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DATE ON WRAPPER shows the month at the end of which the subscription expires. The sending of remittances for renewal prior to that date will be much appreciated by the publishers.

During 1907 the Street Railway Journal printed and circulated 427,250 copies, an average of 8216 copies per week. Of this issue 7500 copies are printed.

Pay-As-You-Enter Cars and the Public

The failure of the attempt in Pittsburg to use the pay-as-you-enter principle without the proper equipment was chronicled in our news columns last week. It seems to have attracted a great deal of attention in the daily press throughout the country on account of the statement sent from Pittsburg that the public united to defeat the project. To what extent opposition on the part of the public may have assisted in the failure of the experiment it is hard to say. But it is gratifying to note that any such alleged attempt has been heartily condemned by the leading papers

of the country which have commented on the subject. One great object sought by railway companies in the use of the pay-as-you-enter car is the reduction of accidents by avoiding the necessity of making the conductor leave the back platform. The experience in Montreal has shown that this advantage is not theoretical merely, so that the public should be as greatly interested in the proposed change as the company. If the passengers were required to assist the latter in an unreasonable way the conditions might be different. But the prepayment rule of the pay-as-you-enter car is not unreasonable. It is in force on all subway and elevated railways and on steam railroads. It is easy to conceive how traffic could be delayed on any of these lines if a very large number of passengers insisted upon being given change for a dollar or a two-dollar bill, as the reports from Pittsburg stated was the case in that city. It is always well to bear in mind, however, that the habits of the general public, formed after many years of travel under certain conditions, cannot be changed immediately, but if brought to understand the advantages of any proposed improvement their co-operation can usually be secured.

Rolling Stock Distribution on Large Systems

Close analysis of traffic conditions on large street railway systems tends to bring out the need of an occasional distribution change in car assignments at division headquarters and secondary operating centers. In the case of a road which uses open cars in summer and closed or convertible cars in the cooler season attention paid to the re-distribution of cars as traffic conditions change is particularly worth while. Next to keeping as large a percentage of the rolling stock as possible out of the repair shop the provision of the proper number of cars at each car house to meet the general service conditions is one of the most important functions of the transportation department. Few systems are operated from year to year without shifting changes both in the types of cars in service and the schedule requirements in different parts of their territory. Strong as the tendency may be toward standardization of equipment, there is no escaping the gradual development of improved types of cars which render the old rolling stock more or less out of date. Everything conspires to require changes in distribution if the system is to be operated economically.

On a large system recently visited the company had in service at the beginning of the winter season 663 cars of the closed type. The re-distribution was planned on the basis of centralizing similar equipment as far as possible in the same house, to facilitate keeping the rolling stock in service and to reduce the cost of minor repairs. Six car houses are in use on this road. The rolling stock consists of 519 double truck closed cars and 144 single truck cars,

the car bodies varying in length from 21 ft. to 32 ft. Twelve different styles of car were in service. A table of car re-assignments was made up by the company with the following general distribution: The largest house required 196 cars and the five others required from 86 to 99 cars each. At the largest house the traffic conditions required the greatest variety of cars, so at this station nine types were assigned. This included all the cars of two types, and with one other house, all the cars of three more types. Thus nearly half the styles of cars in service were confined to two houses and both these houses are located in the same general section of the city. Only two types were assigned to all the car houses. Fifty new pay-as-you-enter cars were assigned to one house, no other cars of this type being in the system. In all but two houses only one style of single truck cars was assigned, and the company's standard 32-ft. body car for double truck service was distributed through all the houses, about one-third of these, however, being assigned to one house. The company's main repair shop is located at the station housing the maximum number of cars. By keeping down the varieties at each house the operating problem has been much simplified.

The same method can of course be applied to other parts of the equipment, like the motors. It is convenient to keep in the car house a certain quantity of small repair parts, but if motors of many types are being operated from the same depot the number of parts required in stock is apt to be legion. Under these conditions the separation of the equipment among the various depots so that one type of motor and controller is operated from one car house and a different type from another reduces the variety of spare parts necessary to a reasonable figure.

It is a mistake, however, to assume, especially so far as the rolling stock of the road is concerned, that a distribution once worked out will remain the most economical throughout the season. From time to time the daily records of car movement should be examined with reference to the number of cars assigned to each house, the regular and extra service, hours of operation and reserve capacity, taking the system as a whole. Some idle mileage may be necessary in adjusting shortages, but it is better to run off a little of this than to have insufficient capacity at any given house. Considering the large proportion of operating cost due to car movement, including platform labor and interest on rolling stock, it pays to study the economies of car distribution quite as intimately as the expense of power generation and the cost of maintenance.

Progress in Power Plant Auxiliary Equipment

Recent power plant designs exhibit an interesting tendency toward the improvement of auxiliary equipment in the direction of a large flexibility of operation. Experience shows that this can be effected in a good many cases without much extra complication of the station layout. In some of the earlier stations using steam turbines the auxiliary pumps and condensing equipment were installed without much regard to their convenience in operation, being scattered around the plant in odd corners wherever the space could be found for their erection. This was often an absolute necessity in plants which were being enlarged

by the addition of steam turbines to a reciprocating engine layout, but there is less excuse for a scattered arrangement of auxiliaries in a new turbine plant designed without the restrictions which apply to most operating installations.

It frequently happens that a central station design is suggestive to builders of railway power houses, and in connection with improved arrangements of auxiliary equipment a new lighting plant recently completed at Fall River, Mass., illustrates an advance in methods worth noting. This plant is a turbine installation of one 500-kw and two 1000-kw units, with immediate space for a third 1000-kw machine when the load demands the latter. The usual wet and dry vacuum pumps are omitted in this station. A 7 in. x 16 in. x 10 in. single air pump is installed in connection with the condenser of the 500-kw unit, while each 1000-kw unit is provided with a duplex air pump of the same cylinder dimensions. In this way the pump equipment is standardized and the spare part storage is simplified. If trouble occurs on either pump there can be little delay in hunting up the proper fittings. Although the ratio of turbine sizes is unusually favorable to the use of standard pump cylinders for all units, it is worth considering in other plant designs if this simplicity of arrangement cannot be followed, by the use of different combinations of single, duplex or triplex cylinders.

At Fall River the connections between the condensers and the air pump cylinders are arranged with a single pipe between the smaller units and with double pipes between each of the larger units. This gives a more even flow of the water of condensation, avoids the use of special three-way connections and presented great simplicity in erection. In case anything happens to either pump cylinder, or to either discharge line, the turbine can still be operated at a reduced output of condensation water. The circulating water arrangements are unique in the provision of a cross connection between the suction and discharge lines, two top inlets, and a central bottom discharge leading into the cross connection at each condenser. By this arrangement the suction and discharge lines at each condenser can be reversed and circulating water fed through the condenser tubes in either direction for cleaning purposes. In this way eel grass and other small débris which cannot be kept out of the circulation system by the usual screens at the entrance of the intake can be flushed out at the condenser tubes with very little trouble and without shutting down the circulation for more than a moment or two. The circulating pumps are located beyond the condenser.

In the absence of dry vacuum pumps each air pump discharge line is run directly to the hot well tanks, two of these being provided in the boiler room basement. Inserted in each discharge line is a vertical riser terminating in an open head in the engine room. Atmospheric vapors entrained in the discharge lines find an outlet through their corresponding riser at zero cost of operation. The turbines are of the Curtis type, but no accumulators are installed to provide reserve step bearing pressure. Two steam driven step bearing pumps are installed, and in addition to these an automatic motor-driven triplex pump built for 800 lbs. per square inch pressure is connected to the system in such a way that it starts as soon as the step bearing pressure falls below a certain point.

An unusually flexible arrangement of draft equipment is in service at the Fall River station. This includes a fuel economizer induced draft fan and a large brick chimney. Four different arrangements of flue gas discharge are possible here: from the boilers direct to the stack, from the boilers to the fan and stack and from the boilers to the economizer, fan and chimney. Some special iron work was required in the flue passages to handle these combinations, but they provide for all conditions which can be anticipated in the way of temperature, wind and barometer valves. All the principal moving auxiliary apparatus connected with the turbine installation is placed in the turbine room, where it will receive the necessary skilled attention. The compactness and flexibility outlined above are obtained with little complication in the piping, a point doubtless due in some measure to the low cost of land at the station site, which favored liberal spacing of equipment in the building.

Car Intervals in Interurban Service

There are few more important questions connected with the transportation side of interurban service than the arrangement of schedules to fit the traffic requirements. The problem resolves itself into determining the proper car intervals, assuming a fixed running time over the route from terminal to terminal. A very simple and convenient equation connects the factors of car movement on any double track line:

$$n = \frac{l \times 60}{v \times m}$$

where m is the car headway in minutes, v the schedule speed in miles per hour, l the length of single track figured in miles, and n the number of cars or trains in service. When different values of these quantities are worked out and plotted in the form of curves for a given road the results become very interesting, for they enable a considerable variety of questions to be answered at a glance. From some points of view such treatment of the schedule problem appears academic, but the values obtained by assuming variations in the different factors set the limits of the problem of intervals, car numbers and speeds, and leave these to be modified by local conditions as the case may require.

Facing concrete conditions the interurban car interval resolves itself, as a rule, into service every two hours, hourly, half-hourly or every fifteen minutes, though other fractions of the hour may be used occasionally, and in special times of heavy travel cars may be run in one direction as close together as the safety of the service and the capacity of the power system permit. Obviously the intervals best suited to each case must be determined on the spot, but there are certain aspects of the interval question worth considering by themselves in light of their influence upon public sentiment and convenience. It is primarily important for every manager to accustom his public to certain variations in the headway of cars, and, while it is true that some cars must be run at small profit, or even at a loss, on very large, as well as the smaller, systems, it is desirable to reduce this loss as much as possible when the traffic is light. The public becomes accustomed to a fixed interval in electric railway service, and unless timetables are distributed as in steam practice curtailments are likely to cause not a little friction. No one objects seriously to a rea-

sonable reduction in steam railroad train frequency in connection with outlying points in the winter season which are much busier centers in the summer, but when a trolley road lengthens its service from thirty-minute to sixty-minute intervals the public is not always as appreciative of the points at issue. A case in point occurred this week on the Hartford & Springfield line. The local authorities of the town of Suffield asked the Connecticut Railroad Commission to order the company to maintain a half-hourly schedule during the winter, in place of the usual hourly headway maintained between November and April. The local authorities' claim was that an hourly interval is not a reasonable accommodation, while the company argued that the service could be run only at a loss. The commission decided in favor of the company and laid down the broad principle that the use which the public makes of any service is a sure indication of the public need of such service. If the cost of furnishing a service exceeds the income derived therefrom, the only ultimate outcome of such operation is a receivership. The importance of ascertaining what service pays and what does not can scarcely be exaggerated.

Fixed intervals tend to establish routine conditions and habits of operation, but there is no reason why the interval should not be varied as traffic requires, through certain limits, on electric interurban lines, as well as on steam roads. The probabilities are that as interurban practice more and more approaches steam railroad standards of transportation handling fixed intervals will more and more give way to less regular headways, dependent upon more careful studies of the traffic requirements, but invariably scheduled on time tables freely distributed among the public and in places of general meeting and gathering of prospective patrons. The fixed interval has its place; it is very convenient when the car or train is due at the even hour, half or quarter; but as this condition can apply to few points on the line, it is manifestly more desirable that actual times be specified. Extras can be sandwiched in without any detriment to the average patron, if the despatching methods are in harmony with the best practice. A graphical study of the traffic, made at regular intervals of a month or so, is of the greatest value in this connection. By plotting the number of passengers carried per car as ordinates and the number of cars as abscissae the need for extra cars at different hours or quarter hours of the day can be determined with ease.

Sometimes it happens that public convenience would be greatly served by a comparatively slight change in intervals, as in the case of a line passing through a large manufacturing district en route between interurban centers. A little planning will often enable the company to deliver a large traffic at such a district within five or ten minutes of the time when the mills begin work, whereas if the rigid half-hourly or hourly interval was maintained the service would not only be poorer but less profitable. An extra turnout may be necessary, but a little figuring will soon show whether it is justified by the traffic conditions, or whether extra cars run on the regular interval will be the best all-around solution of the problem. Elasticity in intervals cannot be safely practiced, however, unless the discipline and operating qualities of the car service men are distinctly excellent and alert.

SINGLE-PHASE EQUIPMENT OF THE WINDSOR, ESSEX & LAKE SHORE RAPID RAILWAY

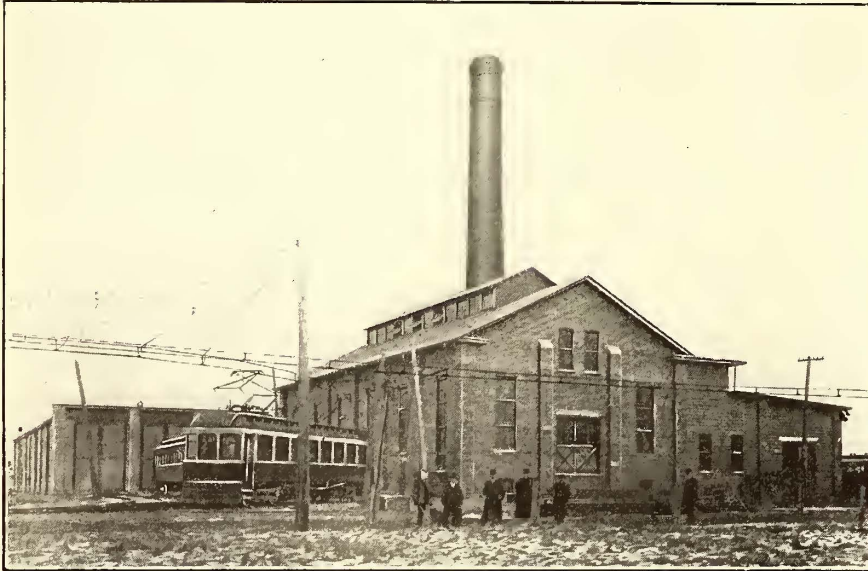
BY S. C. DE WITT

Electrical Engineer, Windsor, Essex & Lake Shore Rapid Railway.

The first company to adopt single-phase railroad equipment in Canada is the Windsor, Essex & Lake Shore Rapid Railway, running at present between Windsor and Kingsville, Ont., a distance of 28 miles. It is now being ex-

expense of having to pipe the discharge water for a number of miles.

When it is understood that the digging of cellars at Essex is considered impracticable on account of the water, it can readily be appreciated with what difficulties the company would have to contend in excavating for a sub-crossing. A decision was granted by the Railway Commission of Canada to permit a grade crossing at this point, protected by interlocking switches and a signal station. The first car crossed these tracks on Sept. 26, 1907.



EXTERIOR OF POWER STATION AND CAR INSPECTION SHED

tended from Kingsville to Leamington, which will make a total line of 37 miles. This road runs through a very prosperous district, and from the time the first car was run the patronage was much more than anticipated and has been steadily on the increase.

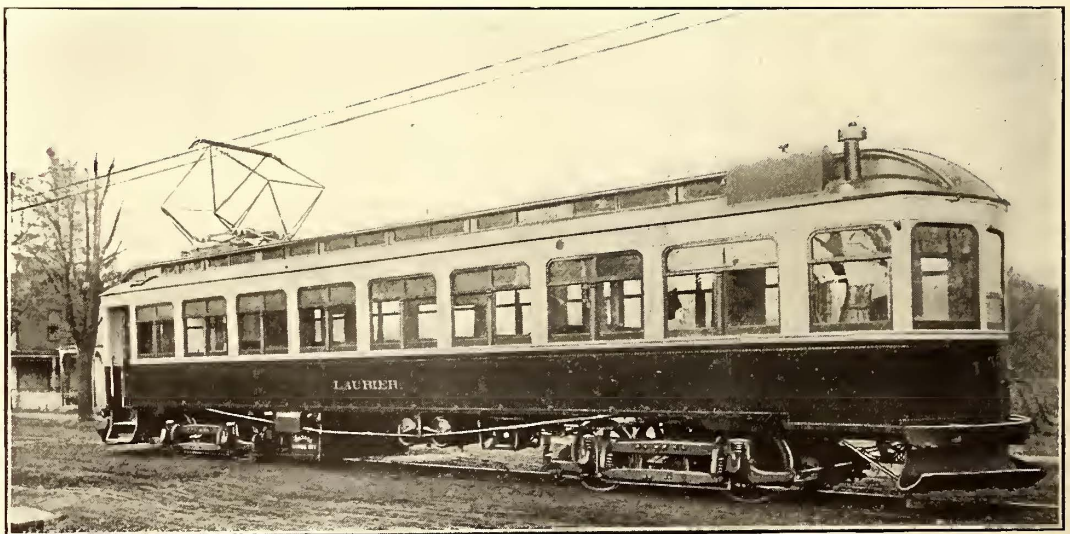
The population, except in Kingsville, Essex, Windsor and Leamington, is mostly agricultural, and there is a good deal of through travel. In addition to the above places, the road passes through the following villages: Pelton, Maidstone, North Ridge, Cottarn, Albertville and Ruthven. At present the company is making five round trips a day with one extra on Wednesday, Saturday and Sunday.

At Essex it was necessary to cross the tracks of the Michigan Central Railroad, which fought the idea of a grade crossing very strongly. The town of Essex very decidedly urged running the line through their main street, and they would not hear of an elevated track at this point on account of spoiling the street. A subway was impracticable, as there is no drainage in this part of the country, and, it being nearly flat, a pumping station would have to be kept going continually to keep the subway dry, besides the extra

in the towns they are soldered under the rail joints. The bonds have a carrying capacity equal to No. 00 wire and were furnished by the Lord Electric Company, of New York. The rails are fastened with Continuous rail joints.

ROLLING STOCK

The company plans handling freight, and is now carrying



CAR, SHOWING PANTOGRAPH TROLLEY AND PECULIAR CONSTRUCTION THROUGHOUT

express, as well as passengers. The cars are built for interurban traffic by the Ottawa Car Company, and are 55 ft. in length, over all. At present the company has five cars equipped with four passenger trailers and two trailers for express. The trailers are not in regular use and not more than one is drawn by a single motor car. There are on each motor car two 160-hp Westinghouse No. 132

motors. These motors are provided with compensating field coils for neutralizing the armature reactance.

The outside longitudinal sills of the cars are constructed of $4\frac{1}{2}$ in. x 6 in. and 2 in. x 6 in. oak, placed on edge and separated by a 6 in. x $\frac{1}{2}$ in. steel plate running the entire length of the car, and which is bolted to the oak. There are two other beams parallel to these, each composed of two pieces of $2\frac{3}{4}$ in. x 6 in. oak separated by a similar plate as above, to which they are bolted. There are two needle beams spaced 6 ft. $11\frac{1}{2}$ ins. apart, to the ends of which the struts for the truss rods are fastened. There are two truss rods. The trucks are of Brill manufacture, and the wheels are 6 ft. 6 ins. apart. The distance between centers of trucks is 31 ft. 4 ins.

The whole interior of the car is finished in oak. The seats are of the walkover type and have a covering of rattan. The seats in the smoking compartments are pivoted chairs, with rattan bottoms, the pivot allowing the chairs to turn in any direction. There is a continuous basket rack on either side over the windows. Each car is equipped with a water closet and a smoking compartment at either end, the one at the front end of the car to be used for smoking when going either way.

The doors between the smoking rooms and main part of car are on hinges and the end doors are of the single sliding type. Each vestibule is fitted with a double-acting swinging door, to form when closed the motorman's cab. When open it folds closely against the side of the car. The regular Westinghouse pantograph is used on the cars.

The pantograph is raised by tension springs and is pulled down by a trolley rope. This rope is run in fibre conduit on the top of the car and passes over two pulleys.

A fender is used which is provided with two hinged leaves at the bottom and held up by chains: the leaves can be let down so as to act as snow plows in moderately deep snow. The snowfall in this part of the country is quite light. The flooring of the cars is double and is fitted with trap-doors over the motors.

The air-brake equipment is of the S. M. E. type, furnished by the Westinghouse Air Brake Company. The features of this type are the three position brake valve with graduated release, and the automatic slack adjuster. The gage is illuminated. The compressor type DI Eg is driven by a 3.3-hp, single-phase, 100-volt motor.

A complete diagram of the wiring of the cars is shown. It will be noticed that provisions have been made to take current from the wire both at 1100 and 6600 volts. The change-over switch is shown and is located at the bottom of the car. Only one of the voltages mentioned is used, however, although when the equipment was bought it was intended to use 1100 volts in the city of Windsor and to supply current at 6600 volts over the rest of the line. As permission was granted to run the higher voltage at Windsor, the change-over switch is no longer necessary and only one lead to the auto transformer is used. If the necessity should ever arise to use 1100 volts at any point, it can be done without altering the car equipment.

The connection from the pantograph to the circuit breaker is made with lead-sheathed, rubber-insulated cable. The

resistance and reactance coils R and C are connected between the controller segments and the armature to minimize sparking at the controller. The rating of the auto transformer is 100 kilowatts; there is one of the oil-insulated, self-cooling type to each car.

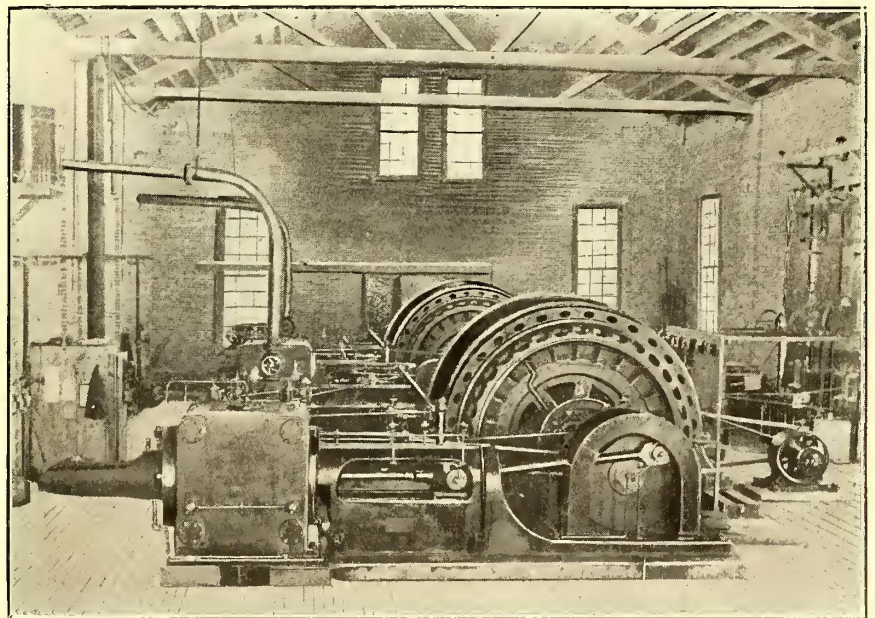
LINE CONSTRUCTION

The line is of catenary construction, with poles at 120 ft. apart on the tangents and as close as 80 ft. on the curvers. Bracket construction on the poles is used exclusively with the exception of where the line passes through towns.

The trolley wire used is No. 000 grooved, and the hangers from the messenger wire to the trolley wire are spaced 10 ft. apart. Where the bracket construction is used the messenger wire rests in the grooves of the insulator fastened to the T-bracket arm. The hangers allow the trolley wire to hang below the arm, and no further insulating devices are needed on these poles, except where there is a lateral strain on the wire. A steady strain device of the wooden-arm type is used on all curves where brackets exist. This is the standard wooden arm steady strain with skirt type insulator which the Westinghouse Company now furnishes for bracket catenary construction.

