements north of Ogden 100 carloads of peaches and grapes. These were all turned over to the Oregon Short Line at Five Points, 3 miles north of Ogden. During the season the company hauled 350 cars of sugar beets, and from 30 to 40 cars of canned goods, from the same section.

On the Plain City line, which branches off at Five Points and runs northwest, there were handled over 700 cars of sugar beets. This line is now operated by steam, but if the company's present plans are carried out, the line will be equipped with electricity in the near future.

OFFICERS

The Ogden Rapid Transit Company has the following named officers: President, David Eccles; vice-president, M. S. Brown; treasurer, H. S. Rolapp; secretary, Geo. H. Matson; directors, R. B. Porter and H. H. Spencer; superintendent, J. W. Bailey; master mechanic, W. V. Reed. Acknowledgment is hereby made for courtesies extended by Superintendent Bailey in the preparation of this article.

A BULLETIN ON FUEL VALUES

"The Volatile Matter of Coal" is the title of the first bulletin to be issued by the new Federal Bureau of Mines. The authors, Horace C. Porter and F. K. Ovitz, conducted their investigations at the Pittsburgh station while it was under the technologic branch of the Geological Survey, the work being a continuation of the fuel investigations begun several years ago at the Louisiana Purchase Exposition, St. Louis, Mo. The results obtained at that plant showed that the work of determining the fuel values of the coals and lignites in the United States with a view to increasing efficiency in their utilization would be incomplete if it did not include systematic physical and chemical researches into the processes of combustion. Hence in their later investigations the authors carried on such researches, concentrating attention on those lines of inquiry which promised results of greatest economic importance. This bulletin is therefore a report on an investigation of the volatile matter in several typical coals—its composition and amount at different temperatures of volatilization.

Quoted directly the authors say: "The investigation has already shown that the volatile content of different coals differs greatly in character. The volatile matter of the younger coals found in the West includes a large proportion of carbon dioxide, carbon monoxide and water, and a correspondingly small proportion of hydrocarbons and tarry vapors. The older bituminous coals of the Appalachian region yield volatile matter containing large amounts of tarry vapors and hydrocarbons, difficult to burn completely without considerable excess of air and a high temperature. Coal of the Western type, moreover, gives up its volatile matter more easily at moderate and low temperatures than that of the other type. The volatile matter produced at medium and low temperatures is rich in higher hydrocarbons of the methane type, such as ethane and propane, which contain a larger portion of carbon than is present in methane.

"These facts help to explain the difficulty of burning Pittsburgh coal, for example, without smoke, the low efficiency usually obtained in burning high-volatile Western coals, the advantage of a preheated auxiliary air supply introduced over a fuel bed and the advantage of a furnace and boiler setting adapted to the type of fuel used. They bear directly also on the question of steaming 'capacity' of coal for locomotives, the designing and operation of gas producers for high-volatile fuels and the operation of coke ovens and gas retorts.

"The results show further that certain bituminous coals of the interior and Rocky Mountain provinces give promise of good yields of by-products of coking, notably ammonia and high-candle-power gas, comparing favorably in these respects with the high-grade coking coals of the Eastern province. They show also that inert, non-combustible material is present in the volatile products of different kinds of coal to an extent ranging from 1 per cent to 15 per cent of the coal."

The bulletin will be of interest to fuel engineers, designers and builders of gas producers, superintendents of power plants, railway master mechanics and those engaged in the suppression of smoke.

The bulletin may be obtained by applying to the director of the Bureau of Mines, Washington, D. C.

SHOP RECORDS IN RICHMOND, VA.

The management of the Virginia Railway & Power Company believes strongly in keeping systematic records of car troubles and using definite inspection and overhauling methods instead of relying upon the foreman's say-so that this or that car can stay out on the line a little while longer. About March, 1908, the company adopted a basis of 1000-1100 miles

INSPECTION.		
Car No.....	Date Due.....	Date Inspected.....
ITEM.	WORK DONE.	SIGNATURE.
Trolley Light and Heater Circuits Cables Lightning Arresters Circuit Breakers Controllers Relays and Contactors Rheostats Electric Bells Motors Armature & Axle Bearings Air Brakes Hand Brakes Brake Rigging Draft Rigging Sand Boxes Foot Gongs Fenders Gates, Screens, etc. Grab Handles Registers and Fittings Car Body and Fittings Trucks Journal Boxes		

Fig. 1—Richmond Records—Type of Inspection and Overhaul Blank

for inspecting and washing cars, and a basis of 50,000 miles for overhauling cars by taking out and disassembling the motors, stripping the controllers to the backboards, renewing truck parts and bolts, retouching the car body, etc. The result of this policy has been a most gratifying decrease in the number of repairs, as will be seen from the examination of the records later reproduced. Those who fear the clerical expense of a record system may be astonished to learn that the statistics for some 320 car equipments are kept up without trouble by one man.

The mileage reports are obtained in the usual way from the dispatcher's daily slips on the performance of all cars. The figures as received are entered on a loose-leaf ledger sheet divided vertically for months and horizontally for the days of each month. Each sheet corresponds to a certain car number and the figures are integrated daily until the inspection or

Instead of employing separate mileage forms or cards for each item recorded, it has been found feasible to use a single blank arranged as shown on Fig. 2. This is a loose-leaf sheet only 9¼ in. high x 11½ in. wide over all, with certain common headings, besides individual headings for different kinds of trouble with coils, commutators, motor shafts, pinions, bands, bearings and wheels. A combination form like this can effect quite a saving in the printing bill of a small or medium-sized company. It will be understood, of course, that only the history of one article is recorded on one sheet. The same blank is used to make up for the general superintendent a monthly summary of all troubles coming under the several headings, including a comparison with the same month of the preceding year.

Fig. 4 is reproduced from the actual armature repair records of the company for December, 1908, and December, 1909. Not only does this show the careful watch kept on

ARMATURE	ARMATURE	ARMATURE
No.	No.	No.
Type.....	Type.....	Type.....
Put in Car No.	Repairs begun.... Completed.....	Taken out of Car No.
Date.....	Material used.....	Date.....
Signature	Make of coils.....	Trouble.
	Hours.....	
	Signature	Signature

Fig. 3—Richmond Records—Armature Tag

the behavior of each make of car equipment, but also the trouble reductions due to the continued practice of mileage maintenance and inspection. Similar records are kept of armature and axle bearings, wheels, etc.

Particular attention is given to following up armature troubles. For this purpose the three-part armature tag reproduced in Fig. 3 is shown. The right-hand portion is filled out and signed by the inspector who removed the armature; the middle portion gives the shopman's report on the defects remedied, accompanied by a labor and material statement; and the last portion records the final disposition of the repaired armature.

The motorman and conductor's daily report, Fig. 5, and the usual type of car pull-in report form the basis for a monthly statement of car failures. The term "failures" really is too strong for this record, because even such items as broken glass

RECORD OF.....				(ARTICLE)										No.....									
(TYPE)				CAUSE OF REMOVAL										MILEAGE									
CAR No.	PUT IN	TAKEN OUT	MAKE	COILS		COMMUTATOR		SHAFT		PINION	BANDS		BEARINGS		WHEELS			PART	TOTAL				
				Short Circuit	Open Circuit	Short Circuit	Rough	Flat	Worn Out	Cut	Spring	Loose Sleeve	Thread	Worn Out	Loose	Broken	Loose Babbit			Melted	Worn Out	Turned	Turned

Fig. 2—Richmond Records—Head of Combination Blank for Mileage of Electrical and Mechanical Equipment

overhauling mileage has been reached. In that event the foreman is notified on the form shown in Fig. 1, a white copy being used for inspection reports and a yellow one for overhauling. When the work has been done the sheet must be returned with the signature of every shopman concerned, while the back of the form serves for the foreman's signed statement of supplies used. This form is supplemented by one on which the shop foreman gives a record of all cars received, all cars removed and all cars remaining for attention.

and bent guards are listed. The actual pull-ins or service breakdowns do not exceed three or four a month. According to the mileage for December, 1909, this would mean only one pull-in for every 140,772 car miles or every 187,696 miles. Even on the basis of all recorded troubles there was but one failure for every 2887 miles operated. The company began to get in December, 1909, the beneficial results of its system of inspection on a mileage basis, and the records show the improvement effected.

Most of the records described in this article, as well as the shop time sheet reports, are used in making up loose-leaf page records of the labor and material expended on individual cars and their motor and truck equipments. Each side of the record is divided into six rectangles covering respectively the first six and last six months of the year. The rectangles in turn have columns for labor and material charges, under specific account numbers. This record has

POWER PLANT IMPROVEMENTS AT PORTLAND, MAINE

Current for the operation of the cars of the Portland Railroad Company's urban lines is supplied from a power station located about a mile north of the center of the city, on a site where tidewater is available for condensing purposes and where fuel can be delivered by barges. This station delivers exclusively a direct-current output at 550 volts, and has for

several years illustrated a design of plant adapted to combined reciprocating engine and turbine operation. The company installed here two of the first direct-current steam turbo-generators for 550-volt service, the machines being of the vertical type. The company is now completing the installation of two 500-kw Curtis-General Electric generators built for horizontal operation. These machines are of the four-stage type and deliver current to the busbars at 550 volts, when operating at full load and at a speed of 1800 r.p.m. The generators are provided with commutating poles and the field winding is disposed upon four coils in addition to the former. The commutators are provided with insulated rings to prevent spreading under the action of centrifugal force. At present these machines are being operated non-condensing pending improvements to the auxiliary system mentioned below.

The other units in the station consist of a 1500-hp Rice-Sargent vertical cross-compound engine direct-connected to a 1050-kw generator,

and two 400-kw generators direct-driven by horizontal cross-compound Allis-Corliss engines. The normal capacity of the station is 3050 kw. The speed of each engine is 100 r.p.m. Steam is supplied from a boiler plant of 2200 hp rating, there being four 250-hp units, two 350-hp units and one 500-hp unit. The boilers are being equipped with Taylor stokers.

Until the present turbines were purchased the station was provided with an independent condensing equipment for each of the prime movers in service. The result was a maze of piping under the engine room, with complications in operation and maintenance. The company is now completing the installation of a simple condensing system of the ordinary barometric type, there being one condenser for the reciprocating engine units and one for the two horizontal turbines. Each engine discharges its exhaust into a 24-in. trunk line carried through the basement to the outside wall of the engine room, where the two barometric condensers are installed. The two turbines discharge through 26-in. pipes into a 36-in. exhaust main, which also leads to the corresponding barometric condenser at the north end of the building. The two condensers discharge into a single hot well, each having a 14-in. tail pipe.

The injection water for the condensers is taken from Portland harbor through three 14-in. pipes, which deliver into a 24-in. cross-header. Each pipe is provided with a small bleeder valve for destroying the vacuum when it is cut off from service, a main service valve and a covered strainer. Two pumps

		SUMMARY OF CHANGES.													December, 1909-1908.	
		CAUSE OF REMOVAL													Number of Changes.	
		COILS.			COMMUTATOR			SHAFT.		PINION.		BANDS.		Overhauled.		
Short Circuit	Open Circuit	Ground.	Short Circuit	Rough.	Flat.	Ground.	Worn Out.	Sprung.	Loose Collar.	Broken.	Loose.	Worn Out	Loose.		Broken.	Change.
														ARMATURES.		
G. E. 57	1909....					2	3	1								
	1908....													1	7	18
G. E. 58	1909....	2	4		2	2								2	1	16
	1908....															0
G. E. 62	1909....		1													2
	1908....			1												1
G. E. 67	1909....	4	2	6		1	17									4
	1908....	3	7		3	2	4							6		46
G. E. 90	1909....					3	5									3
	1908....															10
G. E. 1000	1909....														6	6
	1908....															0
West. 49	1909....	1	2	1	6	1	1	3		1						15
	1908....		8				2									10
West. 101-B.	1909....														2	3
	1908....					3										4
West. D-1	1909....	1														1
	1908....															0
Chris. AA-1	1909....	1														1
	1908....	2	3	1	2			1						3	1	13
Total 1909.		9	5	7	6	1	4	24		1	1			1	19	94
Total 1908.		5	22	1	6	10	11			1				2	7	100

Fig. 4—Richmond Records—Summary of Armature Troubles on Combination Form

proved a valuable guide for studying the comparative merits of the different types of rolling stock operated by the Richmond company.

The foregoing forms and data were furnished through the courtesy of C. B. Buchanan, general superintendent of railways, Virginia Railway & Power Company. The records are

MOTORMAN AND CONDUCTOR'S DAILY REPORT.					
Car No.Line.			
PARTS OF CAR MARKED OUT NEED ATTENTION.					
All O. K.	Trolley.	Brakes.	Gongs.	Hood Supporters	Doors.
Motors.	Trolley Wheel.	Brake Handles.	Signs.	Hand Straps.	Steps.
Bearings.	Trolley Rope.	Sand Boxes.	Ventilators.	Register.	Grab Irons.
Gears.	Lamps.	Couplers.	Headlight.	Register Rope.	Floor.
Gear Cases.	Truck Wheels.	Bumpers.	Gates.	Bells.	Hoods.
Controller.	Axle Boxes.	Fenders.	Platform.	Windows.	Seats.
Hood Switch.	Lightning Arresters.	Pilots.	Heaters.	Blinds.	Wheel Guard.
		Dash.		Resistance Box.	
Time taking car.....			Time leaving car.....		
.....190		Motorman		
		Conductor		

Fig. 5—Richmond Records—Car Crew Report on Defects

prepared under the direction of C. C. Johnson, who in the unusual two-fold capacity of superintendent of equipment and purchasing agent has found these various forms an invaluable help.

An effective way used by a Southern railway to maintain the platform where the motorman stands is to insert flush with the flooring a patch of steel 10 in. x 14 in. in area and 1-in. thick.

are shortly to be available for handling the injection water. The present service is handled by a Dean duplex horizontal double-acting pump connected with the supply header by a 24-in. pipe line and discharging into the injection lines through a 20-in. pipe. A 42-in. Dean centrifugal pump is now being installed for operation by a 550-volt direct-current motor, and the supply for this pump is to be drawn from the header by a 20-in. pipe, the discharge being of the same size. Beyond the two pumps the injection water delivery lines are to be cross-connected so that either pump can be used to supply the condensers, the injection water being furnished to each outfit by a 14-in. supply pipe. A vacuum as high as 29 in. has already been obtained with this equipment under favorable conditions, and the basement of the engine room has been almost entirely cleared of small piping.

INVENTORY OF PHYSICAL RAILWAY PROPERTY OF TOLEDO COMPANY GIVEN TO CITY

An inventory of the physical railway property of the Toledo Railways & Light Company, prepared by Ford, Bacon & Davis, of New York, was filed with Mayor Whitlock, of Toledo, by the company on Nov. 1. The inventory was submitted by the company in accordance with a request made by the City Council of Toledo in July.

A letter of Ford, Bacon & Davis, addressed to Albion E. Lang, president of the company, accompanied the inventory. The letter, which is as follows, gives a general list of work and expense items entering into the construction cost of a street railway, which in addition to the physical property should be included in an appraisal:

"In accordance with your request of July 5 we beg to advise you that we have completed the inventory of the railway property of your company. In the consideration of this inventory the following points should be borne in mind:

"1. The date of the inventory is as of Oct. 1, 1910. There is included, however, additional property which had been purchased prior to this date, the delivery or installation of which will occur after this date.

"2. This inventory has been prepared from the records of the company supplemented by inspection on the ground, which has been made in as much detail as the time allowed us has permitted. In a matter so complex as this it is possible that some items have not been listed, which may be found by further investigation.

"3. This inventory has been made sufficiently detailed for the proper identification of the property of the company for the purpose of inspection for valuations. Such inspection will develop the detailed specification upon which the property should be priced. For instance, our description of cars and buildings shows in a general way the type of car or building, but does not attempt to include all of the parts, fixtures and accessories composing the finished car or building.

"4. This inventory is intended to show only property within the city limits, except as noted below, in actual use by the railway department of your company. There are a number of items, however, which, although required for the railway operation, are nevertheless used jointly by other departments of your company and by other companies. The proportion allotted to railway department uses of items such as power houses, underground conduits, feeders, poles, etc., will have to be determined by methods of usual practice, modified in so far as necessary by local conditions. In the case of power houses the machinery used exclusively for commercial lighting and power has been omitted.

"5. Track and overhead line construction amounting to 6.18 miles of single track owned by your company is outside of the city limits. As this, however, is part of the city system, we have included it in this inventory.

"6. The Casino property has not been included as real estate inasmuch as the company owns this as one of its investments, but as it was acquired for park purposes for the development

of the company's business it should properly be valued as a portion of the railway property. There are other investments of the same general character which should also be considered in a valuation of this property.

"7. A description of the pavement outside of the franchise requirements has been included for the purpose of facilitating estimates upon the cost of reproduction new of the track work.

"8. This inventory includes only those items of physical property which can be labeled and inspected. In the construction of this property there are many further work and expense items necessarily incurred which should be included in a valuation, whether the matter be viewed from the standpoint of cost of production through the period of development or cost of reproduction new at this date.

ITEMS ENTERING INTO CONSTRUCTION COST

"A general list of the work and expense items entering into the construction cost of a street railway should include the following, of which the inventory which we submit comprises only part of sections 2, 4, 5 and 6:

I. Company's overhead charges upon construction.

"1. Executive organization's work and expenses, including:

"1. Accounting expenses. 2. Office expenses. 3. Store-room and stable expenses. 4. Permits of authorities and city inspection.

"2. Legal work and expenses.

"3. Technical work and expenses.

1. Company's engineering organization. 2. Consulting engineers. 3. Architects. 4. Testing and outside inspection.

"4. Interest during construction.

"5. Taxes during construction.

"6. Wear and tear during construction.

II. Land, including private right of way and sites for power houses, car barns, shops, terminals, etc.

"1. Assessed value.

"2. Additional sales value.

"3. Additional value for railroad purposes, including

"1. Plottage. 2. Contiguity factor. 3. Special value for railroad purposes due to location.

"4. Overhead charges for acquisition of land, such as

"1. Brokerage. 2. Legal work and expenses. 3. Technical work and expenses. 4. Title insurance. 5. Loss on portion of site not necessary. 6. Loss on buildings discarded.

III. General contractor's overhead charges and profits.

"1. Work and expenses of contractor's general organization and office.

"2. General superintendence, watching and lights.

"3. Fire, accident and liability insurance during construction.

"4. Maintenance and use of tools.

"5. General contractor's profits.

IV. Material and labor comprising the physical construction and equipment.

"1. Inventory priced on basis of subcontracts.

"2. Physical extras, incidentals and contingencies.

V. Stock, tools and supplies.

"1. Inventory priced.

"2. Incidentals.

VI. Working capital, including

"1. Cash on hand. 2. Accounts and bills receivable. 3. Prepaid accounts. 4. Lands and buildings not used in operation.

"9. In addition to the above enumerated property there are work and expense items which must necessarily be considered in arriving at the total value. These can be valued only by experienced and competent men who will be able to arrive at the cost of a street railway property as a whole, constituting a going concern and including the cost of securing the necessary rights and capital for construction and the development of the business to its present magnitude ready for modern, adequate service to the city of Toledo.

"10. In addition to the above items we would also call your attention to the unexpired franchises of the company."

HEARING ON BOSTON TRANSIT MATTERS

As a joint board the Railroad Commission of Massachusetts and the Boston Transit Commission gave a hearing on Nov. 1 on various propositions pending for the extension of rapid transit facilities in Boston. In addition to these matters, which have been referred by the Legislature to the two commissions for consideration and report, the joint board also considered the proposed consolidation of the Boston Elevated Railway and the West End Street Railway. President William A. Bancroft, of the Boston Elevated Railway, stated the position of that company.

President Bancroft described the development of transportation facilities in Boston since the operation of horse cars and explained how some awkward situations had arisen in which the company needed the co-operation of the community in order that proper solutions might be found. The management had conducted its construction work upon broad plans. President Bancroft urged the consolidation of the Boston Elevated and West End companies and spoke favorably of an extension from South Boston to Dorchester and in opposition to the West End loop, through Scollay Square and Bowdoin Square. The community served by the system was like a wheel with the business heart of Boston as the hub. In little over 12 years, since the Elevated company assumed operation of the property, it had done in track mileage three-fifths as much as had been done in the 42 years previously and in actual investment more than twice as much. Other extensions might be made upon the general design already adopted, providing for other sections of the community direct routes to and from the business heart of Boston. Within a reasonable time the company was willing to assume a rapid transit thoroughfare from Park Street to Dorchester by way of the South Station and South Boston. It was essential, however, to this undertaking that extensions be given to the leases of the Tremont Street subway, the East Boston tunnel and the Washington Street tunnel and also that a single control of the Elevated and the West End properties be effected.

