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Through Routes and Joint Rates.

Two representatives from Iowa electric railways made the principal protest at Washington against the clause in the railroad rate bill that was designed to withhold from the Interstate Commerce Commission power to prescribe through routes and joint rates between steam and electric carriers. Properties in all sections of the country, however, are vitally interested in the outcome and we believe that the omission in the amended bill of the clause to which objection was raised will be approved by most roads which are especially concerned in legislation upon this subject. The facts in the case may be summarized briefly in the statement that while, under the existing law, the interstate commission has authority to direct the installation of through routes and joint rates between carriers of the two classes, it was proposed by amendment to take away the power of this commission to prescribe the establishment of through traffic routes between steam roads and electric passenger railways. The freight traffic that will be developed by many interurban electric railways if they establish through routes with steam roads will have an effect upon the revenue that will be much smaller in importance than the benefit to the public in many localities that are now without adequate transportation facilities.

Developments in the South

So much has been written about the "New South" during recent years that electric railway men doubtless will be interested to learn to what extent their brethren in the Southern States are keeping pace with the developments in electric transportation which are going on in other parts of the country. A study of the traction conditions in the South Atlantic States was recently made by a representative of this paper and it is gratifying to report that in its electric railway systems every Southern city visited is showing the same enterprise and progress which it is customary to associate with the improved development of the agricultural and manufacturing resources of that section of the country. This condition is not based upon any forced or "boom" growth of the different cities, but is due entirely to the better exploitation of the splendid resources of the South. For a generation after the Civil War these resources lay almost dormant. Now capital is pouring into this territory from all sides and under this impetus, the people are showing an activity hardly suspected by the rest of the country. A visitor to Atlanta, for instance, seeing its bustling population, its busy manufactories and its network of railroads could easily imagine himself in a miniature Chicago. The upward industrial movement naturally has had a most favorable influence on the electric railways. Hitherto most of these roads have been controlled almost wholly by local capital and the properties, although well maintained, have been managed along the most conservative lines with regard to extensions which would require large bond issues. Outside capi-

talists, however, are appreciative of the fact that the electric railways in a rapidly-growing country can be made attractive investments. Hence they are now putting their money into the properties for such purposes as the extension of the lines and the construction and equipment of modern power stations, car-houses and shops. It is not likely that the near future will bring any radical changes in standards of car line and track as these divisions of railway work appear to be all that could be desired for the conditions obtaining in each case.

The Philadelphia Strike

The underlying cause, in fact the only reason for the strike and scenes of disorder which have disgraced Philadelphia during the past 10 days, is a demand for the recognition of the union. All other reasons or excuses which have been put forward by the strikers and their sympathizers have been advanced to cloud the main issue. Up to this time, the company has consistently refused to grant this recognition or to treat with its employees, except on the basis that union and non-union men should have equal rights and treatment. This position it not only has a legal and moral right to take, but it should be supported in this attitude by all right-thinking people. It is for the citizens of Philadelphia to determine whether the tremendous cost to which they and the company have been and are being subjected is warranted by the effort to make the company discriminate against its non-union employees.

The history of the differences which led up to the present strike is brief. On June 5, 1909, the company signed an agreement with its employees in regard to wages and other matters to continue in force up to June 30, 1910. The text of this agreement was published in the *ELECTRIC RAILWAY JOURNAL* for June 12, 1909, and contained four sections. The first provided that the company, through its accredited representatives, would meet with the accredited representatives of the employees, to adjust any differences or grievances which might arise. The second provided the way in which the employees should obtain uniforms. In the third, the company agreed that when an employee was suspended or discharged, and after an investigation it should be found that he had been unjustly suspended or discharged, he should be reinstated to his former position and paid for the time lost. It also provided "that the wage schedule shall be 22 cents per hour for the surface men and the same proportionate increase for the elevated men from June 5, 1909, to June 30, 1910," provided that the report of the audit of the city controller for 1908 sustained the company's statement that its receipts did not warrant any further increase beyond 22 cents. In such cases, the wage schedule should be immediately adjusted. The fourth section stated that the agreement should be binding on both parties up to and including June 30 of the present year.

This agreement was made with the employees as a whole. At the same time the company issued a statement denying any obligation to deal exclusively with the union, then comprising not more than one-sixth of the company's employees. It said it was prepared at the time the agreement was signed, and it had always consented, to receive complaints and communications from all kinds of its employees and to adjust these complaints to the best of its ability, but that there were few, if any, concessions in the agreement then just made which could not have been obtained peacefully by the employees.

As will be seen, the agreement was to continue until June 30

of the present year, and negotiations were under way for the wage schedule which was to go into effect on July 1, 1910. In the meantime, the discharge of a number of men for various breaches of discipline some two weeks ago was made an excuse by the union for the present strike, which they call a "lock-out." At the same time, the members of the union were forbidden by their leaders to return to work, until the company should agree to pay 25 cents an hour, although the agreement provided that the present rate of wages should continue until June 30, 1910.

Thus the two issues are, the right of the employees to deal directly with the company, whether they belong to a union or not, and the question whether in the future mob rule and violence are to be recognized in Philadelphia as the favored and most efficacious means for securing advances in wages and other concessions from employers.

That the leaders of the union realize they are losing ground is shown by their insistent demands for arbitration, but we do not see that there is any question to arbitrate. The rate of wages to be paid after June 30 is still to be settled, but the present is no time to take up that question. In fact, the experience of the company with the agreement of last June demonstrates the futility of contracts of a character which hold one side, but not the other. Until some method shall be devised by which a penalty may be attached and can be enforced against employees or the members of a union as a body for violations of trade agreements, we cannot look upon them seriously or regard them as practicable methods to be used in the settlement of a controversy between capital and labor.

The public in Philadelphia can settle the struggle in a few days, if it wishes, but not through arbitration. If peace should be secured in this way, it would be an armistice only and the embers of the present struggle would burst forth again into flames within a short time. But if the citizens of Philadelphia adopt the advice of the Mayor, who seems to have kept his head during the struggle, and insist on a termination of the presents acts of disorder, the situation will right itself, as it is now fast doing.

Direct Current on the Washington, Baltimore & Annapolis

Another chapter was added last month to the history of electric railway distribution systems when the Washington, Baltimore & Annapolis Electric Railway Company changed from single phase to 1200-volt direct current. It is a curious coincidence that this road on which the single-phase system has now been displaced was the first in the country in which the use of that system was seriously considered, although a change of ownership occurred before the system was finally installed. We hardly believe that the action of the company will be considered as a reflection upon the single-phase system *per se*, but simply that it was not adaptable to the particular set of conditions existing on this road. One of the foremost of these adverse circumstances was the necessity of using a 600-volt single-trolley system in Baltimore and a 600-volt double-trolley and an underground conduit system in Washington. A second objection was that the Washington conduit tracks were unsuitable for the long, heavy cars which were necessary with the complicated electrical apparatus required when single-phase motors were used with each of the varieties of direct current distribution mentioned. A striking feature of the conversion was the absence of interruption to the service by the change.

Double Claim for Damages

The Kentucky Court of Appeals was recently called upon to decide an interesting case, John Raymond's Administrator vs. Louisville Railway Company, in which the court decided that the settlement of a claim for damages made in good faith and without fraud precludes the recovery of a judgment for the death, at a subsequent time, of the person injured. The case has just been reported in 123 Southwestern, 281, and is of such general interest as to merit consideration.

A little over a month after Raymond was injured by a car, he compromised with the company by accepting \$20 in full settlement of all claims which he had against it because of the accident. He died about six months afterward. Nearly a year later his administrator sued the company for the loss of his life, alleging that his death was the result of the injury he had sustained. As a bar to the action the company pleaded, among other things, the written settlement which it had made with the decedent.

At common law a civil action could not be maintained to recover damages for the death of a human being. In 1846 the English Parliament passed what is known as Lord Campbell's Act, the purpose of which was to do away with the common law principle just stated, and similar acts have been generally passed by the States of the Union, but the recovery thus permitted is purely statutory and the statutes have generally been strictly construed. The Kentucky constitution provides, following Lord Campbell's act, that when death shall result from an injury inflicted by a wrongful act, damages may be recovered, and subsequent statutes specify through whom the suit may be brought.

The holding of the Kentucky court, briefly stated, is that the constitution and statute did not create a new cause of action, as claimed by the plaintiff, distinct from that which accrued to the decedent, and that a personal representative cannot sue in damages for death and also for physical pain and mental suffering. A recovery for one bars an action for the other. The reason for this rule is that only a single wrong is committed, and while the law gives the injured person or his representative two remedies for that wrong, either of which can be used, there cannot be two recoveries by them for the one injury.

The debates in the constitutional convention and the intention of the legislature in passing the subsequent acts, upon which plaintiff relied, are considered by the court in an opinion too long to be reviewed in detail, but cases which sustain the court's contention are cited from the law reports of England, Vermont, Indiana, Rhode Island, New York and Georgia.

We are inclined to agree with the Kentucky court that the authorities are consistent and uniform. The rule has been thus stated by a well-known text book:

"The right of action in the personal representatives, it has been held, depends not only upon the character of the act from which death ensued, but also upon the condition of the decedent's claim at the time of his death. If the claim was in such a shape that he could not then have enforced it had death not ensued, the statute gives the executors no right of action, and creates no liability whatever on the part of the person inflicting the injury. Therefore, where in an action by the personal representative of a person to recover damages for his death, caused by the wrongful act of the defendants, it was shown that the defendants settled with the deceased in

his lifetime, and paid him the amount of his claim on account of injury, it was held that this would bar the plaintiff's action. Such a release is invalid if secured by unfair means."

Of course, under certain conditions, two causes of action may arise for a single injury. For example, if a child is hurt and the parent settles, this does not bar an action by the representative of the child because two actions lie for the injury, one by the parent, which he settled, for loss of services, and the other by the child for pain and suffering. The same would generally be true if a married woman had been hurt.

The subject is an interesting one, and should be clearly understood by claim departments of railway companies and their adjusters in making settlements.

Hudson & Manhattan Power Station

Electric power is now being generated on so vast a scale in and about New York City that the inauguration of a new power station, even of monumental size, hardly arouses the interest it deserves as an engineering achievement. When electric railway train service is so uniformly smooth from the beginning as that operated by the Hudson & Manhattan Railroad even the engineering fraternity may be profitably reminded of the perfection of detail with which the power generating system has been worked out. A brief description of it in this issue by Hugh Hazleton, one of its designers, is therefore worthy of notice.

The power station is advantageously located, both with respect to its load and coal and water supply. It would appear that bedrock at the power house is near enough to the surface to obviate piling and at the same time to introduce some rather unusual construction for the intake and discharge tunnels. As in many other instances, some of the most difficult and fundamentally important construction work about a large power station is out of sight beneath the surface. It almost looks as if the pneumatic shield tunnel experts, who made possible the construction of the railroad itself, preferred that style of intake construction from force of habit, but it is also to be supposed that the subaqueous method was estimated to cost less than cofferdam construction under existing conditions.

The combination of the use of the vertical type of turbine with all boilers on a single deck enables the construction of a building of more uniform height than has sometimes been possible where very large power has been concentrated within a restricted area. The design of the building is worked out to make the boiler room nearly square instead of oblong, which may offer some operating advantages in cutting any battery in or out of service, with a simpler steam piping layout than is possible with the long-line style of boiler arrangement. The boiler units are increased to the unusual size of 900 hp, apparently by increasing the width rather than the height, and necessitating the division of each boiler furnace into two units. It does not appear that the floor space per boiler horse-power is appreciably less than in former installations, but some floor space is gained by raising the stack structures entirely above the boilers and economizers. The balanced draft system is used for greater fuel economy with firing and further to insure that the smallest possible number of heat units shall escape, the boiler settings are reinforced with magnesite covering and tightly sealed by being encased in steel plating. Even the furnace and ash pit doors are fitted with asbestos gaskets. The still unfilled want of an automatic stoker suitable for small anthracite coal is emphasized by the use of flat grates.

A good feature resulting from the shape of the boiler room is the subdivision of the coal-bunker system into compartments which would seem to aid in the distribution of the dead load on the supporting columns and also minimize the losses and inconvenience of bunker fires in case spontaneous combustion is possible with the fuel used. The situation of the power house for the receipt of coal by rail is much more advantageous than with most of the large stations about New York harbor, and it is presumably for this reason that the coal-handling system seems somewhat more complicated than is usual where coal is brought by water.

In the adoption of heavier and especially designed valves, flanges and fittings for the main steam piping, it is evident that the experience of large stations during the past 5 years in the use of superheated steam with turbines, has been profitably followed. So much has been learned in that time about the effect of superheat on piping and valves that its influence on the details of this plant would doubtless make an interesting story in itself.

The absence of electric driven auxiliaries, excepting one exciter, is noticeable, as is also the economy of space consequent upon combining the air and circulating pumps for each main condenser into a single machine of the vertical type.

Among the electrical features worthy of special note is the system of busbar and feeder group arrangement, by which a high degree of flexibility is assured in working out combinations between generators and feeders, though at the expense of a considerable number of extra switches, there being 13 besides those necessary for the generators and feeders alone, according to the diagram. Another remarkable thing about the electrical installation is the compactness with which the busbar structures and switch gear are disposed in the basement, excepting only the operator's benchboard which is in the usual elevated gallery and the rotary converter substation direct-current switchboard, which is on the main floor. The arrangement of so much of the switching apparatus in the basement requires less gallery space above the main floor and affords better lighting and ventilation than would otherwise be possible, besides saving considerable construction expense. It also speaks well for the confidence of the engineers in the reliability of the 11,000-volt switches selected.

The comparatively short distance to which the outgoing direct-current is transmitted and the vital necessity of quick control in case of emergency have caused the addition of some special distant control apparatus not commonly met in railway substations for sections of the third rail in the Hudson tunnel.

Although this is the third of the large power stations in the New York district which have been designed under the engineering guidance of Mr. Stillwell and his associates, it is the first of the three to be uniformly equipped with steam turbines, the others having been designed before turbines had come into common use in large sizes. While there is little in the description to indicate that there have been any further distinct advances during the past few years in the design or economy of the main items of generating apparatus as supplied by manufacturers, there is every evidence of intelligent effort on the part of an experienced engineering staff to work out from available means the best combinations for securing the economical generation of power.

Purchase of Power for Electric Traction

As a rule electric railways in this country generate their own power, but in a few conspicuous instances they have found it wise to purchase power from large producers who are able to furnish it on favorable terms. The figures quoted for power thus supplied have usually been low and it is therefore with considerable surprise that one picks up a recent report of the prices charged tramways for current in England. There are sixty-five towns in Great Britain having combined lighting and tramway generating stations under municipal ownership and the average price charged up against the tramway amounts to about 2.7 cents per kw-hour. In addition there are seventeen separate traction stations owned and operated by the local authorities and generating each over two million units per annum. These separate stations furnish current at an average price of 1.5 cents per unit, a figure that would stagger most electric railways in this country if proposed as an equitable figure for purchase of power.

These prices charged the tramways in Great Britain are notoriously high, higher even than the power rates of many of the same stations to their large power consumers, a fact due, in some cases at least, to a practice of embodying in the franchise for a privately owned road, or making an agreement with the tramways committee of a municipally owned road that it should take energy from the municipal power station at a high stated price. This phase of the topic may not be of particular interest to American railway companies, but it opens up the entire subject of equitable rates for electric service, which is of vital concern to many railway corporations in this country. And right here is the point at which we propose to propagate a heresy.