The porcelain insulator holding the steady strain rod is carried in a malleable iron yoke adjustable on the bracket arm. The steady strain rod is made of a thoroughly impregnated wooden rod having malleable iron end lugs. This is used on account of the trolley wire being closer to the bracket arm than when the sleeve type insulator is used. In addition to using these on curves, one is put on in every twelve poles on the tangents.

A sketch of the section break used is shown. Since the messenger and the trolley wire are both electrically connected, it is necessary to break the current on both these



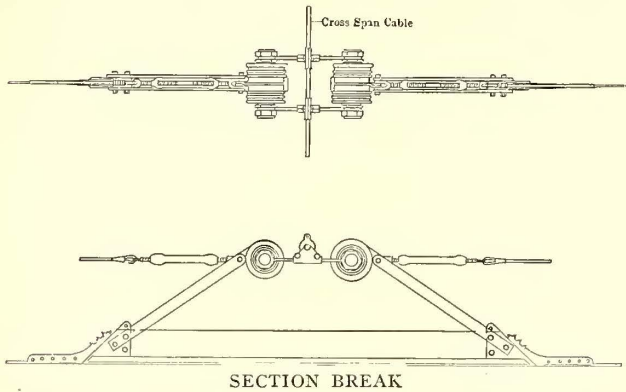
INTERIOR OF POWER STATION

conductors. The messenger wire is cut at the point of the change of circuit and the ends are fastened to separate line insulators, the insulators being suspended from the horizontal arm of the bracket, as shown in sketch.

To break the current upon the trolley wire a piece of second growth hickory, treated to make it moisture proof, is introduced into the line. The ends of this block are provided with terminals into which the ends of the trolley

wire are fastened, the construction of the terminals and the shape of the wooden arm being such that the trolley passes smoothly from one circuit to the other across the intervening space without leaving the line. The arc is broken on the terminal casting.

The line breaks used are at the sub-station and one at Kingsville near the power station and car shed. This



allows all the wires in the yard to be cut out or in without interfering with the rest of the line. A separate switch for controlling the yard is installed in the power house, but is not shown on switchboard diagram.

It is found that the men can work with perfect safety from the trolley tower, even when the current is on the line, by mounting a platform on four double-skirt insulators, such as are used on the poles for spare wire construction.

At every thirty poles the line is anchored to prevent the messenger and trolley wires from pulling out of shape, except in the section where the break occurs.

Anchoring is done by setting two extra poles opposite two adjacent bracket poles. These extra poles are on the opposite side of the track from the bracket poles. The guys are attached to the catenary structure midway between the two bracket poles, and the guys are then run to the two bracket poles and the two opposite poles in the shape of the letter X, the catenary structure being at the intersection of the guys. Where the guys are fastened to the poles, strain insulators are used in every case.

The cross-span construction is of the steady strain cross-span, skirt type. In this style of construction the only insulators ordinarily used are those on the poles, leaving the span wires alive. This has the advantage of cheaper and lighter construction, but the disadvantage of having all the cross wires alive. The construction in this case has been modified by placing wood strain insulators 3 ft.

from the catenary structure. This makes the span wires dead, except for 3 ft. on each side of the trolley wires.

In Windsor all of the poles are made of reinforced concrete and have been tested to stand a horizontal strain of 1000 lbs. The poles on the rest of the line are of cedar.

The catenary structure carries the whole current from the power house to the sub-station at Maidstone, a distance of eighteen miles, at 6600 volts. From this point to Windsor the line is taken care of by an auto transformer. A special transmission line is used from the power house to the sub-station carrying current at a voltage of 13,200. It is here stepped down to 6600, making the whole voltage the same. The 13,200-volt transmission line is carried on the same poles from which the catenary is carried, except in the town of Kingsville. Here the trees were so thick that it was found necessary to place the transmission poles on property lines and private right of way until the town limits were reached.

POWER HOUSE

The power house is located at Kingsville, by Lake Erie, from which the condensing water is pumped. The main part of the building, which is the engine room, is of brick and measures 106 ft. x 54 ft. The boiler room and division wall between boiler room and engine room are made of concrete blocks. The size of the boiler room is 88 ft. x 50 ft. All the above are outside measurements.

The chimney, built by the Alfons Custodis Chimney Company, is of radial brick and is 130 ft. high, supported

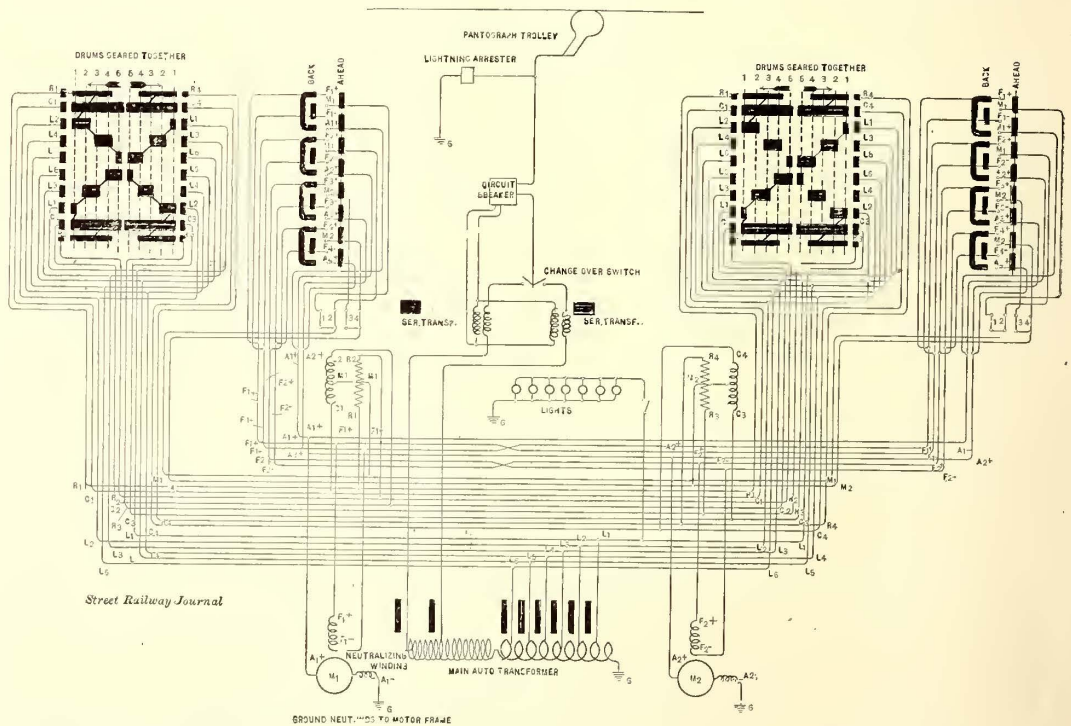


DIAGRAM OF CONNECTIONS FOR TWO NO. 451 CONTROLLERS AND TWO A. C. MOTORS FOR TWO TROLLEY VOLTAGES

on a concrete foundation 8 ft. deep. At the depth mentioned there is good hard blue clay formation.

There are two Goldie Corliss cross compound engines, 20 ins. x 40 ins. x 36 ins., manufactured by the Goldie & McCulloch Company, of Galt, Ont. These are provided with steam actuated dash pots and have separate eccentrics for the steam and exhaust valves. The speed is 125 r.p.m. The governor is belted to a pulley on the main shaft and is similar to a flywheel type governor.

The generators are 500-kw, 25-cycle, single-phase West-

inghouse machines, direct connected to the engines with belted 30-kw exciters. Space is left for one more complete unit, similar to the above, in the engine room. Piles were driven to the depth of 12 ft. under the engine foundations.

The condensers, boilers and piping were made by the Canada Foundry Company. There is one jet condenser for each engine, size 16 ins. x 24 ins. x 24 ins. The injection water, as previously mentioned, is piped from Lake Erie through two 10-in. pipes. One condenser has a lift of 22 ft. and the other 19 ft. The distance from the power house to the end of the intake pipe is 500 ft. The end of the pipe is 100 ft. from the foot valve, and was extended this distance to get into good clear water. The pipes were supported to the side of a pier with bolts. To keep sticks and such matter from getting into the pipes an extra piece 3 ft. long with a cap was screwed on the end and perforated with 1/2-in. holes. The horizontal pipe from the foot valves to the end was set 2 ft. below the average level of the lake to insure getting water when the lake at this point became low, as is frequently the case during northwest winds. To get the pipe down to this depth it was necessary to dig a channel for about 75 ft. under water, as the water is very shallow near the shore.

This work was done in the winter by using a scoop

as the Atlas boilers and are manufactured exclusively in Canada by the Canada Foundry Company. There are two Cochrane heaters supplied by a 10-in. x 6-in. x 10-in. Blake duplex pump from the hot well, and these heaters are supplied with the automatic attachment for regulating the feed from the hot well by cutting this pump in and out of service as the hot water is needed.

The boiler feed pump is a duplex, size 7 1/2 in. x 4 1/2 in. x 10 in., built by the boiler maker. It is now being arranged to use natural gas, and under one battery of boilers are being installed twenty-six 5-in. Gwynne burners, manufactured by Reineke, Wilson & Company, Pittsburg. These are to be fed with a 6-in. supply pipe at a pressure of 10 oz. The other battery of two boilers will not be equipped until these prove satisfactory. The boilers have cyclone grates made by the Canadian Steam Boiler Equipment Company, Toronto. There is a gravity oiling system, with oil separator, filter and steam-operated pump purchased from the Pittsburg Oil Gauge & Supply Company.

The plant was run for a little over a month and a half non-condensing, as this part of the work was not finished, and it may be interesting to give the comparative costs per horse-power running with and without the condenser. Up

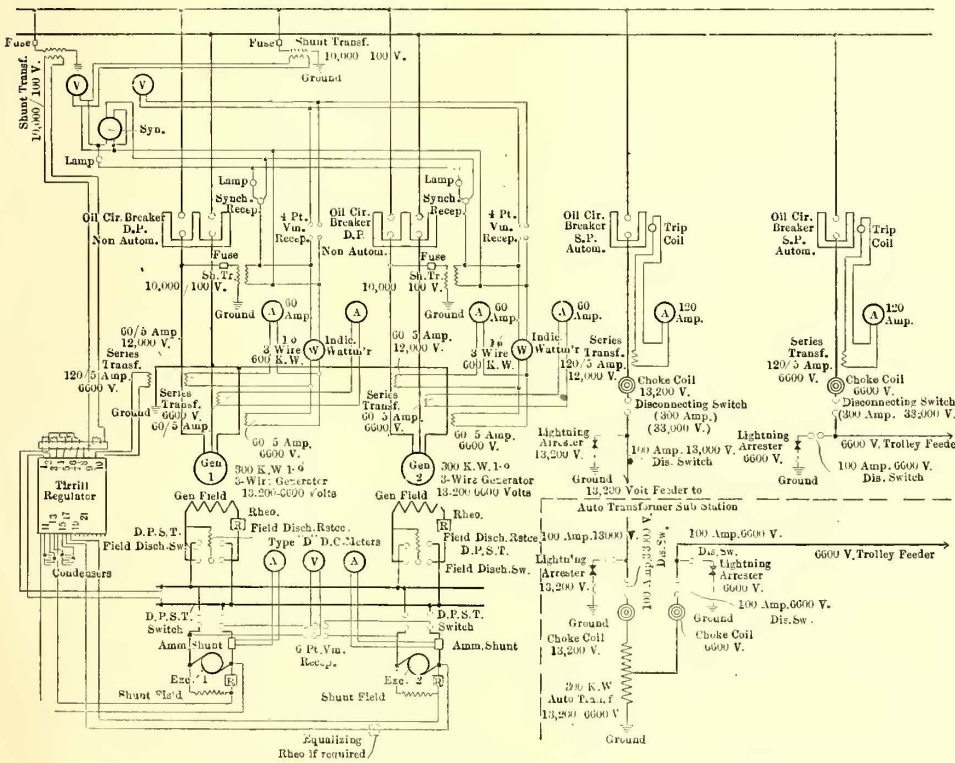
to the time the condenser was put on (Nov. 19, 1907) the average cost for running per horse-power per hour was 1.155 cents. From Nov. 19 to Nov. 30, with the condenser, the cost was .708 cents. These figures are given only to show a comparison between running condensing and non-condensing, and do not represent what will be done under better conditions. The steam pipes have not been covered, and the average load is a little under 50 per cent of full load rating of machines.

A diagram of the switchboard layout is shown. There are three wires from the stationary armature of each generator—one ground wire, one carrying current at 6600 volts and one at 13,200 volts. Both the latter wires are lead-sheathed, rubber-insulated cables and are run to the switchboard in fiber conduit. This conduit is tested to stand over 34,000 volts on a puncture test. It will be noticed on the diagram that a Tirrell voltage regulator is used. The resistance coils and potential transformers are located in the basement of the building directly below the switchboard apparatus.

The feeder wires are brought into the building, each through two glass plates set in 10-in. glazed tile. Both outside and inside the building the wires are fastened to insulators supported on a bracket structure made of 3-in. angle iron, bolted together. The lightning arresters, disconnecting switches and auxiliary apparatus are mounted on an oak frame work well shellacked.

SUB-STATION

There is only one sub-station, located, as previously stated, eighteen miles from the power house. This steps



SWITCHBOARD DIAGRAM, SHOWING ALSO WIRING OF SUB-STATION

scraper with long handles made of 1 1/2-in. pipe and pulled by a team of horses, which were hitched to the scraper by a long rope. The men holding the scraper walked on the ice, which was then nearly a foot thick on the lake. The foot valve was kept down at the same depth as this pipe, thus insuring its always being under water. A manhole was built around the foot valve, from which the water can be pumped should any repairs here be required.

The two condensers feed into a common hot well, the overflow from which discharges into a 14-in. pipe back to the lake.

In the boiler room there are four Canada Foundry Company water-tube boilers rated at 360 hp each, and there is room for two more. These boilers are the same type

the voltage down from 13,200 to 6600 by a 300-kw, oil-insulated and self-cooled auto transformer.

The building is made of concrete blocks and is 12 ft. square and 18 ft. high. The same lightning arrester apparatus with two line disconnecting switches is used as in the power house at Kingsville, and the same method of entrance wires has been adopted.

CAR INSPECTION SHED

The car inspection shed is on the west side of the power house and a little to the rear, as shown in the accompanying illustration. There are three tracks entering the building, a repair pit 80 ft. in length, 3½ ft. deep and 4 ft. wide, being built of concrete and under one track.

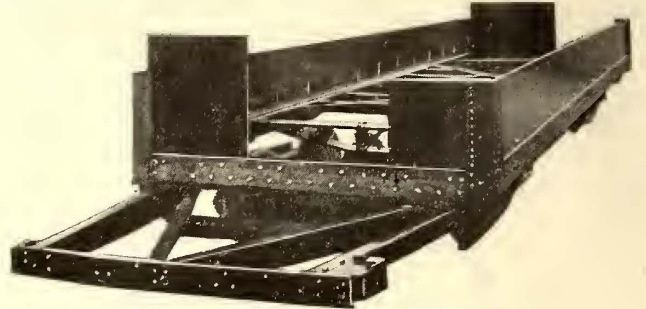
The building is constructed of brick and is 133 ft. x 50 ft. This building has a tar and gravel roof, which is supported in the center by posts set on concrete piers. No trolley wires enter the building. In the illustration it is seen that the yard is not wired up. All of the tracks will have trolley wire above them as far as the building. This is part of the construction not yet finished.

The floor of the building is of clay, covered with cinders and packed down hard. The inspection building and power station are lighted with incandescent lamps, the leads for which are taken from the exciter busbars.

old and new cars are respectively 9 ft. 1 in. and 9 ft. ¼ in. outside and 8 ft. ½ in. and 8 ft. 1 in. inside, thus a gain of ½ in. inside width was made with a decrease of ¾ in. overall width. The overall length of the new car, 46 ft., is practically the same as the old one. The rear platform is 6 ft. 10½ ins. and the front one 5 ft. 7½ ins.

STEEL FRAMING

The bottom framing of the new car is shown in accompanying reproductions. The side members are made of a

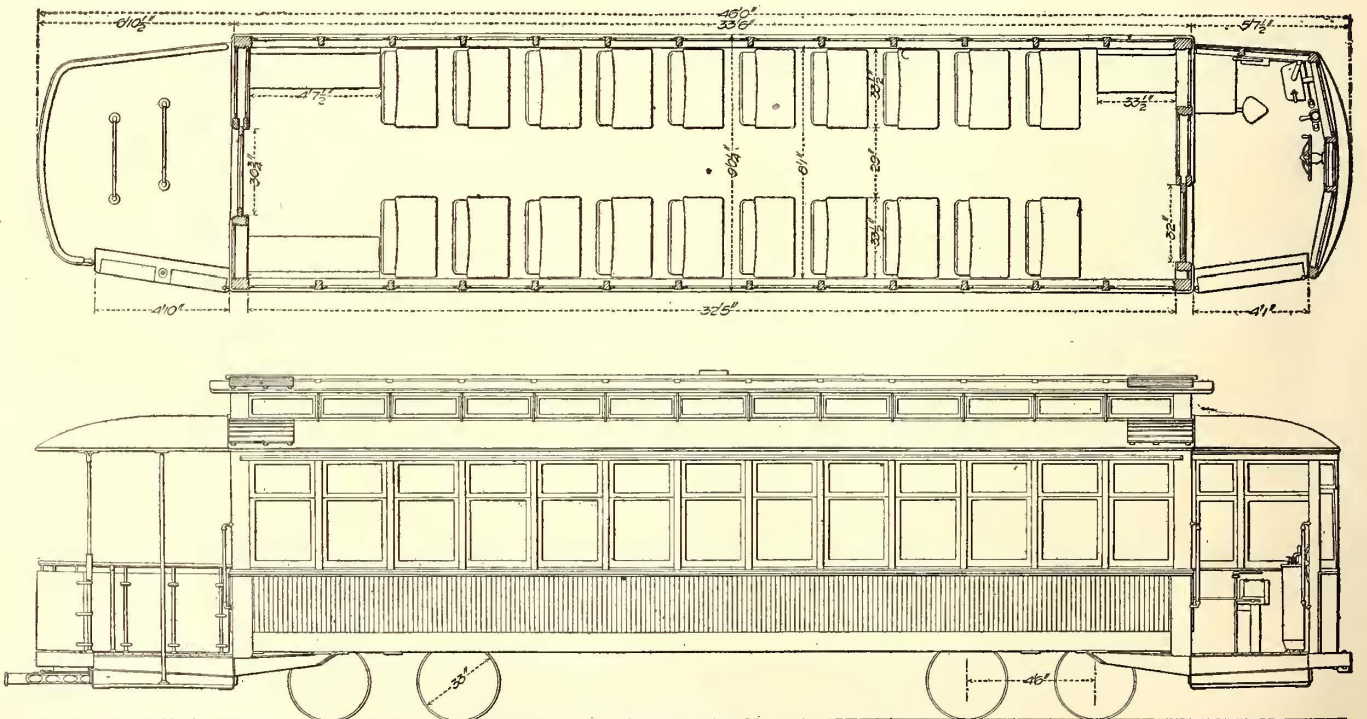


GENERAL VIEW OF UNDERFRAMING

3/16 in. x 28 in. steel plate stiffened by an 8 in. x 3½ in. angle at the bottom and by a 4-in. head and 5-in. stem T-iron. The T-iron is secured to the inside of the plate about 6 ins. from the bottom, being held away from it by malleable iron spacer castings placed at each post. All parts are hot riveted to the plate. Further stiffening effect is obtained by ¾-in. yellow pine furring secured with wagon box rivets to the outside of the plate. The outside sheathing is secured to this furring in the usual manner. Longitudinal support is aided by a ½ in. x 2½ in. inside truss of the usual type.

NEW CAR OF THE UNITED RAILWAYS COMPANY, ST. LOUIS

The United Railways Company, of St. Louis, is building its own cars. About fifteen have been erected and others will be built from time to time. The car being built is similar in general appearance to the type purchased prev-



PLAN AND SIDE ELEVATION OF ST. LOUIS CAR

ious to the World's Fair, but differs radically in the construction of the bottom framing, which in the new car is entirely of steel.

This steel framing was designed in the office of M. O'Brien, master mechanic of the system. It permits a wider interior with a less overall width. The widths of the

The end sills are 8 in. x 3½ in. angles and are hot riveted to the angles of the same size that form the side sills. The cross sills are of 4-in. I-beams riveted to the spacer castings and to the 4 in. x 5 in. T-irons. In addition to the cross sills there are two sets of diagonal braces. The bolsters extend under the side members and are riveted

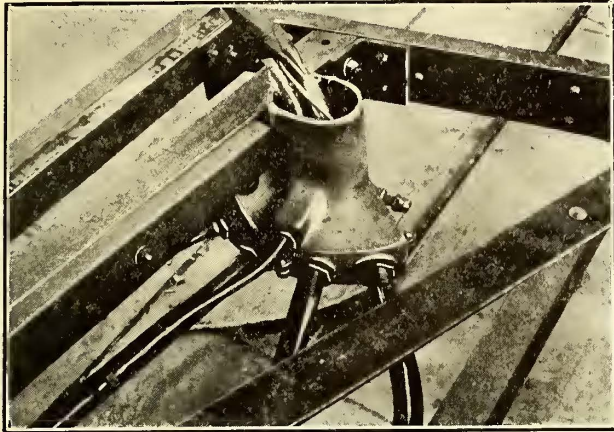
to the bottom angles. This construction throws all the weight of the car on the side members.

The platforms are supported on four 8 in. x 3½ in. angles placed in such a manner that the platform cannot be pulled out of square. The weight is distributed about equally between all four members. The two on each side of the car

forms the outside or corner of the car up to the height of the window openings. The 4½ in. x 7 in. post is secured to it by ¾-in. bolts. The step angles are riveted direct to this corner casting and to the outside platform angles in such a manner that the step has a rigid support.