The permanent investment had been increased from \$25,960,000 in 1898 to \$81,440,400 in 1909, with authorized extensions which would bring the total investment up to \$112,633,000 by 1914, when the street railway property would show an investment of \$1.00 for every \$20 of taxed wealth in the community. The company was somewhat disappointed at the failure of the public to read carefully the advertisements which it had been printing for the last few weeks in order to show the community what enormous strides had really been effected in the last 12 years. The intolerable system of competitive horse car lines gave way to a comprehensive electrical service under a single management under the régime of the West End company, while the Boston Elevated had carried the work farther, developing elevated, subway and tunnel lines forming rapid transit trunk routes between the business center and the suburban districts, with unparalleled transfer facilities and a close articulation of surface, overhead and underground lines. The free transfer was removed from politics and the arrangements with respect to compensation taxes for the use of public franchises were greatly improved by the Boston Elevated régime. The company had added about 600 cars to the system. The seating capacity of cars had been increased from 22 to 52, and the 5-cent fare extended to the benefit of the health and comfort of the community.

If the company should assume additional obligations for additional facilities it must consider not only the amount of additional capital required and the additional charge because of obligations assumed, but also the probability of any increase or diminution in cost of operating the properties as they now exist. If the leases of subways were not renewed a substantial rearrangement of the entire system would be necessary and this would involve large additional expense and possibly loss of revenue.

Such uncertainty necessarily made the prudent manager less willing to enter into new undertakings which might require years

for completion and before a fair return would be earned thereon. The leases might be renewed upon expiration, but it was conceivable that they might not be. The only reason that President Bancroft had heard suggested why the leases should not be extended was that the rates of interest might change and that a rental which might be fixed now might not be fair after 40 years. Such an argument would prevent anybody from concluding any arrangement for any number of years. The city's bonds for subways ran, say, 40 years, and bore a fixed rate of interest. The certainty of long-time arrangements more than offset any possible gain from slight change in interest rates.

The company was subject in its operation of subways to the control of the State through the Railroad Commission. No one doubted that this control was sufficient at all times to insure a proper performance by the company of its duties to the public.

The Elevated and West End systems were a unit so far as equipment and operation were concerned. Neither system could convey by itself the major part of its passengers from their point of departure to destination. The advantages to the public of a single control of the properties were indisputable. The only question was with respect to the terms of consolidation. The question before the joint board had reduced itself to whether a modification of the act of 1908 should be effected so as to provide for an 8 per cent dividend on the second preferred stock of the West End company or a consolidation be postponed indefinitely. The lease would end in 11 years and in undertakings for rapid transit that was a short period. Plans and provisions must be made for many years ahead, but they could not be made in the face of uncertainty as to the future, especially with uncertainty as to whether or not the surface system would be separate from the elevated system.

Under the terms of the lease, the Elevated company must return the West End property equipped and provided with its own power so that it could be operated as a separate system. The two systems interlaced each other and to provide each with separate power would involve both wasteful expenditure of capital and wasteful operating expense. It was recognized as fundamental that a public-service corporation should operate its property in the most economical manner with due regard to the requirements of the public and that all waste should be avoided. Stone & Webster had estimated that if power requirements increased as in the past there would be an actual waste in 1918 in duplicate provision of \$600,000, and that the amount would be still greater at the expiration of the lease in 1922. The two systems could not be operated as at present until the expiration of the lease, for the planning and construction of power stations and distributing systems would require years. In providing for additional power the company must know whether or not the two systems were to be a unit. An additional power plant was necessary at once. The company had purchased a large tract of land in South Boston for \$300,000 in order to produce power economically. The construction of this power station and its accompanying provisions would mean an expenditure of nearly \$3,500,000. If the two properties were separated, a considerable part of the expenditure would be wasted. The alternative was to provide separate power stations for the two properties at a considerable increase and waste in capital expenditure and operating expenses.

Another difficulty would arise in the division of subways between the surface and elevated systems at the expiration of the lease. The Elevated company had no desire to pay more for the West End system than was necessary, but it was a plain business proposition. The Elevated company believed that it was much better to take over the West End property on the basis of 8 per cent dividends for the second preferred stock than to delay consolidation further. If it was a good proposition for the Elevated company it was equally good for the public. The question was what was best to be done. The dividend rate of 8 per cent was not unreasonable. That was paid by the West End company prior to the lease of the property by the Elevated company, and was recognized by the general laws of 1906 as reasonable in so far as they provided for

a division with the State of dividends in excess of 8 per cent. The actual amount paid by the common stockholders of the West End company for shares of stock of a par value of \$50 was \$61.24 per share and a dividend of 8 per cent meant a net return of 6½ per cent on the investment. Nearly one-half of the stock had been paid in since 1891 at an average price of \$76.23 per share.

The proceeds from the stock which was paid in at par before 1891 had been invested at the time of the electrical equipment of the West End property, when the success of the enterprise was problematical. Eight per cent was not an unreasonable return upon the investment in an undertaking which was well-nigh a sheer hazard at the time. No interest or dividends were being paid upon any franchise value or upon anything but actual cash invested in the property.

After the conclusion of the statement of President Bancroft the hearing was adjourned until Nov. 8.

ARBITRATION IN PHILADELPHIA ON "LOYAL MEN"

A board of arbitration decided this week a question growing out of the Philadelphia car men's strike of no little importance to the street railway world in general. What the arbitrators were called upon to do was to define the meaning of "loyal men" as applying to the settlement of the February-April strike. Their decision, which supported the company's contention, establishes a precedent in cases of dispute as to what relation, with respect to seniority, strikers who return to their employment bear to men employed during a strike.

The Philadelphia arbitration was the outcome of the claim first put forth in August last by the returned strikers that they were entitled to seniority rights immediately following the Philadelphia Rapid Transit Company's "loyal men," which, the former strikers asserted, meant that they were to yield precedence only to the men who were in the service when the strike began. It was further claimed that no man employed by the company during the strike was a "loyal man" and that, therefore, all such men should be displaced (but not necessarily discharged) in favor of the men who were on strike.

To these claims the company asserted that it had always considered as loyal men those who had permanently entered the service at regular wages during the strike and remained thereafter. It conceded that professional strike breakers, hired at excessive wages for temporary service, were not to be considered as coming under the definition of loyal men. Upon the refusal that this position involved to give the seniority that they demanded to the returned strikers, it was agreed that the whole question hinging upon the definition of what constituted "loyal men" should be referred to arbitration, and that the arbitrators should decide where the men who came back after the strike were entitled to be placed.

As one arbitrator the company nominated John G. Vogler, a Philadelphia business man in no way interested in or connected with the street railway business; while the union men, who are, of course, the only element concerned in the attempt to secure a reversal of the company's position, nominated Raymond Robins, a Chicago lawyer, who has been to a greater or less degree affiliated with the labor movement, as their representative on the board. If these men failed to agree, they were to select an umpire, but none proved to be necessary.

Hearings before Mr. Robins and Mr. Volger were begun on Oct. 25 and concluded on Oct. 27. Daniel T. Pierce represented the company, while the spokesman for the men was C. O. Pratt, of the Amalgamated Association.

The agreement upon which the arbitration was based read as follows.

"Oct. 17, 1910.

"It is hereby mutually agreed by President C. O. Kruger, representing the Philadelphia Rapid Transit Company, and the committee representing their employees that the following proposition shall be submitted to a board of arbitrators, as already agreed upon, for their consideration and decision. Their

decision, after a complete hearing, rendered in writing, to be accepted by both parties hereto as final.

"At the time the strike was settled it was agreed and understood that the men returning to work should be placed behind what the company was pleased to term its 'loyal men.'

"At the expiration of the three months' limit the employees asked to be placed behind the 'loyal men,' their understanding being that 'loyal men' were those employees who were in the service of the company prior to Feb. 19 and did not go out on strike. The company declined to so place the men, claiming that 'loyal men' included those men who were in the company's service and did not go out on strike, also all employees who had been hired permanently prior to the time the strike was settled, April 18, 1910, and that the men are now properly placed in accordance with the terms of settlement.

"The board of arbitrators shall determine where these men who returned under the terms of the strike settlement properly belong.

"It is further agreed that each party hereto shall pay the expenses of their own arbitrator and that both parties hereto shall jointly share and share alike the expense of a third arbitrator (should one be required) and such other necessary expenses as may be incurred by the board of arbitrators.

[Signed]

PETER DRISCOLL,
*Chairman Grievance
Committee.*

CHARLES O. KRUGER,
*President of Philadelphia
Rapid Transit Company.*

H. B. BARRON,
Secretary Grievance Committee.

At the hearing Mr. Pratt called 12 witnesses, all motormen and conductors, who testified that their understanding was that by "loyal men" was meant only those men who were in the company's employ before the strike and remained in service. Some of these witnesses stated that this understanding was based upon the fact that the \$25,000 which the company distributed after the 1909 strike was given only to "loyal men" of this description; and that the company had followed the same rule in granting vacations this year; that is, it had given vacations, as it gave the bonus, only to men who were in its employ before and worked through the strike.

President Driscoll and Secretary Barron, of the Philadelphia Local 477 of the Amalgamated, also took the stand and stated that President Kruger, of the Transit company, had, in a conversation on April 25, defined "loyal men" as being those who were in the service before the strike. The men's case was completed by a statement from Mr. Pratt in which he asserted that the company's general counsel, in a conversation with W. D. Mahon, had defined "loyal men" as being those who were in the company's employ when the strike was called on Feb. 19; that he had understood from I. H. Silverman—to whose efforts as intermediary the settlement of the strike was ultimately due—that the returning strikers would immediately follow in seniority the men in the service on Feb. 19. It was understood, Pratt claimed, although he did not say that Mr. Silverman had made any promises in so many words to this effect, that the union men should be preceded only by "loyal men" and that the use of the term in this connection excluded men employed during the strike.

Ellis Ames Ballard, the company's general counsel, was its first witness. He emphatically denied that he had ever given the reported definition to Mr. Mahon. He stated further that throughout the strike he, all the other officials and the members of the board had been of one mind, that the men employed during the strike should not be displaced for the benefit of strikers.

President Kruger with equal emphasis denied that he had ever made the statements attributed to him by Driscoll and Barron, the president and secretary of Local 477. Mr. Kruger testified that at the time referred to he had defined the three classes of men with which the company had to deal as (1) the men who were in the service before and remained throughout the strike, (2) the men employed during the strike, and (3) the strikers

who had come back under the settlement of April 17, when the men voted to stay out, but were ordered back to work by their executive committee without any understanding whatever except that until they got regular runs (which it was believed would be within three months) they would be paid \$2 a day, and that time out on strike would not be counted against them in respect to pension and insurance rights. Mr. Pierce, who was Mr. Kruger's assistant, took the stand and corroborated Mr. Kruger's statement. As to the distribution of the 1909 bonus and the giving of vacations, Mr. Kruger said that the company had been governed in the distribution of these favors by the usefulness and not by the loyalty of the men who received them.

I. H. Silverman also testified for the company. He stated that at no time had he promised that the returning strikers should have seniority over men employed during the strike; that he had never defined "loyal men," but that he had always been told by the company's officials that they would not displace or demote men employed during the strike at regular wages and upon promises of permanent employment. He also denied that he had ever given any estimate of the number of men that would have precedence over the strikers. W. D. Mahon, international president of the Amalgamated, appeared unexpectedly at the hearing and in reply to questions stated that Mr. Ballard had never given the definition attributed to him by Mr. Pratt, and that, so far as his (Mahon's) opinion went, the only "loyal men" were those who were loyal to their rights and went on strike.

In his summing up Mr. Pratt claimed that the men had established their case by showing that the company by its distribution of the bonus and vacations had always excluded men employed during a strike from the "loyal" classification; that the understanding of the men and his understanding was due to this and the further fact that Mr. Kruger had, in spite of his present denial, made the statement testified to by Driscoll and Barron. For these reasons and because seniority was a matter of right which the men did not surrender by going on strike, Mr. Pratt asked that the arbitrators decide that the former strikers be placed on the runs now held by the men who had been employed during the nine weeks' strike and remained with the company since then.

The company's position, as stated by Mr. Pierce in his argument, was that the "understanding" of the men and their leaders had no bearing on the case unless it could be shown that the company had made promises or statements or performed acts that justified such an understanding. It was asserted that there was no evidence of such promises, statements or acts; that the company's position had always been from the first minute that the question was brought up, long before the strike ended, that it would never demote the men who had fought its battles and enabled it to operate its cars in spite of assault, dynamiting and the most cruel use of the boycott. As to the statement attributed to Mr. Kruger, Mr. Pierce asked the arbitrators to consider whether it was likely that the president had reversed the policy of his company, himself and his board of directors and made a statement that would involve the breaking of promises to men employed during the strike.

DECISION

The decision, which was announced Nov. 8, recognizes all men who were permanently engaged or hired at the regular wage rate of 22 cents an hour from the beginning of the strike from Feb. 19 until April 1 as "loyal men." Such men will retain their priority rights except that they must return to the barns at which they were hired originally. Such men as were hired after April 1 and up to the end of the strike will not be considered "loyal men" and will lose their priority rights. The decision, which has been accepted by both sides, follows:

"We, the arbitrators appointed under a letter dated Oct. 17, 1910, by and between the Philadelphia Rapid Transit Company and the committee representing employees, do find as follows:

"All motormen and conductors employed prior to the strike and who remained with the company during the strike and are

now in the employ of the company, shall be returned to those barns at which they were employed prior to the date of the strike.

"All motormen and conductors employed during the strike and up to April 1, 1910, inclusive, who were working at the regular rate of wages, namely, 22 cents per hour, and who received no other compensation, shall remain at those barns and upon those lines where they are now employed.

"All of the foregoing motormen and conductors shall be considered as having priority rights at their respective barns and upon their respective lines.

"All motormen and conductors who went out on the strike of Feb. 19, 1910, and who are now in the company's employ, shall take their respective places following the aforesaid.

"All changes shall be made in accordance with the foregoing on or before Dec. 1, 1910.

(Signed)

"JOHN G. VOGLER.
"RAYMOND ROBBINS."

SUGGESTIONS ON STIMULATING LONG DISTANCE TRAVEL

BY E. C. VAN VALKENBURGH

In the course of a recent trip of about 2000 miles by electric railway between Chicago and New York, described in the *ELECTRIC RAILWAY JOURNAL* for Sept. 24, 1910, the writer was impressed with the difficulty of obtaining advance information in regard to timetables of connecting lines. It seems to him that the railway passenger agent and the conductor should stand in the same relation to the passenger or prospective passenger as the clerk or traveling salesman bears to the customer and prospective customer of the retail or wholesale house. A successful man of either of these classes must not only know his own line of goods but must also be familiar with the use to which these goods are put and their advantages over similar or competing lines. The passenger agent and the conductor are the selling representatives of the railway company, and therefore should be thoroughly informed regarding the extent and responsibilities of the electric railway field. To accomplish this, the following suggestions are made: Electric railway companies should exchange timetables and traffic literature of all kinds, particularly with connecting roads. This matter should be on file in the office of the general passenger agent, and, where possible, a brief statement of the most important connections and other information of interest to the traveler should be printed in the form of a leaflet or circular. Each conductor should then be supplied with a copy of this circular so that he can answer questions in regard to the connections made with other lines. The general passenger agent's office should be supplied with good maps of connecting roads, and copies of these maps should also be displayed in the waiting rooms and ticket offices of the company.

Passenger agents should also be encouraged to travel over connecting lines so that they will be familiar through observation with the country traversed and the service given. This practice should be extended to conductors as far as possible, and they should at least know something about all the divisions of their own company. A great many passengers will not take the trouble to apply to the general passenger agent's office for this class of information, and, while the company may not feel called upon to provide its conductors with all of the information which can be secured from the general passenger agent, yet they should be able to answer simple questions.

It is now possible to reach by electric car nearly all of the larger cities and points of interest in the Central, Eastern and Atlantic States, and the practice of spending a vacation in touring by electric car is growing in popularity. It could be made very much more popular if the practice was encouraged by electric railway companies.

NEW BROOKLYN TRANSFER SYSTEM

Under the new transfer system adopted on Oct. 15, 1910, by the lines comprised in the Brooklyn Rapid Transit System four types of transfers are issued by conductors and two types by transfer agents. There are also various forms of transfers for emergency use, including the car-to-car, bridge "buffalo" and bridge emergency transfers.

The forms of transfers issued by conductors are, in brief, as

This Ticket Transfers to Any Line Printed on Other Side. OCT 15 1910. REGISTER READING. FLUSHING-KNICKERBOCKER LINE B. H. R. R. Co. Not transferable. Good at any intersection or junction of issuing line within the time punched, unless restricted. This transfer (unless noted FINAL) entitles the holder to a "BB" (Black) transfer to the lines on back hereof. The passenger is requested to note that the proper transfer is issued. Tickets issued by short cars are good to all lines named; such lines, if beyond terminus, may be reached by next connecting car on Agent's Special Ticket. Good only in A.M. if P.M. Coupon is detached. 1 2 3 4 5 6 7 8 9 10 11 12 AM 1 2 3 4 5 6 7 8 9 10 11 12 PM

This Ticket Transfers to Any Line Printed on Other Side. OCT 15 1910. REGISTER READING. FLUSHING-KNICKERBOCKER LINE BB B. H. R. R. Co. Not transferable. Good at any intersection or junction of issuing line, within the time punched, unless restricted. This transfer is final, except to feeder lines. The passenger is requested to note that the proper transfer is issued. Tickets issued by short cars are good to all lines named; such lines, if beyond terminus, may be reached by next connecting car on Agent's Special Ticket. Good only in A.M. if P.M. Coupon is detached. 1 2 3 4 5 6 7 8 9 10 11 12 AM 1 2 3 4 5 6 7 8 9 10 11 12 PM

Brooklyn Transfers—Front and Back of One of Cash Tickets

follows: Cash transfers, second (or direction) transfers, continuing trip tickets and conductors' special transfers. With the exception of one line yellow tickets are used on the outbound trip and green tickets on the inbound trip. On the excepted line, the Graham Avenue line, dark red and blue are used. The cash transfers are good in either direction at all intersections and junctions of transferring lines unless otherwise noted on the tickets. The front and back of the green cash transfers are illustrated herewith. The size of the original is 2 7/16 in. by 3 3/8 in.

Brooklyn Transfers—Front and Back of One of the Direction Tickets

when requested by passengers at the time of payment of fare.

The notice issued to conductors in connection with an explanatory booklet regarding the new system, signed by William Siebert, superintendent of surface lines, says, in part:

"In issuing transfers up to and including 12 o'clock noon the conductor will detach the p. m. coupon and punch on the a. m. time limit the hour to which the ticket is good.

"To fix this time limit the conductor will punch the next or succeeding hour, depending upon the time necessary to reach

This Ticket Transfers to Any Line Printed on Other Side. Not transferable. Good at any intersection or junction of issuing line within the time punched, unless restricted. This transfer (unless noted FINAL) entitles the holder to an "AA" (Red) or "BB" (Black) transfer, as noted on back hereof. The passenger is requested to note that the proper transfer is issued. Tickets issued by short cars are good to all lines named; such lines, if beyond terminus, may be reached by next connecting car on Agent's Special Ticket. B.H.R. R.Co. NOTE.—Lines operating over a joint route between a terminus and a junction, will neither issue nor accept transfers from each other while on joint portion of route. Good only in A.M. if P.M. Coupon is detached. Issued only on trips with REGISTER READING. OCT 15 1910. Pope's Pat.—Time limit, Nov. 21st, 1905. GRAHAM AVENUE LINE 1 2 3 4 5 6 7 8 9 10 11 12 AM 1 2 3 4 5 6 7 8 9 10 11 12 PM

Brooklyn Transfers—Front and Back of Ticket Issued for Cash to Passengers on the Graham Avenue Line

The front and back of one of the direction transfers are illustrated herewith.