From a considerable experience in watching the operation of electric railway power stations we are pretty thoroughly convinced that the nature of the load and the cost of supplying it are things rather generally misunderstood by those who are not in the immediate work of electric railway engineering. Whenever an electric railway and a central station begin figuring on the cost of power there is a great hue and cry raised about the irregular load on the railway system. Now as regards small systems operating few cars on heavy grades the loads are undeniably irregular. On the other hand, a large tramway system operated under moderately favorable conditions gives a load factor as steady and almost as high as that found in general power service, save for cases like cotton mills which run as a whole or not at all, and at exceptionally steady output.

As a matter of fact, some electric railway generating stations, in spite of the alleged irregularity of the loads, do actually turn out energy at as low price per unit as any electric stations used for any other purpose, barring such instances as a few stations that own their own coal mines and are therefore enabled to get extraordinarily low fuel costs. The general load factor of a fairly good sized electric railway plant is far from bad. The loads from day to day are rather exceptionally uniform and the generating costs should be and often are low. True, a railway load has a high peak at times, but railways operating their own plants actually do get down to very low figures despite this peak. As we have said, the enormous prices we have quoted as current in England would seem in large measure to be due to methods of charging, excellently adapted to punish traction service. The rate itself

is not only often high but the charge is also frequently based on the now rather discredited maximum demand system. There is no denying the fact that one of the factors in the cost of supplying electrical energy is the maximum demand, but it is only one of the factors in the fixed charges, and in very many, perhaps most, cases not the controlling factor even in tramway load.

Methods of electrical charging are as a rule based on the good old commercial principle of charging what the traffic will bear, under whatsoever disguise the price may appear, and this is what it should be as a fair commercial proposition. That is, the supply company should obtain such a reasonable figure as the general conditions indicate, bearing in mind, of course, that as a public service corporation neither a supply station nor the electric railway it serves is at liberty to grasp for extraordinary profits. The general principle that the total cost of electrical energy may be divided into a fixed sum proportional to the general investment and a production cost dependent on operating expenses, is sound, if indeed one admits that the price charged should be in any direct way dependent upon actual costs rather than upon the basis of reasonable dividends.

It is a mistake, however, as a matter of fact, to suppose that the first element is correctly measured by the maximum demand of the consumer taken under arbitrary conditions. Such a proposition merely assumes the maximum demand to be the only variable in the quantity sought, and all the other factors to be taken as constant by general average. Obviously such matters as the relation of the time of maximum demand to the load of the station, the length of the maximum demand, the frequency with which the load rises over a given amount, and the distance from the station at which the load has to be delivered through costly cables, are all factors certainly commensurate in importance with the absolute amount of highest reading of the ammeter obtained in a certain month or quarter. The running costs pure and simple are much more easily put on a fair basis than the stand-by charges.

When it comes to a matter of trading regarding the prices to be paid for power by a tramway system, it seems to us that the matter should stand on the ordinary basis of buying and selling. The practical question for the tramway company is whether it can buy power cheaper than it can make it. If it can, it is sound business to do so, and we are inclined to think that with the enormous central supply stations now becoming common it will oftener and oftener pay electric railways to purchase their power.

On the other hand, the supply station desiring to sell power must assure itself of a reasonable profit. It is at liberty to figure this out on any basis of stand-by charges and operating charges that it sees fit, but the prospective customer is not really interested in that phase of the matter. If the question of stand-by charge has to be raised at all in figuring out the proposed purchase of power, it seems to us that instead of basing it upon any single factor assumed as variable and averaging the others, a more sensible procedure would be to ask baldly, "How much actual extra investment in apparatus, accessories and lines are you going to install when you take on our tramway load?" If heavy expense of this kind is entailed it is a perfectly proper and legitimate source

of a stand-by item in the price. If, on the other hand, such investment is chiefly theoretical, as we believe will frequently be found to be the case, then it has no place in the calculations. It is a very nice thing for a central station to take on a large consumer and figure out against him a large *pro rata* stand-by charge based on his maximum demand, if at the same time the load is actually assumed with the existing apparatus and without the slightest intention of increasing the concrete investment, save perhaps in cables for handling the new load. What really happens under such circumstances is that the station gets the benefit of an increased load factor and charges up a stand-by charge which it does not really incur. The only way in which a railway load is likely to be a heavy drain upon a supply station is by increasing the general peak, and a stand-by charge, reckoned on such increase, while preserving, so to speak, the factor of safety in the equipment, can be figured out with some fairness to both parties. Such increase will at least lead to a lower figure for stand-by costs than an assumed or measured maximum demand uncorrelated to the actual output conditions of the station.

Possible Coal Strike

If signs which have held true in the past are to be accepted at this time a strike of the coal miners in the Central States will probably occur on April 1. At least conditions in Indiana have taken such a turn that a settlement of the differences between the coal miners and the operators is spoken of as being very unlikely. The daily papers of Indiana, Illinois and Ohio predict that the Indiana mines will shut down on April 1, and that those of the other two States and perhaps Western Pennsylvania will follow shortly. The operators are said to be preparing for a protracted stoppage of the supply. They are accepting restricted orders for delivery after this month. It is also true that large users of coal, so far as possible, are storing large amounts of coal. One steam railroad is storing 200 tons a day at one point on its lines in Indiana.

Several electric railroads already are experiencing difficulty in obtaining any excess coal over that ordinarily received, because wholesale dealers will ship only in amounts sufficient to fulfill their contracts. The managers of some electric railroads have had the foresight to put by coal sufficient to run their plants for several weeks. One road some months ago made plans for storing a large amount of coal in an artificial pocket formed by the 14-ft. embankment at a junction of three inter-urban branches. It was planned to line the embankments and cover the bottom between with concrete. This would permit the coal to be stored under water at a moderate cost. An electrically operated grab bucket mounted on a flat car offers an economical means for reloading the coal.

It is not difficult to find a method of storing coal if the coal is obtainable. Of course, this is the time of the year when rumors that a coal strike is impending are common. It is impossible to tell whether these rumors have any greater foundation this year than last or the year before. Nevertheless, the management of many electric railway and lighting companies think that they are doing wisely to lay in an excess of fuel over the normal requirements. Coal is essential to the operating road and a note of warning has been sounded by several railway men. The situation will certainly merit careful watching.

POWER STATION OF THE HUDSON & MANHATTAN RAILROAD

BY HUGH HAZELTON, ELECTRICAL ENGINEER, HUDSON & MANHATTAN RAILROAD COMPANY

The power station which supplies electric energy for the operation of the Hudson & Manhattan Railroad is located in Jersey City, on the block bounded by Washington, First, Green and Bay Streets. This location is advantageous for the delivery of coal, as it is accessible to all the railroads entering Jersey City. This makes possible the shipment of coal directly from the mines to the power-house siding without break of bulk. Water for condensing purposes is obtained from the Hudson River through an intake tunnel about 1800 ft. long.

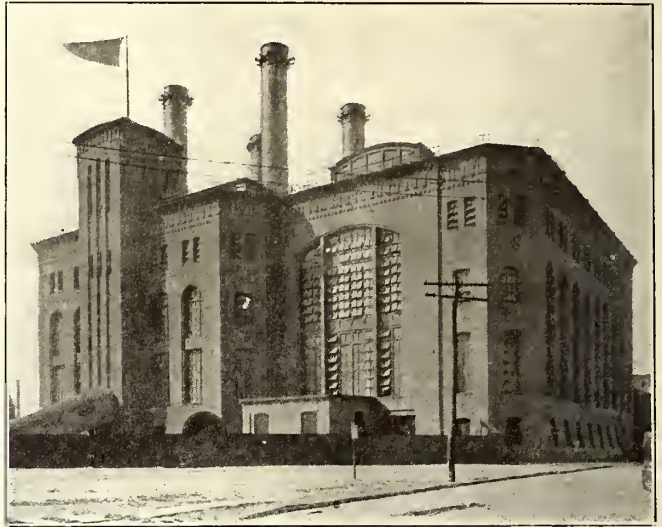
The power house is near the center of the Hudson Tunnel system, and is adjacent to the tunnels under Washington Street, thus minimizing the length of power cables.

The power is transmitted from this station, by means of three-phase, 25-cycle, alternating current, at 11,000 volts, to three substations, two in New York City and one in the power station building, as follows:

Substation No. 1.—Christopher and Greenwich Streets.

Substation No. 2.—Washington and First Streets (in the power-house building).

Four brick-lined, steel chimneys have been erected. They are supported on steel columns to allow maximum room for the boilers, and make it possible to place all boilers on one floor. The chimneys have an internal diameter of 11 ft. The tops are 180 ft. above the curb line and 98 ft. above the

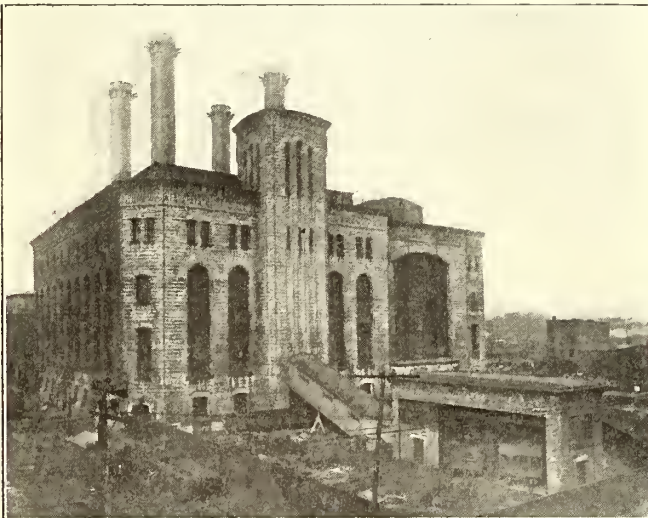


Hudson & Manhattan Railroad Power Station—Eastern and Northern Front

cornices. The two flue openings in the base of each chimney are placed diametrically opposite each other.

GENERATING ROOM

Two views of the generating room are given. One is taken looking toward the boiler room and shows the atmospheric exhaust piping. The other is from the opposite side of the generating room and shows the operating gallery, under which are the converters and transformers belonging to substation No. 2. The generating room is well lighted by means of large window surfaces on three sides as well as by a skylight super-



Hudson & Manhattan Railroad Power Station—Eastern and Southern Front

Substation No. 3.—Hudson Terminal Building, Cortlandt and Church Streets.

THE BUILDING

The eastern and southern fronts of the building are shown in the exterior view in which can be seen the tower which contains the equipment for handling coal and ashes.

The building has an average width of 210 ft., and is 195 ft. long. Provision has been made for an extension to a distance of 70 ft. to the westward for possible future requirements. The present installation consists of two 3000 and two 6000-kw turbo-alternators at normal rating, making a total generating capacity of 18,000 kw. One additional 6000-kw turbo-alternator and its necessary complement of boilers can be installed in the present building. Should the building be extended, two 6000-kw generating units could be added, making an ultimate generating capacity of 36,000 kw.

The foundations are of concrete carried down to bed rock. The floors, except where iron floor plates are used, are of reinforced concrete. All doors and interior window frames are kalomeined, while the exterior window sash, frames and doors are of iron or copper. The windows are glazed with wire glass as a protection against fire. The flat portions of the roof are of reinforced concrete, covered with terra-cotta blocks. The monitor roofs are covered with waterproofing of tar and gravel.



Hudson & Manhattan Railroad Power Station—Generator Room, Looking Toward Boiler Room

structure. As nearly all of the windows are fitted with pivoted sash, the ventilation is very satisfactory. The generating room is provided with an electric crane, having a 61-ft. span and equipped with one 50-ton and one 10-ton hoist.

TURBO-ALTERNATORS

The turbo-alternators are designed to operate at 175-lb. steam pressure with about 100 deg. Fahr. superheat. The turbines are

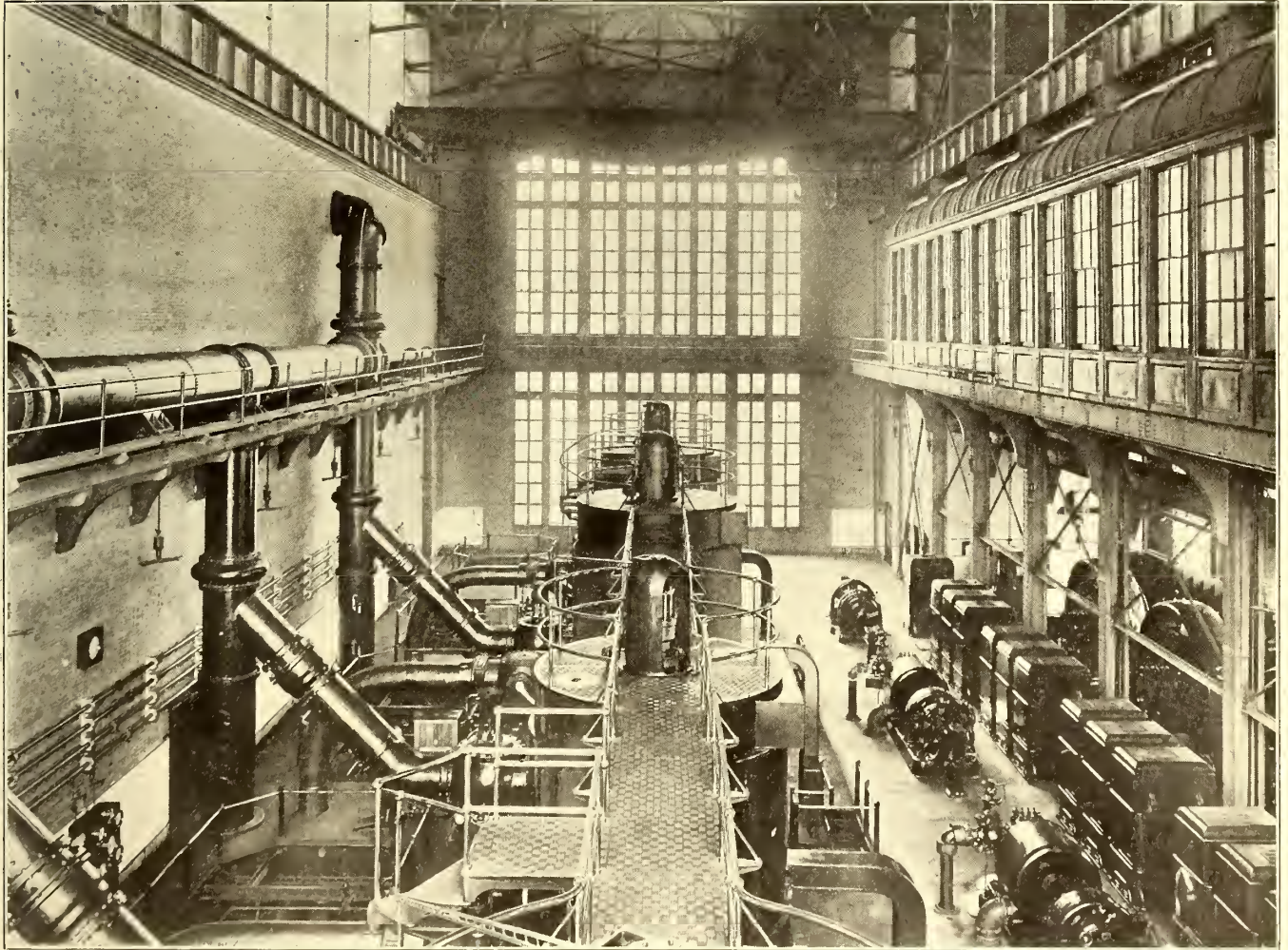
of the vertical shaft five-stage General Electric Curtis type, and are equipped with centrifugal safety stops.