WIRING

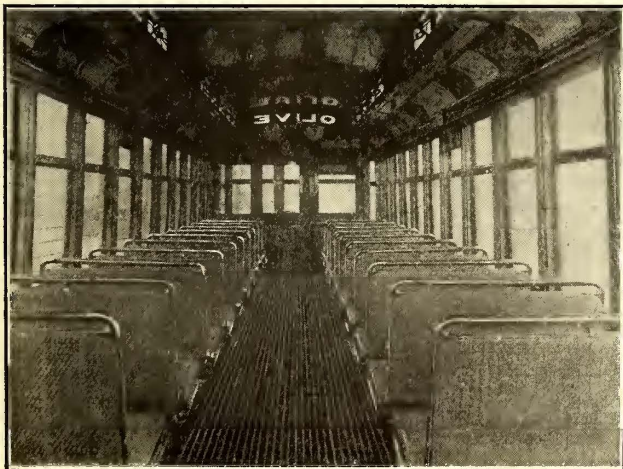
All the wiring is in conduit. The light wires are in ¼-in. conduit and are installed in sections so that in case of trouble any section may be pulled out. The conduit in the top of the car is laid between the rafters and the canvas. The lights are controlled by two switches, the sign light and head light being on one switch. A "kick" coil is placed in the lamp conduit. The wiring under the car is in five groups of conduits, one for wires of motors No. 1 and 2, one for motors 3 and 4 and one for the resistance leads, and there are separate conduits for the control circuit and for the main trolley. All of these conduits terminate in a special junction box under the controller bolted to the platform angle beams. The fuse box is located in the cab and is inclosed in a cast-iron box. The motor wires emerge from the conduit and enter junction boxes of special design through water loops and terminate in brass lugs set in a maple block treated with paraffin. The



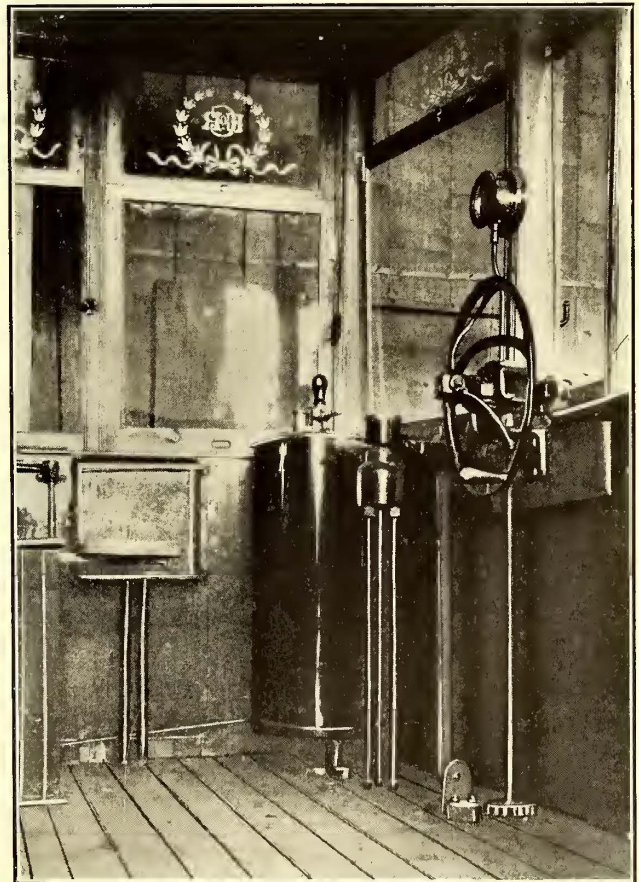
JUNCTION BOX UNDER CONTROLLER

are riveted one behind the other to the bottom angle of the side member. They then diverge and are secured to the end sill angle through malleable iron castings by 1½-in. bolts. At their outer end they are riveted to a 6-in. channel.

One the rear end the two inner platform members are bridged by a 2½ in. x 10 in. channel bar, to which the draft rigging is attached. The drawbar has a cast steel head supported on an angle iron slide. No drawbar is provided on the front end, but a pocket is provided under the bumper iron. This iron is 6 in. x ¾ in. steel and wood is filled in solid between it and the 6-in. channel which forms the front of the platform structure. The bumper is covered by a ⅝-in. steel plate.



INTERIOR OF ST. LOUIS CAR



MOTORMAN'S VESTIBULE, SHOWING ARRANGEMENT OF CONTROLLER AT THE SIDE

The wood posts are fitted up against the inside of the steel side plate and over tongues on the spacer castings and are secured in position by two bolts which pass through the 3/16-in. plate, the posts and the tongue of the spacer casting, and also by wood screws which extend through the plate and into the posts.

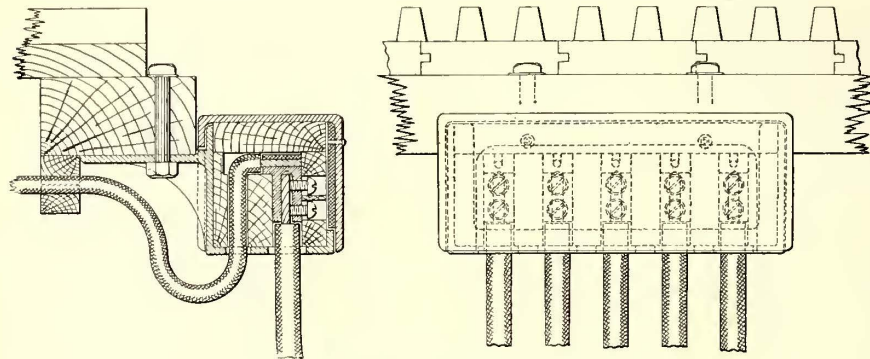
The corner posts fit inside of a ¼-in. steel angle plate which is riveted to the end sill at the bottom and through malleable castings to the 3/16-in. plate. This corner plate

leads from the motor are held in the lugs by screws. The maple block is contained in a cast-iron box bolted to a wood sill and fitted with a removable cover.

The lightning arrester is protected by a 4-ampere fuse. The controller is of the K-28 J type with contactors under the car for making and breaking the main circuit. Motors are of the GE-80 type. The truck is the United Railways No. 25 built in the shops. It has 4¼ in. x 8 in. M. C. B.

OCEAN SHORE RAILWAY

journal boxes adapted to the track and axles 5 1/2 ins. in diameter at the gear and wheel seat. The truck centers are 22 ft. 3 ins. as against 20 ft. in the old car, with about the same length of body. The trucks are offset 2 ins., partly to give more room between cars and partly to balance the weight of the controller and other heavy parts which are on one side.



ASSEMBLY OF CONNECTION BOX

The forward vestibule contains a narrow front window 17 3/4 ins. between posts and two windows on either side 32 1/2 ins. wide. The controller, engineers' valve and other apparatus are so placed that the motorman is compelled to stand near the side of the platform opposite the door and out of the way of the passengers. Behind him is a sand-box containing a seat which may be pulled out and placed in position by raising the cover of the sand-box. The signal bell is inclosed in a wood box partly for appearance and partly to prevent the motorman deadening it with paper.

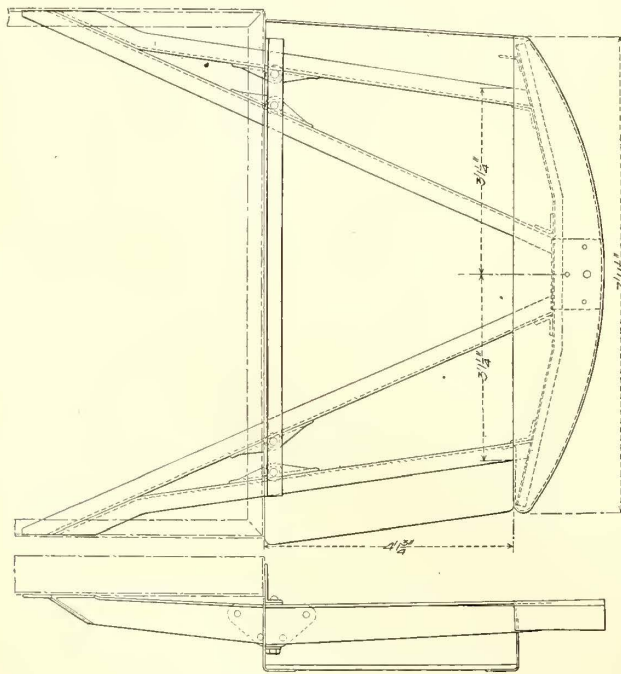
The interior is finished in quarter sawn oak with a white enamel head lining. The wireless clusters for the lamps are inclosed in a casting which supports the bell cord. The casting is screwed into the car lines in such a manner that no strain is thrown on the cluster. The cars are being

The Ocean Shore Railway Company is steadily pushing its work of construction down the coast from San Francisco to an ultimate terminal at Santa Cruz. More than \$3,500,000 has already been expended on the work and the greater portion of the actual construction and nearly all the difficult engineering features have been practically completed.

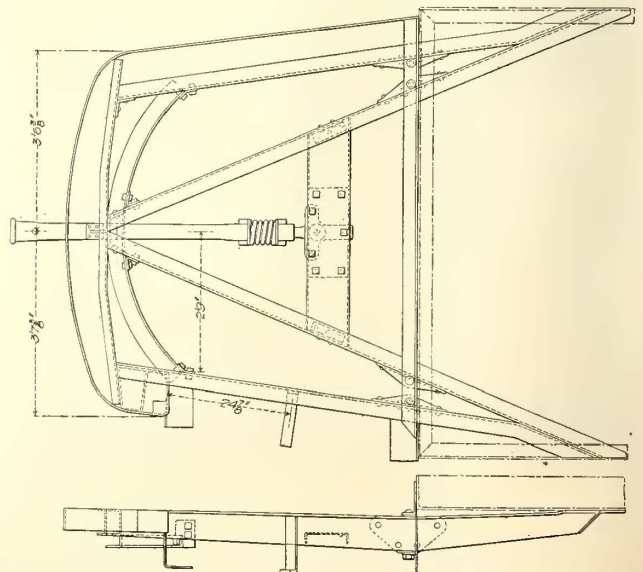
Skirting for miles overhanging cliffs like those on the electric railway round the bluffs to the old Cliff House, this Ocean Shore line is a scenic route. Along the first twenty miles of its completed course a veritable necklace of little suburban residence sections has developed, and already, in advance of the regular electric train service, thousands and thousands of lots have been sold.

Starting at Eleventh and Mission Streets in San Francisco and running southward to Islais Creek, then directly across to the southwestward, past the vegetable country, the Ocean Shore suddenly emerges right over the edge of the Pacific and then goes down the coast. Naturally, the grade varies a great deal. In some places, for instance, the road runs 300 feet above the breakers, while at others it is almost level with the surf. The construction work on this line was preceded by a period of engineering daring, surveyors being lowered 300 feet over the precipices in rope slings to get the necessary preliminary bearings.

In addition to the main line of 79 1/2 miles, from Eleventh and Mission streets down the shore to Santa Cruz, the company is to have three small branches. One will run northward from Ocean View, past Ingleside, round the beach end of Golden Gate Park and then to a terminal near the Chutes. This branch, including the terminal loop, will be 9.7 miles. There will be another short branch from the Park line junction to the main line junction along Lake



FRAMING OF FRONT PLATFORM



FRAMING OF REAR PLATFORM

built in a new shop recently erected, adjacent to the old one, at Park and Vandeventer avenues.

The Fort Wayne & Springfield Traction Company has inaugurated a new schedule which gives an hour-and-a-half service between Fort Wayne and Decatur.

Merced, for a total length of 2.7 miles. Another branch, a mile in length, will skirt the north side of Islais Creek district and extend east to Illinois Street, near the Western Pacific's tracks and in the direction of the sugar refinery. So the total length of the Ocean Shore when completed will be 92.5 miles.

NEW CAR HOUSE AND CLUB ROOMS IN GRAND RAPIDS

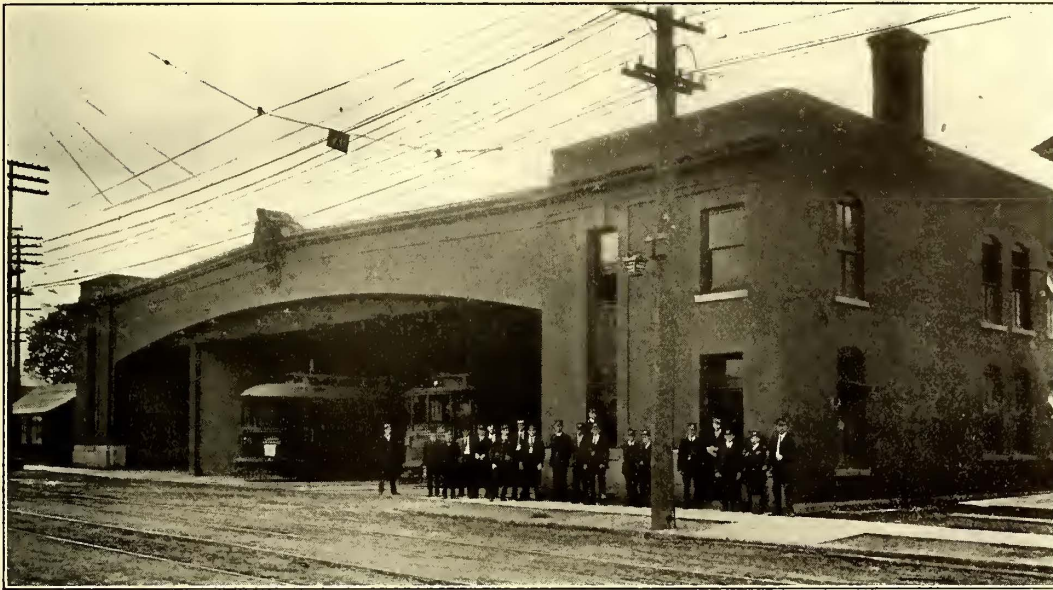
Like many other street railway companies that have gone in for clubs composed of employees, the Grand Rapids Railway Company has found that its efforts are appreciated and that the advantages which the club offers for good, wholesome entertainment and for social intercourse between the men themselves tend greatly toward efficiency

house is open at the front and contains seven tracks separated into two bays, one of five tracks and the other of two, by a fire wall. Of the barn proper an excellent idea is conveyed by the illustrations presented herewith of the general exterior and the track layout, which shows the arrangement of the pits, the location of the transfer table, etc.

Coming to the club equipment, with which it is the purpose of this article to deal, it is only necessary casually to glance at the accompanying pictures of the reading room, the pool room, the lunch room and the dormitory fully to appreciate how thoroughly the entire scheme has been carried out.

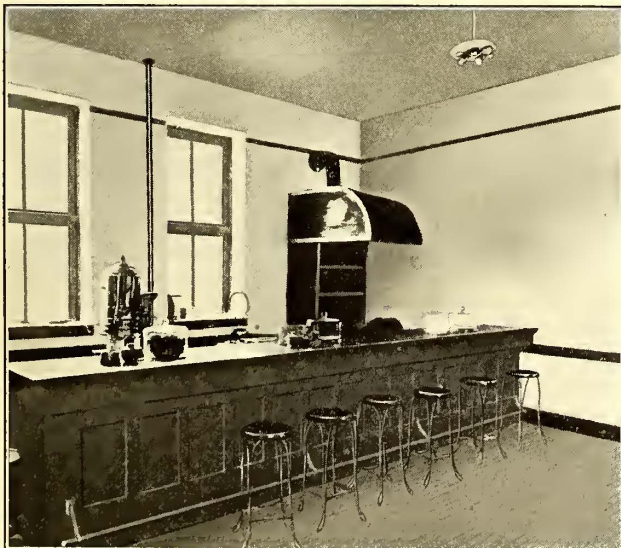
Comparatively few companies have gone in for lunch rooms, but those that have, so far as it is on record, have found them to be a valuable asset. The idea at Grand Rapids has been not to

provide a dining room, but rather to follow the lines along which the buffets in the large cities have been developed. So in one of the rooms where the light was good a lunch counter was installed at which sandwiches, pies, beans and other edibles, and tea, coffee and milk are supplied to the men at all hours, approximately at cost. One feature of the buffet idea has been



THE WEALTHY AVENUE CAR HOUSE, GRAND RAPIDS

in the individual employee and work to the advantage of both the company and the riding public. Thus when the company decided about a year and a half ago to build a new car house on Wealthy Avenue and make it the central car house of the system, one of the first questions that came up for solution was that of providing suitable accommodations for the men. As a result of the deliberations,



THE LUNCH COUNTER



THE READING ROOM

Grand Rapids now possesses one of the best appointed club houses in the United States, the equipment including besides the usual reading and billiard rooms a dormitory and a lunch room.

The car house proper is entirely of brick. At one end is the office structure, which contains the general office and the quarters of the receivers and dispatchers. The car

eliminated, however. The men are not compelled to stand while eating, high wire stools being provided. The lunch counter is especially popular with the night men, who come in late and would find it difficult to obtain any lunch at that hour in the part of the city in which the barn is located. Those going out on the early runs are enabled to get breakfast at any hour, and the emergency men find it a great

convenience. The regular men in many cases find it much more convenient than going several blocks to boarding houses and restaurants, and even those who have homes find it as cheap or cheaper than going home for their meals. The reading room is furnished in mission style with roomy tables and comfortable chairs, book cases and shelves, while on the walls are some tastefully framed pic-

Other games, such as checkers, chess, etc., have also been provided. The scheme of decoration of the billiard room is well shown in the accompanying picture. Careful at-



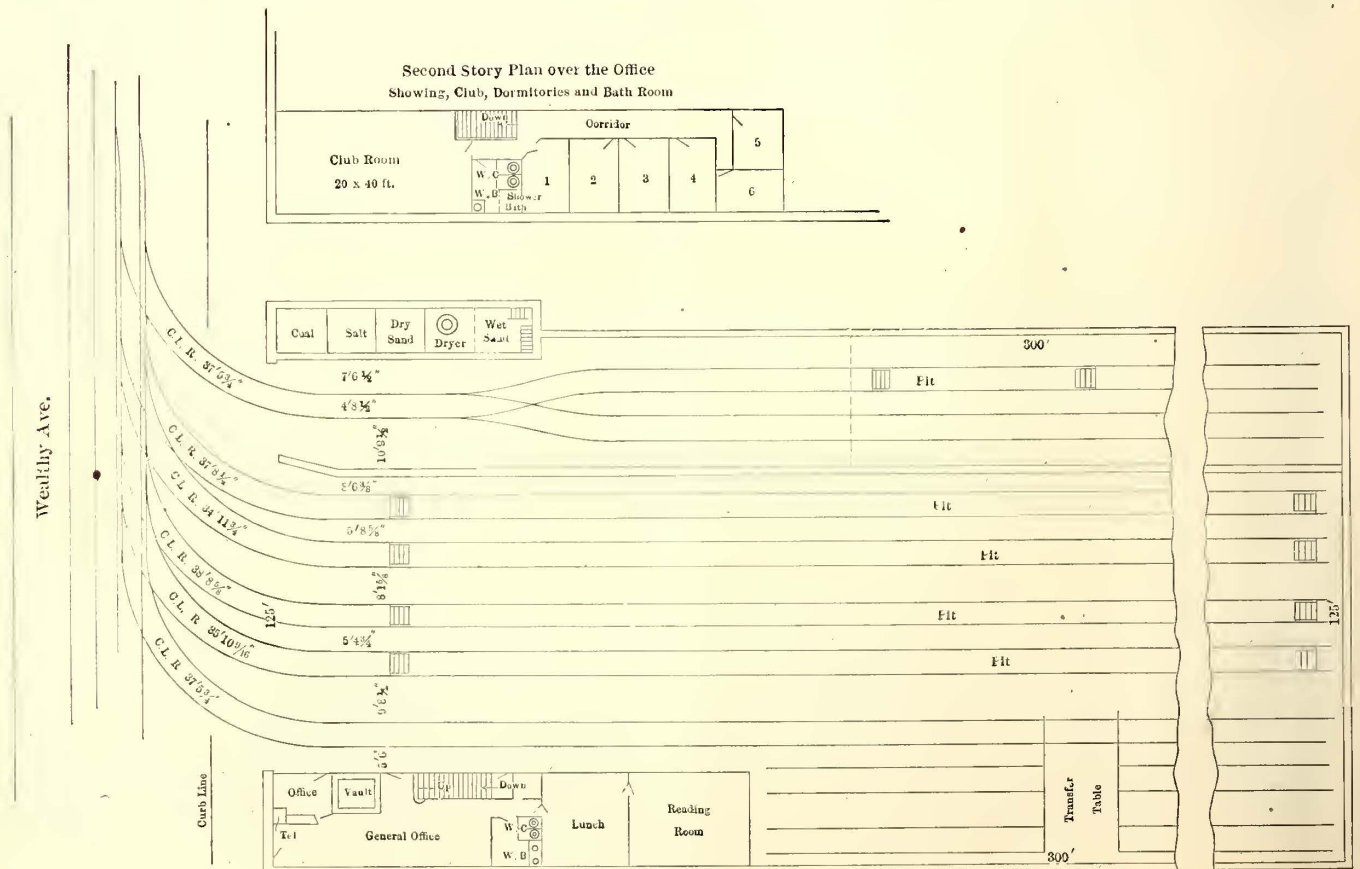
THE BILLIARD ROOM, SHOWING ARTISTIC SETTING



A ROOM OF THE DORMITORY

tures, which harmonize well with the balance of the room. Many interesting books and all the latest magazines are found there. As the real benefit of this feature is realized the library will undoubtedly be greatly augmented by contributions from various sources.

tention has been given to the distribution of light, and in addition to the fixture directly over the table, there is a fixture at either end. The board wainscoting, about 4 ft. high, between which and the ceiling the wall is papered, harmonizes with the furniture and lends a pleasing effect.



PLAN OF THE WEALTHY AVENUE CAR HOUSE, GRAND RAPIDS

For those who enjoy the lighter form of amusements a billiard room has been fitted up in a manner that makes it very attractive. A combination table of the most up-to-date type has been installed. This room is also finished in mission style and is well supplied with comfortable chairs for the players and those who are interested in the game.

For the convenience of emergency men and those who have to start out on very early runs a dormitory or sleeping apartment has been fitted up with pretty white beds, dressers, rugs, pictures, etc., giving all the conveniences one would enjoy at home. This feature also has proved very popular with the men.

PAY-AS-YOU-ENTER SERVICE IN BUFFALO

A full pay-as-you-enter service was begun on Sunday, Jan. 5, by the International Traction Company of Buffalo on its Niagara Street line. For this purpose the company had secured fifty new cars of the pay-as-you-enter type

fare is dropped is so constructed that the conductor can examine the coins as they are deposited and by means of a trip consign them to the locker proper in the bottom of the box.

The wise provision has been made for allowing passengers in emergencies to enter the car proper before paying



PASSENGERS BOARDING AND LEAVING PAY-AS-YOU-ENTER CAR IN BUFFALO

from the Cleveland works of the Brill Company. The cars are very similar in general arrangement to those used in Montreal and Chicago, but instead of the Montreal "coffee-pot" fare box the company has adopted a rectangular safe with a receiver on top. The plan of fare collection pro-

cedure. In this event the conductor is to enter the car as soon as possible and collect the fares as he formerly did on the regular cars. In case it becomes necessary for the



ILLUSTRATIONS USED IN BUFFALO CIRCULAR, SHOWING CORRECT METHOD OF ENTERING AND LEAVING CAR AND PAYING FARE

vides that each passenger shall deposit his own fare in the box, the conductor to furnish change to the required amount. Transfers, however, are to be given to the conductor, who as formerly will examine them to see whether they are good for service. The receiver into which the

conductor to leave the car the motorman is instructed to take his reverse handle and go to the rear platform and see that the fares are properly deposited during the absence of the conductor.

In placing the new system in operation the International

Company followed the same general plan as that adopted by the Chicago City Railway Company for acquainting its employees with the details and of bringing the system to the attention of the public. To this end a booklet of special instructions was issued to the employees and a four-page folder was distributed among the company's patrons. Advertisements were also inserted in the daily press. The instructions to the employees described the purposes of the car and of the system of fare collection and gave instructions as to making out the trip sheet and furnishing change, rules about smoking, manipulation of the heaters, procedure in case of blockades or when cars were turned short of their destination, what to do if it was necessary to leave the car and the proper way of handling the front exit door. Half-tone illustrations were printed to show the correct position of the conductor on the divided platform and a passenger depositing his fare, of the front exit and a passenger alighting from a car, of a car with passengers boarding at "Entrance" and depositing fare before passing to the interior of the car, and of passengers leaving by the front "Exit." A plan of the car was also given, showing by means of arrows the course for passengers to take through the car. The illustrations used in the circular to passengers are presented herewith.