The continuing trip tickets are issued only by conductors on feeder lines for cash fares and, unless otherwise noted on the tickets, entitle the holders to cash transfers on connecting lines of the same company. The conductors' special transfers are issued to feeder lines on second or direction transfers from

GOOD FOR A CONTINUING TRIP from East New York Depot toward Park Row or Delancey St., Manhattan. B.H.R. R.Co. THIS TICKET ENTITLES THE HOLDER TO A CASH TRANSFER. Good only in A.M. if P.M. Coupon is detached. OCT 15 1910. Pope's Pat.—Time limit, Nov. 21st, 1905. STATION No. 27 1 2 3 4 5 6 7 8 9 10 11 12 AM FRACTION OF HOUR 15 30 45 1 2 3 4 5 6 7 8 9 10 11 12 PM FRACTION OF HOUR 15 30 45

Brooklyn Transfers—Cut on Left Is Continuing Trip Ticket Issued by Transfer Agents—Cut on Right Is Car-to-Car Emergency Transfer

the last transferring line on that trip, including a reasonable allowance for the headway of the connecting line.

"Under no circumstance will a conductor issue to a passenger a transfer ticket on which the time limit has been punched in two places. Should a conductor punch the wrong time on the transfer, he must not try to rectify the mistake by punching it a second time, but will issue another ticket, turning in the mis-

punched transfer with his mutilated tickets. All mutilated and mispunched tickets will be turned in with the unused transfers.

LINES ON JOINT ROUTES

"Lines operating over a joint route between terminus and a junction will neither issue to nor accept transfers from each other while on joint portion of the route.

"Transfers are good only on date printed thereon; at intersection or junction of issuing line (unless restricted); within the time limit punched, and are not transferable.

"Transfers punched at 12 o'clock p. m. (midnight) will be accepted until 2 a. m. of the following day.

"The conductor will not accept a transfer, continuous trip or emergency ticket on which the time limit has either expired or been repunched, but will call the passenger's attention to the expired or repunched time limit and demand a cash fare, failing to pay which the passenger will be required to leave the car.

"If a transfer is presented for passage at a place other than a transfer point the conductor will not accept it, but will demand a cash fare from the passenger, failing to pay which the passenger will be required to leave the car.

"When a passenger presents a direction transfer at a transfer point, which transfer is not good in the direction that the car is proceeding, the conductor will so inform the passenger and inquire if the passenger desires to leave the car. If the passenger refuses, the conductor will demand a cash fare, failing to pay which the passenger will be required to leave the car.

"Transferring lines the routes of which come together and operate over the same track to a point of separation will accept transfers from each other only at the first junction, good in either direction, unless otherwise noted.

"In disputes concerning transfers the conductors must enforce the rule, but will inform the passenger that if any rule of the company has been violated the matter will be adjusted at the general office."

CONTROL OF MONTREAL STREET RAILWAY PASSES TO NEW INTERESTS

A new board of directors was elected at the annual meeting of stockholders of the Montreal Street Railway on Nov. 2. Control of the company has been secured by interests identified with the Canadian Light & Power Company, which has under construction a hydroelectric plant on the St. Lawrence River. It is reported that the property of the two companies will be consolidated.

The new directors are as follows: E. A. Robert, J. W. McConnell, D. Lorne McGibbon, F. Howard Wilson, J. M. Wilson, W. C. Finley and George G. Foster. The directors have elected the following officers: President, E. A. Robert; vice-president, J. W. McConnell; general counsel, H. A. Lovett; secretary, Patrick Dubee; general manager, Duncan McDonald.

An account of the meeting of stockholders, published in the *Montreal Gazette* of Nov. 3, says in part:

"Owing to the fact that L. J. Forget had not fully recovered from his recent illness his fellow-directors advised the Senator to take no risks, consequently K. W. Blackwell, vice-president, occupied the chair. The vice-president, in speaking of the future, said that the present board had decided not to stand for re-election and would offer no ticket. Mr. Blackwell said they were handing over a splendid property to their successors and the outgoing directors were proud of their work while in office and proud of the company's present position. During the busy evening hours the company ran 600 cars and he believed that in eight years time they would have 1200 in commission. Mr. Blackwell concluded by wishing the new directors every success in the undertaking they were about to assume.

"Robert Meighen, a director under the old control, arose and said his reason for joining with his co-directors in the negotiations with the Montreal Light, Heat & Power Company was because a syndicate had been formed for the purpose of controlling the Montreal Street Railway, with the avowed

object of amalgamating the Canadian Power Company and the Montreal Street Railway. One of the chief promoters called on him and submitted the program they intended to adopt.

"While opposed to mergers, he felt that the only thing to do at the moment was to coincide with the other members of the board to negotiate with the Montreal Light, Heat & Power Company to put a counter proposition forward, which in his opinion would be more beneficial. He believed that public opinion was so strong that no matter who controlled the street railway they would not attempt to make any amalgamation with any power company at the present time.

"The next business, gentlemen,' said the chairman, 'is the election of directors.' The scrutineer announced that as only one ticket had been nominated and one ballot cast the gentlemen were unanimously elected.

"Mr. Blackwell committed the officials and men generally to the care of the new directors, as the old régime, he said, had always made it a point to care well for the employees of the corporation while in office.

"Congratulations were then the order of the day, and no hard feeling was visible, at least on the surface.

"Mr. Robert stated that a number of gentlemen interested in the company had increased their stock holdings until they now controlled a majority of its shares. They believed that the company has a very prosperous future before it; and that, with continued efficient management, it could be made one of the best street railway properties on the continent. It would be the aim of the new board of directors to invest additional capital in extending the street railway lines and in improving the service to meet all legitimate requirements of the citizens and civic authorities, conserving at the same time the interests of the shareholders.

"After the meeting concluded K. W. Blackwell, the former vice-president, stated that after the old directors had looked over their proxies they came to the conclusion that the Robert group had 49,500 shares and expected to have a couple of thousand more at the meeting, and as the men then in power only had from 30,000 to 35,000 there was only one thing to do, viz., to hand over the direction of the Montreal Street Railway Company to the men who had secured control."

HISTORY OF THE MONTREAL STREET RAILWAY

A brief history of the principal events in the development of the Montreal Street Railway system during the period from 1861 to 1910 is contained in the annual report of the company for the fiscal year ended Sept. 30, 1910. A review of the report for the last year is published elsewhere in this issue. An abstract of the history, which relates to the physical and financial development of the company, the progress in relations with the employees and the traffic conditions, follows:

"With the close of its present fiscal year the Montreal Street Railway concludes its first half century of activity. It is a far cry from the Montreal of 1861 and the Montreal City Passenger Railway incorporated in that year, with its few miles of horse cars and omnibuses, to the metropolis and the hundreds of miles of electric road of to-day. The half century has been one of most extraordinary progress and prosperity for both the city and the company, whose histories are naturally closely interwoven, since the prosperity of the one is inevitably dependent upon that of the other.

"A retrospect tells a story of uninterrupted progress and improvement which will prove interesting to those familiar with the company's history, and instructive to the many to whom the street railway of to-day is merely a part of the accepted order of things in the city's life. It tells a story of civic growth which has been rendered possible to a large extent by the activities of the company in extending its lines, and thus annihilating distance and making suburbs more available than nearby streets were before it started operation.

"In 1861 Montreal had a population of but 91,000, and with its suburbs 101,439. To-day Montreal with its suburbs has a population of approximately 600,000.

"They were men of courage and far-sighted ideas who in

1861 decided that the time had come when Montreal needed a street railway. The population was small, business was a mere fraction of that transacted to-day, while the climatic and topographical conditions were perhaps as forbidding as could be found in any city in the world. The company they founded used horses. Stables were its power stations, and in winter the service was kept up by sleighs, and in the late fall and early spring by omnibuses. They started with six miles of track, eight cars, a few horses and one stable. To-day they could point to an electric system with many hundreds of cars which are not merely modern, but so far in advance of the times that the greatest cities of the United States and the world are paying tribute by the adoption of the same style of cars for their services.

"Their first attempt at modernizing Montreal resulted in the construction of $6\frac{1}{2}$ miles of single passenger track, with eight passenger cars, a stable and car house, which cost altogether some \$80,000, and the company closed its stock books when 2500 shares at \$50 each had been sold for \$125,000.

"To-day the company operates over 144 miles of track, and controls and operates subsidiary companies with some 86 miles of track, a total of 230 miles.

"The manner in which Montreal's population has grown since 1861 shows that, while the increase was always steady, the really rapid progress dates from 1891, about the time the electric car service was put in. The increase has been as follows:

1861, city and suburbs.....	101,439
1872, city and suburbs.....	155,865
1881, city and suburbs.....	178,237
1891, city and suburbs.....	261,302
1901, city and suburbs.....	376,402
1910, city and suburbs (estimated).....	600,000

"This period of latter growth has witnessed a vast improvement of the city in every way, the amount of taxable property for the year 1909 being \$259,500,000, with \$68,500,000 exempt.

"This year the city treasury received from the company \$387,264 as a percentage of its earnings and taxes, or more than four times as much as the total cost of the original system as built in 1861.

BEGINNING OF THE SYSTEM

"The Montreal Street Railway was born with little ceremony or anything else to mark the beginning of a new epoch for Montreal when, on May 18, 1861, the Provincial Legislature adopted a law incorporating the Montreal City Passenger Railway Company 'for the purpose of constructing and operating street railways in the city and parish of Montreal.' On Aug. 17 at a meeting of subscribers Alex. Easton was awarded the contract for building the first section of road, comprising 6 miles of single track and an equipment of eight passenger cars, a stable and car shed.

"Work was started in September, ground being broken on the 18th. The arrangement was that Mr. Easton should build the line and operate it for a time under lease. By Nov. 27, 1861, part of the line was sufficiently advanced to be opened. The road met with immediate success, and was well patronized, although the service, naturally, was slow and the cars infrequent.

"Matters having progressed thus far, a meeting of the directors was held on Nov. 5, 1861, when the company's stock books were ordered closed, 2500 shares having been subscribed at \$50 a share, representing a capital of \$125,000.

"In the following year construction work was continued, and by June 10, 1862, another line had been completed. This was equipped with three horse cars. On this same day the company declared its first dividend, at the encouraging rate of 12 per cent per annum for the first year.

"On July 4, 1862, the company terminated the lease with the contractor, and took over the actual operation of the road, with considerable profit, the earnings far exceeding the lease price.

"The advantage of the car line was so much appreciated by the public that in 1863 the company applied to the city for power to build lines on additional streets.

"During 1863 the company carried 1,066,845 passengers, scarcely 1 per cent of the number carried to-day. It was re-

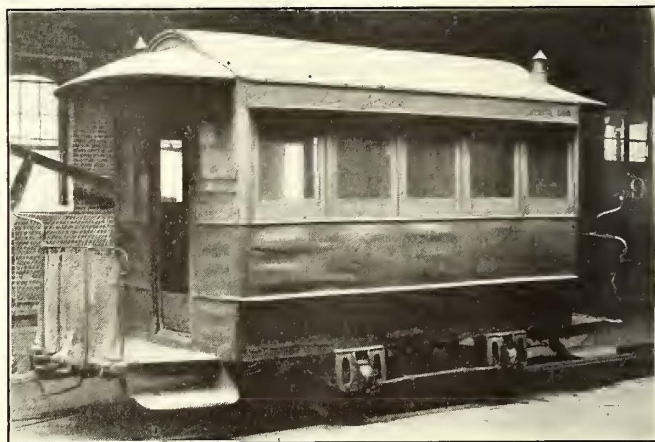
garded, however, as an excellent showing, and the company started to build 6 miles more track. During 1864 1,485,725 passengers were carried, an increase of about 500,000 for the year.

"The winter service was being kept up by sleighs, the tracks and appliances preventing the cars from running. The company had eight sleighs at this time, with five more being built. There were no heating appliances, and in order to keep the passengers warm each sleigh was provided with about a foot of pea straw, in which the people buried their cold feet.

"During the early days the cars were run in a rather happy-go-lucky fashion. Time was of little object. The cars would stop anywhere to take up passengers, and if one wanted to get off and talk to a friend or do a little shopping, the obliging conductors would wait and give their horses a rest. But the demands of business were getting too much for this, and in June, 1865, the board decided that in future the cars should not be stopped to allow passengers to go into stores and make purchases and return again, because this kept other passengers waiting.

"It was found that the wages paid were too high, and in August, 1865, the conductors were reduced from \$30 to \$25 a month. The conductors petitioned for a return to their old pay of \$1 a day, but this was refused, and the directors reduced the pay of drivers from \$25 to \$20 a month.

"For many years matters went along smoothly and quietly until the twenty-sixth annual meeting, in 1886, when an event



Type of Horse Car in Use in Montreal Prior to 1892

occurred which subsequently meant a good deal for the company, although little noticed at the time. This was the election of the present president, L. J. Forget, as a director.

"During all this time the mileage of the company had not increased very greatly, amounting to only $12\frac{1}{2}$ miles by 1892. At this time the company was operating 82 regular sleighs during the winter season.

"The year 1892, however, marked the most important period in the company's history, the beginning of the electric era, which has produced such wonderful results in the past 18 years. It was not without violent opposition that the subject was discussed. Several directors, supported by many of the shareholders, declared that the thing was impossible and would ruin the company, and some of the directors even went to the length of resigning rather than countenance such a project. So if the first directors of the company, in 1861, were men of courage and enterprise, how much more so were those who backed up the change to electricity in face of the great cost and doubtful outcome!

"At the adjourned special meeting of May 17, 1892, a tender for electric car service was submitted and considered clause by clause and finally approved of and adopted and ordered to be transmitted to the city clerk, together with the sum of \$25,000 deposit.

"The city accepted the company's terms, and the work of electrifying the service was started without delay.

"The work of conversion was especially interesting in this city, owing to the climatic difficulties to be overcome. Meteorological records had shown that the average snowfall for each of the 16 winters from 1875 to 1891 was 118 inches; the greatest fall of 173 in., or over 14 ft., taking place in the winter of 1886-87.

"Another exceptional difficulty was that of grades. For instance, Amherst Street rises 50 ft. in a distance of 800 ft.; St. Denis Street rises 47 ft. in a distance of 700 ft.; St. Lawrence Street rises 68 ft. in a distance of 1500 ft.; Beaver Hall Hill, 60 ft. in a distance of 900 ft., and Windsor Street, 70 ft. in a distance of 1500 ft., while on Guy Street and Côte des Neiges Hill there is a rise of 350 ft. in a distance of 5150 ft., with a maximum grade of 11 per cent for about 100 ft.

"It was during 1903 that the formation of the Mutual Benefit Association was inaugurated, which has since proved of great benefit to the employees and greatly strengthened cordial relations among them.

INCREASE OF CAPITAL

"In 1908 \$292,000 debenture bonds were redeemed, and \$2,238,666 debenture bonds and another \$1,000,000 of stock were issued, bringing the capital up to \$10,000,000 stock and \$4,420,000 bonds, where it stands to-day.

"The marvelous story of the progress of the company since the introduction of electric traction in 1892 is best told in the following striking summary:

"In 1892 the track mileage was 12½ miles; at the present time the total single track mileage is 144¾ miles, exclusive of subsidiary companies. The rails used in 1892 were of 30-ft. lengths, weighing 56 lb. to the yard, as against rails of 60-ft. length, weighing 96 lb.

"When in 1892 the company started its electric operation the entire service was run from a single power station. By 1894 with two power plants the company was using six 650-hp Corliss compound Laurie engines, belted to the different generators. At present the power capable of development by the company for its cars is 11,400 kw generated by steam, and 9613 kw purchased water power, a total capacity of 21,013 kw, as compared with 1200 kw in the original installation.

"In no department has the progress of the company been shown more effectively than in rolling stock. Of course it would be useless to contrast the present cars with those of the horse régime; they are so far apart that comparison does not exist. In 1892 the road was equipped with cars which, luxurious as they seemed when contrasted with the old horse outfits, were only 20 ft. in length. Outside of the application of motive power, their main equipment was the conductor and motorman, with lever and cumbrous hand brake. The electric appliances were crude. The cars were fast enough, but they were not particularly reliable and not any too safe. The most modern cars now being turned out are 51 ft. long. The factor of safety has been enormously improved. The adoption of the 'pay-as-you-enter' principle has simplified the collection of fares, saved time at stopping points, decreased the number of accidents and furnished additional comfort to the passengers.

"In 1892 there was an average of eight cars in the service. By 1904 this had grown to an average of 300, while at the present time the company has 600 cars running. Moreover, the passenger capacity of these cars has much more than doubled.

"The contrast between the modest original stock issue of \$125,000 and the present capitalization of \$10,000,000 is sufficiently striking. What makes it the more impressive, however, is the fact that by far the greater part of this capital has been added since the electrification of the road and its subsequent development.

"After 31 years of existence as a horse car system the capital of the company had increased in 1892 only to \$900,000. Then followed the electric era. The following shows the increases since 1892, when the capital was \$900,000: 1893, \$1,100,000; 1894, \$2,000,000; 1897, \$1,000,000; 1900, \$1,000,000; 1903, \$1,000,000; 1906, \$2,000,000; 1908, \$1,000,000; total, \$10,000,000.

"The company owns a majority of the stock and all of the bonds of the Montreal Park & Island Railway Company, having

a mileage of 49.64 miles, leases and operates the Suburban Tramway & Power Company (now called the Public Service Corporation), all of whose stock and bonds it owns, of 6.12 miles, and also owns all the stock and bonds of the Montreal Terminal Railway, 30.27 miles.

"The army of employees of the company are as well looked after as those of any system on the continent, and it is largely due to this that the relations between the men and the company have generally been so friendly. Instead of \$30 to \$35 a month, which the drivers and conductors were paid before the electrification of the company, a liberal schedule of wages is now paid.

"In addition to this the men have an employees' mutual benefit association. This was formed in 1903. It was strongly encouraged by the company, whose officials take an active interest in its progress and contribute handsomely to its funds, while the annual street railway men's picnic at Dominion Park in aid of this organization has become one of the big events of the year.

"In 1892 the number of passengers carried totaled 11,631,386, as compared with 60,281,834 in 1904 and 107,241,406 in 1910. The transfers used in 1892 were 5,994,113, as compared with 17,915,242 in 1904 and 36,437,123 in 1910.

"The average fare in 1892 was about 5 cents, as compared with less than 4 cents in 1910. This is not an advantageous showing for the company, but is a personal advantage to the public, and is accounted for by the purchase of more tickets. It must also be borne in mind that the company is steadily increasing its mileage, consequently a passenger may travel fully 10 times the mileage to-day as compared with 1892 at a cheaper rate of fare.

"The service given by the company is admitted to be the equal of any on this continent. This is more remarkable when we take into consideration the hilly character of our city, the number of narrow streets, the topographical layout, and the severe winter weather with its heavy snowfall. The rates charged are less than in American cities."

DELAYS TO TRAINS IN THE HUDSON TUNNELS

The Hudson & Manhattan Railroad is now operating more than 2200 trains a day in the tunnels under the Hudson River between New York, Jersey City and Hoboken. This is the largest number of trains operated daily on any double-track railroad in the world. During the rush hours the headway of trains in and out of the Cortlandt Street terminal station is only 1 minute, and the maximum headway of trains between the hours of 6 a. m. and 12 midnight is 2½ minutes. In order to maintain the schedule for this very frequent service it is essential that even the shortest delays be prevented as far as is possible. Another reason why delays to trains are particularly to be avoided in the Hudson tunnels is the fact that trains are run from the stations on the Sixth Avenue branch and from the Cortlandt Street terminal to connect with trains of the steam railroads leaving the stations in Jersey City and Hoboken, and all of the railroads whose stations are reached by the Hudson tunnels now advertise the leaving time of the tube trains in their time tables. It is very important therefore that a tube train which is scheduled to make a connection with a steam railroad train shall be on time to the minute.

The Hudson & Manhattan Railroad has a very thorough method of following up and fixing responsibility for delays to trains from any cause. Every detention of a train or failure of any part of the equipment which might cause a detention under ordinary circumstances is reported by the train crews to the trainmaster. The trainmaster makes a daily report of such occurrences to the general superintendent, giving the time, location, nature and cause of the detention. These reports are examined each day by the chief clerk in the general superintendent's office, and a copy of the statement from the trainmaster concerning each detention is sent to the head of the department which, in the opinion of the trainmaster, was responsible for the detention. These daily reports are investigated promptly by the heads of the departments affected, and a

statement is returned to the general superintendent's office, acknowledging the cause of the delay and stating the action taken to prevent a repetition of it, or shifting the blame in whole or in part on some other department. At the end of each month the general superintendent goes over all of the trainmaster's reports of detentions and the explanations of the department heads, and compiles a table showing the number of detentions and the total number of minutes of detention chargeable to each of the different departments. A copy of this table is sent to the head of each department, with a circular letter of comment by the general superintendent. Two typical letters sent out with this monthly statement are re-printed:

"September 9, 1910.