Lubricating oil is distributed under pressure to the various journals, and is then filtered and returned to oil reservoir tanks. Four steam-driven, high-pressure pumps are provided for the step bearings, each pump having a capacity of 20 gal. of oil per minute at a pressure of 1100 lb. per square inch. These pumps were furnished by Dean Brothers, and possess the unusual feature of having high-pressure cylinders and steam chests of about double the customary weight. An accumulator maintains a constant pressure on the step bearings.

The alternators are designed to deliver three-phase, 25-cycle alternating current at 11,000 volts. They have a revolving field and stationary external armature. Exciting current at a

INTAKE AND DISCHARGE TUNNELS

Condensing water is taken in at the end of Pier H, in Jersey City, at a point about 600 ft. beyond the bulkhead line. The water is discharged from the power house into the river at the bulkhead. Between the power house and the bulkhead the tunnels are mostly constructed in rock, where they are lined with concrete provided with an internal facing of vitrified brick. The brick of the discharge tunnel are laid in a slag cement to resist the deteriorating effect of the warm salt water. At the termination of the rock, the tunnels were constructed in the river bed in the manner employed for the construction of the main railway tunnels under the river. A small shield was used for making the excavation, and the cast-iron tunnel plates were lined with concrete.



Hudson & Manhattan Railroad Power Station—Generator Room, Looking Toward Switchboard Gallery

potential of 250 volts is furnished by two 150-kw horizontal Curtis turbo-generator sets and one 150-kw motor-generator.

CONDENSERS AND CIRCULATING PUMPS

There are five surface condensers which were furnished by H. R. Worthington. Three of these contain 10,000 ft. of cooling surface each. The other two contain 20,000 ft. of cooling surface each. As will be seen from the plan, the middle small condenser is connected to the two 3000-kw turbines and the arrangement is such that either one of these turbines can be operated on either of two condensers. The gate valves between the 3000-kw turbines and the condensers are operated by steam. Each condenser is equipped with a centrifugal pump driven by a Kerr turbine, for returning the water of condensation to the hot well and storage tanks.

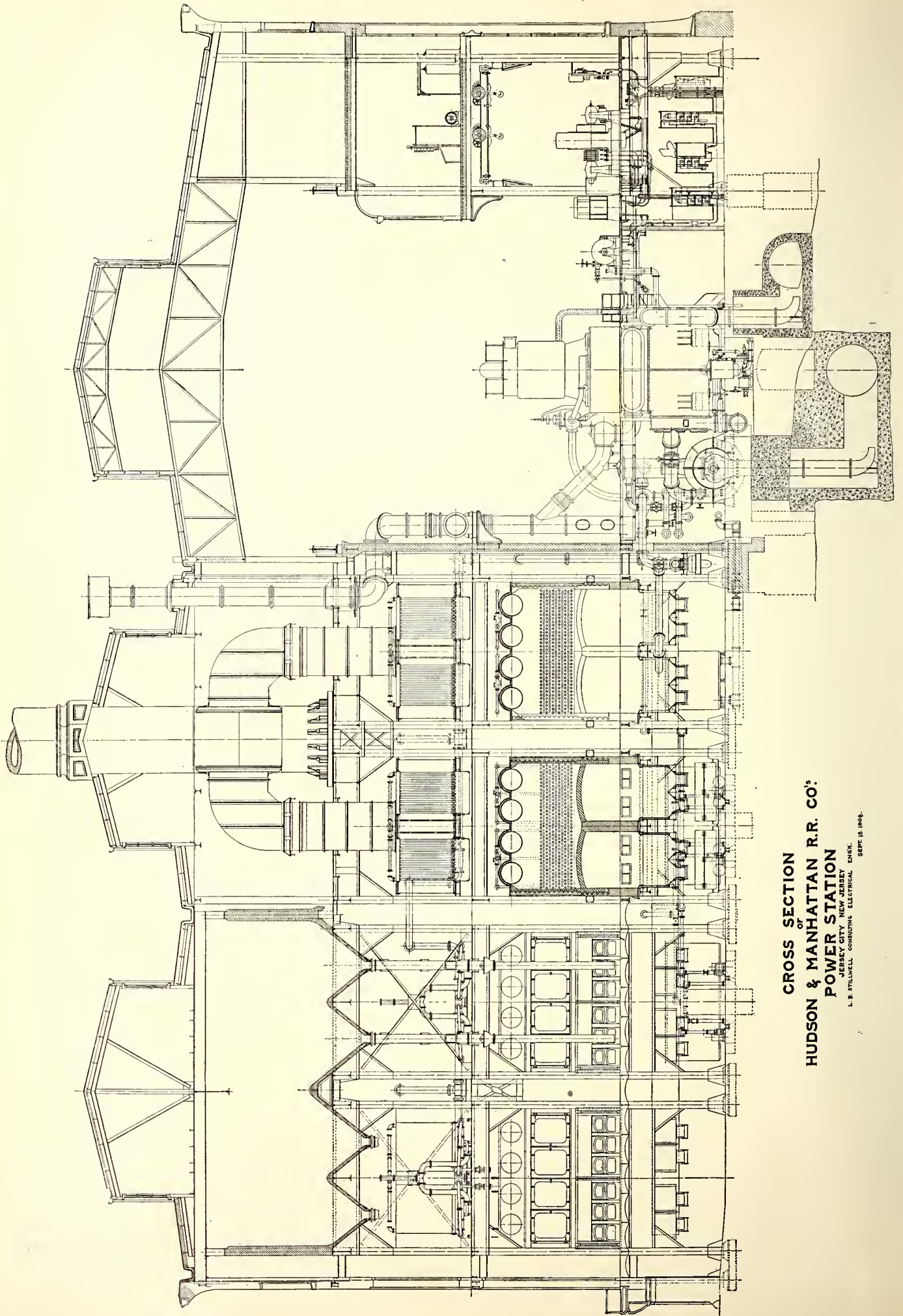
There are four combined circulating and air pumps, each unit consisting of one vertical steam engine, directly connected to one centrifugal circulating pump and one single-stage, dry-air pump proportioned to operate one 6000-kw condenser or two 3000-kw condensers.

BOILER ROOM

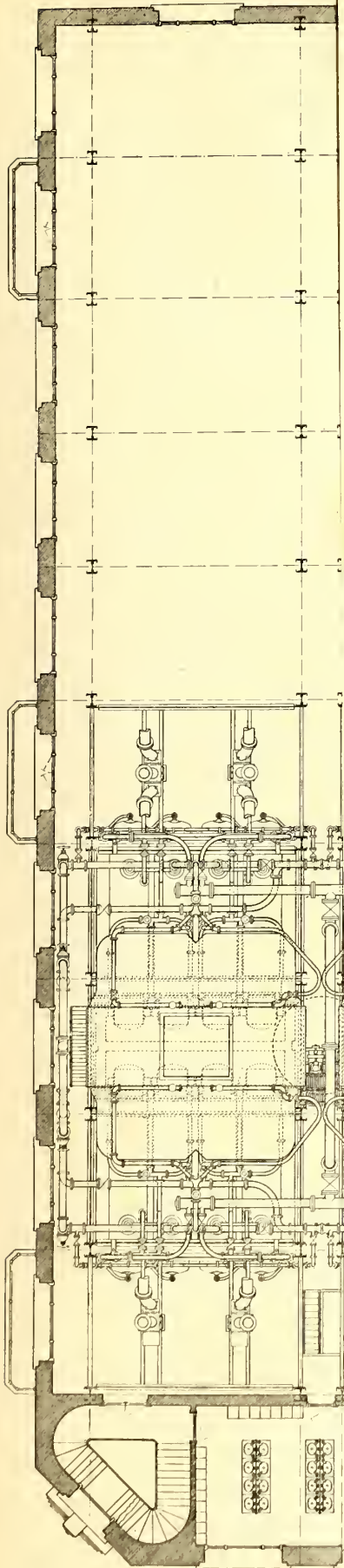
The present building is designed for 16 boilers of 900 boiler hp each. The ratio existing between the boilers and the generating capacity in the station is four 900-hp boilers for 6000 kw of generators. Each boiler is therefore capable of generating steam for 1500-kw capacity of turbines when the boilers are operated under normal conditions of draft and firing. As one of the 6000-kw generating units is a reserve unit, the boilers have been provided for the generation at normal rating of only 12,000 kw, that is, the station contains now eight boilers or half its capacity.

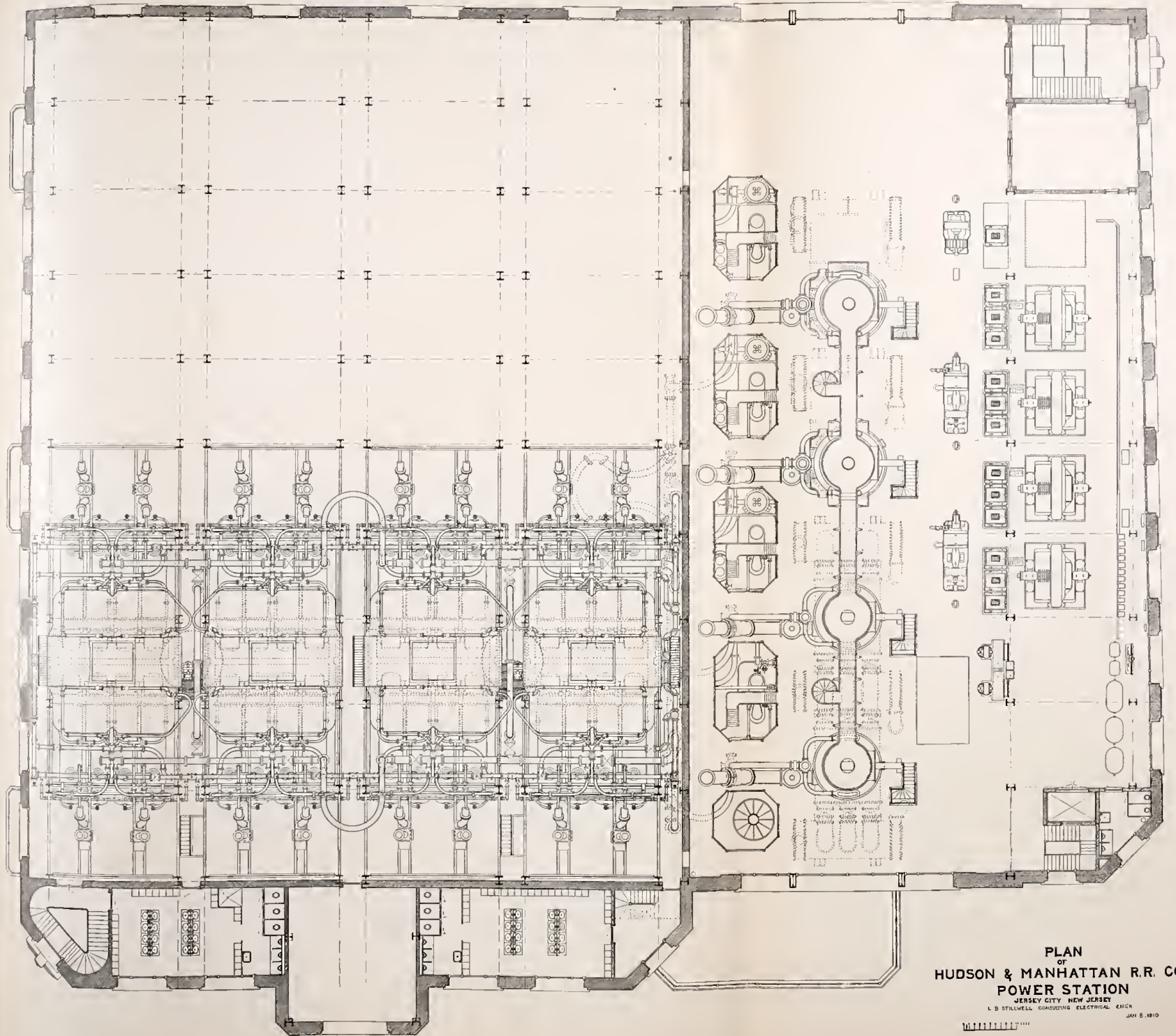
The boilers, which were furnished by the Babcock & Wilcox Company, are arranged back to back in rows of four boilers each, the aisles being at right angles to the generating room. This arrangement shortens and simplifies the steam-pipe lines. Each boiler has 9000 sq. ft. of heating surface and four drums, and is equipped for super-heaters.

There are two McClave-Brooks hand-fired grates under each boiler. Each grate has an area 9 ft. 6 in. wide by 10 ft. deep,



CROSS SECTION
OF
HUDSON & MANHATTAN R.R. CO'S
POWER STATION
JERSEY CITY, NEW JERSEY
L. B. STILLWELL, CONSULTING ELECTRICAL ENGINEER.
SEPT. 10, 1909.





**PLAN
OF
HUDSON & MANHATTAN R.R. CO.
POWER STATION**
JERSEY CITY NEW JERSEY

L. D. STILLMELL, CONSULTING ELECTRICAL ENGINEER

JAN 8, 1910

WILLIAMS BROS. PRINTING CO.

divided into six dumping sections for convenience in cleaning fires.

BOILER SETTING AND EQUIPMENT

A feature of the boiler construction consists in the use of steel-encased brickwork. This brickwork is 12 in. thick, except at the furnaces, when the thickness has been increased to 25 in. Between the brickwork and the steel casing there is a 2-in. layer of 85 per cent. magnesia. All the door and cleaning openings, leading into the boiler setting, are supplied with asbestos-packed doors and frames of special design. Care has also been taken to make the large front cleaning doors airtight, as well as the entire boiler setting.

The boilers are operated on the balanced draft system. The air duct used is designed so that four 10-ft. fans supply air to the eight boilers. All fans discharge into a common ring air-duct system connected to the ash pits.

Each pair of boilers is connected with a CO₂ recorder and with a pyrometer. One of the boilers is fitted for testing purposes with Venturi water meters and with automatic coal weighing scales, making it possible to conduct periodical efficiency and other tests.

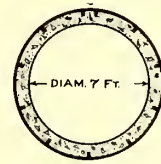
ECONOMIZERS AND FEED WATER HEATERS

One Green fuel economizer is placed directly upon the rear section of each boiler and forms a part of the boiler setting. Four of these economizers thus form a "unit" in connection

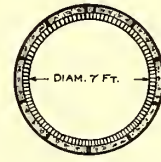
with four boilers, two smoke uptakes and one chimney. The uptakes are constructed of 3/16-in. plate steel stiffened by angle irons, the latter being supported by the steel columns and the boiler setting.