In addressing the public the company said that the new car would tend to eliminate the jostling of passengers by conductor crowding through car to collect fares; reduce the number of accidents; insure better ventilation, and give a warmer car in winter and a cooler car in summer.

Patrons were requested to cooperate in making the use of this car a success by entering the car by the rear portion of the rear platform, back of dividing rail; by having the exact fare (cash or ticket) ready before boarding the car; by depositing the fare in the receiver on the rear platform and passing at once to interior of car; by presenting their transfers to the conductor and not depositing them in the receiver, and by requesting transfers at time of paying fare. Finally, they were asked to alight from the car by the front exit only.

To facilitate traffic the company erected at Shelton Square a kiosk, at which change is made and tickets sold. According to local estimates, fully 10,000 people were transported in the new cars during rush hours between 5.30 and 6.15 p. m. on Jan. 6. The cars were filled much more quickly than those of the old pattern running on the same tracks, and there was a noticeable improvement in the running time.

REPORT OF THE OHIO RAILROAD COMMISSION

The report of the Railroad Commission of Ohio for the year 1907 has just been presented to the Governor. This is the second report under the organization of the Commission and the fortieth of the series of annual reports of the Commissioner of Railroads and Telegrams, whose office was abolished on the creation of the Railroad Commission, Aug. 1, 1906. The report covers the steam railroads and interurban electric railways in the State.

The act under which the Commission was created says: "This act shall not apply to street and electric railways engaged solely in the transportation of passengers within the limits of cities, nor other private railroads not doing business as common carriers." The interpretation of this paragraph has been of some concern to the Commission to determine whether a city line which operates interurban lines as a part of its system comes under the jurisdiction of the Commission, and if so whether the jurisdiction ex-

tends to the entire system. The Commission suggests that the statute be amended to clearly indicate the purpose of the Legislature.

A considerable portion of the report is given to a statement of the physical condition of the electric lines as reported by inspectors of the Commission. These reports are given under the names of the different companies and in some cases are quite voluminous and critical. Copies of these reports have also been furnished the traction companies and the Commission states that the improvements suggested have generally been met.

Statistics are given of fifty-five of the interurban electric railways of the State, from which the following figures are taken: Miles of track, main line, 1918; total, including branches, 2633; capital stock issued, \$114,326,903; dividends paid, \$628,570; funded debt issued, \$91,988,800; amount outstanding, \$82,920,000.

The average cost per mile of road for all of the different interurban lines was \$52,532, the figures varying from \$127,312 to \$15,934 for a completed road.

The consolidated balance sheet follows:

ASSETS.	
Cost of road	\$128,683,073
Cost of equipment	846,066
Stocks owned	6,718,129
Bonds owned	8,055,000
Other investments	5,738,503
Lands owned	1,752,573
Cash and current assets	2,539,562
Materials and supplies	677,792
Sinking fund	20,142
Sundries	9,293,742
Profit and loss.....	1,383,812
Total.....	\$165,706,611
LIABILITIES.	
Capital stock	\$80,694,723
Funded debt	70,451,800
Current liabilities	8,847,731
Accrued interest, not yet payable.....	575,971
Miscellaneous ..	4,096,623
Profit and loss	1,039,763
Total.....	\$165,706,611

The income account for the portions of the roads was:

Receipts from passengers.....	\$10,533,964
Receipts from mail.....	34,367
Receipts from express.....	152,968
Miscellaneous passenger and baggage receipts.....	199,614
Receipts from freight	620,981
Total income from traffic.....	\$11,541,893
Other earnings	714,766
Gross income	\$12,256,659
Operating expenses	7,403,396

Gross income, less operating expenses..... \$4,853,263

The division of operating expenses:

Maintenance of way and structures.....	\$1,031,707
Maintenance of equipment	950,221
Conducting transportation	4,292,412
General expenses	1,129,056
Total.....	\$7,403,396

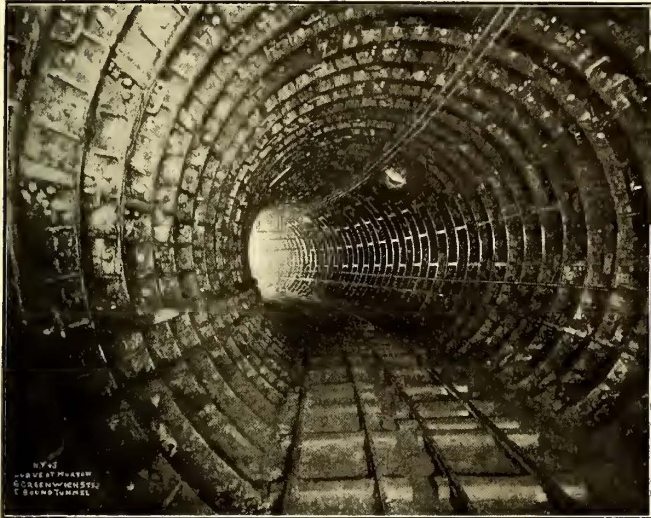
Of the fifty-eight roads reporting to the Commission eight paid dividends.

The total number of employees in Ohio was 6,952, with an annual compensation of \$3,984,558. The following are some additional statistics: Average amount received from each passenger, \$0.110; passenger earnings per mile of road, \$4,538.80; gross earnings from operations per mile \$4,631.90; operating expenses per mile \$2,797.80.

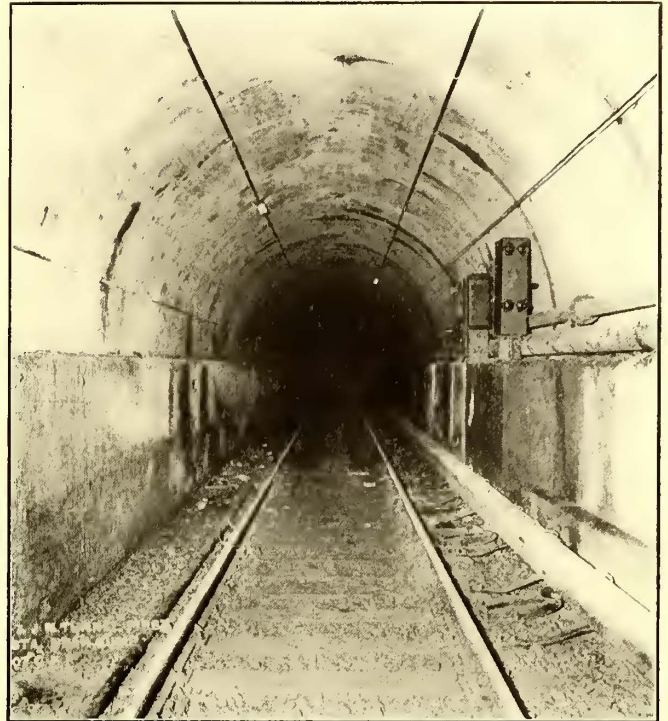
FIRST TRAIN THROUGH THE HUDSON TUNNEL

On Saturday, Jan. 4, the first electric train was run through the tunnel of the Hudson Companies connecting Hoboken, N. J., with Christopher Street, New York, and marked the completion of this important work. The first train carried a number of the officers of the company and newspaper men as guests. Some views are presented herewith of the tunnel before the final track was laid, the completed tunnel and a view of the station at Hobo-

abandoned in 1880, after about 1200 ft. had been constructed. In 1888 it was revived for a few years and some 3000 ft. of brick lined tunnel were completed. In 1902 the



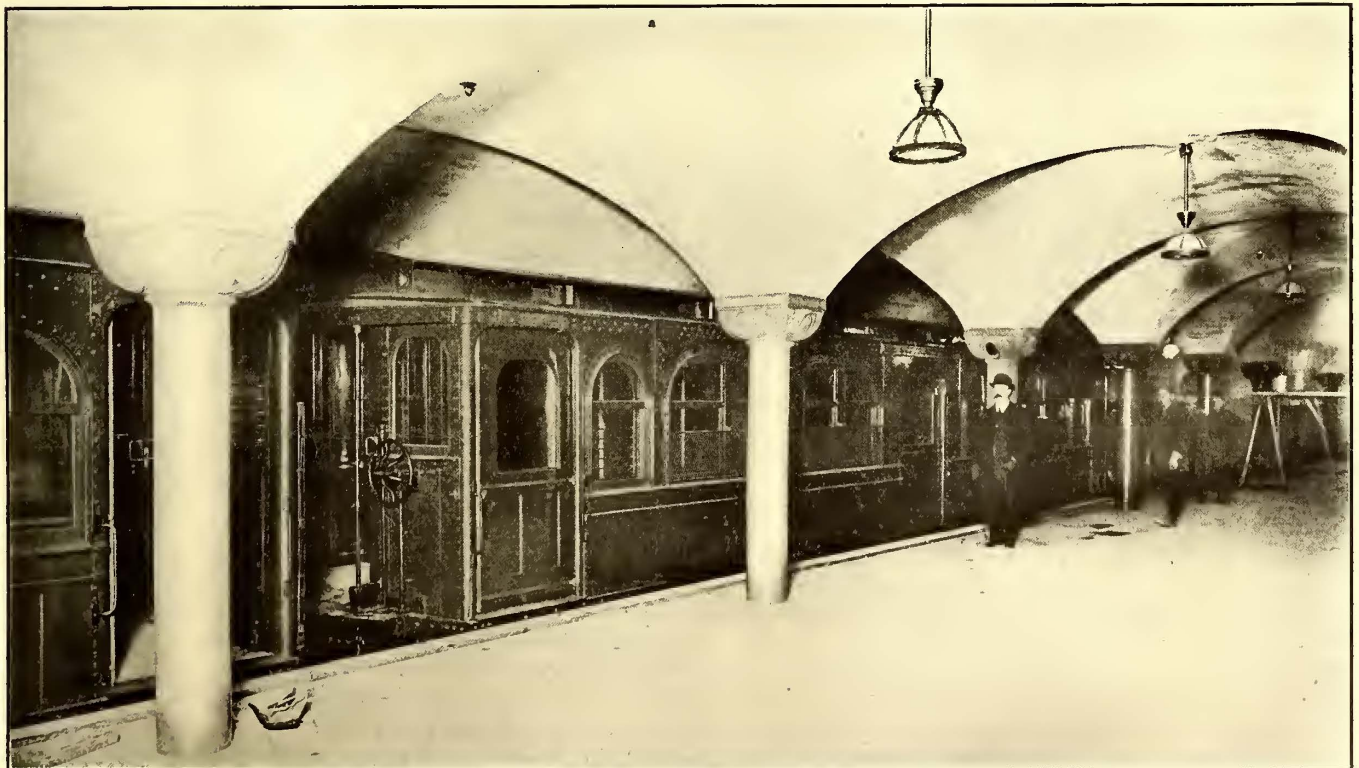
CURVE AT CORNER OF MORTON AND GREENWICH STREETS, EAST BOUND TUNNEL



INTERIOR OF TUNNEL, SHOWING BLOCK SIGNAL, THIRD-RAIL AND TRACK

ken, N. J., with a train in the station. As already announced in this paper, it is expected that the line between Hoboken and New York will be in operation by March 7.

tunnel passed into the hands of the present owners, who projected the extensive system which has been described in this paper, with two pairs of tunnels, one pair between



STATION AT HOBOKEN, WITH TRAIN

The history of the enterprise dates back to 1874, when an English company commenced the construction of a tunnel between Morton Street and Hoboken. The project was

Hoboken and Morton Street, New York, and one pair between Montgomery Street, Jersey City, and Cortlandt Street, New York. The northern tunnels, or those recently

completed, are 5650 ft. in length with a maximum depth below the river of 97 ft. The southern tubes were begun in January, 1906, and will be 5976 ft. in length and 92 ft. below the river. Plans of several of the stations, including the Cortlandt Street Station, were published in the *STREET RAILWAY JOURNAL* for March 9, 1907, and views of the cars to be employed on the system were published in the issue for June 8, 1907.

MEETING OF THE SHOP FOREMEN'S ASSOCIATION

On Thursday evening, Dec. 19, the regular monthly meeting of the Shop Foremen's Association was held in the dining room of the general repair shops of the Public Service Railway Company, Newark, N. J. Up to this time only two divisions of the above railway company were represented, but at this meeting there were present the general manager, three division master mechanics and foremen from every division. As this was the date set for the regular election of officers it was decided that as the present officers had only served a term of about two months and had amply proved their efficiency they should all be re-elected. This was done except in the case of the secretary, J. R. Case, who thought he was unable to give the office the proper attention along with his own duties. His decision was accepted with regret and W. D. Bower was elected instead. After a short but interesting address by the president, R. E. Danforth, general manager of the Public Service Railway Company, made a very interesting address in which he complimented the men on the improvements made on the entire system and urged all to combine their efforts with his to make a still better showing in the coming year. To show that he was anxious and willing to do his part, Mr. Danforth said he would arrange to have the division master mechanics and their foremen visit some of the street railway shops in the neighboring cities, including Brooklyn and Philadelphia, to see how street railway work is carried on in other cities and thus better fit themselves for the advancement of their company's interests. He also suggested that a library of electric and mechanical books be installed in the association meeting rooms by which the members may advance themselves in their work. Mr. Danforth's offer to allow the shop foremen to make these tours of inspection was accepted, and a rising vote of thanks given him for the same. Among the other speakers were F. C. Rapp, general foreman of the Plank Road Repair Shops; P. Connors, master mechanic Hudson Division; J. G. Carroll, master mechanic Essex Division, who gave a short talk on the advancement and benefit of the association. It was decided that the topics of discussion at the next meeting would be lubrication and inspection. Every member was requested to come prepared to talk on these subjects.

After the adjournment of the meeting Mr. Danforth conducted the foremen through the general repair shops and explained to them the advantages of the new type of cars which the company is having built, several of which will be put in service in the near future.

The association would like it known that all general foremen, master mechanics and shop foremen, no matter where situated, are cordially invited to send or apply personally for membership. Any desired information can be had by writing the secretary at the Elizabeth shop, Public Service Railway Company, Elizabeth, N. J. The officers elected were as follows: President, W. Ricker, foreman Central Avenue shop, Newark, N. J.; vice-president, H. Dupras, foreman Milltown shop, Milltown, N. J.; treasurer, H. W.

Wightman, clerk to division master mechanic, Newark, N. J.; secretary, W. D. Bower, clerk to division master mechanic, Elizabeth, N. J.

OPENING OF THE BROOKLYN SUBWAY

In accordance with the announcement made on Monday by the Interborough Rapid Transit Company regarding the opening of the tunnel under the East River from the Battery, New York, to Borough Hall, Brooklyn, service was begun Thursday at 1 a. m. For the present all Lenox Avenue express trains will run to Brooklyn, the Lenox Avenue locals to be run through after the express service for the day has been stopped. Broadway locals and express trains will continue to be operated around the Battery loop. The traffic at the Borough Hall, Brooklyn, will be cared for by the Brooklyn Rapid Transit Company's local Borough Hall service, which will be increased to meet the demands imposed upon the different lines. In the handling of this traffic the new Livingston Street line of the Brooklyn Rapid Transit Company, which was the subject of an article in the *STREET RAILWAY JOURNAL* for Nov. 16, 1907, will play an important part.

CORRESPONDENCE

GAS ENGINE MAINTENANCE

NIAGARA FALLS SOUTH, Ontario, Jan. 2, 1908.

Editors *STREET RAILWAY JOURNAL*:

I have read with a great deal of interest your very optimistic editorial on the gas engine papers, presented at the recent meeting of the American Society of Mechanical Engineers. It seems, however, that both in your editorial and in the papers themselves one very vital point in connection with the gas engine as it exists to-day has been overlooked. I refer to the question of maintenance. During the discussion of these papers in New York I sought to bring out this point as regards gas engine plants of reasonably large size operating on producer gas under American conditions and was unable to get more than a very meager answer from one of the members present. Of what avail is it to have a prime mover of the undoubted economy obtainable with the gas engine if this economy is to be more than offset by the very heavy charges for keeping the apparatus in repair?

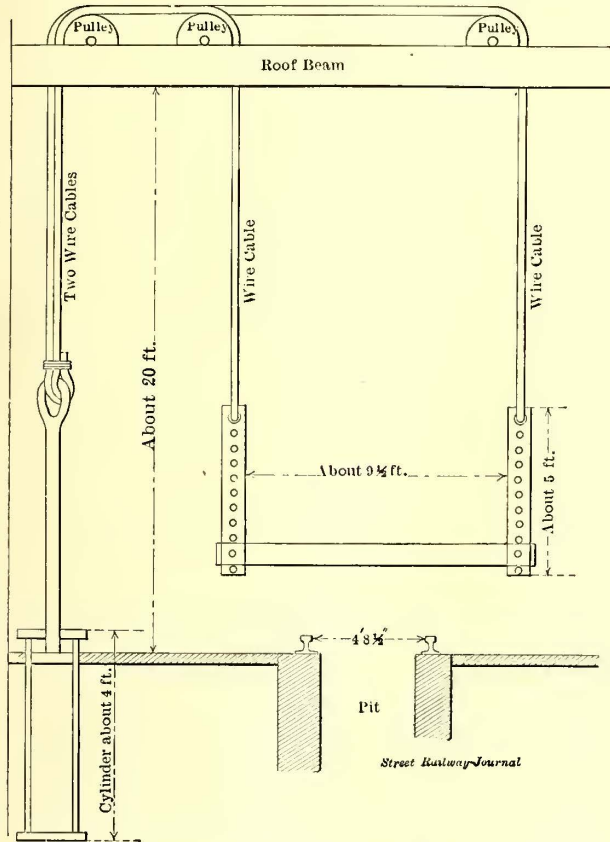
Two comparatively recent cases illustrate my point. The Lackawanna Steel Company has practically discarded its modern gas engine generating plant run on blast furnace gas in favor of electric power purchased and transmitted some 40 odd miles from Niagara Falls. While this was probably not entirely due to the heavy maintenance charges on the gas engine, as the company desired to use its blast furnace gas in other parts of its works, undoubtedly the cost of maintenance was a considerable inducement in making the decision. I was also interested to note recently in one of the technical journals that at the time of an interruption on the hydro-electric lines of the California Gas & Electric Company its much vaunted gas engine plant was not available as "unfortunately the three gas engines were dismantled for repairs."

I am far from being a skeptic as regards the possibilities of the internal combustion engine, but it is only fair that both sides of the question should be clearly brought out, which has certainly not been done to the extent that would enable an intending purchaser to make a fair comparison between gas engines and other prime movers.

W. N. RYERSON.

AN HYDRAULIC CAR LIFT, EMPLOYING CABLES

An hydraulic car lift of rather unusual design is in service in the shops of the West Penn Railways Company, Connellsville, Pa. A 14-in. cylinder is installed below the floor and near the side wall a few feet distant from the track. From the upward projecting piston two wire cables are carried to the roof trusses and over separate sheaves placed in such positions that the cables drop down on either



GENERAL ARRANGEMENT OF HYDRAULIC CAR LIFT

side of the car to be raised. The cables terminate in wrought iron links which support the cross bar under the car. Admitting water on top of the piston lowers it and raises the car under which the cross bar or rail has been placed. This hoist has several advantages over the direct acting type usually found in shops, as the pull is always equal on both ropes and the car body is raised without cross strains. The absence of pistons projecting out of the floor affords a free space to work, and as only two cylinders per car are required, the installation is cut almost half.

REMEDYING DEFECTS IN PARALLEL OPERATION OF ALTERNATORS

An instructive case in connection with difficulties in the parallel operation of similarly designed units is described at length by J. C. Woodsome, of the Houghton County Electric Light Company, in a recent number of the "Stone & Webster Public Service Journal." It is doubtful if the average manager has either the time or the mathematical dexterity that will enable him to work out on paper an intricate solution of a problem in governing or parallel operation and the use of the oscillograph in the study of electromotive force and current waves is beyond the scope of the small plant at present. It is sometimes possible,

even in the small-capacity station, however, to eliminate various disturbing adjustments, and to note the effect of each change on the operation of the machinery. This was the method followed by Mr. Woodsome, who was troubled with an excessive cross current between a 1000-kw, 60-cycle, 2300-volt, two-phase alternator, driven by a 1500-hp reciprocating engine, and a 600-kw alternator of the same make and similar design, driven by a 1000-hp engine built by the same manufacturer as the first. Both units were direct-connected machines, but they could not be operated together on account of the cross current.

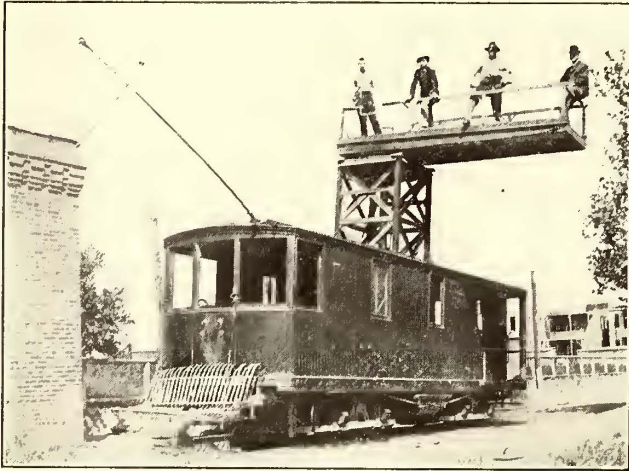
This cross current was indicative of a changing phase relation between the currents in the two machines. It was at once concluded that, since the generators were of identically the same design, if they were driven at a constant and rated speed their currents would always be in phase. In this case the only source of the current could be the difference in voltage of the e. m. f. curves of the two machines. With different e. m. f. curves there would be two surges of the cross current per cycle. Actually, there were observed one and one-third surges per second, which showed that the trouble was not caused by any difference in wave forms. It was evident that there was a lack of uniform angular advance in either one or both of the generators during rotation, due either to a sympathetic period of oscillation between the engines and generators or to improper governing.

It was reasoned that the former cause, if present, might be removed by changing the valve setting in such a way as not to alter the natural period of the engine by altering the force and time of the piston impulses. The valve settings were changed somewhat, without effect on the cross current trouble, and it was concluded that the trouble was probably due to the governing mechanism. In the case discussed by Mr. Woodsome, the valves were operated by the governor through long, knock-off rods, and the period of vibration of these rods was sympathetic with the throw of the valves when the engines were operating at normal speed. The resulting vibration of the rods interfered with the governor action. The source of trouble was removed by altering the throw of the valve arm and splitting the rods into two sections, working through a rocker connection, preventing any vibratory effect getting back to the governor. It was also found that the governors were a little too sensitive, and they were stiffened by thickening the oil in the dash pot and bridging the spring on the dash-pot piston rod with a solid clamp. These changes reduced the cross current to about 3 per cent during rated load, and the units now operate without bus-bar voltage disturbance. When only one machine is running, or when both machines are operating out of parallel, the bridge clamp is removed, restoring nearly the original sensitiveness of the governor.

It is probable that the only instruments used in the above adjustment were a speed counter, ammeter in the leads or bus-bars between the two units, a watch and a voltmeter. Oscillographic studies of the e. m. f. curves would doubtless have shown mechanical phase displacements caused by the speed irregularities, and the latter would have furnished some interesting diagrams if recorded on the oscillograph film. The effect of fly-wheel regulation would also have been perceptible if refined methods of measurement could have been used. The net result desired was solved, however, by straightforward adjustments of an engineering rather than a laboratory nature, and the use of such methods of attack is certainly desirable in all similar practical problems of power-station operation.