"To Mr. D. Sage, Chief Engineer.

" Mr. P. V. See, Superintendent of Car Equipment.

" Mr. J. F. O'Rourke, Trainmaster.

" Mr. C. S. Klumpp, Assistant to General Superintendent.

" Mr. M. H. Collins, Supervisor of Signals.

" Mr. L. G. Smith, Chief Electrician.

"Dear Sir:

"We were unfortunate during the month of August to have a cable blow-out causing a delay of 118 minutes. With this exception the work of all departments was excellent.

"The power house again leads with a clean sheet.

"Car equipment, with 20 minutes, is excellent.

"Signals, with 21½ minutes, is also excellent.

"The transportation and substation departments suffered owing to the carelessness of some of their men.

"Thanking you for the earnest efforts you are making to make our service the very best, I remain,

"Yours truly,

(Signed) "E. T. MUNGER,

"General Superintendent."

"October 6, 1910.

"To Mr. D. Sage, Chief Engineer.

" Mr. P. V. See, Superintendent of Car Equipment.

" Mr. J. F. O'Rourke, Trainmaster.

" Mr. C. S. Klumpp, Assistant to General Superintendent.

" Mr. M. H. Collins, Supervisor of Signals.

" Mr. L. G. Smith, Chief Electrician.

"Dear Sir:

"I have before me the detentions for the month of September, 1910. The number of detentions was 29 and the total minutes detention 85½. This can be compared with the month of September, 1909, in which month we had 42 detentions, amounting to 171 minutes. The months are directly comparable, for in the month of September last year we opened up the southern division, and in the month of September this year we opened up the western division.

with a clean record, and I wish to congratulate and thank all of the employees in these departments for their good work, and hope they will keep it up.

"Again thanking you all, I remain,

"Yours truly,

(Signed) "E. T. MUNGER,
"General Superintendent."

Praise is given when praise is due, and attention is called to any conditions which in the opinion of the general superintendent require special action.

Table I is a summary of the detention reports for eight months, beginning February, 1910. The minutes of detention shown in the table are the minutes of detention to the first train encountering an obstruction or delayed by failure of any part of the equipment. It will be readily understood that with such a close headway a detention of even one or two minutes to one train will cause a delay to a number of following trains,

TABLE II.—TRAINS OPERATED AND TRAINS LATE AND ON TIME.

Month.	Total Number Trains.	Number Trains Late.	Per Cent. on Time.	Number Trains	Per Cent.
September, 1910.....	58,333	257	0.45	58,076	99.55
August, 1910.....	45,043	148	0.33	44,895	99.67
July, 1910.....	44,755	121	0.27	44,634	99.73
June, 1910.....	43,600	258	0.60	43,342	99.40
May, 1910.....	45,859	220	0.48	45,639	99.52
April, 1910.....	44,721	237	0.53	44,484	99.47
March, 1910.....	46,259	375	0.82	45,884	99.18
February, 1910.....	41,443	320	0.77	41,123	99.23

and in case of long detentions it may be some time before all the trains can get back to their normal schedule. The best record for any month since the road was in operation was made in July, 1910, when there were 20 detentions for a total of 64½ minutes. Occasionally some serious break-down will cause a long detention, which brings the monthly total above the average. Thus in August a cable blow-out caused a single delay of 118 minutes, chargeable to maintenance of way. With this exception the record for August compares favorably with July or September. A great improvement has been made during 1910, as shown by a comparison with the total number of minutes of detentions during the four months previous to February, 1910. In October, 1909, the total detentions were 463 minutes; in November, 1909, 211 minutes; December, 1909, 366½ minutes, and in January, 1910, 145 minutes.

The classification of detentions by departments is made very carefully. The transportation department, for example, is charged with all detentions due to errors in the routing made by the signal men in the interlocking towers, failure to load or unload trains promptly and failure to have trains made up in time to leave terminals. The best record made by this department was in May, when it was charged with no detentions. All

TABLE I—CLASSIFICATION OF HUDSON AND MANHATTAN TRAIN DETENTIONS BY DEPARTMENTS FOR EIGHT MONTHS OF 1910

	September		August		July		June		May		April		March		February	
	No.	Min.	No.	Min.	No.	Min.	No.	Min.	No.	Min.	No.	Min.	No.	Min.	No.	Min.
Transportation	6	18	5	19	3	6½	7	15	0	0	..	5	..	12½	..	2
Car equipment	7	18	6	20	4	19½	12	12½	11	45½	..	7	..	35½	..	21
Maintenance of way.....	3	17	3	125	1	2	1	10	3	5½	..	6	..	10½	..	0
Signals	4	10	7	21½	4	13	7	21½	7	11½	..	67	..	41½	..	41
Power house.....	0	0	0	0	0	0	0	0	0	0	..	0	..	0	..	0
Substations	0	0	4	13½	1	2	0	0	0	0	..	5	..	6	..	0
Construction	2	7½	0	0	0	0	0	0	1	2	..	2	..	0	..	10
Signal construction.....	7	15	0	0	1	2	0	0	2	3½	..	0	..	0	..	0
Miscellaneous	0	0	0	0	5	18	0	0	0	0	..	5	..	3½	..	11
Ticket bureau.....	0	0	0	0	1	1½	1	3	0	0	..	0	..	0	..	0
Total	29	85½	25	199	20	64½	28	92	24	68	..	97	..	109½	..	85

"Transportation has 18 minutes' detention this year against 50 minutes last year.

"Car equipment has 18 minutes this year against 64 minutes last year.

"The signal department has 10 minutes this year against 43 minutes last year. This is a big improvement for all of the above.

"Ten minutes' detention on signal breaks all records, and I wish to congratulate and thank the signal department.

"We are now running 2078 trains a day, which makes the above comparisons all the better.

"The power house and substations again come to the front

failures of car equipment due to defective materials or workmanship in making repairs, or to inadequate inspection, are charged to the car equipment department. As will be seen from an examination of the totals, the delays chargeable to this department are greater in number than almost any other department, but they are of comparatively short duration. In no one month since the record was begun has the car equipment department escaped with a clean record. The maintenance-of-way department is charged with all delays due to defective tracks and switches, third-rail and third-rail jumper cables. In February no detentions were charged against this department, and the average for the last eight months is small.

Delays due to defective signals, including the automatic stop apparatus, have averaged about the same for the last five months. The power house has had an absolutely clean record for eight months, and there have been very few delays chargeable to substations. The detentions listed under miscellaneous include all those which cannot justly be charged to any one of the operating or engineering departments.

Table II shows the number of trains operated by months, the number of trains late and on time, and the percentages. This table is interesting in connection with Table I, because it shows the cumulative delays to trains on account of the several detentions given in Table I. Thus in August, while the total detentions were very much larger than for July, the number of trains which were late is only slightly greater. For the purpose of compiling this table a train is considered to be late which arrives at either terminal one minute or more behind its scheduled arriving time. No allowance is made for a train which arrives at a terminal late, but leaves on time.

THE BASIS OF VALUATION IN CASE OF MUNICIPAL PURCHASE OF STREET RAILWAYS

BY SIDNEY OSSOSKI, SECRETARY FINANCE COMMITTEE, CHICAGO RAILWAYS COMPANY

Developments of the last few years in connection with various proposed schemes of federal, State or municipal control and supervision over semi-public utilities, and taxation and rate making for these properties, have made the subject of valuation one of the utmost importance not only to investors, but to the public generally.

With street railways the question has arisen most frequently in connection with the settlement of controversies over the companies' rights in the streets and the extension or renewal of franchises upon terms which are intended to reserve to the municipalities effective control over the companies by the reservation of an option to purchase at certain stated periods and at an agreed valuation.

The valuation of the street railway properties in Chicago and Cleveland will serve as an example of the methods employed. An inventory is made of the physical properties with prices as of day of inventory; then certain percentages are added as allowances for overhead charges, which may be considered as money spent in the necessary production of the physical property and in placing it in operation—namely, such charges as engineering, superintendence and incidentals. To the inventory price thus determined there is added the value of the remaining life of the franchises; this value is reached by capitalization of the estimated net earnings for the remaining term, discounted to date of the valuation, and based upon the existing rate of fare, taxation and service rendered.

This method of valuation is open to the criticism that, outside of the small overhead charges above referred to, it fails to give full and proper recognition to certain intangible elements of value, consisting of expenditures which do not appear tangibly in the physical property, but are necessary to its creation and development.

In no scheme of evaluating railway or railroad properties, whether only proposed or brought to conclusion as in Chicago, have the valuation commissions and municipal authorities who prescribe the terms of the grant taken any account of appreciation. The commissions do not recognize the additional value of real estate for railroad purposes, such as (1) location value for railroad purposes; (2) necessity of discarding part of the real estate purchased; (3) additional cost of condemnation of property. The municipal authorities, in turn, require reserve funds for depreciation purposes, but will concede no advantage to the company arising from increase in property values. In Chicago, a rapidly growing city of 2,200,000 people, the real estate investment (not including buildings) for railway purposes amounts to approximately \$4,500,000. What the increases in value will amount to at the time the ordinances expire it would be difficult to say. But should the city purchase

at that time, or authorize a licensee to purchase, as authorized in the ordinance, the company would turn over a rehabilitated property at a figure which was arbitrarily fixed at the beginning of the term (namely, an agreed fixed price at which the valuation commission "inventoried" the property, plus the cost of all expenditures for rehabilitation and extensions, as prescribed in the ordinance). The purchasers would take the property with its increased real estate values without the payment of a dollar of allowance for such increases, the item of appreciation having been entirely omitted from the calculations of the valuation commission.

In an appraisal of properties that may in future be acquired by the municipality the following elements of value must be considered, in addition to the purely physical property: (1) Special circumstances and conditions rendering the use of property profitable or unprofitable; (2) present earning power; (3) future earning power; (4) intangible elements such as cost of promotion, engineering and legal expenses prior to and during construction, and cost of financing; (5) development expenses, cost of experimentation, and obsolescence, resulting in the premature abandonment of devices due to changed conditions; (6) appreciation of real estate; and (7) going value, taking into consideration the losses suffered during the development period.

Even on the physical side of the problem, the tendency of engineers is to underestimate the cost of a project. This fact reveals itself in the case of such great public enterprises as the Panama or the Suez Canal and holds good in the main throughout the list of less prominent projects. It is particularly true in the railroad field, whether steam, surface, subway or elevated. Enterprises like the London tubes, which were originally projected by the engineers to cost not to exceed from \$1,000,000 to \$1,500,000 per mile (route length), ultimately cost over \$2,500,000 and in some instances over \$3,000,000 per mile.

In what respects the commissions and municipalities have fallen short in their recognition of the principles above enunciated will appear below. In Chicago a valuation was put upon the street railway properties by a commission composed of B. J. Arnold, Prof. M. E. Cooley and A. B. Du Pont. This was probably the first enlightened attempt to place a valuation on a public utility corporation's property in order to determine a basis for possible municipal purchase in the future. Under this valuation the following percentages were added as "overhead charges" to the inventory value, as representing intangible or non-physical values: On track, electric power distribution system and buildings, 15 per cent; on power plants, 10 per cent; on cars and car equipment, 5 per cent. In addition to the reproduction value of the property, there was added, to cover legal expenses, interest during construction, brokerage and contingencies, 10 per cent. Nothing, however, was added to the following items: Real estate, patent rights, ordinary shop machinery and tools, stores, supplies, office furniture and fixtures, horses, wagons, miscellaneous items.

Among other disputed items in the Chicago settlement was that of paving. The question was as to whether anything should be allowed to the companies in the way of additional valuation on account of expenditures for paving over several hundred miles of right of way. The contention on the part of the city was that no allowance should be made, because the paving, although paid for by the companies, was the property of the city, and the expense thereof was in the nature of additional compensation for franchise rights.

This contention entirely overlooked the fact that the paving obligations of the companies created an expenditure which the companies were entitled to amortize. The questions of ownership of the pavement, and of whether the cost is a part of the permanent value of the properties, are entirely immaterial. The fact remains that the companies were obliged to make extensive expenditures for paving, which either constitute an addition to capital or else represent franchise value. If these expenditures represent franchise value, the meaning is that the cost of paving has been met out of the net receipts above operating expenses, taxes and interest charges. In either event, however, the companies are clearly entitled to an allowance on account of such

expenses, precisely as they are entitled to an allowance on account of intangible values, such as development expenses and the cost of experimentation. The fact that the companies have been unable to create an actual amortization fund as a provision against loss at the termination of the grant should not weigh against them, unless it can be shown that the money applicable to such a fund was improperly dissipated. It should never be forgotten that items like the foregoing, which do not add to the permanent value of a property, must be paid for out of somebody's pocket. If they have been paid out of net receipts the owners of the property have thereby been deprived of so much in dividends which must at some time be made up to them, or reimbursed by amortization. If, on the other hand, these items represent an expenditure of capital funds, there is equal reason for making good the amount thereof to the company, in order that the investment may remain intact, which, in all justice, is the investor's due.

In Europe, whence we inherit these schemes of corporate valuation, which are really merely an emanation of the socialistic and paternalistic tendencies of certain European countries, some distinctly novel features of valuation are to be observed.

In the case of the elevated-underground road of Berlin, including both the original line and the extension from Potsdamer Platz now under construction, the conditions of reversion and purchase are as follows: The franchise for the entire system extends 90 years from 1897. At the expiration of the franchise term the entire roadway, including tunnels, elevated structures and stations, reverts without payment to the city. The rolling stock, power stations, workshops, office buildings and other property remain with the company, but can be purchased by the city on payment of full value plus a bonus of 10 per cent. The city also retains the right to purchase the entire property of the company at certain fixed periods prior to the expiration of the franchise. Such purchase may take place in 1927 (30 years after the granting of the original franchise) and each 10 years thereafter, up to 1977. In case the city decides to exercise this privilege, it must notify the company of its decision two years prior to the date of taking, and such notice once given cannot be withdrawn. The basis of valuation for purposes of purchase is fixed at 25 times the average net receipts for five years prior to such purchase. The valuation, however, shall not be less than the book value of the property. The franchise defines to some extent the method of determining the net receipts and provides for a supervision and audit of the company's accounts in order to safeguard the city's interests. In case the company fails to carry out the accounting methods prescribed by the city, the latter may take the structural value instead of the earnings as the basis of valuation in purchase. If the purchase takes place in 1927, the price paid is to be 25 times the net receipts (which shall not be less than the book value of the property) plus a bonus of 37½ per cent on the cost of the road; in 1937 the valuation will be the same plus a bonus of 12½ per cent, instead of 37½ per cent; in 1947 the valuation will be 22 times the net receipts; in 1957, 19 times; in 1967, 16 times, and in 1977, 12 times the net receipts. In 1987 the entire structure goes to the city without payment.

The policy of the Prussian State has heretofore been in favor of extensions of franchises about to expire, even in cases where, as in Berlin, the city has attempted to reserve to itself the right to take over the property without compensation at the end of the franchise period. This conflict of authority between the city and the State is, however, more apparent than real, for the reason that the city has never formally contested the authority of the State in these matters, and in practice has yielded to the State all of its claimed prerogatives.

In England the first provision adopted looking toward the acquisition of street railway properties through purchase by the municipalities was contained in the tramways act of 1870. The purchase price or basis of valuation there prescribed was the structural value of the property, less depreciation, with no allowance for franchise value or good will. Under this act the Board of Trade is permitted to modify these provisions as

to valuation and purchase, and has accordingly adopted more equitable terms in recent years.

Under the light railway act of 1896, which is supplemental to the tramways act, the municipal purchase price has been fixed at the "fair market value as a going concern," and this provision is likewise subject to modification.

Some attempt has been made to make a distinction between a valuation for the purpose of establishing a rate and a valuation for the purpose of fixing a price in the event of municipal purchase. It is contended, for example, in a rate case, that the object of allowing a sufficiently large overhead charge is to make sure that the capital receives its return; whereas in fixing a municipal purchase price the capital is assured of its rate of return, and the question is simply, "What justly and truly ought the capital to be to-day?" But this contention loses sight of the fact that in both instances the value we are trying to find is not only the cost of reproduction of the physical property, but likewise how much has been added to physical value by all of the intangible elements which previous earnings of the company have not been large enough to enable the company to amortize. In other words, it is quite as proper in the one instance as in the other that every dollar that has gone into the property for the purpose of creating its present earning capacity should be protected. It is not alone physical property that should be represented in capital, but consideration should be had for all the other elements as well, and it is no answer to say that these other elements should have been amortized out of the surplus earnings of the company. The question is rather, "Were the past earnings of the company applicable to such purposes diverted to other uses?" And in the consideration of this question the rights of the investors to a reasonable return on the investment should not be overlooked.

In a rate case, no less than a purchase, an attempt to discard any of the elements which have gone to make up the sum total invested in the creation, construction and development of the properties is confiscation.

In theory as well as in practice the original cash investment in any street railway system never is fully represented in the physical properties after the first wheel begins to turn, for from that moment depreciation sets in. To the argument that a depreciation fund should be accumulated to preserve the capital intact, the answer is that there is no record of any new railway that was able to earn enough to pay operating expenses, provide for necessary maintenance and upkeep, and furnish proper service, while setting aside a reserve fund for depreciation. The investor in the properties of public service corporations is unlike the investor in other kinds of property, by reason of the fact that the former's investment is primarily not in lands or buildings or rolling stock, as such, but in a business in which the physical property employed is but an incident and the right to operate is the all-important factor, constituting, as it does, a natural monopoly in which fluctuations of property values play absolutely no part. He regards the security of his investment as dependent upon the earning power of the property and not, like the owner of lands or buildings, upon fluctuations in value or the possible rise and fall of a market. From his point of view the question of the age or condition of his property is of importance only as it bears upon the property's earning capacity. Necessarily, therefore, he will be the first to understand that he cannot afford to let his property run down so as to injure its earning power, and he will be the first to wish to guard against any such result to the fullest extent the earnings permit, and in doing so he has not only often to deprive himself of his dividends, but must actually in frequent cases supply further sums wherewith to conserve the property and prevent greater losses.

It must accordingly be plain to everyone that it is absurd to allow investors only the depreciated value of their properties, for this is tantamount to penalizing them for maintaining and operating a property that happens to be one that renders a service to the public. In other words, they are asked to suffer a loss for providing the public with something that the public wants, and which is in innumerable ways a public benefit and necessary to comfort and convenience.

ALL-METAL CURTAIN ROLLER

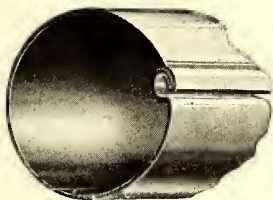
The Curtain Supply Company, Chicago, Ill., is offering to the trade its Rex all-metal roller, which is shown in the accompanying illustration. All the parts of the roller are made of metal by dies and are therefore uniform and correct. The roller barrel is closed by a seam instead of being soldered in the usual manner. This process produces a barrel of absolutely uniform diameter, allowing the curtain to be wound up evenly along its entire length. It also prevents the barrel from opening at the joint. The end caps and pins, which are pressed in one piece from metal, give assurance that the end pins will



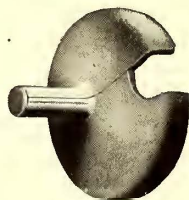
Roller Complete

always occupy a position at the center of the barrel. As the pins are part of the end piece they cannot get out of alignment. This construction allows the roller to revolve on its axis and eliminates all wabby motion. On account of its peculiar construction the groove is never clogged with solder and has a round instead of a sharp cutting edge. The grooves also mate and match perfectly, rendering it easy to apply the curtain to the roller.

The plug ends are made of metal with spring extensions which bear against the inside of the roller barrel and produce an even and smooth holding adjustment, at the same time



Section of Tubing



End

permitting the roller to be readily lengthened or shortened at will. This prevents all swelling or shrinking of the wooden plug and the consequent difficulties arising therefrom. The mandrel is of hollow metal and is strong, avoiding the liability of breaking. The metal bung affords a durable and smooth working bearing and is stronger than the ordinary wooden bung. The springs are stronger than the usual spring and have more turns, thus making less variation than usual in the spring tension when the curtain is at the top and bottom of the window. The brackets are made of formed metal and are therefore solid and uniform.