COAL AND ASH HANDLING MACHINERY

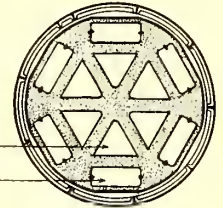
The coal and ash handling system is shown in plan and sec-



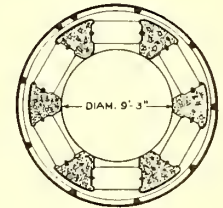
SECTION C-C



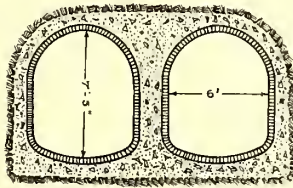
SECTION D-D



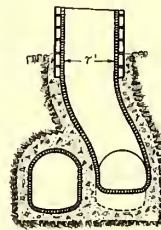
TOP PLAN



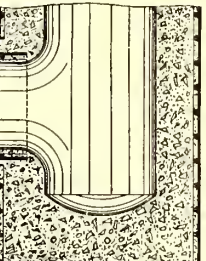
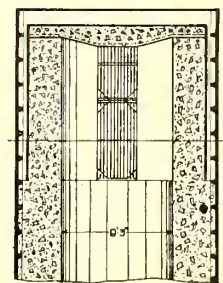
SECTION E-E



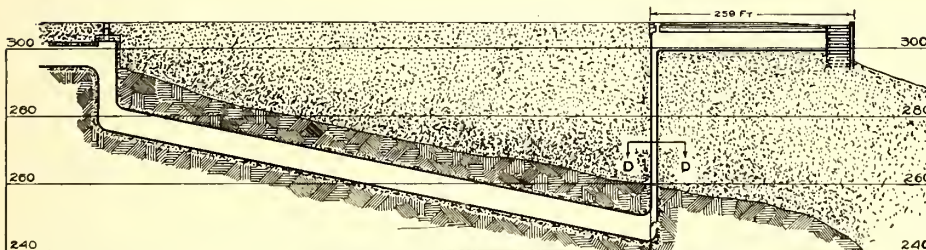
SECTION A-A



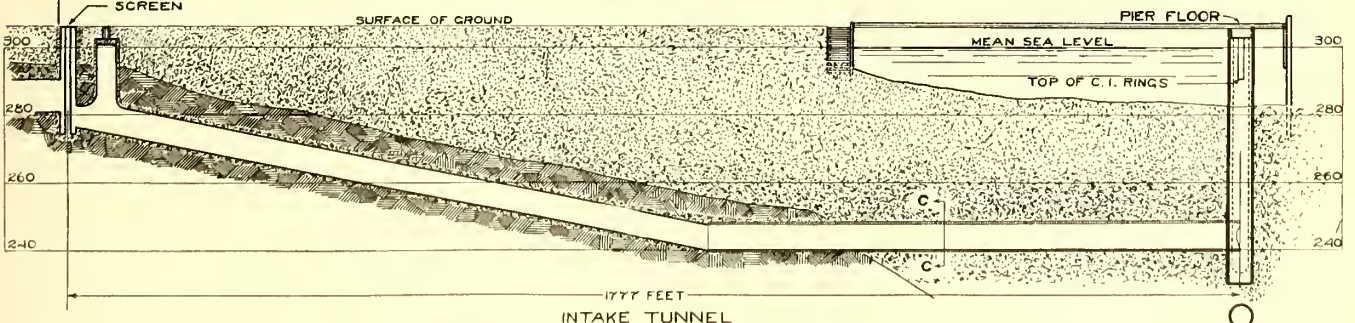
SECTION B-B



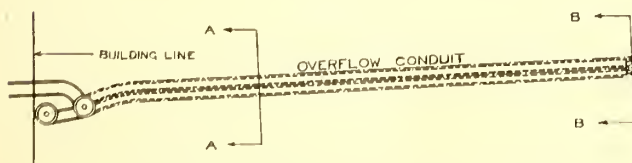
INTAKE SHAFT



OVERFLOW CONDUIT



INTAKE TUNNEL

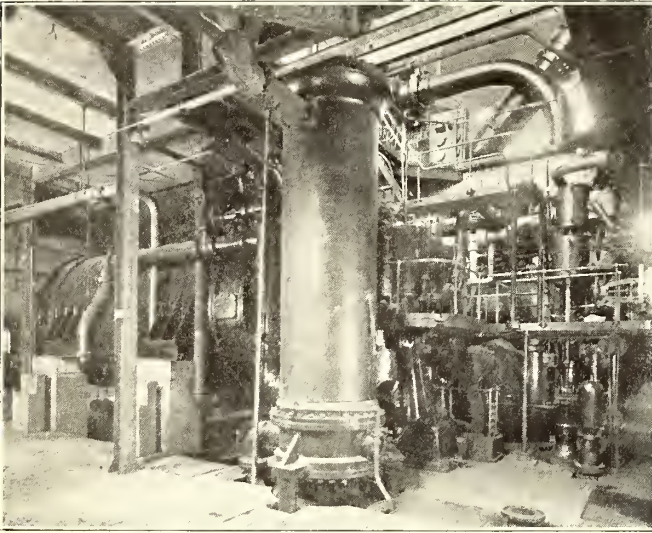


OVERFLOW CONDUIT

INTAKE TUNNEL

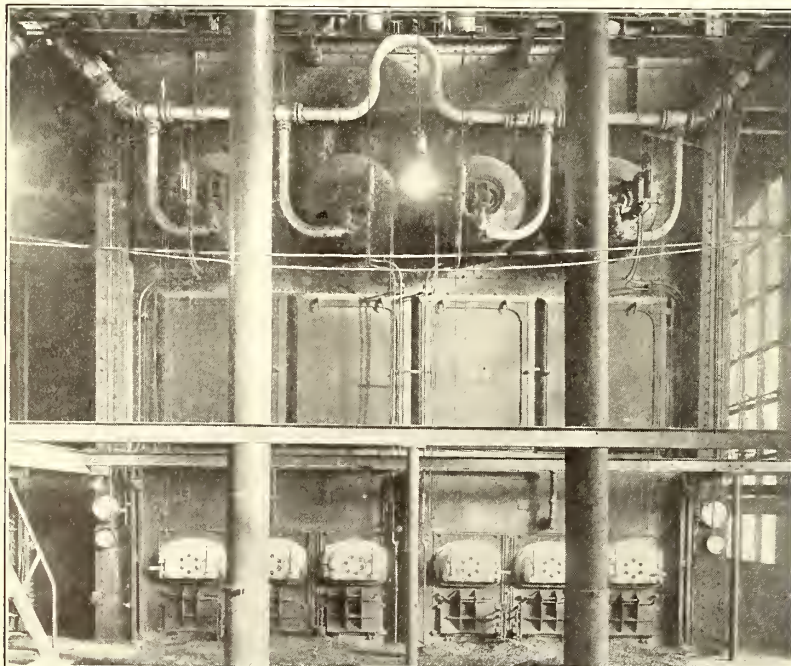
Hudson & Manhattan Railroad Power Station—Intake Tunnel and Overflow Conduit

tion. Coal is delivered in cars to the coal unloading house in the power house yard, and is conveyed from the track hoppers, under the track in the unloading house by two 30-in. Robins belt conveyors to the receiving hopper in the building. From the receiving hopper the coal is discharged either through a crusher or directly through a chute to the weighing hoppers. After being weighed, it is dumped into skip hoists, by which it is



Hudson & Manhattan Railroad Power Station—Condenser, Circulating Pumps, Vacuum Pump, Feed Water Heater

lifted to the distributing belt conveyors over the coal bunkers and is automatically unloaded. The coal bunkers that are now in service have a total capacity of about 4000 tons. From the bunkers the coal descends through cast-iron downtakes to the middle of the firing aisles. At present No. 3 buckwheat anthracite is being used for fuel.



Hudson & Manhattan Railroad Power Station—Boiler Fronts.

Two brick-lined steel ash hoppers, with cast-iron gates, are provided under each boiler. By means of steel ash cars and tracks, the ashes are conveyed to one of the skip hoists and elevated to chutes through which the ashes are delivered either directly into a car on the track outside the building or to a large ash storage bin. The ash storage bin is designed so that the ashes can be discharged into railroad cars.

FEED WATER

The feed water is obtained from two independent 8-in. city mains. There are four main storage tanks equipped with

float valves to maintain proper depth of water. As the water of condensation from the surface condensers is returned to the storage tanks, only sufficient water is drawn from the city mains to replace the loss from evaporation or leakage. Feed-water heaters are used with the piping so arranged that the feed water may also be by-passed around either the heaters or economizers or both. The boiler feed pumps and feed-water heaters were furnished by H. R. Worthington.

MAIN STEAM PIPING

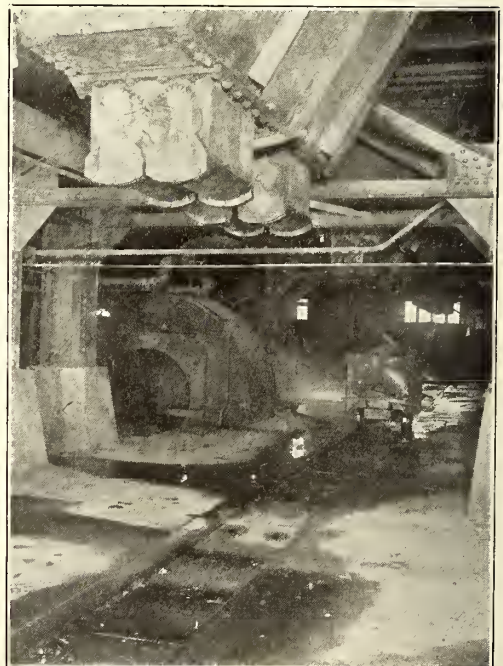
The main steam lines from the boilers are carried directly across the boiler room to the partition wall, whence they drop to two main steam headers in the basement. From the basement headers, the steam is taken through separators and goose necks to the throttles of the turbines. Condensation from the high pressure steam lines is returned to the boilers by the Holly drip system.

The proportions of the flanges, fittings and valves are heavier than the A. S. M. E. standard, and much heavier than is the general practice. All the high-pressure steam valves, which were furnished by the Fairbanks Company, were constructed from new and special patterns by the Pratt & Cady Company. All the high-pressure drip valves from 1/2 in. to 2 1/2 in. were made from new patterns for valves about double the weight of those commonly used.

At eight different points in the steam mains provision has been made for the installation of a similar number of pneumatically operated 14-in. rotating cut-off valves controlled from distant points. These valves are also of new design, and are to be furnished by the Pittsburg Valve Manufacturing Company. The pipe and fittings were furnished by the M. W. Kellogg Company.

ELECTRICAL CONNECTIONS

The high potential wiring system is shown in one of the diagrams. It will be observed that the group busbars may be connected together to form an auxiliary bus and that great flexibility is thus obtained. The group and bus-bar connect-



Ash Dump and Ash Car

ing switching are non-automatic. The feeder and alternator switches are provided with overload time-limit relays. All high potential connections are made by means of oil switches. As shown in the cross-section, the oil switches and busbars are located in the basement, thus securing the shortest possible length of high potential cables.

A reference to the diagram of electrical connections shows that a grounded neutral is used for protecting the cable system. A 16-ohm rheostat is employed in connection with the lighting cables and an 8-ohm rheostat with the power cables. The

system of connections is such that the neutral point of either of the 3000-kw alternators, when carrying the lighting load, can be connected to the 16-ohm resistance, and that of any one of the 3000-kw or 6000-kw alternators to the 8-ohm resistance, but at no time can more than one machine be connected to one rheostat.

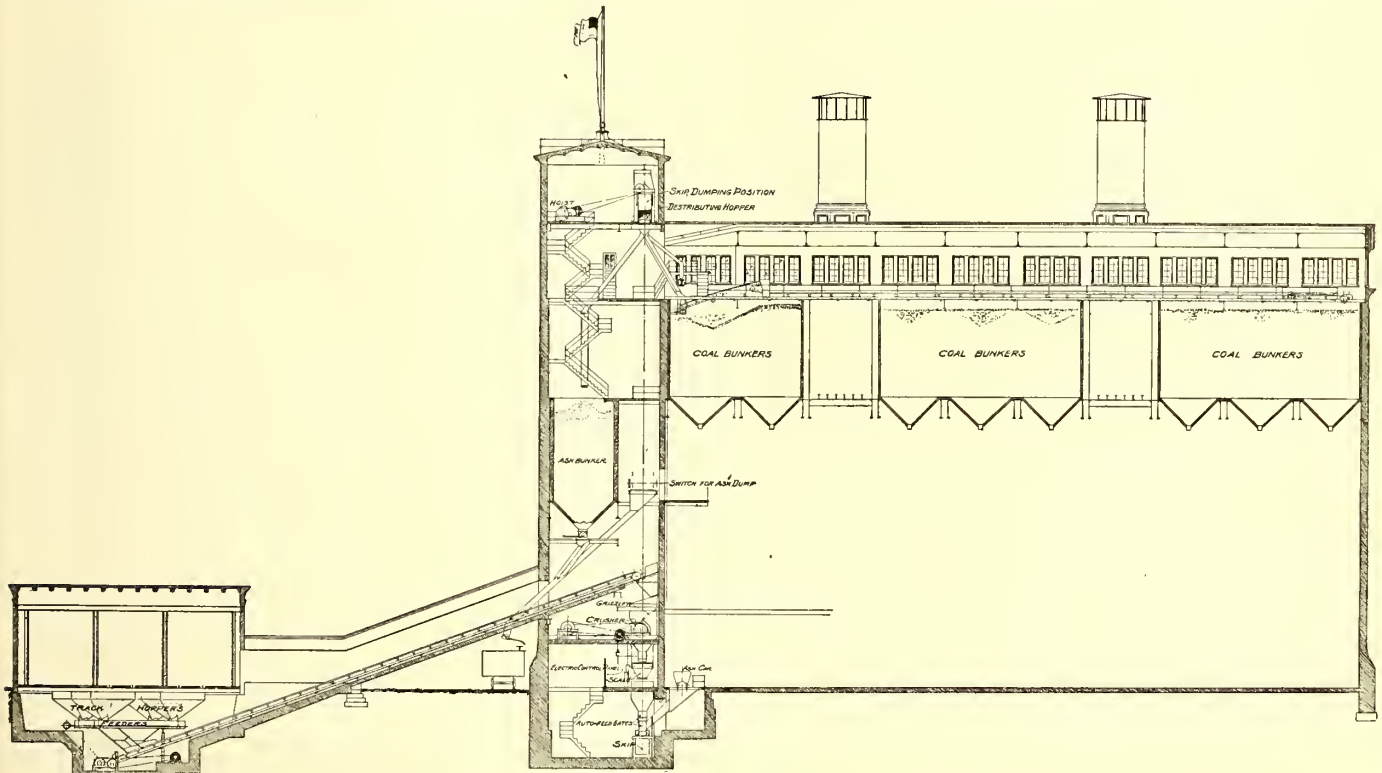
BENCH BOARD

One view illustrates the control bench board with indicating and recording instruments for alternators and feeders. The

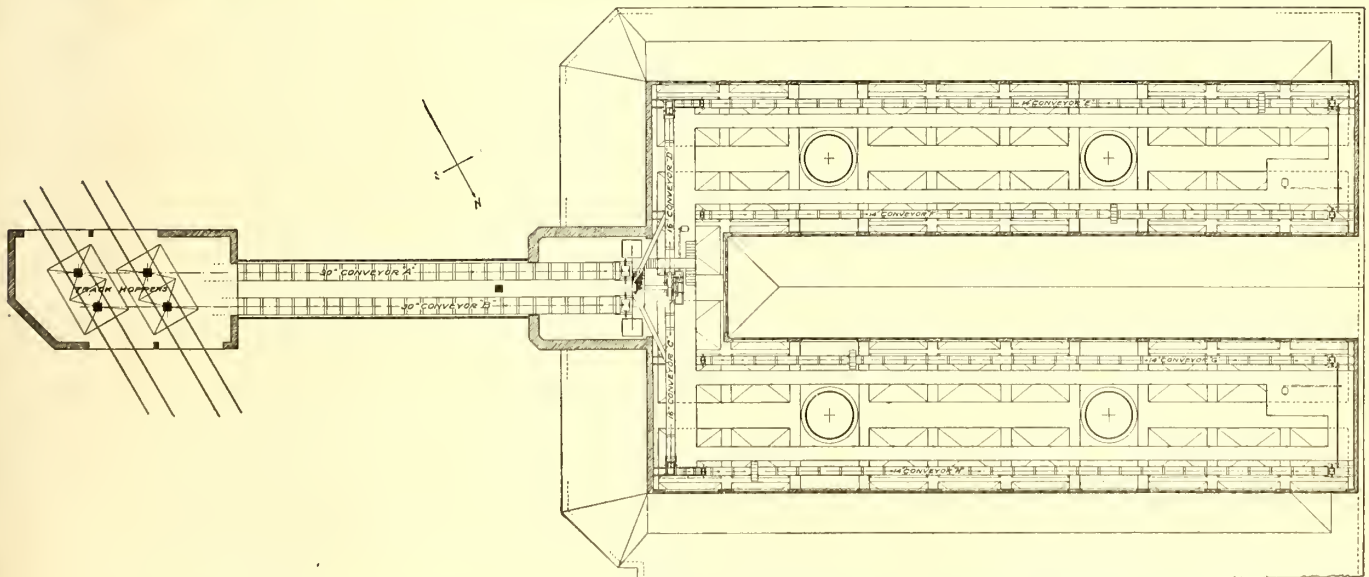
extensions can be made by adding successive panels with minimum interference to the present board. The two instruments on the upper lefthand corner are ammeters connected to neutral ground. To the right of the bench board are the exciter and power house lighting switchboards.