A LINE CAR WITH A PNEUMATIC HOIST

The standard line car of the United Railways, St. Louis, is provided with an air hoist controlled from a valve on the tower. A 6-in. piston extends through the center of the tower. Compressed air is furnished by a Christensen com-

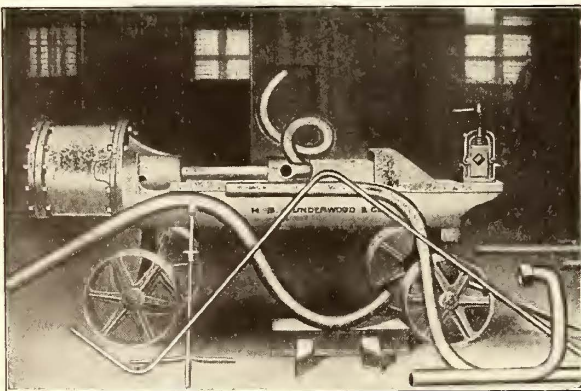


LINE CAR FITTED WITH PNEUMATIC HOIST

pressor. The tower is provided with a swinging platform 15 ft. long. The car body is 40 ft. long and about one mile of trolley wire is kept in each end of the car, so that wire may be strung in either direction with the least possible delay. The car is driven by four 50-hp motors.

PNEUMATIC PIPE BENDING MACHINE

H. B. Underwood & Company, of Philadelphia, Pa., have placed on the market a pneumatic pipe bending machine which should appeal to all who have pipe bending to do and have been compelled to do it by hand machine and by filling and heating. The new machine, illustrated herewith, has been in practical use for a number of months in a large railroad repair shop, where it has been employed for all the pipe bending required in equipping locomotives and for air brake and regular work as well. It will make a right angle bend in a 2-in. pipe in two minutes, and does not flatten or injure the pipe in any way. Dies are furnished of standard radius for locomotive work for ½-in. up to 2-in. pipe, and special dies



PNEUMATIC PIPE BENDING MACHINE

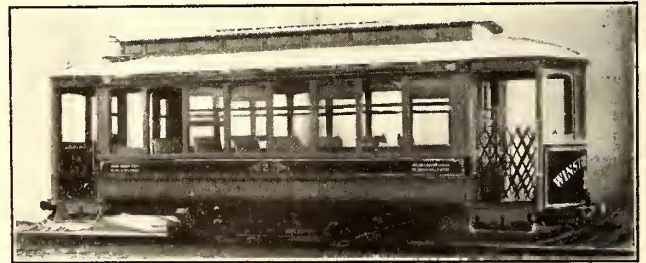
of any required radius or shape are made to order. H. B. Underwood & Company, the makers, have made a line of portable tools for many years that have become the standard in a large number of the shops, and the new machine is a valuable addition to their already numerous high grade tools.

SCHOOL TICKETS IN NEW JERSEY

Beginning Jan. 1 the Public Service Corporation enlarged the scope of its plan to give school children cheap transportation to and from school. Under the new arrangement all school children enjoy the 3-cent fare. Children of the high school, grammar school, private and parochial schools are treated alike. It is necessary for the head of the school or some person in authority to send to M. R. Boylan, general auditor of the company, at Broad and Centre streets, Newark, for identification cards for each member of the school. These cards are issued to the pupils and upon presentation at the offices of the company they can purchase the 3-cent tickets. The tickets are good between the hours of 8 and 4 o'clock on every school day, that is, every day except Saturday and Sunday, and may be bought in such quantities as are needed. The children using the 3-cent tickets must carry at all times their identification card about their person.

MORE SEMI-CONVERTIBLE CARS FOR WINSTON-SALEM

The J. G. Brill Company has just shipped two more of its patented semi-convertible single-truck cars to the Fries Manufacturing & Power Company, successors to the Winston-Salem Railway & Electric Company. The entire rolling stock for the system has been supplied by The J. G. Brill Company and repeat orders have been filled for the type of car mentioned since it was first introduced in 1904.



EXTERIOR WINSTON-SALEM SEMI-CONVERTIBLE CAR

It is probable that about three more cars will be needed this spring. On the arrival of the last two semi-convertibles the company started to run cars over that portion of the main division of the system which has lately been considerably extended. The new cars are almost exact duplicates of their predecessors and measure 20 ft. 8 ins. over the end panels and 30 ft. 1 in. over the vestibules; width over sills, including panels, 7 ft. 8½ ins.; size of side sills, 5 ins. x 3¾ ins.; end sills, 3½ ins. x 6⅝ ins. The No. 21-E truck is standard with the road and has wheel base of 6 ft. 6 ins. Two motors of 37 hp capacity each are employed. The seats are of Brill manufacture and several familiar specialties of the builders' make, namely, angle iron bumpers, drawbars, folding gates, etc., completed the equipment.

In connection with the article on the electric railway system of Buenos Ayres, Argentine, which appeared in the issue of the STREET RAILWAY JOURNAL for Dec. 7, it is interesting to note that the air-brake apparatus with which the rolling stock of the Buenos Ayres-La Croze tramways is equipped was furnished by the National Brake & Electric Company, of Milwaukee, Wis. The equipments furnished by this company are of the National straight air type, with A-1, 11 cu. ft. compressors and Type N pneumatic governors.

FINANCIAL INTELLIGENCE

WALL STREET, Jan. 8, 1908.

The Stock and Money Market

The turn of the New Year has brought with it a very decided change in financial conditions, both as regards the money and stock markets. In the latter there has of late been a pronounced upward tendency, with some very substantial, if not phenomenal, advances, which of course have been largely consequent upon the vastly improved monetary situation. Respecting the money market it is of the highest importance to note that during the current week not only have the rates for call loans eased off materially, but what is of even greater significance, quotations on time loans have fallen sharply; in fact the current quotations are the lowest that have prevailed since before the recent panic. On good mixed Stock Exchange collateral 60 to 90 day loans have been made at 6 per cent, and there has been a very pronounced disposition on the part of Stock Exchange borrowers to hold off for even lower rates, which they apparently have good reason to expect in the immediate future. This belief evidently is based not so much upon the fact that the local banks are gradually getting back to their normal position, as evidenced by the big cuts that have been reported the past few weeks in the existing unusual deficit of the Clearing House institutions, but more particularly upon the change in attitude on the part of the out-of-town banks, who are now disposed to release the enormous amount of funds they hoarded during the recent disturbances. Already currency is flowing from several interior centers in considerable volume, and it is the consensus of opinion among bankers and money lenders here that this movement will ere long assume much greater proportions. Another noteworthy incident in connection with the local monetary situation is the complete disappearance of the premium on currency, showing conclusively that the effects of the recent scare have entirely worn off. It is now expected that the next important announcement will be the retirement in full of all the New York Clearing House certificates. As a matter of fact, considerable quantities of these certificates have already been retired. With the complete elimination of these certificates, the last vestige of the great financial upheaval of 1907 will have been effectively removed.

Besides the greatly improved local monetary condition, the situation abroad has been materially bettered, one illustration of which is afforded by the announced deduction in the Bank of England's discount rate from 7 to 6 per cent. This very naturally added to the more optimistic feeling engendered by factors above set forth and which created a more general public interest in the stock market than has been observed for a long time past. Conspicuous in the general upward movement in security values were the shares of anthracite coal roads, some of which scored sensational advances. This is accounted for partly by the fact that an impression has gained ground that Congress may relieve these roads from the necessity of complying with the provisions of the Hepburn rate law.

Practically the only discordant notes in the situation have been the appointment of receivers for the Seaboard Air Line Company and the Chicago Great Western and reports from Washington of the possibility of the Department of Justice instituting proceedings to disrupt the existing relations between the Union Pacific and Southern Pacific. Aside from creating some momentary weakness in the stocks chiefly interested and slight sympathetic recessions in other directions, these matters, however, failed of any noteworthy influence.

The local traction shares were by no means behind in the general enhancement in values. The appointment of a receiver for the Third Avenue Railroad Company had no apparent effect on these stocks, principally for the reason that such a development had been fully expected by all those in a position to know the true status of the property. A pronounced offset to this development was the announcement of the payment of January interest coupons by several of the Interborough subsidiary companies and of even greater importance the opening of the tunnel under the East River, which event makes a distinct

epoch in the history of the Brooklyn Rapid Transit. This tunnel is destined to prove a great feeder to the lines of this company and in consequence sentiment in favor of its securities is now very strong.

Philadelphia

Although the dealings in the local traction issues were upon a somewhat smaller scale, prices for nearly all the leading issues have shared in the general improvement which has taken place in the general securities market. Philadelphia Rapid Transit and Philadelphia Traction both scored substantial gains over the prices ruling at the close a week ago, the first named selling at 185/8, while the latter brought 84 3/4. Union Traction was sympathetically strong, the price rising to 51. Philadelphia Company's stocks were strong, the common moving up one-half point, on light trading to 36 1/2, while the preferred rose to 37. Consolidated Traction of New Jersey gained a point to 62 1/2. American Railways sold at 43 1/4, and United Companies of New Jersey at 230.

Chicago

Further progress has been made in carrying out the details of the Chicago Union Traction Company reorganization. The necessary funds for taking the company out of the hands of the receivers has been obtained in Chicago, and it is expected that the next important move will be to take the property from the receivers, which will be done within the next week or ten days. Trading in the local tractions was fairly active and prices generally held firm. South Side Elevated sold at 65. Metropolitan Elevated common sold at 17, the preferred at 42, the extension 4's at 80, and the gold 4's at 84 1/2. City Railway stock brought 148 1/2, North Chicago receipts 45 1/2 and West Chicago receipts at 32 1/2 @ 32.

Other Traction Securities

There was a fairly active market for traction shares at Boston, the feature being Boston Elevated, which sold at 128 @ 129; Massachusetts Electric brought 10 @ 10 1/8 and the preferred rose from 44 to 46. Boston & Worcester preferred sold at 56. West End rights were rather active at from 95 to 80 cents. The common stock sold at 80 @ 78 and the preferred at 96. The Baltimore market was quiet and price changes were for the most part unimportant. United Railway 4's sold at 81 1/2 @ 82; the incomes at 44 1/2 and the funding 5's at 70. Metropolitan Railway 5's sold at 105 1/2.

While the higher price of Cleveland Electric has been maintained on the Stock Exchange at Cleveland the past week, the sales have been few. Buyers were willing to take the shares at 40 and 41, but owners held out for 43, which seemed a little too high. Aurora, Elgin & Chicago preferred held through the week at 68, while a few small blocks of the common sold around the usual price. Some trading was done in Northern Ohio Traction & Light at 20, while Washington, Baltimore & Annapolis pooling certificates changed hands at and around 9.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Jan. 2.	Jan. 8.
American Railways	43	43
Boston Elevated	126	129
Brooklyn Rapid Transit	39	40
Chicago City	2150	2150
Cleveland Electric	41 1/2	41 3/4
Consolidated Traction of New Jersey	60	61
Detroit United	39	37 1/2
Interborough-Metropolitan	7 1/2	6 1/2
Interborough-Metropolitan (preferred)	18 1/4	18 1/4
International Traction (common)	35	—
International Traction (preferred)	48	—
Manhattan Railway	118	118
Massachusetts Elec. Cos. (common)	8 1/2	10 1/2
Massachusetts Elec. Cos. (preferred)	38 1/2	—
Metropolitan Elevated, Chicago (common)	215 1/2	16 1/2
Metropolitan Elevated, Chicago (preferred)	40	41
Metropolitan Street	—	—
North American	42 3/4	50 7/8
Philadelphia Company (common)	35 1/2	36
Philadelphia Rapid Transit	17 1/4	18 1/4
Philadelphia Traction	82 1/2	—
Public Service Corporation certificates	54	54
Public Service Corporation, 5 per cent notes	85	85
South Side Elevated (Chicago)	62 1/4	64
Twin City, Minneapolis (common)	84	85 1/2
Union Traction (Philadelphia)	49 1/2	50 1/4

^a Asked.

Metals

The *Iron Age* says: "To drop within less than three months from a rate of production of pig iron of 27,000,000 tons per annum to a rate of 12,000,000 tons on the first of January is what the industry has accomplished. The returns show that the production of coke and anthracite pig iron during December was 1,234,279 gross tons, against 1,828,125 tons in November and 2,336,972 in October. The output of the steel companies, which was 1,514,521 tons in October, fell to 659,459 tons in December. The majority of pig iron makers have withdrawn the lowest quotations which they recently made and the markets are firmer. Reports from the finishing mills are rather discouraging."

The copper metal market continues firm at unchanged prices. Lake, 13 $\frac{3}{8}$ to 13 $\frac{3}{4}$ c.; electrolytic, 13 $\frac{1}{2}$ to 15 $\frac{3}{4}$ c., and castings at 13 $\frac{1}{4}$ to 13 $\frac{1}{2}$ c.

"L" TRAFFIC IN CHICAGO

Traffic of the Chicago Elevated Railroads for December showed considerable gain in the case of the South Side Elevated and the Northwestern Elevated, the increase being largely due to the opening of new stations. The Metropolitan Elevated fell below last year, as it did in the month of November. The decrease in traffic is ascribed to the laying off of men in some large plants in the territory of the road. The figures follow:

SOUTH SIDE ELEVATED.				
	1907.	1906.	Increase.	P. ct.
January	92,411	92,406	5	0.00
February	96,094	95,077	1,017	0.00
March	100,226	95,466	4,760	4.98
April	103,152	95,756	7,396	7.72
May	109,880	91,759	12,721	13.03
June	115,686	101,770	19,986	13.67
July	111,933	92,796	19,187	20.39
August	113,847	88,539	25,308	28.58
September	118,256	89,749	28,507	31.74
October	126,670	93,577	33,093	35.36
November	120,594	94,281	26,313	27.99
December	119,788	95,212	24,576	25.81

METROPOLITAN ELEVATED.				
	1907.	1906.	Increase.	P. ct.
January	150,165	129,720	20,445	15.76
February	154,444	135,570	18,874	13.91
March	154,790	138,169	16,621	12.02
April	156,275	137,477	18,798	13.67
May	151,423	136,735	14,688	10.72
June	148,518	133,974	14,544	10.85
July	135,779	123,370	12,409	10.37
August	136,517	123,512	13,005	10.52
September	140,979	126,975	14,004	11.02
October	157,080	142,671	14,409	10.09
November	151,518	150,565	953	*0.63
December	147,723	155,790	*8,067	*5.17

NORTHWESTERN ELEVATED.				
	1907.	1906.	Increase.	P. ct.
January	88,632	81,204	7,428	9.15
February	88,435	83,572	4,863	5.81
March	89,344	85,154	4,190	4.92
April	99,134	84,244	5,800	6.99
May	94,204	81,748	12,456	15.24
June	99,051	80,165	18,886	23.56
July	91,542	73,308	18,234	24.87
August	93,174	73,170	19,998	27.32
September	97,447	77,508	19,939	25.72
October	108,806	88,344	20,462	23.16
November	106,847	93,238	13,609	14.59
December	105,958	94,904	11,054	11.64

*Decrease.

THE MASSACHUSETTS ELECTRIC COMPANIES

Although railroad companies and industrial organizations all over the country have suffered materially as a result of the financial crisis which is now slowly passing away, a sanguine attitude is entertained by officials of many street railway properties. One of these is the Massachusetts Electric Companies, at whose recent annual meeting President Abbott intimated that the prospects for the declaration of dividends on the preferred stock during the present fiscal year were not at all improbable. The only obstacle which seems to be in the way is the ability of the operating companies to sell bonds, and, assuming that earnings will continue at the present rate, early in 1908 the holding company should be in a position to resume dividends on the senior issue. Had there been any market for bonds last year, it is asserted, the probabilities are that there would have been a disbursement to the preferred shareholders of 2 per cent.

The report of this corporation for the last fiscal year was published on page 1153 of the *STREET RAILWAY JOURNAL* for Dec. 14, and in view of the size of the company a brief analysis of the report for that period may not be out of place. The income account shows that the total earnings of the operating

companies amounted to \$7,758,511, which was nearly \$250,000 more than in the previous year, and greater by over \$1,000,000 than in the fiscal period of 1905. Operating expenses, however, were only \$117,000 more than in 1906, which left a gain in net earnings of some \$123,000. As compared with 1905, the net increase of the last year was pretty close to half a million dollars. After the payment of fixed charges, including interest, taxes and rentals, aggregating \$1,702,623, which were larger by \$108,000 than in 1906, the net divisible income of the Massachusetts Electric Companies was \$1,055,235, or \$15,000 more than in the previous year. Dividends to the holding company aggregating \$880,773, or \$170,000 more than in the year previous, were paid, which left the surplus on Sept. 30 last at \$174,462 for appropriations.

On Sept. 30 last the total mileage of main track was given in the annual report as 882 miles, which compares with 870 miles in the year previous. Reducing the income account of the operating companies for the last fiscal year to a per mile basis, therefore, the comparison with the year previous is as follows:

	1907.	1906.	Changes.
Gross ..	\$8,796	\$8,641	Inc. \$155
Operating expenses	5,669	5,613	Inc. 56
Net	\$3,127	\$3,028	Inc. \$99
Interest, rentals and taxes...	1,930	1,832	Inc. 98
Net dividend increase.....	\$1,197	\$1,196	Inc. \$1
Dividends	998	817	Inc. 181
Surplus	\$199	\$379	Dec. \$180

It will be recalled that a couple of years ago the management stated that it needed approximately \$3,500,000—to be exact, \$3,555,044—to bring the operating companies up to the proper standard of operating efficiency. During the past year \$1,574,680 was expended for improvements and \$1,540,999 in the previous year, making a total of \$3,115,679 for the two years, all of which was charged to the operating expenses. It will, therefore, be noted that the balance required for improvement purposes, according to the management's statements is less than \$500,000. Since the holding company assumed control of the operating companies an aggregate of nearly \$16,000,000 has been expended for reconstruction operations.

The surplus of the holding company for the last fiscal year after the deduction of all expenses, such as salaries, printing and stationery, interest on coupon notes, etc., was \$788,711, which amount is equal to exactly 3.83 per cent on the preferred stock, as compared with 2.92 per cent in the year previous. It is apparent that, with the elimination of extensive improvement charges, the holding company will be in a strong position to resume dividend obligations on the preferred stock.

The last annual report is all the more noteworthy when consideration is given of the fact that the winter of 1906 was one of the most severe in the history of the companies. The fact that the earnings of the last year were even on a parity with those of the previous fiscal period is, therefore, a reflection of the benefits that were derived from past liberal expenditures for improvements.

To give a more lucid idea of the marked progress that has been made by the Massachusetts Electric Companies in the past four years, we compare the income account of the last fiscal period with that of 1903, which shows an expansion of over 22 per cent in gross earnings and a gain of about 26 $\frac{1}{2}$ per cent in net. It is a rather interesting fact, also, that the percentage of operating expenses to gross earnings for the late fiscal year was 64.44 per cent, as compared with 65.60 per cent in 1903. The comparison follows:

	1907.	Increase over 1903.	P. C. Inc.
Gross earnings	\$7,758,511	\$1,424,601	22.49
Operating expenses ...	5,000,652	844,744	20.32
Net earnings	\$2,757,859	\$579,857	26.62
Surplus	1,055,235	208,381	24.60

After this year, it is estimated, the amount needed to complete the present reconstruction programme will not be in excess of \$100,000, or possibly \$150,000. It is understood that the earnings thus far in the present fiscal year are larger than for the corresponding months of the year previous by approximately 5 per cent, and in the neighborhood of twice that amount over the returns in 1905 for the like period.

REPORT OF THE MASSACHUSETTS RAILROAD COMMISSIONERS

According to the thirty-ninth annual report of the Massachusetts Railroad Commissioners, which is for the year ended June 30, 1907, and which has just been submitted to the general court, there have been added during the last year to the mileage of the Massachusetts companies 25.062 miles of street railway line and 7.500 miles of second track, making 32.562 miles of additional main track. There have also been added 4.515 miles of side track, making a total addition of 37.077 miles of track reckoned as single track. The Massachusetts companies now own 2233.121 miles of street railway line, 427.624 miles of second main track, and 157.130 miles of side track, making a total length of track reckoned as single track owned, 2817.875 miles. This does not include the Woonsocket, which was in last year's return, which has 21.961 miles of main line, of which 3.195 miles is in Massachusetts and .863 of a mile of side track, of which .103 of a mile is in Massachusetts. All of the track owned is surface street railway track with the exception of 8.660 miles of elevated line and 8.484 miles of elevated second track. Of the sidings all are surface track with the exception of 3.592 miles of elevated track. All the elevated track is located in Boston. The Old Colony leases and operates the Newport & Fall River, having a mileage of main and second track of 19.294 miles, located in Rhode Island; and the Boston & Northern leases and operates the Nashua, having a mileage of main and second track of 14.899 miles located in New Hampshire. Accordingly 34.193 miles of main and second track are operated outside of the state. The total miles of main track (including trackage rights) operated, is 2745.266—an increase of 31.175 miles over the previous year. A table is given in the report which shows the length of railway line and track, and total reckoned as single track returned by the companies for the year ending Sept. 30, 1907, as compared with the previous year.

The gross assets of the companies Sept. 30, 1907, were \$161,297,913.49. The several classes of assets, and the increase in each class as compared with the same companies in 1906, are shown in detail in the following table:

Gross Assets, Sept. 30, 1906, and 1907.

Assets.	1906.	1907.	Increase.
Construction	\$76,376,521	\$79,993,550	\$3,617,029
Equipment	26,930,391	28,738,946	1,808,555
Land and buildings.....	34,347,591	36,941,286	2,593,695
Other permanent property..	1,721,789	1,808,000	86,211
Cash and current assets....	10,441,634	5,855,412	4,586,222*
Miscellaneous assets	6,096,828	7,960,720	1,863,892
Gross assets.....	\$155,914,754	\$161,297,914	\$5,383,160

*Decrease.

The gross liabilities at the same date, including capital stock (but not including sinking and other funds), were \$153,847,903.47. The several kinds of liabilities, and the amount of each as compared with the same companies in 1906, were as follows:

Gross Liabilities, Sept. 30, 1906, and 1907.

Liabilities.	1906.	1907.	Increase.
Capital stock	\$70,916,925	\$73,280,155	\$2,363,230
Funded debt	50,016,000	59,339,500	1,323,500
Real estate mortgages.....	74,400	84,800	10,400
Current liabilities	15,977,380	17,166,056	1,188,676
Accrued liabilities	4,073,990	3,977,393	96,597*
Gross liabilities ¹	\$149,058,695	\$153,847,904	\$4,789,209
Sinking and other special fund	2,204,503	2,413,354	208,851
Surplus ²	4,651,556	5,036,056	385,100
Totals	\$155,914,754	\$161,297,914	\$5,383,160

¹ Exclusive of sinking and other special funds.

² Includes premium on sales of stock and bonds.

* Decrease.

It will be seen by comparing the last two tables that there was an increase in gross assets of \$5,383,160, and there was an increase in gross liabilities of \$4,789,209, thus increasing the aggregate surplus and sinking and other special funds of the companies by the amount of \$593,951.