The Curtain Supply Company is manufacturing these rollers in all lengths of standard diameters.

TELEPHONE INSPECTION SYSTEM IN ATLANTA

A private telephone exchange is maintained by the Georgia Railway & Electric Company, Atlanta, Ga., to keep in touch with the transportation inspectors throughout the system. As these inspectors are scattered over a large territory, it is very desirable for headquarters to know at all times just where they are or where they may be expected at a given time. The practice is for the inspectors to report at stated intervals from different stations just as watchmen do in a factory. When the inspector calls up he names the box from which he will make his next report and the time he expects to do so. If, for any reason, he cannot carry out the daily program assigned to him, he explains the situation by telephone. For instance, he may have to return on account of a broken switch or some overhead trouble. This method of having the inspectors report in order from certain boxes is also of great advantage to the central office when men are wanted in emergencies.

NEW ADJUSTABLE PIPE WRENCH

The accompanying illustration shows a new pipe wrench, brought out by the Wright Wrench & Forging Company, Canton, Ohio, and known as the "Stover pipe wrench." It is a quick-adjustable wrench, with an automatic grip that cannot flatten the pipe and has an instant release which with the automatic opening makes it impossible to lock on a pipe. It requires but one hand to adjust it instantly to any size pipe and one can get a firm and positive grip the first trial, which is stated to be impossible with any other adjustable pipe wrench. The advan-



Adjustable Pipe Wrench

tages of a pipe wrench which can be adjusted and operated with one hand will readily be appreciated by pipe fitters, who frequently work in dark and insecure places where it is necessary to hold a lamp or grasp some object for support.

The 14-in. 3/4-lb. Stover pipe wrench is stated to be lighter than any other pipe wrench on the market, and 25 per cent stronger, and will grip any pipe from 1/8 in. to 1 1/2 in. The arc on which the jaw moves gives it an automatic grip on any size pipe within the range of the wrench and with an instant release. The wearing parts are all interchangeable and can be easily replaced at the expense of a few cents. The grip is the only part to wear out on this wrench. There are no screws or pivot pins such as are used in wrenches of the overhanging-bar type.

NEW CARS FOR THE OKLAHOMA RAILWAY COMPANY

The Oklahoma Railway Company has recently purchased from the Danville Car Company four single-truck cars of the type shown in the accompanying illustration. The length of the car body over the end panel at the sill is 20 ft. and over the platform crown piece 30 ft., the length of each platform being 5 ft. The extreme width of the car at any point does not exceed 7 ft. 10 in. The bottom framing consists of 3 3/4-in. x 7-in. wood sills, plated with 1/2-in. x 8-in. steel, 3 3/4-in. x 6-in. end sills and



Single-Truck Car for Oklahoma Railway

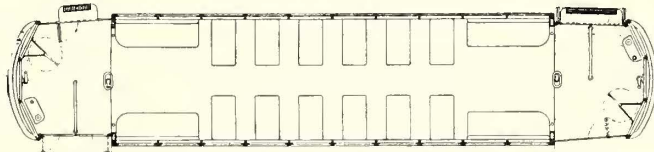
2 3/4-in. x 5 1/8-in. center cross joists. The body framing includes 3 3/4-in. corner posts and 1 3/4-in. side posts. The main and concave panels of the sides of the car are sheathed with No. 14 sheet steel. The end panels are also of sheet steel. The inside finish and sash framing are cherry, and the ceiling finish is three-ply veneer decorated birch. The windows are fitted with Pantasote curtains and Forsythe ring fixtures.

The car body is provided with independently operated double sliding doors at each end. The vestibule has two-leaf folding doors at four corners of the car, but has steps at diagonal corners only. These steps are of the Stanwood type and are located at the motorman's left. Bumper shields are provided by Brill angle-iron buffers which are supported on extended knees. The drawbars are of the Van Dorn type No. 21 1/2.

The bodies are mounted on Brill No. 21-E trucks, having 8-ft. wheelbase and carrying 33-in. diameter cast-iron wheels with $\frac{3}{8}$ -in. tread and $\frac{7}{8}$ -in. flange. The axles are $\frac{1}{4}$ -in. diameter. The equipment of the car will include battery push-button system, Consolidated car heaters, Hunter destination signs and Crouse-Hinds incandescent headlights. The roof sash are stationary, as ventilation is provided by Perry ventilators which are installed as shown in the illustration.

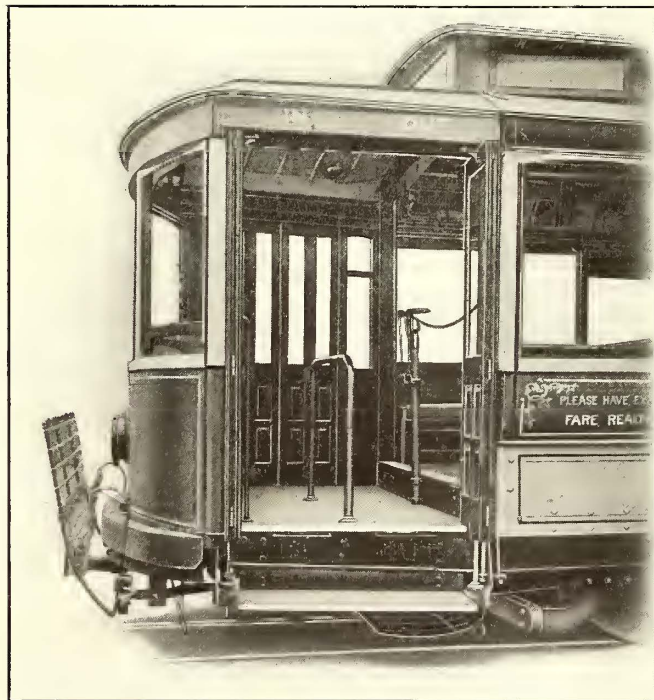
PAY-WITHIN CARS IN WASHINGTON, D. C.

The Capital Traction Company, Washington, D. C., has recently ordered from the Jewett Car Company for immediate delivery 20 new cars of the pay-within type, to be equipped with folding platform doors and steps. This company has had 15 pay-within cars equipped with sliding platform doors and folding steps in service on its Chevy Chase line for more than a year.



Washington Pay-Within Cars—Floor Plan

The new cars are 41 ft. long over all and have 6-ft. 6-in. platforms on each end. The platform entrances are closed with four-part double folding doors which when open give a space 48 in. wide in the clear. The exits are closed with a two-part single folding door, which when opened gives a maximum clear space of 30 in. Both sets of doors are manually operated, the control lever for the motorman being placed to the right of the controller and directly in front of him. The conductor's control lever is mounted on a stand which is directly in front of him as



Washington Pay-Within Cars—Platform Doors Open and Step Down

he stands just inside the car body. The doors and steps are connected by a system of levers so as to operate together.

Passengers enter the car by the rear platform, paying their fare to the conductor before entering the car body. They leave ordinarily by the front door, though in cases of emergency, or when the car is crowded, the conductor allows passengers to leave the car by the rear platform, in such cases merely dropping the chain which runs from his stand to the side of the car. Out-

going and incoming passengers do not become confused on the rear platform because of the iron railing that extends half way across the platform. This railing greatly facilitates loading and unloading.

When the doors of the car are in either the opened or closed position they are locked, thus rendering either accidental opening or closure an impossibility. They are swung on self-aligning vertical ball bearings which allow free and easy operation, and the doors are so connected to the operating levers that slight pressure exerted on either the door or the step prevents closure and avoids accidents due to pinching a passenger. The doors are fitted with metal guides at the top and bottom to insure and maintain proper alignment. The four-part folding doors on the entrance side of the platform open outwardly, while the two-part doors on the exit side fold inwardly.

The cars are being built under license from the Pay-Within Car Company, of which the Electric Service Supplies Company, Philadelphia, is general sales agent. The Pay-Within Car Company also furnished the door and step-operating mechanism with which the cars are fitted.

ASPHALT OIL TIMBER PRESERVATIVE

The Indian Refining Company, Inc., Cincinnati, Ohio, is making a wood preservative called Indian "Timberasphalt." This is said to be a non-inflammable, non-volatile compound containing about 65 per cent asphalt. It is offered as an efficient and economical substitute for the more costly creosote oils. The stable asphalt contents of this oil when once injected into or absorbed by the wood form a preservative which cannot be eliminated. The oil is slow-flowing at high atmospheric temperatures and, therefore, must be heated before application. Its coefficient of expansion is much less than that of creosote oil and it will not bleed from the wood under normal conditions because it remains slow-flowing and viscous at the highest atmospheric temperatures. Hence the sap wood, which is the most susceptible to the action of decay organisms, is thoroughly protected from the entrance of fungi. If any bacteria are present before the treatment they will be destroyed because the wood has been made proof against moisture, heat and air.

Two grades of oil are manufactured to suit the requirements of the consumer. "Timberasphalt" No. 1 is so viscous that it is necessary to use cylindrical pressure apparatus to secure the required penetration. "Timberasphalt" No. 2 oil has the properties of No. 1, but its viscosity is so reduced that it can be applied by the brush or open-tank methods. It can be used as a preservative paint where external appearances are a minor consideration. In the open-tank method, the wood is immersed in hot oil at a temperature of 212 deg. Fahr. for several hours. As the preservative cools to about 150 deg. Fahr. there is a contraction and a partial vacuum due to the condensation of the remaining air and water in the cellular spaces of the wood tissues. Thus atmospheric pressure forces the oil into the wood.

Among the pioneer users of this preservative are the Santa Fé and Mexican Central railroads, which employ it for ties. The Northern Pacific Railroad, Chicago, Burlington & Quincy Railroad, the Pennsylvania Railroad east of Pittsburgh and others are using it for ties, poles and cross-arms. This oil is absorbed by the average mixed oak, beach, elm and gum ties to the extent of from 2 gal. to 2½ gal. per 6-in. x 8-in. x 8-ft. tie. Creosote at approximately 8 cents per gallon and at an injection of 2 gal. per tie costs 16 cents for oil alone, whereas asphalt oil at approximately 4 cents per gallon and 2 gal. per tie costs only 8 cents per tie. The same proportional economy is obtained in the treatment of poles and cross-arms. The company's investigations have further shown that a maximum full-cell treatment may be economically used with asphalt oil. This requires from 6 lb. to 8 lb. per cubic foot and insures excellent penetration. On the other hand, creosote oil if injected for maximum full-cell treatment would be far too expensive for the average consumer.

News of Electric Railways

Details of Triborough Subway Bids in New York

On Nov. 3, 1910, the Public Service Commission of the First District of New York made public the aggregates of the bids which were opened on Oct. 27, 1910, for the construction of the Broadway-Lexington Avenue, Canal Street and Broadway-Lafayette Avenue subways with municipal funds. Twenty-one sections are embraced in the three divisions, and the total of the lowest bids, which were on a unit basis, for the three divisions was \$85,437,570. This is about \$3,000,000 in excess of the cost as estimated by the engineers of the commission and is for construction only. A summary of the bids by routes and sections follows:

ROUTE 5—LEXINGTON AVENUE.

Sect.	Bidders.	Bids.	Lowest Bids.
1—	O'Rourke Company		\$5,863,194
	McArthur Brothers	\$5,881,946	
	Bradley Company	6,978,338	
	Degnon Company	8,697,447	
2—	McArthur Brothers		7,677,464
	O'Rourke Company	7,761,173	
	Bradley Company	9,065,007	
	F. L. Cranford	9,906,668	
2A—	Bradley Company		2,323,542
	F. L. Cranford	3,086,908	
	McArthur Brothers	4,435,564	
3—	Bradley Company		3,619,315
	McArthur Brothers	3,802,444	
	F. L. Cranford	3,978,901	
4—	Bradley Company		3,716,304
	McArthur Brothers	4,305,933	
5—	Metropolitan Company		2,419,127
	Bradley Company	2,473,159	
	McArthur Brothers	2,958,465	
6—	Bradley Company		3,634,213
	McArthur Brothers	4,300,023	
	Degnon Company	4,443,561	
7—	C. H. Peckworth		2,750,463
	Bradley Company	3,870,333	
	McArthur Brothers	4,953,157	
	Degnon Company	4,955,764	
8—	Bradley Company		3,369,484
	Degnon Company	4,107,228	
9—	Bradley Company		2,447,479
10—	Bradley Company		3,253,072
	Henry Steers	4,476,855	
11—	Bradley Company		3,132,195
	Henry Steers	4,159,085	
12—	Oscar Daniels Company		2,825,740
	Behrman & Rodgers	3,397,802	
	Bradley Company	3,474,080	
13—	Bradley Company		4,071,416
	Hugh Nawn Company	4,209,591	
	Brody & Adler	4,628,702	
	McArthur Brothers	4,892,484	
14K—	Arthur McMullen		4,823,513
	McArthur Brothers	5,534,965	
	O'Rourke Company	6,109,858	
	Bradley Company	6,362,166	
15—	Haggerty-Drummond Company		3,820,120
	Godwin Company	4,154,360	
	Bradley Company	4,336,925	
	Hugh Nawn Company	4,414,642	
			\$59,746,656
14H—	McArthur Brothers		5,748,608
	O'Rourke Company	6,119,934	
	Bradley Company	6,396,954	
	S. Pearson & Son	8,500,000	

ROUTE 20—CANAL STREET.

1—	Metropolitan Company	\$4,601,644
	Bradley Company	\$5,979,657
2—	Bradley Company	9,164,909
		\$13,766,554

ROUTE 9—BROADWAY-LAFAYETTE AVENUE.

1—	Newman & Carey	\$4,265,424
	Bradley Company	\$4,318,700
	Degnon Company	4,764,782
	F. L. Cranford	4,926,512
2—	Patrick McGovern	4,676,941
	Bradley Company	4,726,259
	Degnon Company	4,802,919
	Newman & Carey	4,937,874
	Hugh Nawn Company	5,022,709
3—	Walter H. Gahagan	2,981,992
	James H. Holmes	3,240,437
	Patrick McGovern	3,311,827
	Degnon Company	3,411,697
	Bradley Company	3,455,583
	Smith, Scott, Hannan & Hickey	3,471,807
	Creamer, Cranford & Donovan	3,575,278
	Oscar Daniels Company	3,575,485
	Smith & Pennock Company	3,668,568
	Hugh Nawn Company	3,813,727
	Newman & Carey	3,822,764
	S. Pearson & Son, Inc.	5,066,937

Route 9	\$11,924,359
Route 5	59,746,656
Route 20	13,766,554

Grand total.....\$85,437,570

The Chamber of Commerce of New York adopted on Nov. 3, 1910, a report on the proposed triborough subway

route presented by its special committee on rapid transit. The report calls attention to the crisis which has been reached and says that the absence of any bids for construction, equipment and operation of the triborough system raises the question "whether the city shall construct this route at its own expense without any possibility of estimating upon what terms contracts for equipment and operation may be obtained until after completion and the actual investment of such huge sums of city money."

The committee estimates the total cost of the triborough route for construction only at \$178,500,000 plus 10 per cent for extras and contingencies and 10 per cent for interest during construction, or a total of \$209,600,000. It estimates the cost of equipment at \$35,000,000 to \$40,000,000. From the experience of the last five years a liberal estimate of the increase in assessable value for the next five years would be \$300,000,000 per annum, the report says, providing a borrowing capacity of \$30,000,000 per annum. If one-half of this total could be applied to rapid transit purposes, it would take more than nine years to provide funds for the route without extensions into the Bronx north of 138th and 157th Streets and south of Fortieth Street, Brooklyn, to Fort Hamilton and Coney Island, and more than 12 years with the extensions. On the subject of earning power, the report says:

"While this subway has, your committee believes, been estimated to have a daily carrying capacity of 1,200,000 passengers, with congestion approximating conditions now existing in the present subway, assuming for argument's sake that from the start it should carry a daily load amounting to 360,000,000 passengers per annum, the gross income at a 5-cent fare would be \$18,000,000.

"Assuming operating expenses from the start on the favorable basis of 45 per cent, the operating net income would be \$9,900,000 per annum.

"The fixed charges of interest and sinking fund figured at 5 per cent on cost of route and equipment without the extensions would be \$10,000,000, or on the completed route \$12,250,000, thus showing a large deficit under peak load conditions, to be increased by such an amount as traffic may fall below this maximum.

"The existing subway has carried during its last fiscal year ending June 30, 1910, 269,000,000 passengers. On this basis of traffic the deficit on the route without extensions would be \$2,602,500 per annum, or with extensions \$4,852,500 per annum.

"No estimate is possible of what additional deficit might have to be met by taxation resulting from municipal operation if the city should eventually be forced to resort to that course."

Proposal to Remove Unused Horse Car Tracks in New York City

The receivers of the Metropolitan Street Railway, New York, N. Y., addressed the following letter on Nov. 3, 1910, to the Public Service Commission of the First District of New York regarding the desire of the commission to have the various unused horse car tracks of the company removed:

"Your commission has on several occasions expressed its desire that the various unused horse car tracks of the Metropolitan Street Railway and its various lessor companies should be removed from the streets.

"Recognizing the fact that the continuance of these tracks in the streets is a source of friction and annoyance, we have taken up with the joint committee on reorganization of the Metropolitan Street Railway the question whether some or all of these tracks cannot be removed. We are assured by the joint committee that any efforts which may be made in this direction will have the approval of the committee and endeavors are being made to get consent of the various lessor companies to the removal of their unused tracks.

"Our object in writing you at this time is to say that we are now in a position to consent to the removal of all of the unused horse car tracks of the Metropolitan Street

Railway and probably of those of the Broadway & Seventh Avenue Railroad.

"No suits have been brought by the Attorney-General to compel the removal of these unused tracks; but the same object can be achieved by an agreement between the city, the State and the companies defining the conditions upon which the tracks shall be removed, such agreement to be, of course, subject to the approval of the court.

"If the proposed procedure has your approval, we shall be obliged if you will let us know with whom the questions of detail shall be discussed."

The Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, New York, N. Y., has agreed to discontinue the horse railway on Eighty-sixth Street between Riverside Drive and Amsterdam Avenue, the line on Pleasant Avenue from 109th Street to 110th street and 109th Street from First Avenue to Pleasant Avenue and on Twelfth Avenue from Fourteenth Street to Forty-second Street. The company will relinquish its franchise rights to these lines.

Offer Accepted for Extension of Interborough Rapid Transit Company's Line

The Public Service Commission of the First District of New York has accepted the offer of the Interborough Rapid Transit Company to operate the Steinway tunnel under the East River between the Grand Central Station and Long Island City in return for permission to third-track the company's elevated lines. The agreement includes:

1. The opening for operation of the so-called Steinway tunnel under an arrangement whereby the title to the completed tunnel, which it is estimated cost about \$8,000,000, will vest in the city and the tunnel be operated by the Interborough Rapid Transit Company under conditions generally similar to those under which it is operating the present subway, and with a transfer between the subway and the Steinway tunnel without increase of fare, thus placing Queens County within a 5-cent fare zone.

2. The third-tracking of the Second Avenue elevated line from City Hall station to 129th Street.

3. The third tracking of the Third Avenue elevated line from Pearl Street and New Chambers Street to about 147th Street and the construction of a new bridge across the Harlem River and of a four-track elevated road between the Harlem River and 145th Street for the joint use of the Second Avenue and Third Avenue lines; also the construction of a two-track connection between the Third Avenue line at about 143d Street (thence through Willis Avenue and Bergen Avenue) and the West Farms division of the subway at about Brook Avenue.

4. The third tracking of the Ninth Avenue elevated line from Rector Street to 155th Street.

5. The construction of a two-track road from a connection with the Second Avenue elevated line across the Queensboro Bridge to the Queensboro Bridge Plaza, with provision for carrying passengers from the Queensboro Bridge Plaza in Long Island City to any point on the Second Avenue line for a 5-cent fare.

6. The construction of an elevated railroad from a connection with the Third Avenue elevated line at Pelham Avenue through Webster Avenue, Gun Hill Road and White Plains Road to Becker Avenue.

7. The construction of a two-track elevated extension of the Ninth Avenue elevated line across the Harlem River and to connect with a line over Jerome Avenue at about 104th Street.

The Board of Estimate and Apportionment has fixed Nov. 11, 1910, as the date for a public hearing on the proposed agreement between the Interborough Rapid Transit Company and the Public Service Commission.

Agreement Regarding Trafficway in Kansas City, Mo.