ANNUNCIATOR SYSTEM

An annunciator system has been installed to furnish means of communication between the turbines and the operating gallery. A large annunciator is placed at one end of the gener-



Hudson & Manhattan Railroad Power Station—Section of Coal and Ash Conveyor



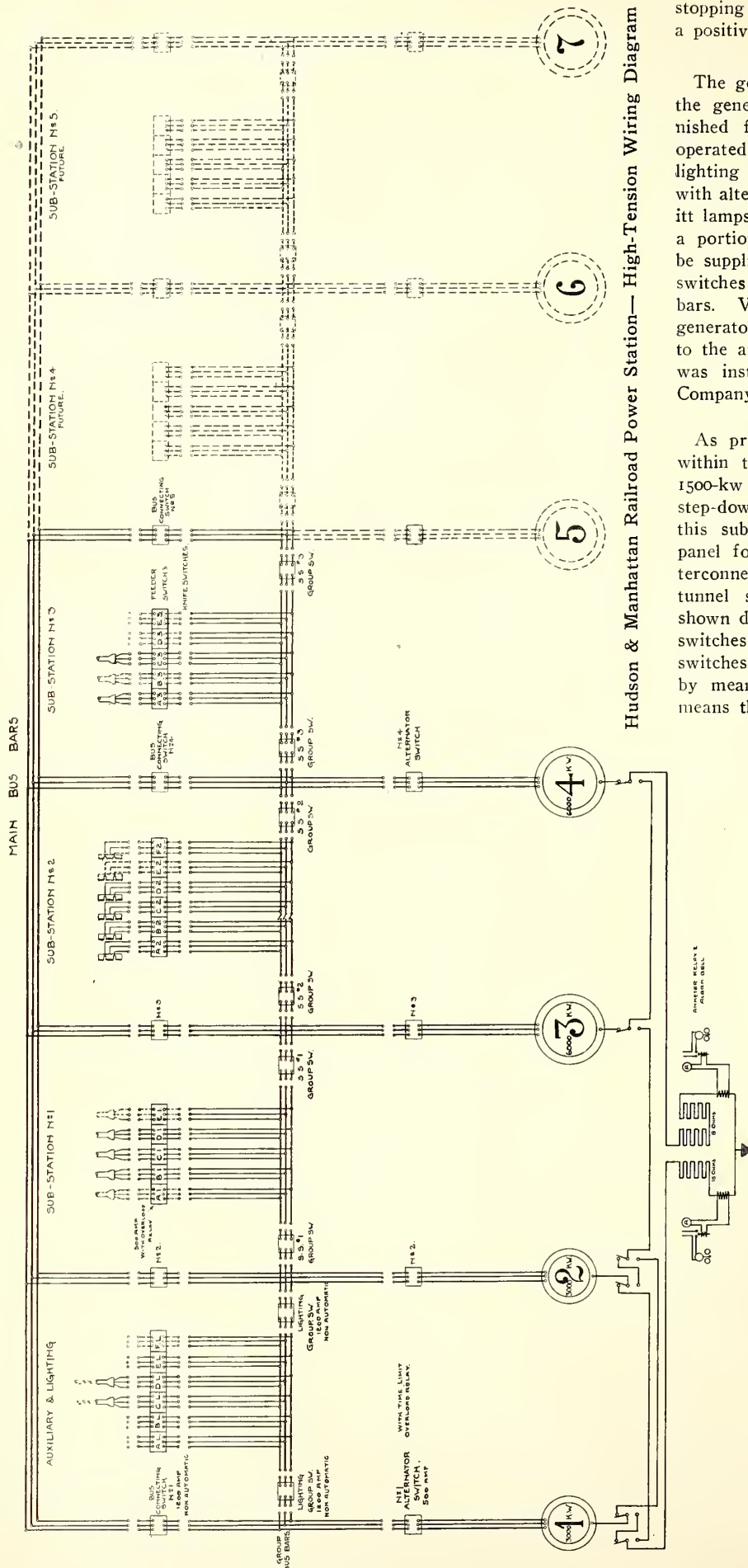
Hudson & Manhattan Railroad Power Station—Plan of Coal and Ash Conveyor and Coal Pockets

high potential layout is shown diagrammatically on the bench-board by means of miniature busbars. The various switching operations are shown by means of colored lights and mechanical indicators. Bull-switches are used on this board to minimize the danger from the accidental operation of the switches by the operator.

Above the bench board are the indicating instruments for the alternators and feeders. Each panel represents an alternator and a feeder group. The arrangement is such that

ating room, in full view from any part of the room. This instrument carries a set of code numbers indicating the nature of the call, i. e., whether to turbine No. 1, 2, 3, or 4, to telephone, etc. Coincidentally with the illumination of a number a loud whistle is sounded. These calls may be sent in either direction between generating floor and operating gallery, and they remain active until the answering signal is given.

Adjoining each turbine, and connected to the annunciator system, is another set of signals covering the various opera-



Hudson & Manhattan Railroad Power Station—High-Tension Wiring Diagram

tions required in connection with the starting and stopping of the machines. Each of these also requires a positive signal by way of answer.

LIGHTING

The general illumination of boiler room aisles, of the generator room, galleries and basement is furnished from Cooper Hewitt mercury vapor lamps, operated on direct current circuits, while localized lighting is by incandescent lamps normally supplied with alternating current. A few of the Cooper Hewitt lamps are supplied from the exciter bus bars, and a portion of the incandescent lighting system can be supplied in emergency by means of double throw switches with direct current from the exciter bus bars. Very little artificial light is required in the generator room and galleries during day time owing to the ample window space. The lighting equipment was installed by the Watson-Flagg Engineering Company.

SUBSTATION NO. 2.

As previously stated, substation No. 2 is located within the power-house building. It contains four 1500-kw rotary converters with 12 550-kw, 11,000-volt step-down transformers. An interesting feature of this substation is that the switchboard contains a panel for operating remote control rail switches for interconnecting various contact rail sections in the tunnel system. The contact rail-feeder layout is shown diagrammatically on the panel, and the section switches may be opened or closed by means of full-switches on this panel, the operation being registered by means of green and red bull's eyes. By this means the operator in the substation has entire control over the contact rail sections and by means of the remote control circuit breakers can throw the current either on or off the various sections or change the connections when a fault develops or an accident occurs in the tunnels.

Emergency alarm boxes have been installed at close intervals throughout the tunnels, by means of which, in cases of emergency, the power can be cut off from the contact rail. At the same time, through a separate circuit, the location of the trouble is immediately reported by means of automatic recording devices, which indicate the number of the box from which the alarm has been given. When the power is cut off the rail, the fact is also immediately reported by means of gongs. Alarm gongs and automatic recording devices are located in the substations and the various offices as required, and the panel board for controlling these emergency alarm circuits is also shown in the interior view of the substation. The emergency alarm boxes and panels were furnished by the Game-well Fire Alams Company.

TELEPHONE SYSTEM

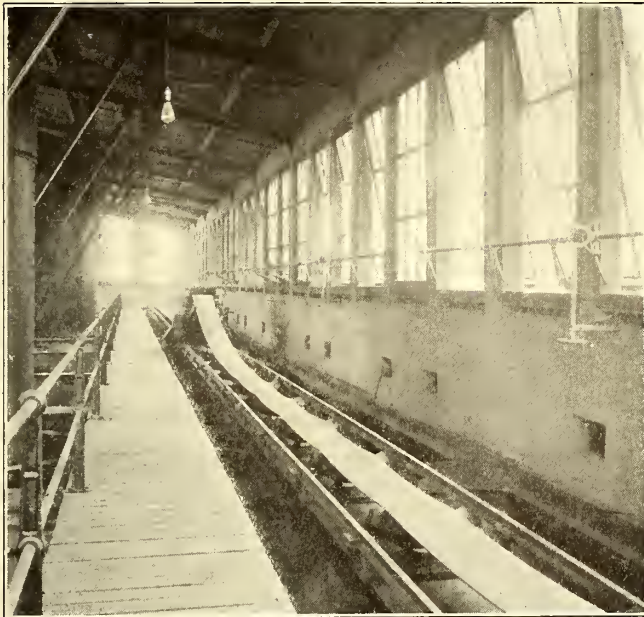
A private telephone system connects the power house with the substations, offices and passenger stations throughout the tunnels. In addition to this an inter-communicating telephone system connects various parts of the power-house building.

SUBSTATIONS NOS. 1 AND 3

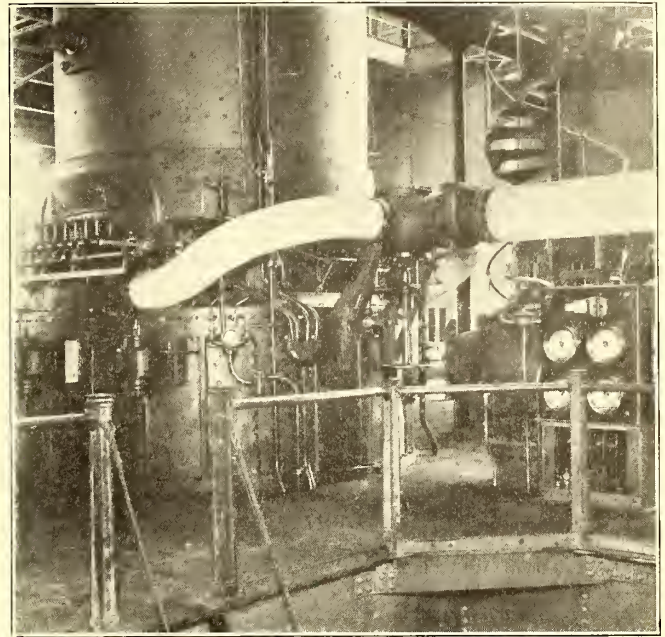
Substation No. 1, located at the corner of Christopher Street and Greenwich

Street, New York City, is equipped with five 1500-kw rotary converters, with the transformers for reducing the 11,000-volt current to 430 volts on the alternating side of the converters.

supply to the Terminal Building, there are steam-driven generators, which are used principally in the winter time when their exhaust steam is utilized for heating the building. When



Hudson & Manhattan Railroad Power Station—Distributing Conveyor and Coal Pockets



Hudson & Manhattan Railroad Power Station—Indicators for Signal System and Base of Turbines

Provision is made in the substation building for the installation of storage batteries on the two upper floors in case their use should later be considered advisable.

Substation No. 3 is located in the basement of the Terminal Building about 90 ft. below the street surface. It comprises

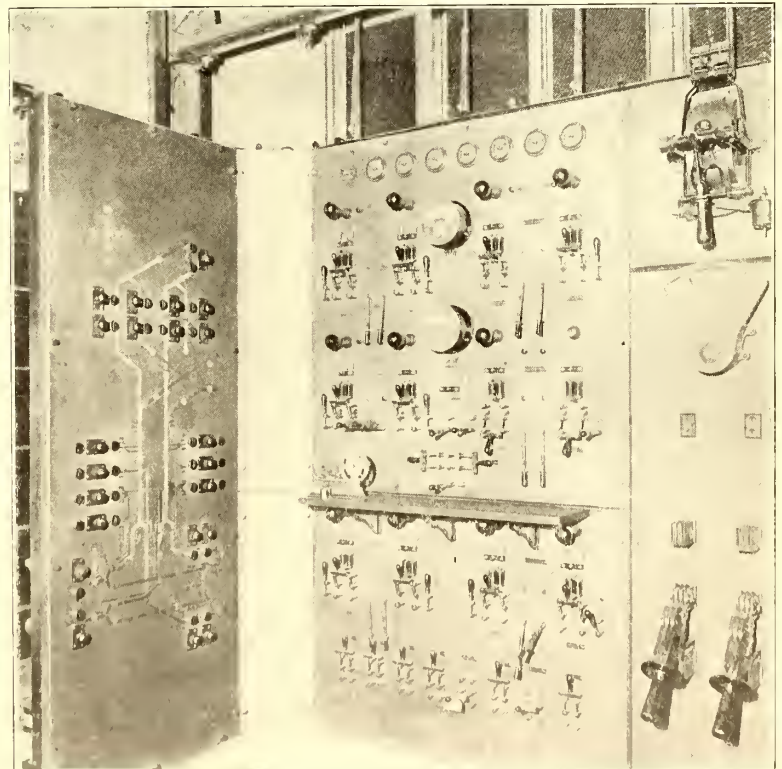
no heat is required in the building, the three 750-kw converters supply all of the power necessary.

ENGINEERING

The power-house superstructure, exclusive of the steel work, was designed and erected under the supervision of the archi-



Hudson & Manhattan Railroad Power Station—Remote Control Panel



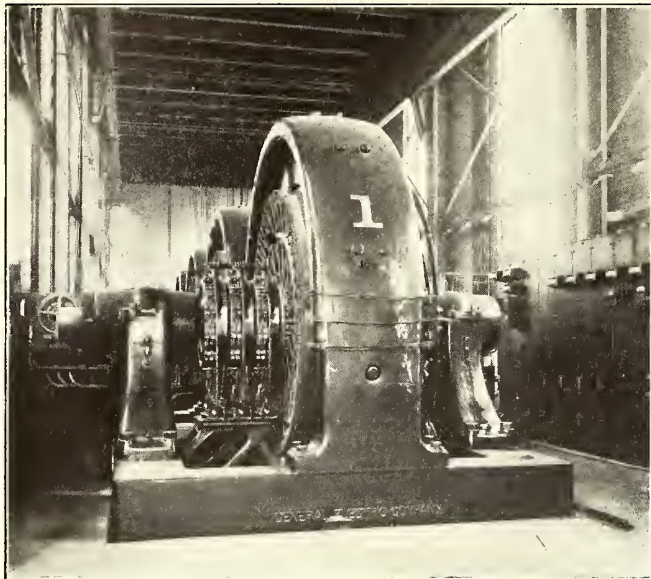
Hudson & Manhattan Railroad Power Station—Control Board, Showing Feeder Diagram

two 1500-kw converters, which are used for supplying the energy for the railway load, and three 750-kw converters, which supply 250-volt current for operating lights and motors in the Terminal Building. In addition to this provision for current

ects, Messrs. Robins & Oakman. The condensing water tunnels were designed and constructed by the Hudson Companies under the direction of Messrs. Jacobs & Davies. The foundation work, structural steel, steam, mechanical and electrical

equipment were designed, constructed and installed under the direction of L. B. Stillwell and his associates, John Van Vleck and Hugh Hazelton.