The aggregate capital stock of the eighty-two companies, Sept. 30, 1907, was \$73,280,155, a net increase of the same companies of \$2,363,230 over the preceding year. The total amount of dividends declared last year was \$3,721,388.24, an increase of \$167,315 over the preceding year. Thirty-six out of the eighty-five companies paid dividends ranging from 1 to 10 per cent, and forty-nine companies declared or paid no dividends. One company paid 10 per cent; six companies paid 8 per cent; one paid 8 per cent on preferred and 7 per cent on common; one paid 7.22 per cent; one paid 7.20 per cent; one paid 7 per cent; eight paid 6 per cent; one paid 5.5 per cent; seven paid 5 per cent; two paid 4 per cent; one paid 3.75 per cent; one paid 3 per cent; one paid 2.5 per cent; three paid 2 per cent; and one paid 1 per cent.

Capital Stock, Net Income and Dividends, 1898-1907.

Years.	Capital stock.	Net divisible income.	Dividends declared.	Percentage on total capital stock.
1898.....	\$38,933,917	\$2,534,002	\$2,076,233	5.33
1899.....	41,380,143	2,502,942	2,318,398	5.60
1900.....	48,971,168	3,037,502	2,409,874	4.92
1901.....	54,069,933	3,398,183	3,417,117	6.32
1902.....	60,036,328	3,388,851	3,138,711	5.23
1903.....	68,404,480	3,602,917	3,586,248	5.24
1904.....	68,542,038	2,998,114	3,214,496	4.69
1905.....	70,326,985	3,556,690	3,174,505	4.51
1906.....	71,216,925	4,160,073	3,554,073	4.99
1907.....	73,280,155	4,125,185	3,721,388	5.08

The aggregate funded debt of the companies, Sept. 30, 1907, was \$59,339,500, an increase of \$1,323,500 over the preceding year. The amount of real estate mortgages outstanding Sept. 30, 1907, was \$84,800, an increase of \$10,400 over the preceding year. The total unfunded debt, including the above mortgages, was \$21,228,249, an increase of \$1,102,479. The gross debt, funded and unfunded, was \$80,567,749, an increase of \$2,425,979. The net debt (the gross debt less \$5,855,412 of cash and current assets) was \$74,712,337, an increase of \$7,012,201. In computing the net debt the sum of \$7,960,720 returned as "miscellaneous assets," covering materials and supplies on hand, etc., is not included with cash and current assets in the deduction from gross debt. The total capital investment (capital stock and net debt) of the street railway companies of the state on Sept. 30, 1907, was \$147,992,492, an increase of \$9,375,431 over the previous year.

The average cost of the street railways of the State, per mile of main track (including the cost, but not the length of side track), as returned by the companies Sept. 30, 1907, was \$30,064.34 for construction; \$10,801.09 for equipment, and \$14,563.32 for lands, buildings (including power plants) and other permanent property, making a total average cost of \$55,428.75 per mile of main track.

The total income of the companies from all sources, for the year ending Sept. 30, 1907, was \$32,203,111.37, and the total expenditures (including dividends declared) were \$31,799,314.56, making a net surplus of \$403,796.81 to be added to the surplus of previous years.

The gross earnings and expenses of operation the last year are classified and compared with those of the previous year, in the following table:

Gross Earnings and Expenses of Operation, 1906 and 1907.

Earnings and expenses.	1906.	1907.	Increase.
Revenue from passengers...	\$28,640,699	\$29,714,698	\$1,073,999
from mails and merchandise	134,182	195,593	61,411
from tolls and advertising, etc.	635,399	647,571	12,172
Gross earnings from operation	\$29,410,280	\$30,557,862	\$1,147,582
Operating expenses.....	19,825,841	20,689,668	863,827
Net earnings from operation	\$9,584,439	\$9,868,194	\$283,755

The following table gives the total volume of traffic, itemized as above, for each of the last ten years:

Volume of Traffic for Ten Years, 1898-1907.

YEARS.	Total Passengers Carried.*	Average Number per Mile of Main Track Operated.	Total Car Miles Run.
1898	330,889,629	207,982	68,206,418
1899	356,724,213	205,098	73,367,235
1900	395,027,198	200,262	81,750,768
1901	433,526,935	195,683	93,005,225
1902	465,474,382	188,787	100,280,687
1903	504,662,243	192,548	107,506,812
1904	520,056,511	195,917	107,897,456
1905	532,731,017	199,637	109,258,739
1906	581,450,906	212,514	114,312,626
1907	600,695,816	217,042	117,719,203

*Computed on the basis of five cent fares collected.

The following table gives the gross earnings from operation, the operating expenses, the ratio of operating expenses to gross earnings, and the net earnings for each of the last ten years:

Percentage of Operating Expenses to Gross Earnings, 1898-1907.

YEARS.	Gross Earnings from Operation.	Operating Expenses	Percentage of Expenses to Earnings	Net Earnings.
1898	\$16,915,495	\$11,672,731	69.01	\$5,242,674
1899	18,151,550	12,378,488	68.20	5,773,062
1900	19,999,640	13,159,947	65.80	6,839,693
1901	21,766,340	14,565,141	66.92	7,201,199
1902	23,486,474	15,912,852	67.75	7,573,622
1903	25,540,811	17,519,367	68.59	8,021,444
1904	26,207,247	18,397,291	70.20	7,809,956
1905	27,041,291	18,269,259	67.56	8,772,032
1906	29,563,892	19,954,000	67.49	9,609,892
1907	30,557,862	20,689,668	67.71	9,868,194

The following tables give, for each of the last ten years, the average gross earnings, operating expenses, and net earnings from operation, (1) per total mile of main track owned, (2) per car mile run and per passenger carried—thus showing more in detail the changes from year to year in the earnings, cost, and net results of operation.

Gross and Net Earnings from Operation per Mile of Main Track Owned, 1898-1907.

YEARS.	Average per Mile of Track Owned.		
	Gross Earnings.	Expenses of Operation.	Net Earnings.
1898	\$10,998	\$7,589	\$3,409
1899	10,459	7,132	3,327
1900	10,452	6,878	3,574
1901	9,998	6,690	3,308
1902	9,609	6,510	3,099
1903	10,124	6,944	3,180
1904	10,178	7,145	3,033
1905	10,300	6,959	3,341
1906	11,156	7,529	3,627
1907	11,485	7,776	3,709

Gross and Net Earnings from Operation per Car Mile Run and per Passenger Carried, 1898-1907.

YEARS.	Average per Car Mile.			Average per Passenger.		
	Gross Earnings.	Expenses of Operation.	Net Earnings.	Gross Earnings.	Expenses of Operation.	Net Earnings.
1898	24.80	17.11	7.69	5.11	3.52	1.59
1899	24.74	16.87	7.87	5.09	3.47	1.62
1900	24.46	16.10	8.36	5.06	3.33	1.73
1901	23.40	15.66	7.74	5.02	3.36	1.66
1902	23.42	15.87	7.55	5.05	3.42	1.63
1903	23.76	16.30	7.46	5.06	3.47	1.59
1904	24.29	17.05	7.24	5.04	3.54	1.50
1905	24.75	16.72	8.03	5.08	3.43	1.65
1906	25.86	17.46	8.40	5.08	3.43	1.65
1907	25.96	17.58	8.38	5.08	3.44	1.64

GENERAL DISCUSSION.

After careful inquiry and extended debates the Legislature of 1906 passed an act, chapter 516, authorizing a new type of

transportation—electric railroads. Under the provisions of that act five different companies in process of formation petitioned the Board for the issue of certificates that public convenience and necessity required the construction of their lines. One of these petitions is now pending, one was held to await further study and development, two were dismissed for sufficient reasons, and one certificate was issued. Under the authority so conferred that company is now endeavoring to obtain from the city of Boston and the boards of selectmen of the towns included in the route locations upon which to build its road.

In rendering its decision the Board stated its views as follows: "The question to be decided under each petition is whether, upon the whole, the net results of the proposed undertaking promise public gain or public loss;" and further, that "It surely cannot be said that public necessity and convenience require the building of an additional railroad if the effect upon existing railroads is so disastrous that the service as a whole is impaired rather than improved."

Practical experience with the new law indicates the necessity of perfecting amendments in addition to those passed during the last session of the General Court.

HEATING AND VENTILATING OF CARS.

Upon this point the Board quotes its previous opinion, printed below, and states that it has nothing to add to the views there expressed.

The Board has recently changed its requirement with reference to the point of outside temperature at and below which companies are called upon to heat street cars, making that point forty instead of fifty degrees above zero, the temperature to be then maintained to have a range that shall not be lower than forty nor higher than sixty degrees. In making this radical change and certain other changes the Board has had in view a rule that companies will find it possible to obey and that the district police can enforce under the statute which makes them responsible for its enforcement.

It is notorious that opinions differ as to what the temperature of a room in a private house ought to be, and that the same person entertains different opinions at different times, according to condition of health or circulation of blood. Obviously, then, an attempt to always satisfy every occupant of a street car with the atmospheric conditions must be futile. Even if passengers were of the same mind, it is impracticable to constantly maintain air of a given quality and the temperature at a specific point in a car that is one moment nearly empty and the next crowded to the limit; now stationary, then in motion; with doors continually opening and shutting, and with an outside temperature varying between zero and forty degrees above.

Companies are not, however, relieved from the obligation to keep the air in cars reasonably warm and pure on account of the difficulties in the way of doing this to the satisfaction of every critic. In fulfilling their obligation both management and employee must expect to deal with the old and young, with the robust and feeble, with those who thrive on draughts of cold air and with those to whom such draughts are fatal; with those who are dyspeptic and nervously unsound, as well as with the sane and cheerful.

The day of horse cars, with straw on the floor to keep the feet warm, and with no ventilation except that afforded through the doors, is within easy recollection. While to-day the electric heater exemplifies radical progress in heating, the ventilator commonly in use is about as crude as any device could be. It is true that a number of experiments have been made, that a ventilator of improved type is now found in the semi-convertible cars upon the Boston & Northern and upon the Boston Elevated lines, and that another device, which promises as good if not better results, is found in cars of the elevated trains; but that there has been, however, a too general indifference on the subject of ventilation cannot admit of question.

After all is said, however, in support of theories and devices for heating and ventilating cars, present discomfort is due fully as much to the failure to properly use means at hand for keeping the air pure and warm as to imperfection in apparatus. There is no reason why, for example, a movable ventilating window should be kept entirely open or entirely shut, or in any one position throughout a long journey, in total disregard of the temperature outside and of the changing conditions inside the car.

It should be a part of the regular duty of those in charge of cars to regulate both heating and ventilating apparatus from time to time to meet varying needs. Admirable work of this kind is now done by individual conductors, and there is no reason why their success in caring for the public should not become a general feature of the service. Co-operation, too, between passengers and employees is of great benefit to both, and the privilege of making suggestions ought not to be monopolized by the chronic complainant.

The Board must ask that companies adopt prompt measures for a larger experimental use of the more improved methods of ventilation, and meanwhile enforce rules for adjusting all devices in use to existing conditions.

STREET CAR FENDERS AND WHEELGUARDS.

During the past year, street railway companies, at the suggestion of the Board, have installed for experimental use various

types of fenders and wheelguards on certain lines in different parts of the state. The efficiency of these devices can best be determined from the results of their use in actual tests in saving life and limb; such tests have been too infrequent to enable the Board to reach any definite conclusion. One of the results of this investigation, however, has been to eliminate from the field many so-called fenders and wheelguards on account of their absolute inefficiency.

The Board deems it necessary to reiterate its views that no particular fender or wheelguard has yet been found the adoption of which can be recommended in preference to all others, and that the greatest safeguard in street railway operation comes from having the cars at all times under such control as to avoid striking a person, rather than depending upon any device to save him from harm after having been struck by a moving car.

The Board will continue to investigate and thoroughly test all meritorious fenders and wheelguards, and will insist upon the more general use of any device found to possess sufficient merit to warrant its adoption.

To assist the Board in determining the efficiency of these devices, it is expected that companies will keep a record of all tests through their use.

BLOCK SIGNALS.

The Board, on page 65 of its annual report for 1906, said: "We recommend legislation requiring railroad companies and such street railway companies as run cars under similar conditions, to equip, within a reasonable time, lines of the character above named with a clock signal of such type and installed in such manner as the Board may approve."

The Legislature of that year provided the necessary authority to enable the Board to carry out the recommendation. After thorough examination and consideration of signal systems then in use in this country and abroad, and being of the opinion that all lines of railroad should eventually be protected by some system of block signals, the following procedure for their installation was adopted:

1. The ultimate end to be secured is the installation of some approved form of block signals upon all steam railroad lines within the State at as early a day as may be practicable. This means a substantial outlay by railroad companies in the immediate future.

2. The order in which block signals should be installed must have reference to both amount of traffic and physical conditions. Of first importance is the equipment of lines of railroad embracing two or more tracks, or presenting the conditions of a single track carrying a large amount of traffic and involving heavy grades and curves. Local conditions may, of course, demand at particular places early equipment out of the usual order.

3. Companies are requested to submit to the Board on or before the fifteenth day of this month (December) a brief description of the block signals now in use upon their several lines within the State, together with an explanation of such action as has been taken in either actually equipping these lines or in making arrangement for their future equipment with block signals, since the first day of January, 1906.

THE MUNCIE STRIKE

The strike of the employees of the Indiana Union Traction Company at Muncie, Ind., of which mention was made in the last issue of the STREET RAILWAY JOURNAL, took a rather serious turn the latter part of last week, and the state had to be called upon for protection. The vote to strike was taken Jan. 1, and on Jan. 4 Gov. Hanly issued a proclamation declaring martial law and placing Brig. Gen. McKee in command of the state troops ordered to the scene of the trouble. The Governor's action in sending troops, supplemented by the energy displayed by the authorities and citizens of Muncie, resulted in checking the mob spirit. Five hundred citizens, including some members of the Commercial Club of Muncie, were sworn in as special officers to preserve the peace, and Mayor Guthrie closed all saloons and ordered all women and children to keep off the streets except on errands of necessity.

Upon receipt of the news that Gov. Hanly had ordered state troops to Muncie, the street cars began running on regular schedule. About half of the employees of the Indiana Union Traction Company at Marion struck Jan. 4, and only part of the local cars are running there, but there has been no serious trouble at Anderson, Alexandria and Elwood.

On Jan. 6 the authorities in control of affairs at Muncie gave notice to A. L. Behner, first vice-president of the Amalgamated Association of Street & Electric Railway Employees, that he must leave Muncie. Cars on the local lines at Muncie began running without interference Jan. 6, on regular schedule,

manned by local men and without guards. The twelve companies of infantry and one battery of the Indiana National Guard rested in quarters. The streets were patrolled by the business and professional men sworn in as deputies.

The alleged cause of the strike is a refusal of the company to sign a contract with the executive committee of the Amalgamated Association of Street & Electric Railway Employees providing for an increase in wages. The company had previously signed a contract with the Brotherhood of Electric Train Men and persistently refused to recognize the Amalgamated Association. The members of the Brotherhood Union are still at work. The officials of the Amalgamated Association insist that the Brotherhood Union is a rival concern fostered by the Indiana Union Traction Company for the express purpose of disrupting the Amalgamated Association.

A majority of the local employees of the company operating the city lines at Marion have also gone out, but the company has, with one or two exceptions, operated the cars with members of the Brotherhood and the men who refused to strike.

POWER DEVELOPMENT IN THE INLAND EMPIRE

Three million dollars were expended in the development of water power in the Spokane River for transportation and commercial purposes in 1907, thus adding nearly 25,000 to the output, placed at 46,000 horse-power, a total of 71,000 horse-power, and it is expected that 50,000 horse-power will be added this year, in various parts of the Inland Empire. The most pretentious work was the building of the \$1,000,000 power plant for the Spokane & Inland Empire system at Nine Mile, 9 miles north of Spokane, which will be in operation next April.

To utilize the water of the river at that point a mammoth dam was necessary. The dam and buildings, in which the machinery is now being installed, were completed last November. With the machinery constituting the initial installation the Nine Mile power plant will generate 20,000 hp. The current will provide the motive power for running all the trains of the Spokane & Inland Empire system, which has 149 miles of track.

In the improvement of its power plant at Spokane Falls, Spokane and Post Falls, 24 miles east of Spokane, the Washington Power Company made extensive additions. In the Spokane plant the company completed the installation of a 1500-hp motor-generator in December. The company has placed an order for a 2000-hp rotary for converting the current generated at Post Falls, where a 3200-hp turbo-generator was added last year. This plant now comprises four 3200-hp generators, and the company has placed an order for one more turbo-generator of the same capacity, which will be installed in April. The Post Falls plant is developing 10,000 hp at Spokane Falls, and with the addition of the machinery contemplated it will deliver 13,000 hp in Spokane.

The Washington Water Power Company has in preparation plans for increasing the generating capacity of the Spokane plant to 40,000 hp. The head of water from which the power is now derived is 78 ft. above the turbines, from which are developed 15,000 hp. The plans provide for the extension of the flumes to the extreme high head of water, between Washington and Division Streets. By the extension a total fall of 134 ft. will be conducted through the flumes and provide nearly three times the power now developed.

With the current generated at the Spokane and Post Falls plants, the company operates 90 miles of street railway in Spokane, electric lines to Medical Lake and Cheney, the Spokane electric lighting system, and furnishes electricity for lighting systems and power in Coeur d'Alene, Post Falls, Idaho; Colfax, Palouse, Tekoa, Farmington, Garfield, Oakesdale, Rockford, Medical Lake and Cheney, in addition to that consumed in Spokane in the operation of mills and for general purposes.

The Washington Water Power Company completed the Cheney suburban line during the year. It also completed a steam auxiliary station and strung a high-power line to the mines and the Coeur d'Alene district, 140 miles.

The Spokane & Inland Empire Company completed extensions of the Spokane & Inland Electric Line from Waverly, 34 miles south of Spokane, to Spring Valley Junction, and from that point by two lines, the present terminals of which are Colfax and Palouse. The total length of the extensions, completed, is 82 miles. The Coeur d'Alene & Spokane Electric line of the Inland Empire system was double-tracked from Greenacres to Spokane Bridge, 6 miles, and a branch, 2 miles in length, was built to Liberty Lake.

AFFAIRS IN NEW YORK

Judge Lacombe, of the United States Circuit Court, announced on Saturday that within a few days he would appoint a special master to consider the question of whether the receivers of the New York City and Metropolitan Street Railway shall pay the January interest on the first mortgage and consolidated mortgage bonds of the Third Avenue Railroad. Judge Lacombe observed that none of the counsel who appeared before him on Friday had offered any suggestions that appeared practical as to how the receivers might raise the \$875,000 necessary to pay this interest. He thus disposed of the suggestion made by Edward M. Shepard, counsel for the Third Avenue stockholders, that receivers' certificates might be issued for this purpose.

On Monday Judge Lacombe appointed Frederick W. Whitridge receiver for the Third Avenue Railroad upon application of the Central Trust Company and the committee representing the majority of the Third Avenue consolidated bonds, for which the Central Trust is trustee. This action is the result of the failure of the receivers of the New York City and Metropolitan Street Railways to pay the interest on the Third Avenue bonds falling due Jan. 1. Its effect is to take the Third Avenue out of the Metropolitan system during the pendency of the receivership, since the Metropolitan having defaulted in the rental due under its lease of the Third Avenue to the stockholders of that company in October, is now eliminated from the voting control as the holder of the majority stock in the subsidiary company by the court's order turning the Third Avenue over to its bondholders. The present receivership is temporary. What the eventual outcome will be, however, was forecast by the language of the decision that Judge Lacombe read in court yesterday when the argument had been concluded. He said: "The bondholders under this large Third Avenue mortgage are entitled to the appointment of a temporary receiver, to be made permanent when the time comes to declare the principal due and proceed with the foreclosure."

Telling the Public Service Commission that its orders were unreasonable, and that it did not state the facts as they were, the receivers for the New York City Railway, Adrian H. Joline and Douglas Robinson, nevertheless have signified their intention to comply with the two orders issued by the commission recently which call for certain repairs to the rolling stock and to increase the service materially on the Eighth Avenue line. A separate reply was returned on each order. The first dealt with the order for the repairing of cars. It read, in part, as follows:

We do not concede the correctness of the recital of fact contained in said order, to the effect that the equipment, appliances and devices in question are unsafe or improper, or that the repairs directed by said order ought reasonably to be made to promote the security of the public, or that the time given within which to make such repairs is reasonable.

As stated in our letter to you of Dec. 20, we have been engaged since our appointment in pushing as vigorously as possible, with all available means at our command, the work of repair and maintenance of the rolling stock operated by us. Although laboring under great disadvantages, we have made notable progress, so that by the early part of December the number of cars disabled on the road had been reduced to less than half the number disabled under similar conditions immediately prior to the receivership. While admitting that, for causes entirely beyond our control, the rolling stock is in many respects inadequate, we take issue with the statement that it has been at any time during the receivership, or is now, unsafe either for the public or our employees. Our entire effort has been directed (and we think successfully) toward giving the best possible service to the public consistent with the physical facilities and money which we have had at our disposal. The equipment has been rehabilitated as rapidly as was possible with the circumstances, having due consideration to the necessities and convenience of the traveling public. We cannot promise or undertake, with the facilities and resources at our command, a full and literal compliance with the provisions of your order. We will, however, so far as means will allow, provide the inspection thereby required.

We will further use our best endeavors to see that on and after the 15th day of February, 1908, not fewer than ten of said cars are turned out daily, not including Sundays and legal holidays, so overhauled and repaired. Referring again to our letter of Dec. 20, we once more suggest that the sending to the repair shops of ten cars a day for the thorough overhauling specified (which will require several days for each car), if begun at a season of the year when it is not practicable to substitute open cars for those withdrawn, may reasonably be expected to result in a shortage of cars available for service. In that event, however, we shall endeavor so far as practicable to avoid any reduction of service on lines where you have already designated operating schedules.

The reply of the receivers on the question of the improve-

ment of the Eighth Avenue service is almost identical in its tone. The receivers do not concede the correctness of the commission's recital of fact and believe that many of the increases ordered are unreasonable, especially that ordered for Sundays, with which many specified faults are found. Attention is called to the fact that orders for increased service and for repairing all cars will necessarily take cars out of service, so that increasing the number on any line will be difficult. Nevertheless, the receivers say:

"Although, for the reasons above suggested and others unnecessary to specify, we consider your order unreasonable, we are disposed to endeavor to meet your views, so far as may be practicable, and you are accordingly advised that on and after Jan. 15 service will be provided on the Eighth Avenue line in accordance with the terms of said order."

Orders have been issued by the Public Service Commission of the First District of New York that certain changes be made in the operation of cars on the Richmond Light & Railroad Company's property and the Staten Island Midland Railway Company's property.

Formal announcement was made on Monday by the Interborough Rapid Transit Company that the Battery tunnel to Brooklyn would be opened for service on Thursday. The first train will leave the Bowling Green station at 12:43 o'clock on Thursday morning. The first train to leave Brooklyn will start from the Borough Hall station at 12:51. In announcing the opening of the tunnel the Interborough officials stated that all Lenox Avenue expresses would run through to Brooklyn Borough Hall between 6:44 a. m. and 12:52 a. m. inclusive. During the interval between 12:53 and 6:44 a. m. all Lenox Avenue local trains will run through the tunnel to Brooklyn, and all Broadway trains will run round the South Ferry loop. This will necessitate the abandoning of the City Hall loop daily during the hours from 12:30 a. m. to 6:45 a. m., and on Sundays and holidays from 12:30 a. m. to 9:30 a. m. The company has posted notices in all the stations of the Subway requesting passengers on southbound local trains who desire to go to Brooklyn during the day, when all local trains stop at the City Hall, to change from the local trains at the Brooklyn Bridge to a Lenox Avenue express train. Passengers for South Ferry must change to a Broadway express. Passengers riding on Broadway expresses, southbound, desiring to go to Brooklyn, are requested to change to Lenox Avenue expresses at the Bowling Green station.