Following a conference held recently between officers of the Metropolitan Street Railway, Kansas City, Mo., and the Mayor of Kansas City, the president of the public utilities commission, the counsel to the commission and the city counsel, the following statement was issued regarding the terms arranged between the company and the city in relation to the construction of the West Twelfth Street trafficway, over which the Metropolitan Street Railway desires to

operate: "It has been agreed, subject to the approval of the Twelfth Street Trafficway Commission and the Common Council, that special tax bills shall be issued to pay \$475,000 of the cost of reducing the grade and constructing the viaduct. This is equal to the amount of the city's issue of bonds. The special tax bills will be payable in 10 equal annual instalments and the Metropolitan Street Railway agrees to pay them as they become due as its contribution to the cost of the entire improvement, to be reimbursed by any company succeeding to the right to operate street cars on Twelfth Street. The cost of the grading and building of a viaduct will be between \$725,000 and \$750,000. This plan will enable the administration to apply \$200,000 or more of the bond money to the payment of the property damages and relieve the benefit district proportionately. The details will be worked out by counsel and ordinances immediately prepared to effectuate this tentative agreement."

Appraisal of Property of the United Railways of St. Louis.—James E. Allison, vice-chairman and chief engineer of the Public Service Commission of St. Louis, has announced that the appraisal of the property of the United Railways of St. Louis which is being made by the commission will be completed by Jan. 1, 1911.

Another Strike Conviction in Columbus.—Thomas Hannon was found guilty on Nov. 4, 1910, of throwing stones at cars during the recent strike of the employees of the Columbus Railway & Light Company, Columbus, Ohio, and was sentenced to serve a term of two years in the penitentiary. This makes the tenth conviction in the riot cases. As five men pleaded guilty, 15 men have been sent to the penitentiary or the Mansfield reformatory for disorderly conduct during the strike.

Through Routes in Chicago Necessitate Changes in Elevated Structure.—Terms have been arranged by which the Northwestern Elevated Railroad, Chicago, Ill., which owns the Union Elevated Railroad, operating the loop used by all the elevated lines in Chicago, will remove the 20 pillars of the loop structure which prevent the operation of through routes by the surface railways. It is estimated that it will cost about \$200,000 to complete this work, and the cost will be borne by the Chicago Railways and the Chicago City Railway. It is hoped to complete the work by Jan. 1, 1911.

Situation in Detroit.—The Michigan Supreme Court has not rendered a decision in regard to the injunction sought by J. L. Hudson and others to prevent the proposed Moore municipal ownership amendment from being submitted to the voters of Detroit and the amendment will not be submitted at the regular election. The date for voting upon this amendment was originally set for Aug. 15, 1910, but a number of business men obtained a temporary restraining order and the case was taken to the Supreme Court. Mayor Breitmeyer has received a communication from B. S. Ross, consulting engineer, with offices in the Hodges Building, Detroit, stating that Eastern capitalists that he represents are willing to furnish \$7,000,000 or \$8,000,000 to construct a subway from some point on Woodward Avenue to the new terminal station of the Michigan Central Railroad, provided the city will agree to grant a long-term franchise.

Suit to Determine Interpretation of "Public Utility."—A suit is about to be brought in court to determine the legality of the commission's interpretation of a "public utility" as defined under the Public Utilities Law. The Public Utilities Law states that the term "public utility" shall mean and embrace "every corporation, company, individual, association of individuals, their lessees, trustees or receivers appointed by any court whatsoever, and every town, village or city that may own, operate, manage or control any plant or equipment, or any part thereof, within the State, for the conveyance of telephone messages or for the production, transmission, delivery or furnishing of heat, light, water or power either directly or indirectly to or for the public." The suit was filed by the executors and trustees of the estate of E. Harrison Cawker, deceased, of Milwaukee, against the Railroad Commission. They seek to restrain the commission from enforcing upon them the provisions of the Public Utilities Act, or in any manner interfering with the operation of the heat, light and power plant of the Cawker Building.

Financial and Corporate

New York Stock and Money Market

Nov. 7, 1910.

The Wall Street market to-day was in practically the same condition that has existed for the past fortnight and traders were inclined to be very conservative on the day before election. The volume of transactions was small and the price changes were insignificant. The tendency for the past week has been mostly toward higher prices, but the advances have been small. The steel stocks have been among the strongest on the list and the common especially has been buoyant.

The bond market is duller than for the past few weeks and quotations have been a trifle lower. The money market is somewhat improved from last week. Rates to-day were: Call, 2½@4¾ per cent; 90 days, 5@5¼ per cent.

Other Markets

Interest in traction shares in the Philadelphia market has been rather small during the pre-election trading. There seems to be an evident disposition to await the final decision on reorganization plans. Price changes for both Rapid Transit and Union Traction have been insignificant.

In the Chicago market there has been some light trading in Railways certificates, series 1 and 2, but price changes have been small. Other tractions have been practically out of the market.

There has continued to be some trading in Massachusetts Electric and in Boston Elevated shares in the Boston market during the past week. No changes of moment have been recorded in prices.

In Baltimore there have been no transactions in traction shares in the past week, but United Railways bonds have continued fairly active at former prices.

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

	Nov. 1,	Nov. 7
American Railways Company.....	442¾	443
Aurora, Elgin & Chicago Railroad (common).....	44	445
Aurora, Elgin & Chicago Railroad (pref.).....	490	490
Boston Elevated Railway.....	a128	a128
Boston & Suburban Electric Companies.....	*14¼	*14¼
Boston & Suburban Electric Companies (preferred)....	*72	*72
Boston & Worcester Electric Companies (common)....	10½	*10½
Boston & Worcester Electric Companies (preferred)....	43	*43
Brooklyn Rapid Transit Company.....	77	77¾
Brooklyn Rapid Transit Company, 1st pref. conv. 4s....	83¼	83¼
Capital Traction Company, Washington.....	a129¾	a128½
Chicago City Railway.....	a170	*170
Chicago & Oak Park Elevated Railroad (common)....	3¼	3¼
Chicago & Oak Park Elevated Railroad (preferred)....	*7¼	*7¼
Chicago Railways, ptcptg., ctf. 1.....	a77½	a77
Chicago Railways, ptcptg., ctf. 2.....	a21¼	a21
Chicago Railways, ptcptg., 3.....	a11	a11
Chicago Railways, ptcptg., ctf. 4.....	a6	a5½
Cleveland Railway.....	*91½	*91½
Consolidated Traction of New Jersey.....	a73	a73½
Consolidated Traction of N. J., 5 per cent bonds....	a104	a104
Detroit United Railways.....	*45	a58
General Electric Company.....	155	154½
Georgia Railway & Electric Company (common)....	a122	a121¾
Georgia Railway & Electric Company (preferred)....	a89	*89
Interborough-Metropolitan Company (common)....	22¼	22¼
Interborough-Metropolitan Company (preferred)....	57¾	58¾
Interborough-Metropolitan Company (1½s).....	81¾	81¾
Kansas City Railway & Light Company (common)....	a23½	a23½
Kansas City Railway & Light Company (preferred)....	75	a75
Manhattan Railway.....	a143	a142½
Massachusetts Electric Company (common)....	a20	a21
Massachusetts Electric Companies (preferred)....	a85½	a86
Metropolitan West Side, Chicago (common)....	*21	*21
Metropolitan West Side, Chicago (preferred)....	*64	*64
Metropolitan Street Railway.....	*110	*110
Milwaukee Electric Railway & Light (preferred)....	*67½	*67½
North American Company.....	a23	a23
Northwestern Elevated Railroad (common)....	a63	a60
Northwestern Elevated Railroad (preferred)....	a45	a45¼
Philadelphia Company, Pittsburg (common)....	a43	a42
Philadelphia Company, Pittsburg (preferred)....	a16¼	a15¾
Philadelphia Rapid Transit Company.....	a82	*82
Public Service Corporation, 5 per cent col. notes....	a95	a95
Public Service Corporation, ctf. 5.....	a101	a101
Seattle Electric Company (common).....	*100	*100
Seattle Electric Company (preferred).....	*98½	*98½
South Side Elevated Railroad (Chicago).....	*65	65
Third Avenue Railroad, New York.....	*95¾	13½
Toledo Railways & Light Company.....	*8¼	a8
Twin City Rapid Transit, Minneapolis (common)....	*112½	a111
Union Traction Company, Philadelphia.....	a40	a39¼
United Rys. & Electric Company, Baltimore.....	a15¾	*15¾
United Rys. Inv. Co. (common).....	*14¾	*14¾
United Rys. Inv. Co. (preferred).....	*60	*60
Washington Ry. & Electric Company (common)....	a37½	a35¾
Washington Ry. & Electric Company (preferred)....	a89¾	a89¾
West End Street Railway, Boston (common)....	a86½	a87
West End Street Railway, Boston (preferred)....	*100¾	*100¾
Westinghouse Elec. & Mfg. Company.....	73¼	*73¼
Westinghouse Elec. & Mfg. Company (1st pref.)....	a124	*124

a Asked. * Last sale.

Chicago Consolidated Traction Company

The sale of the property of the Chicago Consolidated Traction Company, which has been set for Nov. 30, 1910, will include all the property of the company, embracing that covered by the general mortgage of 1899, all properties owned previous to Feb. 27, 1899, by the North Chicago Electric Railway, North Side Electric Street Railway, Cicero & Proviso Street Railway, Chicago Electric Transit Company, Ogden Street Railway, Chicago & Jefferson Urban Transit Company and Evanston Electric Railway and also all properties owned by the Chicago North Shore Street Railway. The following official announcement has been made regarding the acquisition of the property of the Chicago Consolidated Traction Company by the Chicago Railways:

"As a result of several weeks' negotiations with bankers and other interested parties, the officials of the Chicago Railways are assured means for completing the rehabilitation of the property of the Chicago Railway pursuant to its ordinance, as well as for the acquisition and rehabilitation of the property of the Chicago Consolidated Traction Company pursuant to the requirements of the ordinance of Oct. 10 last.

"The opposition threatened by certain holders of or parties interested in certain of the \$6,750,000 of 4½ per cent bonds of the Consolidated Traction Company has been rendered negligible by reason of the fact that more than 90 per cent of the entire issue of said bonds has been purchased and paid for in cash at \$300 per \$1,000 bond flat and delivered to interests which are friendly to the Chicago Railways.

"The same friendly interests have completed arrangements for the acquisition of the Harry judgment of \$1,344,685. The Chicago Railways can, therefore, state that the ordinance of Oct. 10, 1910, will be accepted.

"Counsel for Mrs. Yerkes state that, as owner of one-third of the Yerkes estate, which held \$4,594,000 bonds, she will claim that the estate is entitled to the full principal of the bonds with two years' interest. Judge Baldwin in the Circuit Court on Oct. 28, 1910, granted a temporary injunction preventing Executor Louis S. Owsley from disposing of the bonds of the estate. Suit was also begun in the Supreme Court in this city to prevent the delivery of the bonds to the purchasers."

Minority Stockholders Object to Philadelphia Financing

Minority stockholders of the Union Traction Company, Philadelphia, Pa., who oppose the conditions for refinancing the Philadelphia Rapid Transit Company which E. T. Stotesbury, of Drexel & Company, Philadelphia, Pa., has outlined as essential if he should accept the solicited election to the directorate of that company, have made public through Isaac A. Pennypacker the following terms which they propose to insist upon in connection with the plan for refinancing the Philadelphia Rapid Transit Company:

"Union Traction's 6 per cent rental from the Philadelphia Rapid Transit Company must not be reduced.

"Minority holders shall have representation in the Union Traction Company's directorate.

"Bonds (debentures are being considered) must be short term and not of the length of the life of the city's contract with the Philadelphia Rapid Transit Company, as proposed, and a sinking fund must be provided for their retirement.

"Loans on bonds must be limited to a specific sum in any one year, and bonds must be disposed of in such a way that if the Philadelphia Rapid Transit Company defaults the Union Traction Company will be liable for only what has been spent on improvements.

"The Union Traction Company must know how the funds thus obtained are spent and will insist that every dollar be used in improving the Philadelphia Rapid Transit Company's property.

"The Union Traction Company must supervise the expenditure of the moneys derived through a bond issue, and to this end the directors of that corporation shall have full control over the funds. A voting trust for the stock of the Philadelphia Rapid Transit is suggested.

"An examination of the physical property of the operating company is demanded."

Annual Report of the Montreal Street Railway

Gross earnings of the Montreal Street Railway in the fiscal year ended Sept. 30, 1910, increased 12.33 per cent over the previous year, while operating expenses increased 8.88 per cent and net earnings 17.13 per cent. The earnings for two years compare as follows:

Year ended Sept. 30:	1910	1909
Gross earnings.....	\$4,352,551	\$3,874,838
Operating expenses.....	2,455,301	2,255,019
Net earnings from operation.....	\$1,897,250	\$1,619,819
Interest from Montreal Park & Island Railway.....	85,878	55,606
Total income.....	\$1,983,128	\$1,675,425
Fixed charges:		
City percentage on earnings.....	\$278,085	\$260,203
Interest.....	175,421	179,725
Rental leased lines.....	6,472	5,821
Taxes.....	48,000	*.....
Total.....	\$507,978	\$445,749
Net income.....	\$1,475,150	\$1,229,676
Dividend, 10 per cent.....	1,000,000	976,332
Surplus.....	\$475,150	\$253,344
From which has been appropriated:		
Contingent account.....	\$250,000	\$175,000
Fire insurance fund.....	25,000	25,000
Transferred to surplus account.....	\$200,150	\$53,344

*Taxes 1909 in operating expenses.

L. J. Forget, the president, says in his statement to shareholders:

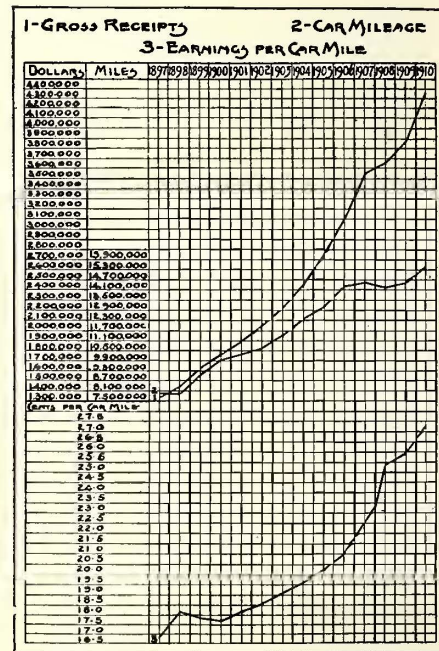
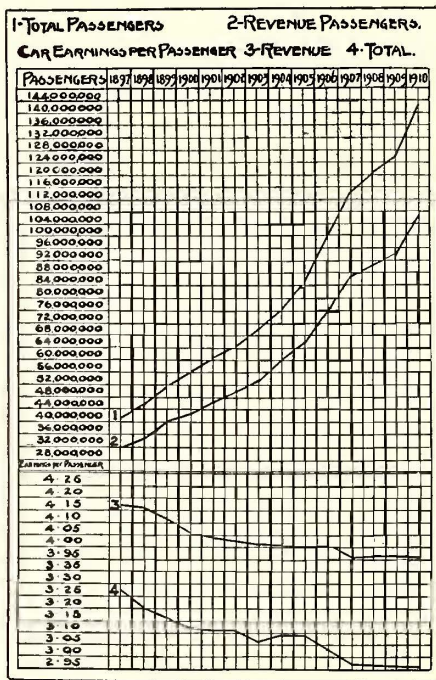
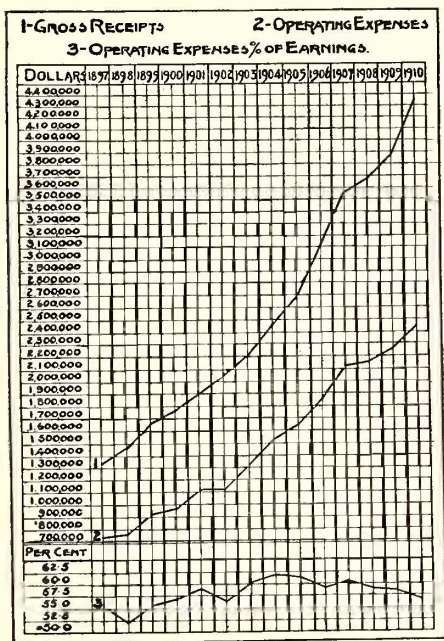
"Your directors appropriated \$25,000 from the surplus

from Côte des Niegés to the city. The City of Montreal has appealed from this decision to the Privy Council.

"During the past year negotiations were entered into between your directors and the directors of the Montreal Light, Heat & Power Company with a view to bringing about closer relations between the two companies. The scheme submitted did not, however, receive the support of the shareholders of either company to the extent anticipated, and has been abandoned; and your directors have been notified by the Montreal Light, Heat & Power Company of their withdrawal from any further negotiations in this connection.

"The property has been maintained in a high state of efficiency, and a considerable sum has been spent in the upkeep of the tracks and rolling stock. The power plants and buildings are in excellent condition, it being the policy of your directors to spare no efforts or expense in this direction; yet, notwithstanding this, the surplus earnings of the company are the largest in its history. There has also in addition been carried over to the credit of the snow account a substantial balance toward this year's expenses. Notwithstanding the above the operating expenses percentage of earnings have decreased.

"The large expansion of the company's business necessitated the erection of new shops for the construction and repair of cars, etc., and work in connection therewith has been commenced. These shops are to be completed during the coming year, and will be most complete and up to date in every respect.



Diagrams in Annual Report of Montreal Street Railway

earnings as a credit to the fire insurance fund. The interest on the investments for the year amounted to \$26,767. The amount now at the credit of the fund is \$521,560.

"During the past year the company secured an amendment to its charter authorizing the construction and operation of underground railways. Preliminary plans for construction have been prepared by the well-known firm of Jacobs & Davies, of New York, and the question will be taken up with the city during the coming year.

"Owing to the continued rapid growth and congestion of the city, your directors again took up the question of securing additional routes which would relieve the present congestion, but regret that no definite action has been taken as yet by the city. It is hoped, however, that the matter will receive early attention. The delay has added to the difficulties of operation in, at best, a difficult and dangerous city to operate in.

"Your directors are pleased to report that the Supreme Court of Canada rendered judgment in favor of this company's appeal from the decision of the Board of Railway Commissioners for Canada, relative to the rates of fares

"The company has paid to the city of Montreal taxes and percentages on earnings amounting to \$387,264, on account of snow removal \$50,919, a total of \$438,183, being an increase over the previous year of \$51,998.

"The company has recently received a proposition from the Montreal, Light, Heat & Power Company offering to make a contract to furnish additional power to this company, but owing to the annual meeting of shareholders being so near at hand, your directors decided to leave the matter to the incoming board to deal with."

Gross earnings of the Montreal Park & Island Railway amounted to \$337,764, an increase of \$57,271 over the preceding year, and of the Montreal Terminal Railway to \$132,313, an increase of \$23,697.

Traffic statistics compare as follows:

Year ended Sept. 30	1910	1909
Expenses—per cent of earnings.....	56.41	58.20
Passengers carried.....	107,241,406	95,376,373
Car earnings per passenger—cents.....	3.95	3.96
Transfers.....	36,437,123	32,285,208
Total passengers carried.....	143,678,529	127,661,581
Car earnings per pass, total carried—cents....	2.95	2.96

Traffic and Transportation

Reduction of Fare Ordered on Syracuse, Lake Shore & Northern Railroad

The Public Service Commission of the Second District of New York has ordered the Syracuse, Lake Shore & Northern Railroad, Syracuse, N. Y., to reduce its fare from stop 26 to Fulton, Oswego County, from 10 cents to 5 cents. The fare had been 5 cents up to June, 1909, when it was raised to 10 cents. The order was made on a complaint presented by residents at stop 26, who alleged that the charge was unjust and unreasonable. The commission in an opinion by Commissioner Decker held that the 10-cent fare complained of between stop 26 and Fulton, a distance of 3.82 miles, tends under the circumstances to discourage instead of encourage business and is not advantageous to the company or to the public; that such 10-cent fare is unreasonable and unjust and that the former 5-cent fare between those points should be restored. The commission also ruled as follows:

"As a general proposition, and leaving out of view cases where service may be required irrespective of profit considerations, a just and reasonable railroad fare should produce adequate return to the carrier, it should afford the greatest possible service to the public for the money paid, it should not interfere unnecessarily with the convenience of the public, and if possible it should encourage the passenger business."