The station was first put in operation on May 8, 1909, and is now producing power for the operation of 140 cars on



Hudson & Manhattan Railroad Power Station—View in Substation

the Hudson & Manhattan Railroad tunnel system, together with tunnel and station lighting, ventilating fans, etc., and a portion of the power load for the Hudson Terminal Buildings. The average daily net station output is at present about 130,000 kw-hours, and the maximum hourly output is about 12,000 kw. These figures include the amount of energy supplied to the air-compressor plant.

Upon the installation of the final 6000-kw generating unit the plant will occupy an area which will be at the rate of 1.7 sq. ft. per kilowatt of normal generating capacity and, it is believed, embodies in its design and construction the very latest and best engineering practices that apply to the generation of electric energy at the lowest possible cost consistent with the attainment of maximum reliability of service.

MEETING OF CENTRAL ELECTRIC TRAFFIC ASSOCIATION

The Central Electric Traffic Association met at the Hotel Algonquin, Dayton, Ohio, on Feb. 19, and discussed the advisability of adopting various measures. After some discussion it was decided to re-issue the baggage tariff, making several minor changes which will enable the agents and public to understand the working of the tariff better. The tariff covering the 1000-mile interchangeable mileage ticket will also be re-issued with a few small changes.

After a careful investigation by the members of the association it was decided not to re-issue joint passenger tariff No. 3 for the present, but to allow it to stand for some time. A. L. Neereamer, the chairman, was instructed to secure data concerning the issue of a joint weight sheet, covering weights of standard commodities.

The subject of a milk and cream tariff was discussed and it was decided to postpone action until the next meeting, which will be held at the office of the chairman, Indianapolis, on March 11 and 12.

The Hollandsche Yzeren Spoorwegmaatschappij, which financed the Rotterdam-Haag single-phase line, has obtained a concession for equipping for electric operation the horse railway system in Leyden, and also the steam railway connecting Leyden, Nordwijk and Kotwijk. Direct current at 1000 volts will be used.

CHANGE TO 1200 VOLTS ON THE WASHINGTON, BALTIMORE & ANNAPOLIS RAILWAY

On the morning of Feb. 15 the Washington, Baltimore & Annapolis Electric Railway changed its system of operation from 6600 volts single-phase a. c. to 1200 volts d. c. The change was made with absolutely no interference with the regular operation of the road or the maintenance of its schedule.

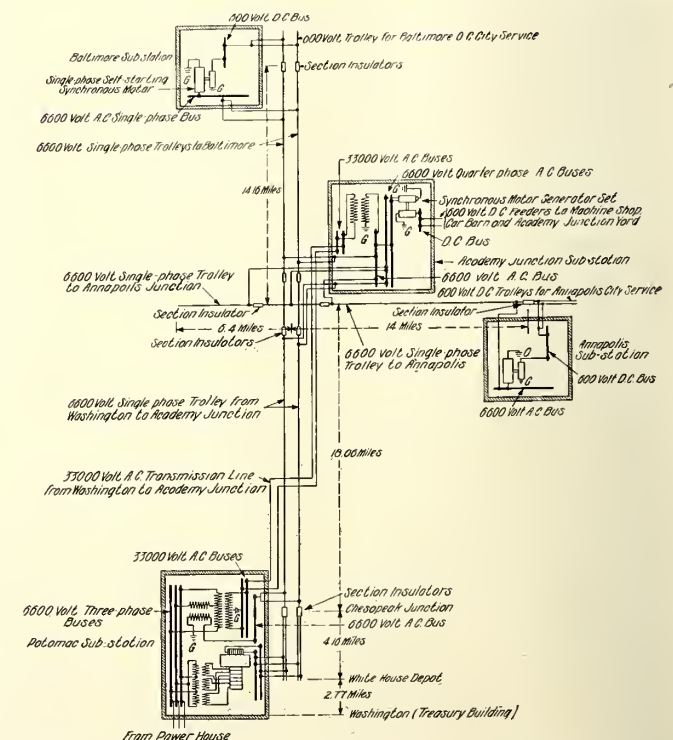
The decision of the railway company, some eight months ago,



Change to 1200 Volts—Map of Washington, Baltimore & Annapolis Railway

to make this change attracted general interest, because it was one of the largest and most important interurban single-phase installations in the country.

The company's 60-ton cars, equipped for operation on the single-phase system, could not enter Washington, because, owing to the limited strength of the yokes which support the



Change to 1200 Volts on W., B. & A.—General Distribution Diagram when Operating Single Phase

city tracks, the maximum weight of the cars was restricted to 40 tons. As the railway company desired to run to the heart of Washington it was confronted there with the problem of securing a car of this weight equipped with motors of sufficient size to provide the high speed and particularly high-class service

required by the character of its patronage. A careful investigation of the engineering features involved showed that it was impossible to meet these requirements with the existing single-phase equipment. The company then made an investigation into the relative merits of the two d.c. systems, and found that a large saving in first cost and operating expenses would result from the adoption of the 1200-volt system in preference to the 600-volt. A contract was, therefore, made with the General Electric Company in accordance with which the latter company was to provide and install the necessary equipments for both cars and substations, with the understanding that the railway company's regular service should not be interfered with in any way.

The change was actually made without any accidents. At 1:15 a. m. on the morning of Feb. 15 the last a.c. car was taken



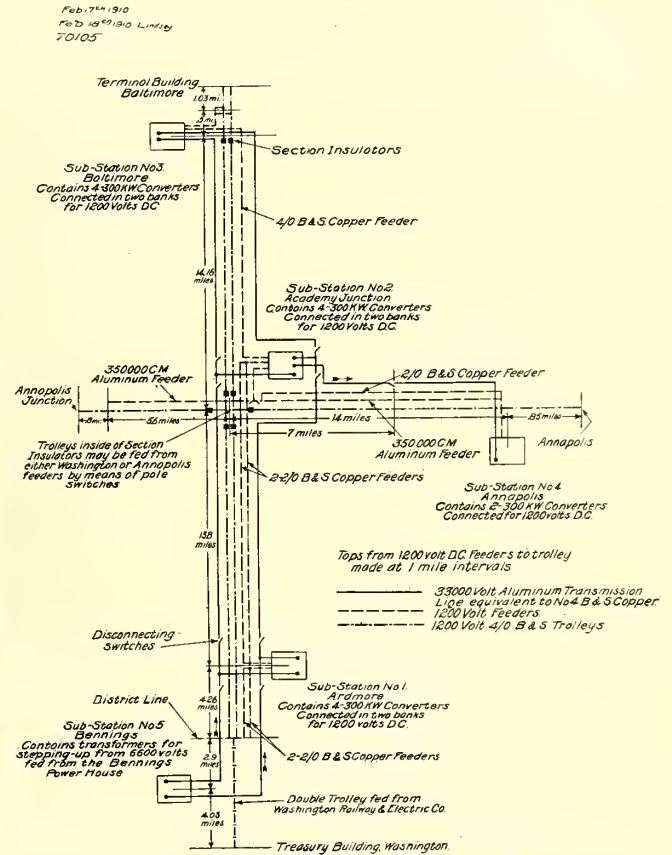
Change to 1200 Volts on W., B. & A.—Exterior View of the Temporary Substation at Naval Academy Junction, Showing Line Entrance

off, and at 5:20 a. m. the first d. c. car was started. The records made under the new system substantiate the expectations formed of it. During the first day of operation the cars ran over 4500 car-miles and not a trip of the regular schedule was lost. Moreover, a saving of over 25 per cent in power is indicated by the wattmeter records of the first few days. The apparatus, which included many new designs, was constructed, delivered and installed in the short period of eight months.

For the operation of the railway with single-phase apparatus power was purchased from the Potomac Power Company, in Washington, and delivered to the Washington, Baltimore & Annapolis Electric Railway Company substation at Benning, where it was received through two underground cables at a potential of 6600 volts and a frequency of 25 cycles. It was there changed into two phase by means of T-connected transformers, giving 6600 volts on one phase and 33,000 volts on the other. The 6600-volt phase furnished power direct to the trolley for operation of the road from District Line to Naval Academy Junction. For the operation of the three sections of the line from Naval Academy Junction to Baltimore, to Annapolis and to Annapolis Junction, power was transmitted single phase, at a potential of 33,000 volts to the substation at Naval Academy Junction, where it was stepped down to 6600 volts and fed to the trolley lines. At Naval Academy Junction 6600-volt, two-phase synchronous motor-generator sets in duplicate supplied 600-volt d.c. for the car houses and yard. At Baltimore and Annapolis the 600-volt d. c. local trolleys were supplied with power by means of single-phase motor-generator sets, the 6600-volt motors taking power from the high-tension a.c. trolley. The a.c. trolley line was of the single-catenary type with the side-bracket arrangement of suspending the trolley.

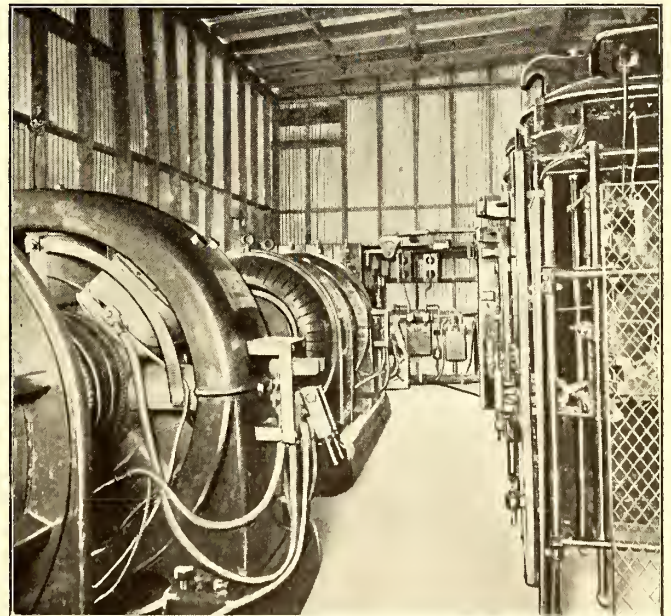
As it was necessary, in changing over the system, to move the motor-generator sets, the transformers and controlling panels out of the substations without interfering with the operation of

the road, one of the motor-generator sets and its controlling panel at Baltimore was moved into a temporary structure made



Change to 1200 Volts on W., B. & A.—General Distribution Diagram when Operating with 1200 Volts D. C.

of galvanized iron. In accomplishing this it was, of course desirable to have the set out of service the shortest possible time. So after preparations were completed, in the early morning, the

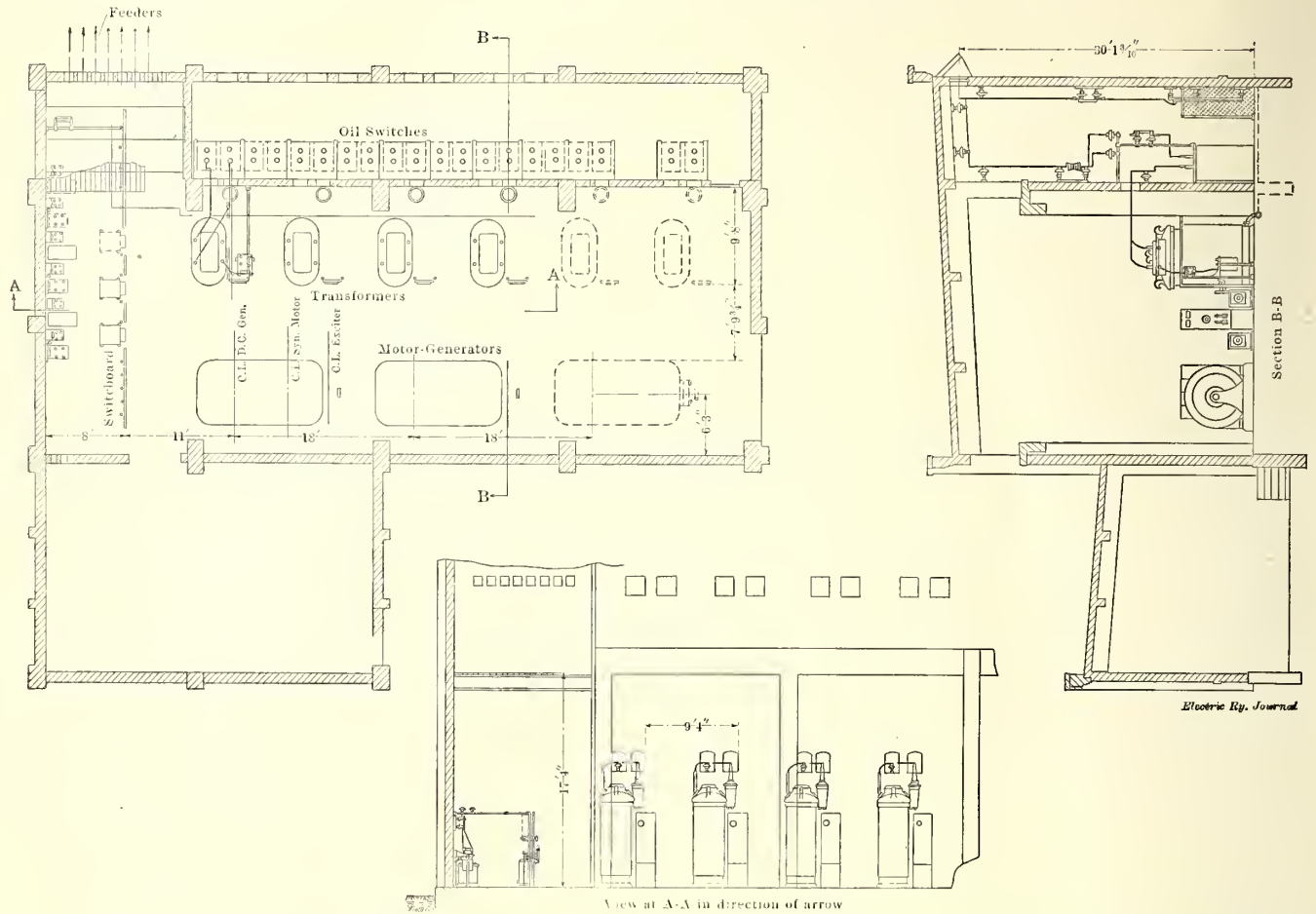


Change to 1200 Volts on W., B. & A.—Interior View of the Temporary Substation at the Naval Academy Junction, Showing Installation of the Motor-Generator Sets, Transformers and Controller Panels

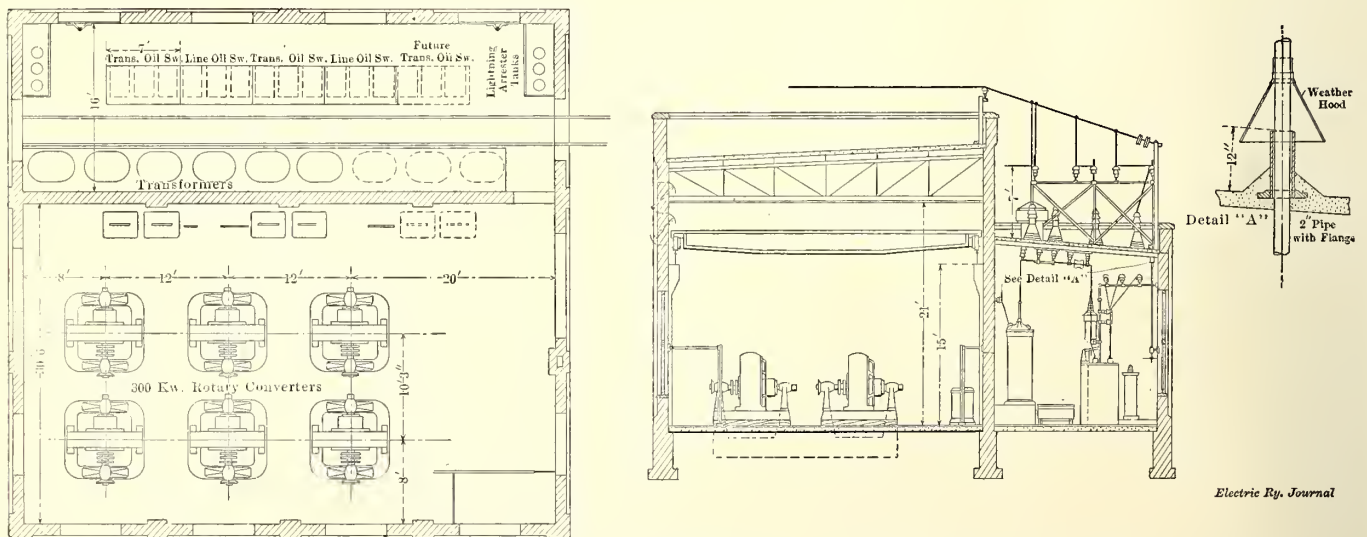
set was jacked up by means of four 20-ton jacks, rollers were placed underneath, and it was pulled into position in the temporary substation by means of a block and tackle. The switch-

board panel and other necessary apparatus were also transferred and installed. At midday the installation was complete and the set was then started up and operated in multiple with the set in the substation for two days as an assurance that the temporary installation would afford reliable service. Then the second set

so that the cars might be tested out and the car crews broken in. This plan was followed because the company wished to be sure that the car crews would handle the cars under the new system with as great dispatch as under the old, and would have no difficulty in maintaining the schedule.