It is stated that the purchase by the city of the Belmont or Steinway tunnel to Long Island City, is being seriously considered by the municipality. According to one authority a proposition that the city should buy the tunnel has been made informally to members of the Board of Estimate by officials of the Interborough Rapid Transit Company. One point pretty well decided upon by both sides is the purchase price. Both agree that the verified cost of constructing the tunnel would be a fair price. The company, at the traction inquiry, asserted that this was about \$8,000,000. The negotiations so far have left out of all consideration the Public Service Commission, which must give its consent before the line can be operated.

At the meeting of the Public Service Commission Wednesday a report was received from the commission's counsel stating that the consents of the owners of the property affected had been obtained to the proposed changes in the subway at Ninety-Sixth Street. This will do away with the congestion of trains at that point by adding two additional tracks on the outside of the present lines so that it shall be unnecessary for the express trains to cross in front of locals, and vice versa. The tracks will extend to 103d Street and will cost approximately \$850,000, which the Board of Estimate has already appropriated. The work will consume about eighteen months.

A report was received at the meeting on Wednesday by the commission on the accident to an experimental train in the Battery tunnel on Tuesday. No passenger trains were being run and no one was injured. The investigation showed that a fuse blew, and at the same time, through a coincidence, a short circuit occurred on the lighting circuit, which is entirely distinct from the power supply. Workmen on the train walked to the entrances, while others remained on the train and repaired the damage.

Frederick R. Coudert, counsel for Paul Fuller, J. Hampden Dougherty and Melville G. Palliser, the receivers for the Metropolitan and New York City Railways appointed by Justice

Seabury in the Supreme Court, filed in the United States Circuit yesterday a bill seeking the removal of the Federal receivers of the two corporations, Douglas Robinson and Adrian H. Joline. The bill alleges that the Federal receivership was collusive as between the petitioning creditors and the defendant corporations and a part of a plan to oust the State of New York from its jurisdiction over the traction companies, in violation of the Federal Constitution. Under these conditions, the Federal Court is held to have no jurisdiction in the matter.

AN AUTHORITATIVE STATEMENT REGARDING THE PLANS FOR THE LINE BETWEEN NEW YORK AND PORT CHESTER

President Charles T. Mellen of the New York, New Haven & Hartford Railroad Company, as briefly stated in the STREET RAILWAY JOURNAL last week, says the intention is to merge the New York & Port Chester Railroad and the New York, Westchester & Boston Railroad, and build one new line between New York and Port Chester if arrangements can be made with the Board of Estimate.

It seems that the New York, New Haven & Hartford Railroad owns all the stock of the Millbrook Company, organized under the business corporation law of the State of New York, Nov. 5, 1906, with a total authorized issue of stock of \$100,000, consisting of 1000 shares of the par value of \$100 each. The Millbrook Company, in turn, since a date prior to July 1, 1907, has owned and now owns 91,551 shares of the stock of the New York & Port Chester Railroad Company, being all the stock of that company issued and outstanding, excepting that nine qualifying shares are held by the directors of the company. The New York & Port Chester Railroad Company since a date prior to July 1, 1907, has owned and now owns the following securities of New York, Westchester & Boston Railroad Company:

(a) 5,639 shares of the stock of New York, Westchester & Boston Railway Company, par value \$100 a share;

(b) The beneficial interest in 23,469½ shares of stock of New York, Westchester & Boston Railway Company, evidenced by voting trust certificates;

(c) \$13,490,000 out of \$13,500,000 of a certain underwriting agreement calling upon the conditions therein stated for \$15,000,000 of bonds and 45,000 shares of stock of New York, Westchester & Boston Railway Company, evidenced by voting trust certificates now held by Knickerbocker Trust Company under the said syndicate agreement of underwriting. All of said underwriting interests, with the exception of \$10,000, are now held by this company, but the same have not yet been paid in full. Upon completion of payments to said underwriting this company will be entitled to 44,967 shares of stock of New York, Westchester & Boston Railway Company, evidenced by voting trust certificates.

It is the intention of the New York, New Haven & Hartford Railroad Company to construct a high-speed third-rail electric railway from the Harlem River to Port Chester, consisting of two tracks from the Harlem River to 177th Street, four tracks from 177th Street to the city line, and two tracks from the city line to Port Chester, in compliance with the provisions of the franchises heretofore granted by the City of New York to the Port Chester Company and the Westchester Company. The plan under which this construction is to be made has not taken final form only because of the resistance by property owners disputing in the courts the validity of the charter of the New York, Westchester & Boston Railway Company. It was hoped that, pending a decision upon this charter, the work of construction might proceed, in so far as it covered that portion of the route from 177th Street to the city line, by the New York & Port Chester Company under an agreement with the New York, Westchester & Boston Railway Company.

Since the filing of the application for change of route by the Port Chester Company, additional property has been purchased between 177th Street and the city line, and the company has now bought, or arranged to buy, substantially all property between those two points, with the exception of a few pieces, which it is now proposed to condemn in order to complete the rights. Until either the Westchester Company, by reason of a final decision by the Court of Appeals sustaining the validity of its charter rights, is in a position to condemn,

or the Port Chester, by reason of the consent of the Board to cross the streets on its amended route, is in like position, little progress can be made in this regard.

On Dec. 27, 1907, Judge Charles F. Brown, the referee before whom the proceedings to determine the validity of the Westchester charter were pending in the form of a condemnation proceeding to acquire property of Mrs. Arabella D. Huntington, rendered an opinion sustaining the validity of the charter of that company. If this charter is finally sustained, it is the intention of the New York, New Haven & Hartford Company that the New York & Port Chester Railway Company and the New York, Westchester & Boston Railway Company shall be consolidated or merged so as to form one company. Should, however, the decision of Judge Brown be reversed, and the Court of Appeals adjudge the charter of the Westchester Company to be invalid, the construction of the road will be completed under the Port Chester charter.

PROGRAM FOR THE ANNUAL MEETING OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

As already announced, the second annual meeting and banquet of the Central Electric Railway Association, will be held at the Algonquin Hotel, Dayton, Ohio, Thursday, Jan. 23, 1908. The business meeting will take place at the morning session, convening at 10:30, and the election of officers will take place at the afternoon session. The program follows:

MORNING SESSION.

President's annual address.

Promotion of Traffic. Paper by Charles F. Price, G. P. A., Western Ohio Railway Company, Lima, Ohio.

Telegraph Signal System. Paper by Chauncey P. Button, general manager, Telegraph Signal Company, Rochester, N. Y.

AFTERNOON SESSION.

Can Electric Interurban Railroads Profitably Carry Passengers at the Present Rate of Fare? Paper by F. W. Coen, general manager, Lake Shore Electric Railway Company, Norwalk, Ohio.

REPORTS OF COMMITTEES.

Report of Standardization Committee on "Fundamental Brake Rigging," by R. C. Taylor, chairman.

Report of Committee on Traffic Organization, by F. D. Norvel, Chairman.

Election of Officers.

An urgent request is made that all members be present as the meeting promises to be one of great importance to all operators of electric railways in Central territory. A cordial invitation has also been extended to all officers of interurban railway companies to bring their private cars to Dayton on this occasion and arrangements have been made through a special committee to take care of these cars. T. J. Ferneding, superintendent of the Dayton & Xenia Transit Company, is chairman of this committee.

The after-dinner program will be made a special feature of entertainment. Many gentlemen of prominence in railway, municipal and state affairs have been invited. E. G. Spring, the first president of the association, will be toastmaster. The dinner will be served at 6:30, and tickets will be \$2 each. Every member of the association can bring as many friends as he desires.

EARNINGS OF THE UNITED RAILWAYS COMPANY OF ST. LOUIS FOR THE YEAR

The United Railways Company of St. Louis carried approximately 325,000 passengers on its lines during 1907, being an increase of 5 per cent over the previous year. The gross receipts for the year will, it is expected, approximate \$10,600,000, a gain of 5 per cent. The receipts and traffic are the largest which the company ever has had. The exceptionally heavy business of the World's Fair year has been surpassed. The average number of passengers carried daily exceeds 800,000. It was not unusual last summer for the road to carry an average of 100,000 each Saturday and Sunday. The most important development of the year was the acquisition of the Suburban and its affiliated lines by the United Railways. The comparative figures above stated include the business of the Suburban lines both for 1907 and the previous year.

ANNUAL REPORT OF THE BOSTON ELEVATED RAILWAY COMPANY FOR YEAR ENDED SEPT. 30, 1907

At the annual meeting of the Boston Elevated Railway Company, held at Boston Monday, Jan. 6, only routine business was transacted. The retiring directors were re-elected. The vacancy in the board caused by the death of Walter S. Swan was not filled. In the course of his remarks, President Bancroft said in part:

"Concerning the capitalization of the properties owned and leased by the Boston Elevated Railway Company, the directors wish you to know that the capital stock of the West End Street Railway Company on Sept. 30, 1907, was as follows: Preferred, \$6,400,000; common, \$10,109,250; total, \$16,509,250.

"Of this capitalization the preferred stock was the amount authorized by the Legislature (Chapter 413, Acts of 1887) for the purchase of the horse railroads which made up the West End system, and was considered only the value of these properties.

"Of the common stock, \$7,150,000 was paid in in cash at par, and the balance was sold under orders of the Railroad Commissioners for cash at prices ranging from 45 to 80 per cent in excess of the par value, realizing a premium of \$1,696,656.

"Of the \$13,300,000 par value of the stock of the Boston Elevated Railway Company, the first \$10,000,000 was paid in in cash at par, and the balance was sold under orders of the Railroad Commissioners for cash at a price 55 per cent in excess of the par value, realizing a premium of \$1,815,000 above the par value. The present capitalization of the two companies, therefore, represents an actual payment in cash of \$3,511,656 above the par value of the outstanding stock. The amount of this cash premium has been invested in the properties now owned by the companies. So there is not only no capital inflation of these properties, but much more has been paid in than is represented by the par value of the stocks. The dividends paid on the stocks and the interest paid on the bonds of the two companies make an average return to the capital invested of something less than 5.13 per cent per annum. It is not true, therefore, of these properties that 'excessive dividends are paid on watered stock.'

"Besides its ordinary taxes the company's contribution to the public during the last fiscal year amounted to at least \$489,547.94, made up as follows:

Compensation tax for the use of streets under the Act of 1897	\$123,275.92
Interest at 4 per cent on \$4,197,413, cost of paving laid in streets by company.....	167,896.52
Cost of maintaining street paving by company.....	130,907.01
Amount of subway rental devoted to sinking fund.....	47,468.49
Moving snow removed from sidewalks and roofs (estimated) not less than.....	20,000.00
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Total extraordinary payments to the public.....	\$489,547.94
Add taxes assessed on real estate.....	265,500.70
Add taxes assessed on capital stock.....	578,198.06
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Total	\$1,333,246.70
To the above may be added the balance of the subway rental..	159,805.00
Also the rental of East Boston tunnel.....	51,371.09
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Grand total, which is nearly 11 per cent of the gross revenue of the company for the year.....\$1,544,422.79

"Since the last report the company has increased its power supply by building additions to three of its power stations, to wit: to the Lincoln station on Battery Street, in Boston; to the Charlestown station, and to the Harvard station, in Cambridge. Two 2700-kw generators have been installed in the Lincoln station, one of the same size in the Charlestown station, and a fourth in the Harvard station, making a total installation of 10,800 kw—an increase of about 27 per cent.

"The forty-five 'easy access' elevated cars, spoken of in the last report, have been received and are in service. Only a portion of the last hundred of the 150 'easy access,' semi-convertible surface cars have been received, owing to the failure of the contracting builder to deliver as agreed. About sixty bodies are here, and thirty have been equipped and are in service.

"The company has maintained the excellent character of its surface tracks, \$562,757.85 having been spent thereon during the year in renewals and repairs. The extent of additions to the surface tracks, including a new line to Linden, a section of the city of Malden, is 5.807 miles. A lease has been taken of a short piece of track heretofore controlled by the Boston &

Northern Street Railway Company at Orient Heights, East Boston. The total length of surface tracks controlled by the company, including these tracks, is now 445.897 miles. This, with the elevated mileage of 16.015 miles, makes a total mileage of 461.912.

"The company has continued its liberal policy toward its employees in respect to their wages, as well as in other matters. Compensation for learners during the year amounted to \$27,670.18. There was paid during the year the sum of \$42,821.77 as a guaranteed minimum wage for new or extra men. There was also paid as increased compensation to long-service men the sum of \$66,630.36. There was paid in pensions, under the provisions recited in former reports, the sum of \$11,325.50. There was also paid in 'satisfactory service' money, in sums of \$15 to each of the employees deemed worthy thereof, the sum of \$55,320. The aggregate sum of increased payments to employees, under the provisions adopted four years ago, amounted during the year to \$203,767.81. The provisions of last year raising the rate of wages increase this amount by \$97,726.35, making a total of \$301,494.16.

"The elevated structure to Forest Hills has been substantially completed with the exception of so much as is involved in the erection of a station at Forest Hills, final authority for which has been received so that this can now be done.

"The construction of the Washington Street tunnel is so far advanced that the company has begun to install its equipment, but at the date of this report much remains to be done, and, although the Transit Commission is steadily prosecuting its work, it is not now certain at what time during the year 1908 the tunnel can be used for traffic.

"The company has designed extensions of its elevated station platforms for the future operation of eight-car trains in place of five-car trains, the longest trains which it can now use. These extensions have been approved by the public authorities, and their construction is about to be undertaken. In connection with the Washington Street tunnel, whose station platforms are also designed for the ultimate operation of eight-car trains, these extensions will admit of a very great increase in the carrying capacity of the elevated division.

"Chapter 573 of the Acts of 1907 was accepted by the board of directors on July 11, 1907. This act modifies Chapter 534 of the Acts of 1902, and the contract with the Boston Transit Commission, dated Sept. 25, 1902, made in pursuance thereof, for the use of the Washington Street tunnel and the subway, especially adapted for the use by surface cars provided for therein. By this act, authority for the building of such a subway ceases.

"Under the act the Boston Transit Commission may construct a tunnel or subway, to be known as the Riverbank Subway, from a point or points in or under the existing Park Street subway station, Boston Common, and the lands intervening between it and the Charles River; in or under the so-called Charles River Embankment, to a point or points in said embankment west of Harvard Bridge; or to a point or points in Beacon Street, at or near the Back Bay Fens; or to a point or points in Commonwealth Avenue or Beacon Street, east of the junction of Commonwealth Avenue, Beacon Street, Brookline Avenue and Deerfield Street. The company may have a lease of this subway for twenty-five years from the beginning of the use thereof, at an annual rental equal to 4½ per cent of the net cost thereof.

"By Chapter 497 of the Acts of 1907, accepted by the board of directors July 11, 1907, by the Board of Aldermen of the city of Everett, and approved by the Mayor June 24, 1907, and by the Board of Aldermen of the city of Malden June 25, 1907, approved by the Mayor July 9, 1907, the company is authorized to construct an elevated railway from Sullivan Square, Charlestown, in the city of Boston, through the cities of Everett and Malden, to such point or points in the city of Malden, southerly of Pleasant Street therein, as may be convenient for a terminus.

"Under the Act of 1906, relating to the Cambridge subway, authorizing the company to construct a subway or subways in the city of Cambridge, and with advice of counsel, the company complied seasonably with the initial steps relating thereto, but the Mayor of Cambridge has applied to the courts upon a question relating to the number of stations, and the provision of rapid transit on our system for that municipality and the communities beyond has been delayed for the present.

"Progress has been made upon the plans for the East Cambridge elevated extension and in the acquisition of land for the thoroughfare. The design for the structure in Boston, both in

the public ways and over private lands, for the viaduct across the Charles River, and for the structure and its connections with surface tracks in Cambridge, has been approved by the authorities whose consent is requisite therefor. Lands and buildings have been taken between Causeway Street and Brighton Street. Buildings have been torn down, and the engineers are making detailed plans in co-operation with the architects, whose valued advice is assisting us in the erection of highly ornamental structures.

"A summary of our business for the year is as follows:

Gross earnings from operation.....	\$13,952,966.00
Operating expenses	9,647,145.28
Net earnings from operation of owned and leased lines	\$4,305,820.72
Subway rental	\$224,805.95
Less amount collected from the Boston & Northern Street Railway Company.....	17,622.46
Interest on funded debt of West End Street Railway Company	650,318.89
Dividend on preferred stock of West End Street Railway Company, 8 per cent.....	512,000.00
Dividend on common stock of West End Street Railway Company, 7 per cent.....	688,874.15
Dividend on stock of Somerville Horse Railway Company, 6 per cent.....	9,180.00
Taxes on West End Street Railway Company..	525,509.34
Interest and taxes on leased property of the Old Colony Street Railway Company.....	40,362.35
Total payments on account of leased railways	2,633,518.22
Miscellaneous interest	58,201.72
Interest on funded debt.....	\$306,388.90
Taxes, Boston Elevated Railway Company....	318,189.42
Compensation tax under Act of 1897.....	123,275.92
East Boston tunnel rental.....	51,371.09
Depreciation fund	100,000.00
Balance	\$831,278.89
Dividend No. 12, paid Feb. 15, 1907, 3 per cent..	\$399,000.00
Dividend No. 13, paid Aug. 15, 1907, 3 per cent..	399,000.00
Surplus for the year.....	\$33,278.89

GENERAL BALANCE SHEET, SEPT. 30, 1907.

ASSETS.	
Construction	\$12,350,453.27
Equipment	2,256,922.23
Real estate	7,541,767.66
Subway and tunnel construction and equipment.....	495,722.11
Cash on hand and in bank.....	1,404,725.41
Bills and accounts receivable.....	89,247.42
Damage and insurance funds invested.....	906,566.19
Stocks and bonds.....	208,010.72
Bonds deposited with Commonwealth of Massachusetts.....	500,000.00
Materials and supplies.....	1,472,381.25
Somerville Horse Railroad Company.....	102,851.11
West End Street Railway Company. Open account.....	792,731.24
West End Street Railway Company. Property account.....	2,219,543.23
Old Colony Street Railway Company. Property account....	57,417.97
Total assets	\$30,398,339.81

GENERAL BALANCE SHEET, SEPT. 30, 1907.

LIABILITIES.	
Capital stock	\$13,300,000.00
Funded debt	8,500,000.00
Audited vouchers and accounts.....	615,190.53
Salaries and wages.....	160,358.41
Dividends not called for.....	6,220.00
Matured interest coupons unpaid.....	71,840.00
Rentals unpaid	353,823.75
Outstanding tickets and checks.....	34,116.18
Interest accrued and not yet due.....	250,429.99
Taxes accrued and not yet due.....	950,512.06
Rentals accrued and not yet due.....	148,828.11
West End Street Railway Company. Lease account.....	1,207,201.98
Damage fund	778,891.40
Insurance fund	615,421.21
Depreciation fund	700,000.00
Premium from sale of capital stock and bonds available for construction and equipment purposes only.....	2,036,900.00
Surplus	668,603.19
Total liabilities	\$30,398,339.81

INCOME ACCOUNT FOR THE YEAR, ENDING SEPT. 30, 1907.

DEBIT.		
Operating expenses		\$9,647,145.28
For general expenses.....	\$983,996.49	
For maintenance of roadway and buildings	1,060,659.69	
For maintenance of equipment.....	1,011,633.62	
For transportation expenses.....	6,500,855.48	
Taxes		966,974.68
West End Street Railway Company's tax on capital stock and property.....	525,509.34	
Boston Elevated Railway Company's tax on capital stock and property.....	318,189.42	
Boston Elevated Railway Company's compensation tax on income.....	123,275.92	
Coupon Interest on West End Street Railway Company's bonds		650,318.89
Coupon interest on Boston Elevated Railway Company's bonds		306,388.90
Rentals of leased railways.....		1,250,416.50
Rental of East Boston tunnel.....		51,371.09
Rental of Subway.....	224,895.95	
Less amount collected of Boston & Northern Street Railway Company.....	17,622.46	207,273.49
Depreciation fund		100,000.00
Dividends paid on capital stock.....		708,000.00
Balance carried to surplus account.....		33,278.89
Total		\$14,011,167.72
CREDIT.		
Earnings from operation.....		\$13,952,966.00
From passengers carried.....	\$13,546,779.20	
From carriage of mails	38,898.15	
From tolls for use of tracks by other companies	41,214.13	
From rentals of real estate.....	159,799.69	
From advertising	93,170.09	
From interest on deposits, etc.....	64,397.26	
From miscellaneous income	8,707.48	
Interest from special deposits.....		58,201.72
Total		\$14,011,167.72

TRAFFIC STATISTICS.

ROUND TRIPS.	
Run by elevated passenger cars.....	986,034
Run by surface passenger cars.....	4,600,794
Run by U. S. mail cars.....	19,788
Total	5,606,616
REVENUE MILES.	
Run by elevated passenger cars.....	7,802,457
Run by surface passenger cars.....	44,027,731
Run by U. S. mail cars.....	231,381
Total	52,061,569

PASSENGERS CARRIED.	
Revenue passengers on elevated and surface cars.....	271,084,815
RECEIPTS.	
From revenue passengers on elevated and surface cars....	\$13,546,779.20
From U. S. mail cars.....	38,898.15
Total receipts from car operation.....	\$13,585,677.35
Average receipts per revenue passenger.....	4.997 cents

THE PITTSBURG PAY-AS-YOU-ENTER EXPERIMENT

An interview with Duncan McDonald, general manager of the Montreal Street Railway Company and president of the Pay-as-you-Enter Car Company, on the Pittsburg pay-as-you-enter experiment, appeared in the New York Globe for Jan. 4. Mr. McDonald said that he had just returned from Pittsburg, and that the failure was due to an attempt to use the pay-as-you-enter system with short platform cars. The difficulties were further enhanced by the fact that in the Pittsburg cars there is no exit from the front platform. If everybody had been prepared with their nickels matters might not have been so bad, but it took time to make change and, with little room on the rear platform for waiting passengers, the cars were delayed. Mr. McDonald said that similar conditions will not exist when the pay-as-you-enter cars are put in operation in New York City. He referred to the fact that 150 cars of this type had been in successful operation in Chicago since Nov. 25, and 150 more have been ordered. He also mentioned the order of the Public Service Corporation of New Jersey for cars of the same type.

THE CLEVELAND SITUATION

Impressions have been gained from what has been said by Mayor Johnson to F. H. Goff and others, that he will attempt to secure legislation the coming winter that will allow the city of Cleveland to acquire not only the street railway system, but the lighting system and other public utilities. In order to do this, an extremely large bond issue will be necessary and the Mayor will be compelled, of course, to induce the General Assembly to pass a special act that will allow an increase sufficient to carry out his purpose. This will mean an addition of \$70,000,000 or \$80,000,000 to the present indebtedness of \$28,000,000.

In support of the statement of Engineer Clark regarding the charges made by the city for cleaning the streets after the Cleveland Electric had completed track laying or repairs, F. H. Goff exhibited a bill for \$145.50 a mile for cleaning stretches of St. Clair Avenue. Both the Mayor and Superintendent of Streets Hanna tried to explain this bill by saying that the street was left in a terrible condition and that the sand was three inches deep in the gutters. Mr. Goff said he wondered how this could be with the care that is generally taken to take away the material and the litter that is left. The impression left by this showing was that the city officials had forgotten the charges that were made at times for the work. At the same time the Mayor stuck to his declaration that Mr. Clark was wrong in his figures. In case he is right, the Mayor said he would be willing to apologize.