Referring to the zone system of fares on electric railways as opposed to a mileage basis the commission said that this is a convenient and in general a just method of fixing passenger fares on such lines, but it is sometimes subject to criticism in that where fares are based on multiples of 5 cents the passenger just outside of a zone limit pays that much more than the passenger who is just inside of the zone limit, so that two passengers pay materially different amounts for nearly the same service. This result, the commission says, should be avoided as far as practicable, since it not only subjects passengers to inconvenience but is against the interest of the company in that its object of securing additional revenue in so fixing the zone limit in large measure may be defeated.

Accidents in New York in September

The Public Service Commission of the First District of New York has issued the following summary of accidents which occurred in September, 1908, 1909 and 1910, on the railways within its jurisdiction.

September,	1908	1909	1910
Car collisions	155	187	93
Persons and vehicles struck by cars.....	889	1010	1300
Boarding	588	581	735
Alighting	1068	931	1158
Contact electricity	39	32	31
Other accidents.....	2284	1897	2122
Totals	5023	4638	5439
INJURIES.			
Passengers	2098	2027	2360
Not passengers	586	571	479
Employees	526	455	652
Totals	3210	3053	3491
SERIOUS (included in above).			
Killed	34	28	33
Fractured skulls	9	10	11
Amputated limbs	6	4	8
Broken limbs	36	41	34
Other serious	225	145	162
Totals	310	228	248

Time Placards.—The Rochester, Syracuse & Eastern Railroad and the Auburn & Northern Electric Railroad, which are owned and operated by the Beebe syndicate, have issued placards 14 in. long by 5½ in. wide which show the running time of both local and limited trains between Syracuse and Rochester and Auburn and Rochester.

Accident Campaign in Seattle.—The Seattle (Wash.) Electric Company has inaugurated a campaign of education addressed particularly to the school children of Seattle, looking toward minimizing accidents, which are due primarily to carelessness and to ignorance of children regarding means for protecting themselves when crossing tracks or alighting from street cars.

Atlantic Shore Line Railway.—The committee which is acting in behalf of the holders of the 4 per cent refunding bonds of the Atlantic Shore Line Railway dated 1906, the second mortgage 6 per cent bonds of the company dated 1909 and the first preferred stock of the company has given notice that these bonds and the preferred stock must be deposited under the plan of reorganization by Nov. 21, 1910. If the bonds are not deposited they will take their pro rata share of the proceeds of the sale. As stated in the *ELECTRIC RAILWAY JOURNAL* of Nov. 5, 1910, page 969, the property of the company will be sold under foreclosure at Alfred, Maine, on Dec. 1, 1910.

Babylon (N. Y.) Railroad.—The Public Service Commission of the Second District of New York has authorized the Babylon Railroad to issue \$21,500 of bonds additional to those authorized on Sept. 14, 1910, to be sold at not less than 85. The proceeds are to be used to pay for construction work and various expenses attendant upon the organization of the company.

Los Angeles (Cal.) Railway Corporation.—The Los Angeles Railway Corporation, which recently succeeded the Los Angeles Railway, is reported to have concluded negotiations to take over all the city lines of the Pacific Electric Railway, Los Angeles, Cal.

Massachusetts Electric Companies, Boston, Mass.—The Railroad Commission of Massachusetts has approved the issue of coupon or registered bonds by the Boston & Northern Street Railway to the extent of not more than \$266,000 at par and by the Old Colony Street Railway of not more than \$25,000. The bonds are payable in 50 years from date and bear interest at 4 per cent a year, being necessary for the payment of certain floating indebtedness of the companies.

Metropolitan Street Railway, New York, N. Y.—Judge Lacombe, in the United States Circuit Court, has signed a supplemental decree in the case of the Farmers' Loan & Trust Company as successor to the Morton Trust Company against the Metropolitan Street Railway, Adrian H. Joline and Douglas Robinson as receivers of the Metropolitan Street Railway, the New York City Railway and others. Judge Lacombe holds that the mortgage given by the Metropolitan Street Railway to the Morton Trust Company dated March 21, 1902, is a valid mortgage constituting a claim upon all of the property of the Metropolitan Street Railway and orders that the special master be directed to sell all of the interests of the Metropolitan Street Railway in the Dry Dock, East Broadway & Battery Railroad, the Fulton Street Railroad, the Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad, Second Avenue Railroad, Twenty-eighth & Twenty-ninth Streets Crosstown Railroad, the Third Avenue Railroad and the Union Railway and also the Central Park, North & East River Railroad. The special master is also directed to settle all demands, claims and contracts against the Metropolitan Street Railway pending further direction of the court.

Virginia Railway & Power Company, Richmond, Va.—Nathaniel V. Campbell has been elected a director of the Virginia Railway & Power Company to succeed the late Charles S. Whelen.

Wilmington, New Castle & Southern Railway, New Castle, Pa.—Justice Pennewill, in the Chancery Court at Wilmington, Del., has issued a decree which provides for the sale of the property of the company between Wilmington and New Castle under the first mortgage of the Wilmington & New Castle Railway, which was dated 1896, for \$150,000 and given to the Real Estate Trust Company, Philadelphia, Pa., as trustee. The company is a consolidation of the Wilmington & New Castle Railway and the New Castle & Delaware City Railway, and operates 16 miles of line.

Dividends Declared

Federal Light & Traction Company, New York, N. Y., quarterly, 1½ per cent, preferred.

Lincoln (Neb.) Traction Company, quarterly, 1½ per cent, preferred.

Metropolitan West Side Elevated, Chicago, Ill., quarterly, ¾ of 1 per cent, preferred.

Ft. Wayne & Wabash Valley Traction Company to Increase Wages.—The Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., has announced that on Jan. 1, 1911, it will increase the wages of all motormen and conductors on its line in Ft. Wayne, Ind., 1 cent an hour. The new wage scale runs from 19 cents to 22 cents an hour, depending upon the length of service, and will affect about 200 men.

Accident on Brooklyn Bridge.—Traffic on the elevated lines of the Brooklyn (N. Y.) Rapid Transit Company which operate over the Brooklyn Bridge was suspended from about 5:20 p. m. to 7:30 p. m. on Nov. 4, 1910, on account of a car being derailed at the stub terminal at the Manhattan end of the structure.

Evidence Presented in Investigation of Accident on the Indianapolis & Cincinnati Traction Company's Line.—Charles L. Henry, receiver for the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., appeared before the Railroad Commission of Indiana on Nov. 4, 1910, as a witness in an investigation of an accident which occurred on the line of the company at Connersville on Oct. 13, 1910, when a conductor named Ratcliffe suffered a broken leg and Carl Hunt, a motorman, lost his life. Upon the evidence given by Mr. Henry Ratcliffe was discharged. The commission has not reached a decision in the case.

Freight and Passenger Stations Combined at Dayton.—W. S. Whitney, general passenger and freight agent of the Ohio Electric Railway, Cincinnati, Ohio, has announced that after Dec. 31, 1910, the transfer of all freight and baggage between various divisions of the company at Dayton, Ohio, will be eliminated on account of the consolidation of the different Dayton freight and passenger depots at Third Street and Kenton Street. The operation of both passenger and freight trains from the one terminal will add greatly to the convenience of the traveling public and will eliminate the delays to freight shipment incident to the transfer by wagon which was necessary heretofore.

Traffic at the Indianapolis Terminal Station.—During October, 1910, 15,794 interurban passenger cars were handled at the Indianapolis Traction & Terminal Station, an increase of 1187 over October, 1909. The number of freight cars handled from the station during October, 1910, was 1898. The number of passengers handled at the station, both in- and out-bound, was 4,209,243 during the nine months which ended on Sept. 30, 1910, an increase of 379,485 over the corresponding period of the preceding year. The number of pieces of baggage handled at the station during the nine months which ended on Sept. 30, 1910, was 91,181, an increase of 21,961 pieces over the same period in 1909.

Limited Service Over Indiana Roads.—The Chicago, South Bend & Northern Indiana Railway and the Winona Interurban Railway, Winona Lake, Ind., have arranged to operate trains as far as Peru, Ind., where direct connections will be made with the limited cars of the Indiana Union Traction Company which are operated to Indianapolis. The company will not, however, be able to offer through service to Indianapolis this year. The Chicago, South Bend & Northern Indiana Railway and the Winona Interurban Railway formerly operated limited trains to Warsaw, but the new service will extend from Michigan City to Peru, Ind., a distance of 100 miles. Four trains will be run in each direction beginning Nov. 10, 1910.

Indiana Union Traction Company to Increase Wages.—The Indiana Union Traction Company, Anderson, Ind., has announced that on Jan. 1, 1911, it will establish the following scale of wages for the men employed on the interurban lines of the company: Twenty cents an hour for the first year, 21 cents for the second year, 22 cents for the third year, 23 cents for the fourth year, 24 cents for the fifth year, 25 cents for the sixth year, 26 cents for the seventh year, 27 cents for the eighth year and 28 cents for 10 years or more. The old rate graduated from 18 cents to 25 cents an hour, according to the length of service. The advance in wages for the men on the city lines follows: Seventeen cents an hour for the first six months of service, 18 cents for the first year, 19 cents for the second year, 19½ cents for the third year, 20 cents for the fourth year, 21 cents for the fifth year, 22 cents for 10 years or more. This is an increase of 1 cent over wages paid formerly on the city lines of the company. This is not a fixed wage scale. The discarded scale has been in effect for three years.

Personal Mention

Mr. H. A. Baymiller has been appointed auditor and traffic manager of the Lake Erie, Bowling Green & Napoleon Railway, Bowling Green, Ohio, to succeed Mr. H. H. Stephenson, resigned.

Mr. Kenyon B. Conger has been elected assistant secretary of the Hudson & Manhattan Railroad, New York, N. Y., to succeed Mr. William Everdell, Jr., who has been elected secretary of the company.

Mr. A. C. Kelly, who went to Argentina in 1909 to report on the electrification of the suburban lines of the Buenos Ayres & Pacific Railway, has been appointed chief electrical engineer of the company, with headquarters at Buenos Ayres.

Mr. William Everdell, Jr., whose appointment as acting secretary of the Hudson & Manhattan Railroad, N. Y., to succeed Mr. Charles W. King, resigned, was announced in the *ELECTRIC RAILWAY JOURNAL* of Nov. 5, 1910, has been elected secretary of the company.

Mr. A. J. Glynn, who has been connected with the mechanical department of the Illinois Traction System, Peoria, Ill., for the last three years, has resigned as master mechanic of the southern division of the Illinois Traction System. Mr. Glynn will be located for the present in Decatur, Ill., where he has business connections.

Mr. J. H. Leary, for many years chief dispatcher for the Southern Pacific Company at the Oakland Mole and at the depot at Third Street and Townsend Street, San Francisco, Cal., has been appointed superintendent of the Central California Traction Company, San Francisco, Cal., to succeed Mr. A. D. Miller, resigned. Mr. Leary will have his headquarters at Stockton, Cal.

Mr. T. P. McCrery has been elected treasurer of the Toledo, Port Clinton & Lakeside Railway, Toledo, Ohio, and a director of the company. Mr. McCrery had charge of the property during construction and became general manager of the company when the road was placed in operation. Subsequently he resigned from the company because of ill health. He succeeds the late George Breyman as treasurer of the company.

Mr. Charles E. Phelps, Jr., has been appointed chief engineer of the Public Service Commission of Maryland. Mr. Phelps was born on Jan. 31, 1871, in Baltimore and completed a course in electrical and mechanical engineering at the Johns Hopkins University in 1894. He served as superintendent of electrical construction for the David E. Evans Company from 1894 to 1898. After some private contract work in Pittsburgh and Erie, Pa., and Wilmington, Del., for two years, Mr. Phelps was appointed chief engineer upon the organization of the present electrical commission in Baltimore on Oct. 1, 1898. While chief engineer of the electrical commission he represented a number of cities in technical matters relating to electrical public service corporations principally. In 1906 Mr. Phelps and Mr. Theodore Stebbins were selected by the National Civic Federation to conduct the investigation of municipal ownership and operation of public services which was carried on by the federation.

Mr. George G. Porter has resigned as master mechanic of the New Jersey & Hudson River Railway & Ferry Company, Edgewater, N. J. No successor will be appointed because the road has been purchased by the Public Service Railway. Mr. Porter began railroad work with the Pullman Company, with which he was connected for seven years in different departments of its work at Pullman. In 1893 he became associated with the West Chicago Street Railway Company, first in the paint shop and later in the electrical department. Six years later he went abroad to accept the office of foreman painter of the George F. Milnes Company, Limited, car builders, and before he left that company was general shop foreman of the car building and paint shops. In 1904 Mr. Porter received a flattering offer which he accepted from the Underground Electric Railways Company, Limited, to become chief car-building inspector, and he afterward organized a shop and inspection force for the maintenance and overhauling of equipment of that organization. Three years ago he returned to this country and immediately became associated with the New Jersey & Hudson

River Railway & Ferry Company at Edgewater as master mechanic, the position which he has just resigned. Mr. Porter has not announced his future plans.

Mr. Edmund Arthur Robert, who has been elected president of the Montreal (Que.) Street Railway to succeed Mr. L. J. Forget, was born in Beauharnois, Que., on March 3, 1864. He was educated at the Montreal High School and Montreal Business College and commenced his business career in 1881 with Greenshields, Limited, a dry goods house. After nine years' experience in this business he and his two brothers took over the small woolen mill operated up to that time by his father at Beauharnois. This small mill eventually grew into the Dominion Woollen Manufacturing Company, Limited, of which Mr. Robert became managing director. Mr. Robert took a great interest in the water power used at Beauharnois in the operation of the mills there, and together with some associates acquired a water power in the St. Lawrence River known as the Bisson Point power. This right was eventually sold to the St. Lawrence Light & Power Company, better known as the Chambly Company, and affiliated with the Montreal Light, Heat & Power Company. In 1901 Mr. Robert commenced negotiations with the Ottawa government for a lease of the Beauharnois Canal to develop power and transmit it electrically to Montreal and the surrounding district. In 1907 the negotiations for the lease of this property from the government were concluded. After obtaining this concession Mr. Robert formed the Canadian Light & Power Company and served as vice-president and managing director of the company. He was largely responsible for the formation of the syndicate which obtained the control of the Montreal Street Railway.

OBITUARY

E. R. French, superintendent of the Central Division of the Public Service Railway, which includes the lines in Elizabeth and Cranford, is dead. Mr. French was graduated from the Waterbury High School and attended the Massachusetts Institute of Technology. He entered the employ of the Public Service Railway upon completing his studies at the Massachusetts Institute.

L. C. Smith, president of the Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y., died at his home in Syracuse on Nov. 5, 1910. Mr. Smith was born at Torrington, Conn., on March 31, 1850. In 1877 he began to manufacture breech-loading firearms and in 1890 organized the Smith Premier Typewriter Company, of which he was president until it was sold to the Union Typewriter Company. In 1903 he organized the L. C. Smith & Brothers Typewriter Company and was elected president of the company.

Sir J. Clifton Robinson, who retired early this year as managing director of the London United Tramways, London, England, died suddenly on Nov. 6, 1910, in New York, of heart disease, while returning to the Waldorf-Astoria, where he was a guest. Sir Clifton arrived in New York on Nov. 5, 1910, from Canada, where he had gone to inspect railroad interests held by the Charing Cross Bank of England. Following his retirement from the London United Tramways Sir Clifton was retained by Speyer & Company to investigate railroad matters for them in the East. Sir Clifton was born in Birkenhead, England. His tramway work was begun in England in 1860, when he became associated with the late George Francis Train in the construction of the first tramway in Europe, at Birkenhead. Later he came to America and remained here five years, serving with several street railway companies. In 1871 he returned to Europe and in 1884 supervised the construction of the Highgate Cable Tramway, London, the first cable line in England. He was also connected with the Dublin Southern Railway, London United Electric Tramways, Imperial Tramways, Bristol Electric Tramways, Metropolitan District Railway, Underground Electric Railways, Limited, London, England, and the Corris Railway. Sir Clifton was knighted in 1905 by the late King Edward for his public services in tramway construction. On Aug. 30, 1910, Sir Clifton celebrated the fiftieth anniversary of his connection with tramway construction. This date was also coincident with the fiftieth anniversary of the establishment of tramways in the United Kingdom. An extended biography of Sir Clifton was published in the *STREET RAILWAY JOURNAL* of Nov. 30, 1907.

Construction News

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

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

RECENT INCORPORATIONS

Alabama Traction Company, Montgomery, Ala.—Incorporated in Alabama to build a 25-mile electric railway in Montgomery and eventually extend it to other towns. The company advises that material has been ordered and work will begin soon. Power for the line will be leased. Capital stock authorized, \$1,000,000; stock issued, \$250,000. Officers: Charles G. Abercrombie, Montgomery, president, general manager and superintendent; Charles Woodward, Wakefield, vice-president; John J. Flowers, Montgomery, vice-president and treasurer. All communications to be sent to Charles G. Abercrombie, Montgomery. [E. R. J., Oct. 8, '10.]

***Alberta (Alta.) Electric Railway.**—Incorporated in Lethbridge, Alta., to construct interurban railways to the American boundary and between McLeod, Calgary and Medicine Hat.

***Fox & Illinois Union Railway, Aurora, Ill.**—Incorporated in Illinois to build an electric railway from Yorkville to Morris, Ill., with connecting lines at Dwight and Sandwich. Headquarters, Aurora. Capital stock, \$20,000. Incorporators: John Meredith, Joshua Rhodes, Frank M. Zimmerman, Henry H. Evans and Ralph C. Putnam, all of Aurora.

Queen City Transit Company, Traverse City, Mich.—Application for a charter has been made in Michigan by this company to build an electric railway in Traverse City. Capital stock, \$3,000,000. L. K. Gibbs is interested. [E. R. J., Dec. 18, '09.]

Consolidated Traction Company, Philipsburg, Pa.—Incorporated in Delaware to build an electric or steam railway from Philipsburg to Curwensville via Blue Ball, Wallace-town, Bigler, Woodland and Clearfield. Capital stock, \$100,000. It is reported that operations will start in about a month. W. Ellis Shomo is interested. [E. R. J., May 21, '10.]

***Alta & Jordan Valley Railroad, Alta, Utah.**—Incorporated in Utah to build a 16-mile electric or steam railway from Sandy to Alta. Capital stock, \$200,000. Incorporators: D. J. Williams, M. A. Williams, Wm. F. Williams, B. F. Cummings and E. W. Cummings.

***Janesville Traction Company, Madison, Wis.**—Incorporated in Wisconsin to build interurban lines in to the territory surrounding Janesville. Capital stock, \$125,000. Incorporators: Thomas Nolan, William Murphy and J. L. Burke.

FRANCHISES

Birmingham, Ala.—The Alabama Railway & Electric Company has applied to the City Council for a franchise to build its tracks over certain streets in Birmingham.

Oakland, Cal.—The Southern Pacific Company will ask the City Council for a franchise to electrify the Seventh Street line at once.

Council Bluffs, Ia.—The Omaha & Council Bluffs Street Railway, Omaha, has asked the City Council for a franchise to extend its lines in Council Bluffs.

***Ft. Scott, Kan.**—H. L. Phillips, C. E. Cory and associates, it is said, will ask the City Council for a franchise to build an electric railway in Ft. Scott. This is part of a plan to build a railway to connect Ft. Scott and Pittsburgh. They will soon apply for a charter.

Louisville, Ky.—The Louisville Railway has applied to the General Council for a franchise to build an extension to its line in Louisville.

***Kansas City, Mo.**—It is stated that W. D. Miles will ask the Council for a franchise to build an electric railway on certain streets in Kansas City.

Jamestown, N. Y.—The Jamestown Street Railway has applied to the Council for a franchise to build an electric railway on Willard Street and to double-track its lines on Main Street and Second Street.

***New York, N. Y.**—The Bronx Traction Company has applied to the Board of Estimate and Apportionment, New York, for a franchise to build an extension of its electric railway on White Plains Road, from Morris Park Avenue to Gun Hill Road. Nelson P. Lewis, chief engineer.

Seattle, Wash.—The Seattle-Tacoma Electric Railway has received from the County Commissioners an extension to its franchise of three months' time in which to begin the construction of its electric line between Seattle and Tacoma.

TRACK AND ROADWAY

Tucson Gas, Electric Light & Power Company, Tucson, Ariz.—This company is said to be considering plans for building about 2 miles of track on the East Speedway in Tucson.