Change to 1200 Volts on W., B. & A.—Arrangement of Academy Junction Substation when Operating A. C.



Change to 1200 Volts on W., B. & A.—33,000-volt A. C., 1200-volt D. C. Converter Substation with 300-kw Converters

in the substation was shut down and moved to the temporary building. Such changes as were necessary in order to prepare the substation for the new apparatus were then rushed to completion and the apparatus was installed.

In the meantime the same plan of work had been followed with regard to the other substations. The three transformers at Bennings had been rewound, and a 1200-volt generating system was installed and put into operation on an experimental track

In the a.c. system the trolleys for the two tracks were insulated from one another, while in the d.c. system they are tied together. The jumpers for this purpose and also those between the 1200-volt feeders and trolleys were all connected in during the period required for shutting down the a.c. system and starting up with 1200 volts.

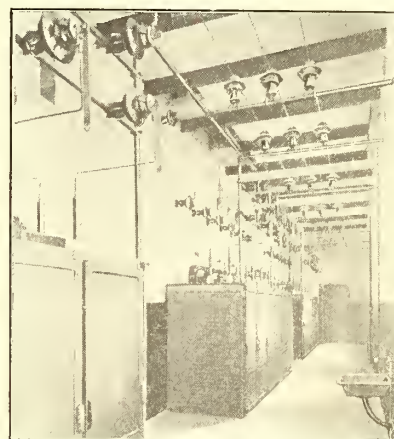
For operation at 1200 volts, d.c. power is purchased from the Potomac Power Company and is received, as before, at the

Bennings substation, where it is stepped-up and transmitted three phase to the substations at Ardmore, Naval Academy Junction, Annapolis and Baltimore at a potential of 33,000 volts and a frequency of 25 cycles. The transformer primaries are Y-connected and the neutral point is grounded. The transmis-

sion substation has one 33,000-volt outgoing line panel for the line running to Annapolis. The Naval Academy Junction substation has one 600-volt d.c. feeder panel controlling power for the operation of the motors which drive the repair-shop tools. For the protection of the substation apparatus



Change to 1200 Volts on W., B. & A.—Interior of Baltimore Substation, Showing the Rotary Converters Arranged in Pairs for Supplying Current at 1200 Volts



Interior of Naval Academy Substation, Showing High-Tension Busses and Oil Switches

sion line is in duplicate, the conductors being aluminum wire.

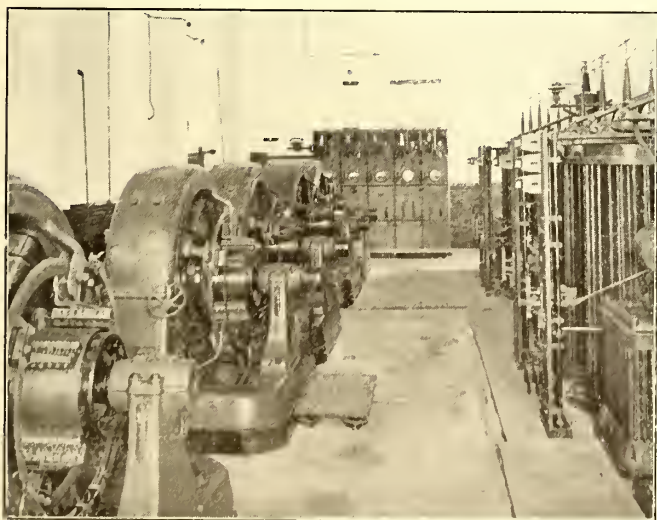
The switchboard equipment at the Bennings substation controls two transformer panels and two 33,000-volt, three-phase outgoing lines.

With the exception of Annapolis, the substation equipments consist of duplicate sets of rotary converters, each set consisting of two 300-kw machines operating in series to supply current at a potential of 1200 volts. The Naval Academy Junction substation also has a spare converter. There is at Annapolis but one set of converters, which supply current at a potential of 1200 volts for the operation of the cars in that city. The converters operate in every way similarly to standard 600-volt machines, and are started from half voltage a.c. taps on the transformer secondaries in the usual manner.

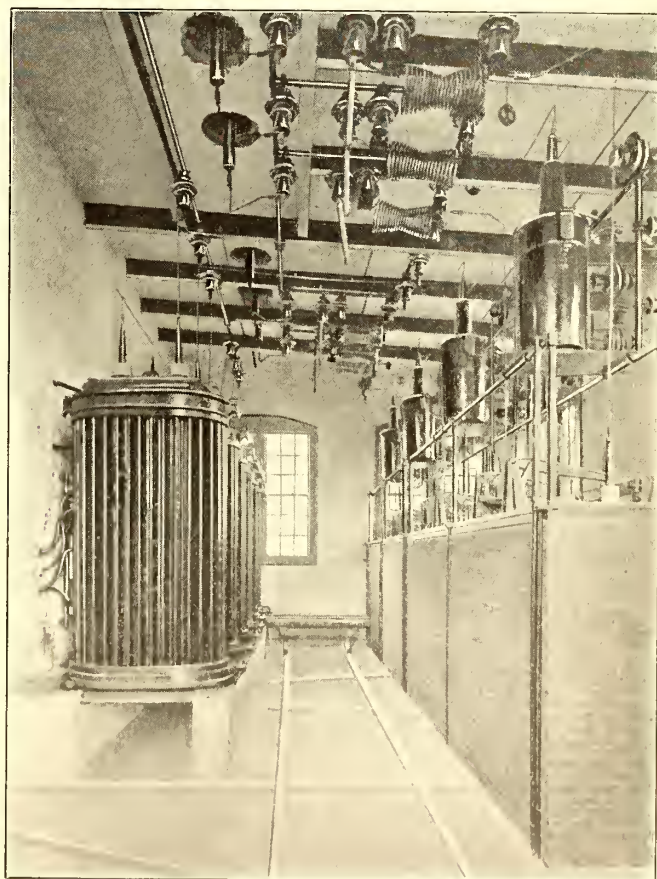
The switchboards of the Ardmore, Naval Academy Junction and Baltimore substations have two 33,000-volt incoming line panels, two 33,000-volt rotary converter and transformer panels, and two 1200-volt d.c. feeder panels, making it possible

33,000-volt aluminum lightning arresters are being installed in the substations. Each transmission line is protected by an overhead ground wire.

The rolling stock consists of 30 passenger cars and three service cars. Each passenger car is equipped with four GE



Change to 1200 Volts on W., B. & A.—Interior of Naval Academy Junction Substation, Showing Rotary Converters, Transformers and Controlling Panels



Change to 1200 Volts on W., B. & A.—Interior of Baltimore Substation, Showing Incoming Lines and High-Tension Apparatus

to supply power to the three sections of the trolley line from this substation. The Ardmore and Baltimore substations have two 1200-volt feeder panels each; the Annapolis substation has one panel of each kind. In addition the Naval Academy Junction

substation has one 33,000-volt outgoing line panel for the line running to Annapolis. The Naval Academy Junction substation has one 600-volt d.c. feeder panel controlling power for the operation of the motors which drive the repair-shop tools. For the protection of the substation apparatus

operation in trains if desired. A potential of 600 volts for controlling and lighting the cars is obtained by means of a dynamo, as on other 1200-volt equipments. This is used only on the 1200-volt section. On the 600-volt section the control lighting circuits are supplied directly on the trolley.

The cars are equipped with Westinghouse automatic "AMM" schedule air brakes with graduated release. The air compressors are GE CP-29, and are operated by 1200-volt motors.

In the city of Baltimore the cars receive 1200-volt power for operation to the point from which they run over the tracks of and obtain 600-volt power from the United Railways Company to the Washington, Baltimore & Annapolis terminal station.

At Annapolis the 1200 d.c. trolley extends through the city, and the cars receive power from this source for operation within the city limits.

At the Washington end of the system the cars are operated from the 1200-volt d.c. system as far as the District Line, and from there they run over the tracks of the Washington Railway & Electric Company, using the power of this company.



Change to 1200 Volts on W., B. & A.—New Standard 40-ton Car

These tracks are equipped with the 600-volt, double-overhead trolley from District Line to Fifteenth and H streets, N. E., and with the 600-volt conduit system from there to the Treasury Building at Fifteenth Street and New York Avenue, N. W.

It will thus be seen that the cars are required to operate with 1200-volt single trolley and ground return; with 600-volt double overhead trolley metallic circuit, and on the 600-volt underground conduit system. The ground connection for single trolley operation is obtained by means of a connection through the negative trolleys and their holding-down hooks in such a manner that when either negative trolley is raised for operation on the double overhead trolley section the ground circuit is broken. The change from double-trolley overhead to conduit is made by a d.p.d.t. transfer switch, which may be operated either by compressed air controlled from the motorman's cab or by hand.

The Cleveland Construction Company was the consulting engineers on the work and supervised the changes in the transmission system, overhead work and changes in the substation buildings required to adapt them to the new apparatus. All the electrical apparatus was furnished and installed by the General Electric Company, Schenectady, N. Y.

THE BERLIN PENSION SYSTEM

The employees' pension system of the Grosse Berliner Strassenbahn, Berlin, Germany, was organized on July 1, 1900, to take care of superannuated employees or those who became unfit for service after 10 years' membership, and to pay to widows 30 per cent of the wages earned by their husbands at the time of death. The organization accepts as members all employees of the railway whose earnings do not exceed \$500 a year and who are not less than 18 years or more than 40 years of age. In exceptional cases applicants over 40 years of age are taken by the board of trustees.

All employees of the transportation department must join the pension association as soon as they accept their positions, but shop and way men are under no obligation of this kind.

However, when the latter have been employed for four years and are still under 40 years of age they must either join the organization or else give up all claim to such privilege in the future. When the organization was begun the charter members were given service records equal to one-half (but not exceeding 10 years) of the time they had worked for the parent company or the Western Suburban Railway. No credit is given for service nor are any dues collected during long absences for military purposes, for recreation or temporary work elsewhere.

If a member of the pension fund is discharged by the management, all payments personally made by him are returned. If he leaves the company's service voluntarily, return payments are made as follows: After one year's membership, one-half of all personal payments; after three years' membership, three-fourths of such payments; after six years' membership, all personal payments. Heirs of those who become superannuated or die before 10 years' membership receive all dues paid by the members in question.

The pension fund dues contributed directly by a member amount to 4 per cent of his annual income plus 75 per cent of a monthly increase in wages when received the first time. Should a member suffer a reduction in wages, he may continue the same payments and receive the same pension benefits as if he had continued to earn the original wages. In addition to the dues contributed by the members, the Grosse Berliner Strassenbahn gives an amount equal to the total of all dues plus three-fourths of monthly wage increases when made for the first time. The allied Berlin-Charlottenburg Railway also pays an additional sum of \$2,250.

Qualified members are placed on the pension list as superannuated after a favorable medical decision on the application of the employee or management. No medical examination is made in cases where the retiring member is 65 years of age, or when the mutual aid society (Verein) states that a certain individual has suffered a reduction of at least 66 2/3 per cent in earning capacity.

If the annual pension is based on 10 years' membership it amounts to one-fourth of the last yearly salary earned by the applicant up to the limiting wage of \$1,125. To this amount one-sixtieth is added for every additional completed year of service, but the maximum pension must not exceed forty-five-sixtieths of the pensioner's latest earnings. All pensions are paid monthly at the treasury of the society, or are sent to the beneficiaries at their risk.

The fund is managed by a board of trustees selected four and four by the management and the men for terms of three years each. The chairman of the board is selected by the company. Meetings of the members are held annually. The original fund was started with a contribution of \$200,000 from the company, and by Dec. 31, 1900, or six months after the organization, the fund amounted to approximately \$264,000 for 4880 members. At the end of 1908 the pension fund had grown to approximately \$1,740,000 and the membership to 6850. Members began to be retired after July 1, 1905. Of the 162 so retired 20 died within the next three years, and one who went abroad accepted three years' payments as a receipt in full. There are also 38 widows on the pension list. The average age of the pensioners is 56.08 years, and of the widows 48.58 years.

At Drammen, Norway, a city of 25,000 inhabitants, two lines of trackless trolleys have recently been placed in operation. One is 3 km long and the other 3 1/2 km. Grades as steep as 10 per cent are surmounted by the cars which have a speed of 14 m.p.h. Current at 500 volts is transmitted through a pair of overhead wires supported from brackets on wooden poles. The cars, of which there are four, weigh 3000 kg each and will seat 20 passengers.