Mr. Goff said that Clark had put the average weight of rails at 80 pounds and that the Mayor had ridiculed the idea, but that City Engineer Hoffman now says that this is correct. Again the Mayor said he would apologize if he is wrong. Mr. Goff, however, told him that he might do much harm by trying to discredit the statements of members of the committee on the floor of the Council chamber, when his own information is not correct.

During a conference between Mayor Johnson and Mr. Goff after the regular meeting the subject of a security franchise was taken up. The Mayor said he thought that an act of the Legislature could be secured which would allow a security franchise that would continue twenty-five years after a possible forfeiture. Mr. Goff said that he would have to know that the earnings are properly secured, but that he did not want it made possible to forfeit easily. He and the Mayor also considered the question of the parties to the negotiations, the Mayor saying that they are between the Cleveland Electric and the public, while Mr. Goff said they are between the Cleveland Electric and the Municipal Traction Company. As to the rate of fare to be incorporated in the security franchise, Mr. Goff said that he would confer with Secretary Davies, and if he, after figuring the problem out, thought that seven tickets for a quarter would pay at the end of the grant, he would accept it. Otherwise he would demand a higher rate of fare. Mr. Goff contends that legislation along municipal lines will not be popular and that it will be hard to get a law enacted allowing any special privileges before the expiration of the franchises, if the date is as claimed by the city. The committee on expiration of franchises has had several private meetings; but no report has yet been made.

In the discussions last week, Mayor Johnson said that the value of the paving should be placed at what it would cost another company to reproduce it. This is the way he wants to get at the matter, although the cost to the Cleveland Electric may have been quite different. Mr. Goff said that if a figure is to be placed upon the value in that manner, then the cost to the Cleveland Electric may as well be taken. C. H. Clark reported an estimated value of \$2,048,000 for the paving, while the other member of the committee, City Engineer Hoffman, placed the value at \$1,500,000. The mayor said he would rather call the figures guesses, and asked if some more satisfactory basis could not be reached.

Mayor Johnson proposed to Mr. Goff that, as soon as they receive the report of Messrs. Tolles and Baker on the dates of franchise expirations, that they take what they believe will be the physical value of the property and go ahead with the negotiations, going back and correcting the figures to correspond with the actual value after they are through. Whether Mr. Goff will agree to this or not remains to be seen. He did not accept the proposition at the time. However, the committee

on franchise expirations does not seem to be in any particular hurry to make a report.

A brief prepared by Judge Sanders was read at the meeting Thursday, in which it was contended that paving is in the nature of a tax upon the company in return for the franchise grants made to it. As Judge Sanders is one of the attorneys for the Cleveland Electric in some of its suits the mayor expected this brief to have considerable effect. It was prepared for use in another case some time ago.

Mr. Goff a few days ago suggested to Mayor Johnson that the Cleveland Electric system be leased to the city directly and that the terms of the lease be made so strong, as well as those of the security franchise, that there would be no opportunity for corruption in any way and that the term be a long one. The Mayor replied that this is just what he is trying to do, but owing to existing laws, it must be done through a holding company. The city has no authority to own or operate street railway lines and, unless the Mayor succeeds in getting through certain legislation, this can not be done at all, if a settlement is to be made within a reasonable time.

Hereafter the council committee of the whole will consist only of the members of the Council. Since the election the committee has been made up of members and members-elect of the Council, but when the new men took their seats, the old ones went out of the committee as well as the city law-making body. The only reason for including the members-elect was to get them acquainted with the questions before the body before they went into office.

PLANS FOR THE CHICAGO RAILWAYS COMPANY

It is expected that the Chicago Railways Company will be in full possession of the Union Traction Company properties by Feb. 1, when the time limit for acceptance of the new traction ordinance expires. Public sale Jan. 25 will be a formality. Within three years, according to the terms of the ordinance, the company must entirely rehabilitate the lines, which means that 118 miles of new track must be laid, to say nothing of extensions. The old company, during 1907, laid 20 miles of new track and spent \$2,000,000. Work to be done will cost \$25,000,000. There must be in operation within three years 1200 double truck cars. Making due allowance for what the company has, the car item alone will amount to more than \$5,500,000. During the first year only 225 of the new cars need be put in operation. A central power plant would cost \$5,000,000. City officials have estimated the addition to the city revenue from the 55 per cent of net receipts, as provided for in the ordinance, at \$500,000 a year. An almost equal annual contribution will come from the Chicago City Railway. Both franchises took effect as of Feb. 1, 1907.

No important changes in the personnel of traction management are expected. John Z. Murphy, who has had charge of the reconstruction work on the Union Traction the past year, it is said, will be appointed engineer for the Chicago Railway Company on the supervising board of engineers. John M. Roach will be president or general manager of the company. Final orders and decrees entered by Judge Grosscup, preliminary to foreclosure sale of the Union Traction properties, provide as follows:

That all of the properties go at auction, under foreclosure, to the highest bidder and that "pending and in aid of this sale," the receivers execute a lease thereof to the Chicago Railways Company. The latter must raise \$12,000,000 for rehabilitation. Lease holds good until absolute title passes.

Only one claim—a receiver's certificate for \$10,000—out of the \$61,000,000 represented by the various interests involved, stood out against the reorganization plan. Consent of all the trust companies representing the bondholders finally assured the success of the modified arrangement. Outstanding bonds amount to \$25,699,000, and \$22,461,500 of these were deposited in aid of the plan. No bondholder refused to come in. Consents from the stockholders of the parent and subsidiary companies ran from 80 to 90 per cent.

Union Traction receivers must execute a lease of the properties, which lease must be accepted formally by the Chicago Railways Company within a month, and probably will be within a week. The new company will bid the amount of the bonds it represents when the property is sold by Master in Chancery Bishop, whereupon he will issue a mortgage foreclosure deed, and the legal transaction will be completed.

STREET RAILWAY PATENTS

UNITED STATES PATENTS, ISSUED DECEMBER 24, 1907.

874,477. Railway Signal; Harry M. Abernethy, Cleveland, Ohio. App. filed April 3, 1906. A signal of the type operated by a gear train driven by an electric motor, the motor being clutched into relation to raise either a danger or caution signal according to the completion of circuits. The signals are dropped by an magnet-operated trip.

874,490. Derailing Device; William O. Clegg and Oscar J. Asmann, Palestine, Tex. App. filed May 6, 1907. Details of construction.

874,491. Switch for Street Cars; William H. Coombs, Rockford, Ill. App. filed Aug. 26, 1907. Relates to mechanism whereby switch-points may be engaged and thrown from the platform of a moving car.

874,508. Brake for Electric Cars; Moses G. Hubbard, Jr., Austin, Ill. App. filed Nov. 18, 1896. A vehicle brake having its power controlled by the speed of one or more of the wheels thereof, in combination with automatic yielding mechanism for holding the vehicle from moving when stopped until the operator releases the brake.

874,558. Alternating Direct-Current System of Control; Howard L. Beach, Wilksburg, Pa. App. filed March 3, 1906. Relates to the control of the trolleys for electric locomotives adapted to take electric current from an overhead trolley or third-rail system, as desired. Includes electrically operated pneumatic apparatus.

874,559. System of Control; Howard L. Beach, Wilksburg, Pa. App. filed March 3, 1906. A system for the control of motors adapted to be operated either by direct or alternating current. Provides means whereby the circuits of the system may be arranged automatically in accordance with the character of the energy supplied.

874,567. Electric Controller; Roy W. Brown, Amsterdam, N. Y. App. filed Feb. 19, 1907. A construction of rheostat having a contact which is spring actuated to move in one direction and an electromagnet for controlling said contact.

874,568. Car; Ezra S. Bucknam, Philadelphia, Pa. App. filed Feb. 7, 1907. Relates to a double-sash car window and provides means whereby the raising of the lower will also raise the upper sash.

874,608. Danger Signal; Clevia J. Luther, Desloge, Mo. App. filed Aug. 13, 1907. Apparatus responsive to a rise of water level, or fire, to effect the closure of circuits to operate danger signals.

874,630. Third-Rail Attachment for Electric Cars; George H. Sohn, Lincoln, Cal. App. filed June 10, 1907. Relates to current collectors for underground trolley systems having a special truck which runs upon a grooved conduit and has a depending shoe engaging the conductor in said conduit.

874,635. Registering Device; Ralph Storm, Joseph F. Underwood and Robert Jackson, Waterloo, Ia. App. filed May 10, 1907. Provides registering mechanism to be used in railway stations whereby a record may be made and kept of passing trains and of their stopping for orders.

874,638. Controller; Emmett W. Stull, Norwood, Ohio. App. filed May 3, 1906. Provides means whereby an injured or disabled motor may be cut out of circuit without interfering with the regulation of the remaining motor or motors.

874,663. Brake-Shoe; William E. De Voe, Chicago Heights, Ill. App. filed July 17, 1907. A back for a brake-shoe formed with a flange and tread portions, and a reinforcing strip formed partially from each.

874,857. Brake; John H. Meredith, Altoona, Pa. App. filed April 3, 1907. Automatic means to compensate for the wear of the brake shoes.

874,869. Control System for Electric Vehicles; Olof A. Sandborgh, Swissvale, Pa. App. filed March 3, 1906. Provides means for automatically completing circuit connections from one collecting device to a car when said device engages its supply conductor and for completing circuit connections from a second collecting device when the first is disengaged from the supply conductor.

PERSONAL MENTION

MR. W. B. SUTHERLAND, of Rochester, has been appointed counsel for the second district public service commission of New York.

MR. A. I. BRECKENRIDGE has been appointed purchasing agent of the Waterloo, Cedar Falls & Northern Railway Company, with headquarters at Waterloo, Ia.

MR. R. T. LAFFIN, who recently resigned as vice-president and general manager of the Manila Railway & Lighting Company, arrived in San Francisco recently on the liner *Manchuria*.

MR. A. L. SMITH has resigned as superintendent of transportation of the Lexington Railway Company, the Central Kentucky Traction Company and the Blue Grass Traction Company, and the position has been abolished.

MR. W. H. KEMPTON, who recently resigned from the Westinghouse Electric & Manufacturing Company, of Pittsburg, as engineer on line construction, assumed a similar position with the Johns-Pratt Company, of Hartford, Conn., on Jan. 1.

MR. W. A. McWHORTER, formerly master mechanic of the Birmingham Railway, Light & Power Company, of Alabama, has resigned to join the staff of the Galena Signal Oil Company as expert on street railway lubrication. Mr. McWhorter will be attached to the Atlanta office of the company, and will cover the territory south of the Ohio River and west as far as the Mississippi. Mr. A. Y. Evans has succeeded to the position of master mechanic at Birmingham.

MR. J. F. WESSEL, for a number of years with the General Electric Company at its Baltimore office, is now connected, as electrical engineer, with Mr. R. D. Apperson, president of the Lynchburg, Roanoke and Montgomery properties. Mr. Wessel is a young man of wide experience, and is very highly thought of by the General Electric Company, and before leaving its employ he was offered a much higher position, but preferred to associate himself with the Lynchburg Traction & Light Company, Lynchburg, Va.; Lynchburg Water Power Company, Lynchburg, Va.; Roanoke Railway & Electric Company, Roanoke, Va.; the Petersburg Gas Company, Petersburg, Va.; Montgomery Traction Company, Montgomery, Ala., in the operating department.

MR. CHARLES V. WESTON, who was elected president of the Chicago South Side Elevated on Jan. 4, has been associated with elevated roads in Chicago for the last 13 years. From 1875 to 1888 he was engaged in the location, construction and maintenance of steam railways in the Southwest. He came to Chicago to take charge of building one of the water works intake tunnels under Lake Michigan, and remained in the employ of the city until 1890, when he was engaged to supervise the construction of the West Chicago Street Railroad tunnel under the Chicago River. In 1894 this was completed, and Mr. Weston was made chief engineer in charge of the building of the Northwestern Elevated Railroad. He was later given charge of all of the new construction of elevated roads controlled by Mr.

Charles T. Yerkes, and designed and built the union loop and the extensions and betterments of the Lake Street Elevated. In 1901 he formed a partnership with his brother, Mr. George Weston, as consulting and contracting engineer. This firm was dissolved in 1903, when he was made chief engineer of the South Side Elevated, of which he has just been elected president. In the last four years he has had charge of the third track reconstruction on this road, also of its Englewood, Boulevard and Stock Yards extensions. He is, therefore, intimately acquainted with the property of which he is now the head, and of its many complex operating problems. On May 6, last, he was appointed by the Mayor of Chicago as the city's representative on the board of consulting engineers, which has charge of the rehabilitation of the traction lines in Chicago, which position he has resigned. Mr. Weston is a member of the Am. Soc. C. E., of the Western Society of Engineers, the Chicago Engineers' Club, and other societies.



C. V. WESTON

NEW YORK STATE STREET RAILWAY STATISTICS

The statistics of the street railway companies of New York for the year ending June 30, 1906, are now on file with the Public Service Commissions of the two districts to which the transportation interests of New York State have to report. The following table shows the capitalization and income report of those companies which are under the jurisdiction of the Commission of the Second District, or all of those outside of New York City. The list includes seventy-six companies, of

which fifty-one show a surplus after paying operating expenses and fixed charges and twenty-five a deficit. Last year the corresponding figures for the entire State were ninety-one companies reporting, of which fifty-four showed a surplus after paying fixed charges and thirty-seven a deficit. Of the seventy-six companies, this year nine paid dividends. Last year twelve companies paid dividends. The funded debt is that appearing as such in the balance sheet.

The Long Island Railroad is included in the accompanying table, although the greater part of its system is operated by steam, because a part of the road is equipped with electricity.

TABLE SHOWING CAPITALIZATION AND OPERATING STATISTICS OF THE NEW YORK STATE STREET RAILWAY COMPANIES, REPORTING TO THE PUBLIC SERVICE COMMISSION OF THE SECOND DISTRICT.

NAME OF COMPANY.	ON JUNE 30, 1907.		YEAR ENDING JUNE 30, 1907.				Surplus or Net Income for Year.	
	Capital Stock.	Funded Debt.	Total Receipts, All Sources.	Operating Expenses.	Charges on Earnings.	DIVIDEND PAID		
						Amount.		P. C.
Long Island R. R. Co.	\$12,000,000	\$42,418,703	\$10,260,183	\$7,938,993	\$2,614,631	.....	Def. \$293,441
International Ry. Co.	16,320,500	10,868,000	4,707,454	2,698,778	969,824	652,820	4	
Rochester Ry. Co.	6,000,000	4,375,000	2,451,701	1,484,018	516,067	270,000	4 and 5	
United Traction Co.	12,500,000	5,141,000	2,048,424	1,187,735	349,925	187,485	5 and 6	
Syracuse Rapid Transit R. R. Co.	4,000,000	3,899,000	1,176,767	686,516	282,710	67,263	5 and 6	
Utica & Mohawk Valley Ry. Co.	7,500,000	3,157,000	1,045,278	657,363	183,982	125,000	5	
Schenectady Ry. Co.	4,100,000	2,000,000	1,043,369	708,813	137,736	102,500	.....
Fonda, Johnstown & Gloversville R. R. Co.	2,500,000	6,537,000	794,933	402,582	356,818	.....	.....
Crosstown St. Ry. Co. (Buffalo)	2,860,000	2,974,000	668,289	381,059	192,922	114,400	4	
Hudson Valley Ry. Co.	3,000,000	7,845,000	618,614	415,640	202,248	.....	Def. 20,092
Yonkers R. R. Co.	1,000,000	1,000,000	417,587	338,265	120,770	.....	.....
Auburn & Syracuse Elec. R. R.	1,950,000	1,345,000	354,346	202,501	86,511	35,937	5 and 6	
Binghamton Ry. Co.	976,848	1,786,000	287,024	163,813	94,977	.....	.....
*Buffalo & Lake Erie Trac. Co.	7,500,000	6,500,000	285,670	181,202	148,581	.....	Def. 3,562
Albany & Hudson R. R. Co.	1,750,000	1,850,000	273,997	161,774	108,597	.....	.....
Rochester & Eastern Rapid Ry. Co.	1,500,000	1,500,000	258,984	168,963	120,115	.....	Def. 3,626
Elmira Wtr., Lt. & R. R. Co.	512,042	.....	224,817	162,949	51,696	.....	Def. 30,094
Niagara Gorge R. R. Co.	1,000,000	1,000,000	167,146	91,971	56,553	.....	.....
Jamestown St. Ry. Co.	100,000	300,000	166,445	104,778	33,591	.....	.....
Oneonta & Mohawk Valley R. R. Co.	1,800,000	1,300,000	165,937	145,896	45,225	.....	Def. 25,184
†Rochester, Syracuse & Eastern R. R. Co.	6,372,500	2,757,000	145,605	92,762	73,779	.....	Def. 20,936
Kingston Consolidated R. R. Co.	400,000	700,000	142,246	85,053	40,025	8,000	4	
New York & Stamford Ry. Co.	500,000	426,000	136,748	127,370	30,014	.....	Def. 9,168
Syracuse, Lake Shore & Northern R. R.	1,268,000	.....	136,345	95,076	4,961	.....	Def. 20,636
Orange County Traction Co.	325,000	425,000	133,029	118,237	33,900	.....	Def. 36,308
Tarrytown, White Plains & Mamaroneck Ry. Co.	300,000	300,000	132,386	144,086	32,070	.....	Def. 19,108
Poughkeepsie City & Wappingers Falls Elec. Ry. Co.	750,000	366,000	124,650	93,258	27,878	.....	Def. 43,770
Ithaca St. Ry. Co.	325,000	315,000	113,644	80,422	22,137	17,875	5 1/2	
Peekskill Ltg. & R. R. Co.	650,000	612,000	111,164	37,237	33,236	19,000	6 and 2	
Syracuse & Suburban R. R. Co.	400,000	550,000	107,473	59,011	36,499	.....	Def. 6,790
Genova, Waterloo, Seneca Falls & Cayuga Lake Trac. Co.	450,000	450,000	97,148	54,214	22,056	.....	.....
Chautauqua Trac. Co.	500,000	139,000	95,739	52,316	16,675	.....	20,878
Black River Trac. Co.	105,000	55,000	94,221	91,901	2,300	.....	26,558
†Western N. Y. & Penn. Trac. Co.	2,000,000	2,174,000	91,428	43,936	11,420	.....	20
Warren & Jamestown St. Ry. Co.	200,000	300,000	84,135	42,152	23,130	.....	36,072
Waverly Sayre & Athens Trac. Co.	200,000	500,000	77,303	53,793	10,800	.....	18,853
Cortland County Trac. Co.	320,000	500,000	77,298	43,624	17,644	.....	12,710
Rochester & Suburban Ry. Co.	420,000	450,000	70,860	43,785	51,176	.....	16,030
Cohoes Ry. Co.	120,000	84,000	70,051	52,528	6,894	.....	Def. 24,101
Wallkill Transit Co.	320,750	300,000	59,866	42,921	17,489	.....	12,001
Buffalo Southern Ry. Co.	547,200	500,000	58,940	41,838	1,817	.....	Def. 544
Oswego Trac. Co.	300,000	288,000	56,466	40,932	13,964	.....	15,295
Corning & Painted Post St. Ry.	100,000	100,000	53,247	31,592	7,781	.....	1,570
Elmira & Seneca Lake Trac. Co.	200,000	200,000	52,568	33,488	6,704	.....	13,874
Fishkill Elec. Ry. Co.	50,000	50,000	51,182	31,908	12,220	.....	12,376
Bennington & N. Adams St. Ry. Co.	650,000	448,667	48,360	36,994	10,833	.....	7,054
Eastern N. Y. R. R. Co.	300,000	300,000	45,109	23,653	16,864	.....	533
Buffalo & Williamsville Elec. Ry. Co.	75,000	117,500	36,603	25,039	9,745	.....	4,592
Odgensburg Street Ry. Co.	150,000	150,000	33,509	20,459	18,758	.....	1,819
Troy & New England Ry. Co.	180,000	183,725	33,463	31,157	774	.....	Def. 5,718
Penn Yan, Keuka Park & Branchport Ry.	94,000	100,000	30,028	21,788	7,520	.....	1,532
Rome City St. Ry. Co.	150,000	200,000	29,651	20,004	11,417	.....	720
Hornellsville & Canisteo Ry. Co.	50,000	80,000	26,152	12,532	4,033	.....	Def. 1,771
Plattsburg Trac. Co.	100,000	80,000	25,522	16,112	6,950	.....	9,587
Rochester, Charlotte & Manitou R. R. Co.	97,500	81,250	25,095	15,182	5,048	.....	2,460
Oneida Ry. Co.	2,000,000	10,000	24,409	22,847	1,563	.....	4,865
Marcellus & Otisco Lake Ry. Co.	200,000	200,000	23,597	16,011	11,150	.....	1,999
New Paltz, Highland & Poughkeepsie Trac. Co.	100,000	100,000	23,207	15,161	4,876	.....	Def. 3,564
Keeseville, Ausable Chasm & Lake Champlain R.R. Co.	60,000	175,000	23,514	15,570	7,128	.....	3,170
Hornellsville Elec. Ry. Co.	50,000	70,000	22,341	16,215	3,900	.....	816
Huntington R. R. Co.	30,000	26,000	20,755	17,719	1,887	.....	2,226
Glen Cove R. R. Co.	10,000	loans 50,862	18,496	20,395	477	.....	1,149
Buffalo & Depew Ry. Co.	305,000	350,000	16,041	22,754	18,683	.....	Def. 2,376
St. Lawrence International Elec. R. R. & Land Co.	250,000	200,000	14,957	7,025	1,357	.....	Def. 25,396
Catskill Elec. Ry. Co.	138,000	132,000	14,839	13,534	7,104	.....	6,575
Port Jervis Elec. Lt., Pwr., Gas & R. R. Co.	150,000	95,000	13,898	16,759	6,376	.....	Def. 5,799
Nassau County Ry. Co.	35,000	.....	12,780	11,735	397	.....	Def. 9,437
Newark & Marion Ry. Co.	100,000	250,000	11,583	10,841	425	.....	3,905
φ Buffalo, Dunkirk & Western R. R. Co.	3,500,000	750,000	11,514	4,500	19,500	.....	345
Lima, Honeoye Elec. Lt. & R. R. Co.	Private ownership	.....	9,694	10,045	205	.....	Def. 12,536
Northport Trac. Co.	45,000	.....	9,657	10,170	251	.....	Def. 556
φ Paul Smith Elec. Lt., Pwr., & R. R. Co.	200,000	400,000	8,148	3,655	6,028	.....	Def. 764
Adirondack Lakes Trac. Co.	60,000	100,000	7,751	7,325	5,593	.....	Def. 1,535
Elec. City Ry. Co.	80,000	.....	6,370	3,308	597	.....	Def. 5,167
Fulton & Oswego Falls St. Ry. Co.	15,000	15,000	2,564	2,869	1,498	.....	2,465
Babylon R. R. Co.	25,000	33,000	155	450	1,692	.....	1,803

* 6 mos. end. June, '07. † Nov. '06 to June 30, '07. ‡ To Nov. 15, '06. φ 6 mos. end. Dec. 31, '06. θ Aug. '06 to June 30, '07.