Pacific Electric Railway, Los Angeles, Cal.—Press reports state that this company has placed in operation its new 4-track electric system between Los Angeles and Pasadena. It begins at Indian Village, near Eastlake Park, and ends at El Molino Junction, outside the city limits of Pasadena.

Fairview Interurban Railway, Delta, Col.—This company advises that it has secured all right-of-way and most of the grading is done for its proposed 25-mile electric railway to connect Delta, Cedaredge and the Fairview coal mines. Capital stock, \$250,000. Its power house and repair shops will be located at Delta. Charles G. Montz, 1154 Clarkson Street, Denver, is interested. [E. R. J., Oct. 22, '10.]

***Waterbury, Conn.**—Surveys have been made and rights-of-way secured for building a 10-mile electric railway to connect Waterbury and Milldale. Charles H. Preston, Jr., 136 Grand Street, Waterbury, is said to be interested.

West Chester & Wilmington Electric Railway, Wilmington, Del.—It is reported that this company will let contracts within the next 10 days for the construction of its railway between West Chester and Wilmington. Lewis Dalmas, Morris Building, Philadelphia, Pa., president. [E. R. J., Nov. 5, '10.]

Washington Railway & Electric Company, Washington, D. C.—It is said that this company will build an extension of its double track line to Congress Heights. It is expected to begin work in the spring.

Carnesville (Ga.) Railway.—This company advises that its proposed 20-mile railway to connect Toccoa, Carnesville and Red Hill will be operated by steam. W. S. Erwin, Carnesville. [E. R. J., Oct. 29, '10.]

Kankakee & Urbana Traction Company, Kankakee, Ill.—Press reports state that the stockholders of this company will hold a meeting on Nov. 22 for the purpose of increasing the capital stock from \$200,000 to \$2,500,000. Preliminary arrangements have been made to begin construction soon on this 125-mile railway between Kankakee, Urbana, Villa George, Camargo and Charleston. W. J. Brook, Kankakee, president. [E. R. J., July 2, '10.]

Evansville, Mount Carmel & Olney Electric Railway, Evansville, Ind.—This company is said to have sold enough bonds to insure the building of its railway as far south as Lancaster, Ill.

Ft. Wayne & Toledo Electric Railway, Ft. Wayne, Ind.—It is said that this company has secured all equipment and will begin construction soon on its 44-mile railway to connect Ft. Wayne and Maysville, Ind., and Hicksville, Bryan and Toledo, Ohio. R. T. Bastress, general manager. [E. R. J., Sept. 17, '10.]

Chicago, Lake Shore & South Bend Railway, Michigan City, Ind.—Press reports state that this company has completed and placed in operation a second track between Gary and the State line, a distance of 11 miles. It is expected to continue the double track through Gary and eventually the entire route will be a double-track system.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—This company has completed surveys and will let contracts next spring for building its proposed 20-mile extension from Waterloo to Dike via Cedar Falls.

Winnipeg, Salina & Gulf Railway, Salina, Kan.—This company advises that its railway will be operated by steam and not by electricity. [E. R. J., Oct. 29, '10.]

Paducah (Ky.) Traction Company.—It is said that this company is considering plans to extend its tracks 3 miles to Lone Oaks.

Frederick (Md.) Railroad.—It is reported that this company expects to extend its tracks in Frederick City on Market Street and Patrick Street to afford local service in connection with the interurban line.

***Commonwealth Power Company, Lansing, Mich.**—It is stated that this company intends to build an electric railway from Lansing to Battle Creek via Charlotte, Olivet, Potterville and Millet. It is the intention of the company to begin work in the Spring. W. A. Foote, Lansing, president.

Michigan United Railways, Lansing, Mich.—This company, it is said, will compete this fall \$55,000 worth of track work in Lansing and Jackson. This will include replacing single track with double track and installing the tracks in new Jackson terminal building and car house.

Morris County Traction Company, Morristown, N. J.—It is stated that this company has begun construction for the continuation of its tracks from Morristown to Madison, a distance of about three miles.

Charlotte Electric Railway, Light & Power Company, Charlotte, N. C.—This company is said to be building an extension of its tracks in Charlotte extending down Tryon Street to Palmer Street to connect with the Lakewood line on West First Street, thereby forming a complete loop in Ward 3.

***Youngstown, Ohio.**—John McClure, Poland, is reported to be considering plans for building an electric railway to extend from Poland to Boardman and there to connect with the Youngstown & Southern Railway.

Muskogee (Okla.) Electric Traction Company.—This company is said to be considering plans for building a 9-mile extension of its Alta Vista line through the brick yards and Crekola to Taft. It is probable that it will cross Pecan Creek over a county bridge.

Portland Railway, Light & Power Company, Portland, Ore.—It is reported that this company will soon build a 3½-mile extension of its Cazadero line in Portland.

***Lock Haven, Pa.**—It is reported that plans are being considered for building an electric railway to connect Lock Haven and Avis.

Wilkes-Barre (Pa.) Railway.—It is said that this company has decided to expend \$500,000 in improving the service on the various lines running through the Wyoming Valley.

Dallas (Tex.) Standard Traction Company.—Official reports state that this company has just placed in operation 1 mile of track from Mount Auburn addition to a point where connection will be made with the lines of the Dallas Electric Corporation. Capital stock, authorized, \$10,000. Bonds, authorized, \$10,000. Power to operate the line will be leased from the Dallas Electric Light & Power Company, and it will also use the repair shops of that company. Officers: E. A. Lancaster, Dallas, president and general manager; J. B. Martin, vice-president; R. A. Groves, 336 Commerce Street, Dallas, secretary, and W. O. Siler, treasurer. [E. R. J., Oct. 29, '10.]

***San Antonio, Tex.**—Press reports state that a company has been organized with a capitalization of \$2,000,000 to build an interurban railway between San Antonio and Austin with several branches. The railway is to obtain power from Marble Falls.

Yakima Valley Transportation Company, North Yakima, Wash.—It is reported that this company has begun work on the extension of its tracks on Second Avenue, from Yakima Avenue to Pine Street, in North Yakima.

Fairmont & Clarksburg Traction Company, Fairmont, W. Va.—It is reported that surveys will soon be made by this company for an extension of its railway from Clarksburg to Northview. S. B. Miller, Fairmont, chief engineer.

***Martinsburg, W. Va.**—It is reported that surveys are being made for the purpose of building a proposed electric railway to connect Martinsburg, Hedgesville and Tomahawk.

SHOPS AND BUILDINGS

Northern Electric Railway, Chico, Cal.—Press reports state that this company has purchased Armory Hall in

Marysville and will build on the site a combination freight and passenger depot. It is also reported that this company will soon build a station near Rancho Del Paso.

Los Angeles (Cal.) Railway.—It is reported that this company intends to build new car houses at Hawthorne, on the Los Angeles & Redondo line.

Illinois Traction System, Champaign, Ill.—This company has prepared plans and specifications for a new freight house and storeroom at Granite City, Ill., near St. Louis. Fire-proof structural materials will be used. The building will be 122 ft. x 50 ft. and two stories high. The foundations and floors will be of concrete, the second floor being carried by 9-in. and 7-in. I beams. The side walls will be made of buff brick, inclosing concrete window sills and lintels. Steel trusses spanning the second story will support a fire-proof roof of concrete placed on Hy-rib reinforcing and covered with interlocking tile. The first floor will be subdivided into a freight room and office section 55 ft. by 47 ft. 2 in., a storeroom 39 ft. 5 in. x 47 ft. 2 in. and two rooms approximately 23 ft. square for a substation and a meter room. The second floor will be subdivided into rooms for storage purposes. Hollow tile will be used for partition walls.

Michigan United Railways, Lansing, Mich.—This company has commenced the building of a new car house at Jackson. It will occupy ground space 264 ft. x 132 ft. and will have a frontage on two streets and will contain eight tracks with the necessary pits and machine shop. The cost is estimated to be about \$60,000.

Northern Ohio Traction & Light Company, Akron, Ohio.—It is reported that this company will spend \$1,000,000 during the coming year in the erection of new car houses and shops and other improvements in the southern part of Akron. The old car house on Main Street will be abandoned when the new building is completed. Charles Currie, general manager.

Portland (Ore.) Railway, Light & Power Company.—It is stated that this company is considering plans for the erection of a large car shop at Portland for the construction and repairing of its cars. The company will probably build another clubhouse for the use of its linemen on the block bounded by Hawthorne Street, Clay Street, Water Street and First Street in Portland. The structure will be 100 ft. x 200 ft., of reinforced concrete construction, and it will be used by the lighting department of the company. A modern garage will be in the basement.

Ogden (Utah) Rapid Transit.—This company, it is said, will soon build car houses to be located several blocks from the County Court House in Brigham City.

POWER HOUSES AND SUBSTATIONS

Southern Pacific Railroad, Los Angeles, Cal.—This company is said to have awarded to William Brothers & Henderson the contracts for constructing a substation at the west side of Bay Street and Sixth Street in Oakland. The structure will be of concrete and will cost, it is estimated, \$35,000.

Illinois Traction System, Champaign, Ill.—This company is receiving bids on additional rotary converter substation equipment for the Jacksonville Railway & Light Company, Jacksonville, Ill.

Worcester Consolidated Street Railway Company, Worcester, Mass.—This company is installing at its power plant in Millbury two heavy duty boiler feed pumps, capacity of supplying 3600-hp boilers, and a copper coil feed water heater of 3500-hp capacity, made by the C. H. Wheeler Manufacturing Company.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company, it is said, is considering plans for building a large power house in Akron or vicinity.

Lehigh Valley Transit Company, Allentown, Pa.—This company is said to be asking bids for one 5000-kw turbine with boilers, condensers and auxiliaries. The bids are being requested through the company's consulting engineers, Ford, Bacon & Davis, New York.

Wilkes-Barre (Pa.) Railway.—It is reported that this company will build a new addition to its present power house on South Main Street in Wilkes-Barre.

Manufactures & Supplies

ROLLING STOCK

Northern Ohio Traction & Light Company, Akron, Ohio, is reported to be considering the purchase of several new cars.

New Orleans Railway & Light Company, New Orleans, La., expects to receive this week the first of 50 new cars which are being shipped from the plant of the St. Louis Car Company.

Norfolk-Portsmouth Traction Company, Norfolk, Va., which was noted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 5, 1910, as considering the purchase of several new cars, has ordered 10 cars from The J. G. Brill Company.

Michigan United Railways, Jackson, Mich., has ordered eight single-truck car bodies equipped with Brill 21-E trucks from the G. C. Kuhlman Car Company. The Michigan United Railways will install 30 Peter Smith hot-water heaters in its city cars this fall.

Richmond & Henrico Railway, Richmond, Va., has ordered four cars from the Southern Car Company and 20 closed cars from The J. G. Brill Company instead of 16 cars from the Southern Car Company, as reported in the *ELECTRIC RAILWAY JOURNAL* of Oct. 29, 1910.

Ottawa (Ont.) Electric Railway has ordered 18 vestibuled, semi-convertible car bodies 33 ft. 6 in. long from the Ottawa Car Company, Ltd. The cars will be 45 ft. 6 in. long over all and will have pay-as-you-enter platforms. Brill 27-F E double trucks and Westinghouse 101 B-2 four-motor equipments have been specified.

Illinois Traction System, Peoria, Ill., has just received the following new interurban equipment: Four motor express cars and 32 express trail cars, and has on order the following interurban equipment: Thirty-five express trail cars, 50 coal cars, 25 box cars, 2 sleeping cars, 2 passenger cars with motors, 5 passenger trail cars with observation ends and 4 combination baggage and express cars equipped with motors and designed for hauling sleeping cars. It has also ordered from the Danville Car Company 29 single-truck closed cars for distribution among the local properties. The company is building at its Decatur shops eight interurban snow plows, two of which are designed for use on the Chicago, Ottawa & Peoria Railway in Northern Illinois.

Bangor Railway & Electric Company, Bangor, Me., has ordered from The J. G. Brill Company one 30-ft. baggage and express car and two semi-convertible vestibuled motor cars. The baggage car will be equipped with four G. E. 80 motors, Brill 27 M. C. B. trucks, Peacock hand brakes, Brill Dedenda gongs and Neal-Kirby headlights. The specifications for the semi-convertible cars follow:

Seating capacity.....	44	Destination signs....	Hunter
Length of body....	30 ft. 8 in.	Gears	split
Over vestibule....	40 ft. 1 in.	Gongs.....	Brill Dedenda
Width over sills..	8 ft. 1½ in.	Hand brakes.....	Peacock
Over posts at belt..	8 ft. 4 in.	Headlights.....	Neal-Kirby
Body	wood	Motors.....	G. E. 80
Underframe	wood	Registers....	Sterling Meader
Axles.....	A. E. R. A. Std.	Sanders.....	Brill dumpit
Bumpers....	Brill angle iron	Seats.....	Brill Winney
Center bearings..	Symington	Seating material.....	rattan
Control system...G. E.	K-10	Step treads.....	Stanwood
Couplers	Brill	Track scrapers.....	Root
Curtain fixtures...Cur. S. Co.		Trolley base.....	Sterling-Ridlon
Curtain material,		Trucks...Brill 27 M. C. B.	1
double coated sheeting		Wheels, Standard Steel Wks.	

TRADE NOTES

Harbison-Walker Refractories Company, Pittsburgh, Pa., has appointed Kenneth Leaver chief engineer.

Chicago Bearing Metal Company, Chicago, Ill., announces the appointment of H. H. Hiland as general sales agent, effective Oct. 15.

Railway Materials Company, Chicago, Ill., is having plans prepared by Bacon & Huber, Toledo, Ohio, for an addition to its plant in Toledo. The new building is to be 60 ft. x 140 ft., and is to be used as a foundry.

O. M. Edwards Company, Syracuse, N. Y., has moved its New York office to Room 1232, New York Life Building, which is located at 346 Broadway.

Duff Manufacturing Company, Pittsburgh, Pa., has purchased the entire plant of William Forgie, Washington, Pa., also all rights and privileges of making oil-well jacks. The Forgie line will be added to the present line of Duff products.

Birmingham Frogless Switch Company, Birmingham, Ala., has been incorporated with a capital stock of \$11,000. The incorporators are: S. E. Risher, president; Charles T. Stacks, vice-president, and W. C. Hawkins, secretary and treasurer.

Davis-Expansion Boring Tool Company, St. Louis, Mo., has changed its name to Matthews-Davis Tool Company. The officers of the company are as follows: W. N. Matthews, president and treasurer; E. E. Davis, vice-president and general manager; Claude L. Matthews, secretary.

Allis-Chalmers Company, Milwaukee, Wis.—At the annual meeting of the stockholders of this company, Nov. 3, Frank O. Wetmore was elected a director to succeed William W. Allis, retired. At the meeting of the directors the old officers were re-elected.

McKeen Motor Car Company, Omaha, Neb., has recently shipped two 70-ft. gasoline motor cars, one to the Southern Railway and the other to the Chicago, Rock Island & Pacific Railway. This makes a total of 90 McKeen cars in service in the United States and Mexico.

G. S. Ackley, president of the Ackley Brake Company, New York, N. Y., and the British Ackley Brake Company, London, England, will sail on Nov. 19, 1910, for Buenos Ayres and will travel through the Argentine Republic and other South American countries in the interest of his company.

Goldschmidt Thermit Company, New York, N. Y., has elected Dr. F. H. Hirschland vice-president. William C. Cuntz, mentioned in a recent issue of the *ELECTRIC RAILWAY JOURNAL* as successor to E. Stütz, vice-president and general manager, will be general manager and treasurer of the company.

Rooke Automatic Register Company, Providence, R. I., reports that its registers have made an excellent record on the Fifth Avenue omnibus line in New York, where they collected last year the fares of practically 6,000,000 passengers. A 10-cent fare is charged on the automobile buses that operate on Fifth Avenue, New York, and the Rooke register is used on all of these automobile buses.

Blake Signal & Manufacturing Company, Boston, Mass., has received from the Illinois Traction System a contract for the equipment with the Blake block signals of 100 miles of track between Springfield and St. Louis. There will be 80 dispatcher's signals on this section, one at each siding. This is the first part of a comprehensive plan for equipping the Illinois Traction System with block signals, which has been approved by the management.

Forsyth Brothers Company, Chicago, Ill., announces that owing to constantly increasing business in its different railway devices, including its specialties in metal formation for cars, it has acquired 23 acres of land at Harvey, Ill., upon which it has begun to erect a new plant. The property is located on several large roads, from which switches will be run into the property. The company expects to have at least one building with new machinery installed therein ready for occupancy before the first of the coming year.

Western Electric Company, New York, N. Y., reports that the Southern Pacific Railroad has adopted the telephone method of dispatching trains on its Shasta division. Telephones are now being used over a 206-mile section of the main line between Ashland, Ore., and Red Bluff, Cal., and a branch of 85 miles from Weed, Cal., to Klamath Falls, Ore. The apparatus for this dispatching system has been furnished by the Western Electric Company.

St. Louis Car Company, St. Louis, Mo., has several hundred cars in its shops and new orders are coming in daily for early delivery. A notice appears in another column of the 50 cars which the company has just finished for the New Orleans Railway & Light Company. With the increased

working capital which the company expects under the re-organization plan published last week the capacity of the plant at St. Louis will be considerably increased.

Railway Steel Spring Company, New York, N. Y., has elected Frederick F. Fitzpatrick president, succeeding William H. Silverthorn, deceased. Scott R. Hayes, general sales agent, will succeed Mr. Fitzpatrick as vice-president of the company. H. H. Scovill has been elected assistant secretary. Jacob K. Griffin has resigned as superintendent of the company's plant at Latrobe, Pa. It is understood that he will continue his connection with the company, serving in an advisory capacity.

ADVERTISING LITERATURE

G. C. Reiter, Canton, Ohio, is distributing a folder describing and illustrating a complete line of gongs for street cars. Attention is called particularly to several types of rotary or multiple ringing gongs.

Nachod Signal Company, Philadelphia, Pa., has issued a booklet entitled "Nachod Spells Safety." It contains illustrations of Nachod signals in operation on electric railways, together with illustrations of the signal box and contactor, and explains their construction.

Packard Electric Company, Warren, Ohio, is distributing a folder describing rubber friction tapes and splicing compounds. The company has also issued price list No. 11 of insulating cloth and bias-cut cambric tape and price list No. 30 of Packard insulating varnishes.

D. & W. Fuse Company, Providence, R. I., has issued Bulletin No. 114, in which is covered the company's line of subway boxes for both low and high-tension service, including equipment for inclosed fuses and various combinations for connecting up subway lines where fuses are not required.

Trussed Concrete Steel Company, Detroit, Mich., has published the 1910 edition of Kahn system standards. This is the fourth edition of the book and contains numerous additions and revisions so as to include the best and most modern ideas on reinforced concrete designing and estimating, waterproofing, etc. The chapter on waterproofing has been re-written and new sets of tables for hooped columns and footings have been added. The publication also contains data on the various Kahn system products for reinforced concrete, steel lath, fireproofing, steel windows and other uses.

The J. G. Brill Company, Philadelphia, Pa., has issued a new car and truck catalog, No. 192, in which are shown upward of 125 different types of city, interurban and work cars. For the most part the cars illustrated have been built since 1908 and they represent, therefore, the latest and best types. They include closed, semi-convertible, convertible and open cars, both single and double-truck. In addition to the exterior views 48 interior views showing seating arrangement, ceilings and finish are given. Accompanying the exterior view of each car is a statement of the length of body, length over platforms, length of platforms, window centers, seating capacity and approximate weight of body. The last pages of the book show Brill trucks and car specialties, including seats, fare boxes, sanders, bumpers, gongs, track scrapers, brake handles, drawbars and truck parts. A number of detachable order blanks are bound in next to the back cover.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has issued circular No. 1189 on hand-operated unit-switch control. The circular contains complete wiring and piping diagrams and describes the details of the apparatus. Another folder just issued by the company briefly describes Westinghouse auxiliary contactor control equipments. Folder No. 4184 outlines a few of the company's practical and successful results in improvements made to the various parts of its railway motor. It also shows comparative advantages of interpole versus non-interpole railway motors and box-frame versus split-frame motors. The company has also published bulletin No. 1510, entitled "Twentieth Century Electric Railway Equipment." It contains more than 40 illustrations showing cars and locomotives of various systems throughout the country which are using Westinghouse railway equipments. The publication includes a description and illustrations of interpole railway motors and parts.