IMPROVEMENTS IN EUROPEAN CATENARY WORK

The Allgemeine Elektrizitäts-Gesellschaft, Berlin, Germany, has developed several improvements in catenary construction to eliminate the troubles hitherto experienced from wide changes in temperature. In the earlier forms of catenary suspension, as made for the Spindlersfeld Railway, the tendency of the trolley wire to depart from the horizontal plane was overcome partially by hand-operated regulators. This tension adjustment, however, had to be confined entirely to the conductor so long as the catenary was anchored firmly to its supports. In this case there was a tendency for the hangers to assume an oblique position, but the variation from the perpendicular was so little that it could scarcely be detected, even at the most unfavorable places. In a later design made for the Hamburg City & Suburban Railway, the entire catenary acted simply as the carrier of a new conductor, or third wire, which was attached with sliding clips to the horizontal hanger-connected wire. As this power wire was supplied with tension means and could slide along the clips, the hangers naturally remained perpendicular. It will be understood that neither the Hamburg nor Spindlersfeld installations provided for the tension regulation of the catenary. The absence of such adjustment in the hanging of the catenary between successive poles changes the sag to such a degree that the current collectors are obliged to make upward and sidewise movements, which may increase to a dangerous extent in high-speed operation. To avoid this fault, the Allgemeine Company has provided a

equalize the changes in the height of the trolley as caused by variations in temperature. The trolley is wire of hand-drawn copper, while all remaining wires are of silicon bronze. Thus the entire construction has similar coefficients of expansion

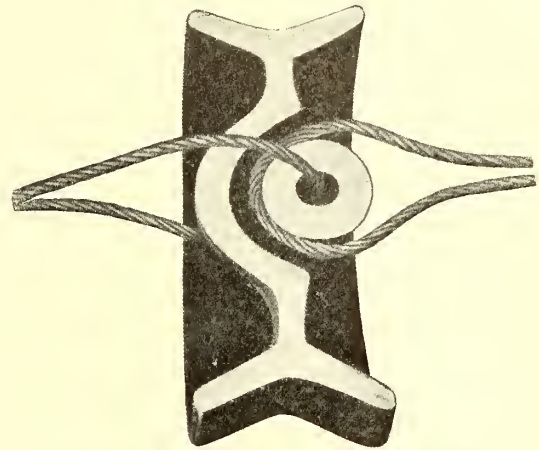


Fig. 3—European Catenary Construction—Cross Section of Insulator

throughout. It can be used as a feeder, and, moreover, is influenced little by chemical changes in the atmosphere. The suspension of this construction at a supporting point is shown

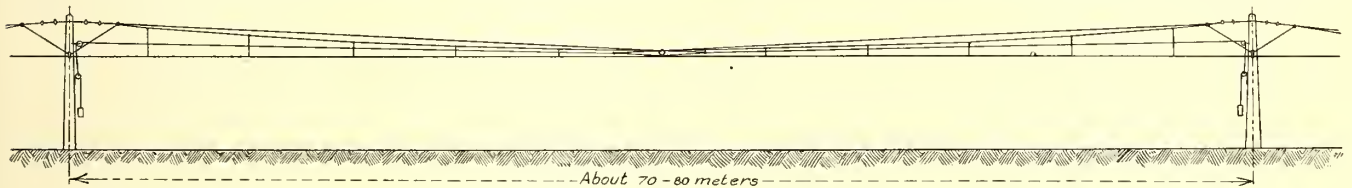


Fig. 1—European Catenary Construction—Tension Regulation by Weights in Every Tenth Span

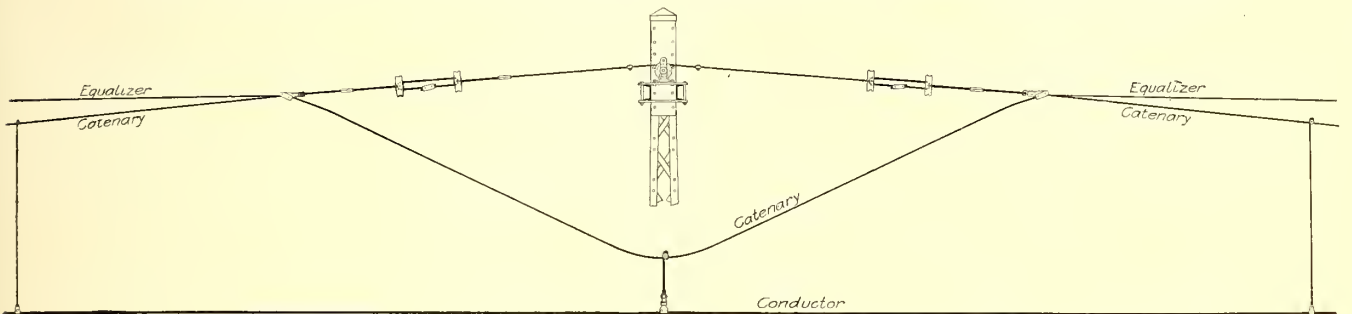


Fig. 2—European Catenary Construction—Interconnected Suspension of All Wires

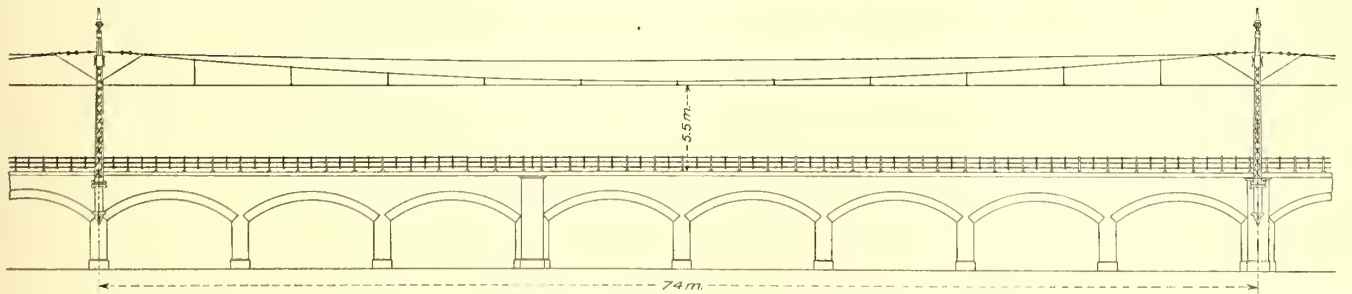


Fig. 5—European Catenary Construction—Side Elevation of 228-ft. Span

design which keeps the trolley wire at the same height in all temperatures through the simultaneous, automatic regulation of both the catenary and conductor wires.

A general view of the new construction as arranged for spans of 210 ft. to 250 ft. is shown in Fig. 1. The conductor wire is connected to the catenary by hanger wires spaced about 19 ft. 6 in. apart. The wire shown above the catenary runs from span to span without any intermediate hangers and is used to

equalize the changes in the height of the trolley as caused by variations in temperature. The equalizer and catenary wires pass through clips a short distance on each side of the span, the former going over and the latter under the span. In this construction the equalizer and trolley wires are of practically the same length, but not necessarily parallel. Double insulation against grounding through the equalizer wire is obtained by using opposite pairs of insulators of the wheel type shown in Fig. 3. The construction of these insulators is such that even if one should

break, the interlooping of the equalizer wires would prevent the catenary suspension from falling. The use of four insulators allows each to receive the same voltage. Where three insulators are used it is customary to have two in parallel and in series with the third. The result is that the third insulator must carry twice the voltage of the others. Consequently if this

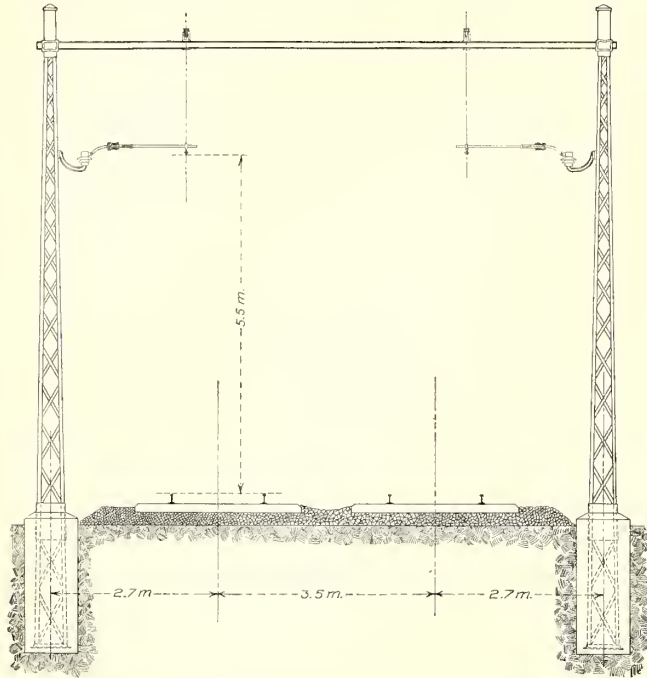


Fig. 4—European Catenary Construction—Two-Track Approach Proposed for Berlin City & Suburban Railway

third insulator should break it is quite possible that the others would be short-circuited on account of the sudden increase in voltage.

The line is zigzagged to such an extent that every contact area of the bow collector is brought into service between the ends of each span. As illustrated in Fig. 4, light supporting brackets are employed at sharp curves to keep the conductor in line, but elsewhere span wires are sufficient. These brackets are also doubly insulated. The trolley wire and the turning point of the brackets are in the same plane to prevent any overturning movement, but the brackets themselves are bent upward so as to protect them from possible blows of the bow collectors.

The automatic tension devices for regulating the height of the trolley wire without distorting the catenary suspension are installed at intervals of 2500 ft. to 4000 ft. The arrangement as applied for double track is shown in Fig. 5. The conductor, catenary and equalizer wires from opposite directions are brought to the middle point between two spans, where they form a cross-over. Each group of wires is fastened to a steel cable and carried over rollers at the span columns, which are

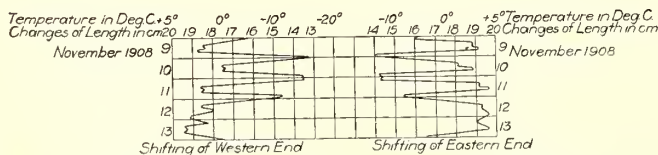


Fig. 6—European Catenary Construction—Effect of Tension Regulating Device on the Oranienburg Test Line

provided with the necessary tension springs or weights. When the temperature drops, the conductor and equalizer wires quickly contract on account of their taut position, the weights are raised and the hanger points of the catenary approach each other. The sag of the catenary remains unchanged, so that a lifting of the conductor wire is held to be impossible. An increase in temperature simply produces a reversed equalization. The reliability of this automatic tension device in practice is

shown in Fig. 6, which gives the variations in the length of the new catenary suspension built for the Oranienburg experimental line of the Prussian State Railway. This suspension is built along a 938 m (3080 ft.) horseshoe curve of the continuous ellipse which constitutes the test track. The tension indicator needles showed that each end of the horseshoe curve was influenced almost equally by the automatic tension regulation.

INSPECTION OF ELECTRIC RAILWAYS BY NEW YORK COMMISSION

The pamphlet report of the New York Public Service Commission, Second District, for the calendar year 1909 contains an account of the work of the division of railroad engineering and inspection. An abstract of the discussion regarding the inspections of street railroads, including various recommendations on questions of operation, follows:

"The reports of inspections of city street railroads show the different kinds of rail, its cross-section, weight, length of track, substructure of same, when track was laid, what repairs have been made if any, and present condition of track divided into four classes: first class, good, fair and poor. The reports also contain detailed description of each piece of track special work, its location, date of construction, date of renewals and repairs, and present condition. Recommendations are submitted for reconstruction or repairs of track and special work where necessary. The reports are indexed by streets, and furnish a complete history of track and special work.

"The inspection of interurban electric roads has been continued to an extent consistent with other matters requiring the attention of the electric railroad inspector. These inspections have been made along the lines previously employed.

"Results of Inspections: In addition to the actual improvements made in compliance with suggestions or recommendations by the commission, the fact that such roads are inspected results in better maintenance of properties and more efficient service to the public, for the reason that the conditions of each road are set forth in the report, and the knowledge that these reports are made public acts as an incentive for companies to have their properties in as good condition as possible when inspected.

"During the business depression of 1907-08, electric railroads were affected seriously. The decrease in receipts during that period necessitated the curtailment of service and operating expenses. Maintenance expenditures for track and equipment were reduced to the lowest possible point consistent with safety of operation. This resulted in a condition of track and equipment which required unusually large expenditures to restore to normal conditions. The past year has been a more prosperous one for the companies, all of them showing increased gross earnings and nearly all have been liberal in expenditures for track and equipment improvement.

"Interurban Roads: The interurban roads inspected this year, with very few exceptions, are reported as having been materially improved, large sections of track having been ballasted and a sufficient number of tie renewals having been made. Nearly all of the roads are employing a sufficient track force to properly maintain track and roadbed. Several of the interurban railroads in this district are reported as models of construction and maintenance and comparing favorably with the majority of the steam roads in this district. Among these are the Rochester, Syracuse & Eastern; the Syracuse, Lake Shore & Northern; Syracuse & South Bay; Utica & Mohawk Valley; Fonda, Johnstown & Gloversville; Buffalo, Lockport & Rochester, and Western New York & Pennsylvania. Some of this class of railroads are reported as not in first-class condition, and while not at present dangerous for operation, require a considerable expenditure of money to make necessary improvements on them.

"Car Heating: A marked improvement has been made in the manner of heating cars during the winter season. A number of the companies have adopted as a standard the hot

water heater and as fast as practicable are replacing the electric heater with it. During the winter of 1888-09 very few complaints of insufficient heating of cars were received by this commission, which is unusual, as previously this was one of the most serious and frequent causes of complaint on city railroads.

"Pay-as-you-enter Cars: A new type of car has been put into operation on several of the city roads, namely, the pay-as-you-enter car, and other companies are contemplating additions to rolling stock of this class of car. The consensus of opinion of the managers of roads who are operating these cars is that it has been of material benefit in handling the fluctuating travel on city systems and has reduced a class of accidents which are of frequent occurrence: injury to passengers boarding and alighting from cars. The introduction of this class of car caused some inconvenience and confusion to the public, which is being reduced as the people become accustomed to their operation.

"Changes in Methods of Operation, Routing Cars, and Restriction in Use of Transfers: During the past year two of the companies operating large city systems have made radical changes in methods of operation and in the use of the transfer. It is alleged that there is considerable abuse of the transfer privilege in the different cities in this State. In the two cases, Buffalo and Rochester, serious congestion of cars occurs during the rush hours. To prevent the alleged misuse of the transfer, these company establish arbitrary transfer points. With the object of relieving congestion, the 'near-side' stop was adopted. An almost unanimous public opinion against the changes has caused the companies to modify their rules in reference to both the transfer and the 'near-side' stop.

"Accidents: During the year 65 accidents have been investigated. Very few collisions have occurred on suburban railroads, but an unusually large number of such accidents have occurred on city railroads. Investigation of these accidents, in most cases, has proven that they were caused by motormen with very little experience.

"Rules: Four-fifths of the accidents occurring on interurban railroads in this district result from causes other than defects in track, roadbed, and equipment, and a large number of accidents on these roads are the results of defects in rules governing operations on them or violations of such rules by employees. The subject of proper rules for the operation of interurban railroads is one to which the commission has given serious consideration, and one on which the Street Railway Association of the State of New York took action in the adoption of a set of rules. The American Street & Interurban Railway Association at its convention this year also adopted a set of rules which it is expected will be adopted by the various State associations. Without approving or criticizing these rules, the adoption of a uniform set of rules to be used on all interurban railroads in this country would be of benefit to the companies and tend to reduce the number of accidents occurring on such roads.

"Block Signals: The use of block signals on electric roads is a very important element in operation. A number of the interurban roads are equipped with signals. They are also used on nearly all of the city roads, protecting sections of single track where view is limited. There are several kinds of signals used, both automatically and manually operated. There is also in use a system of semaphores and signals operated only from the dispatcher's office. This system should be used only for stopping cars to give crews instructions or train orders. The manual system is in more general use than any of the others. Nearly all the single track interurban roads are equipped with it. In addition to the above system, the Auburn & Northern road between Auburn and Port Bryon, and the Syracuse, Lake Shore & Northern road between Syracuse and Long Branch, are equipped with semaphores and oil light signals, with lap block sections automatically operated by track circuits. This system is the most expensive to install and maintain and is unquestionably more reliable in operation than any at present in use on interurban roads in this district. With

the exception of the track circuit system, there are serious defects in all of the above mentioned systems, and collisions have occurred on roads equipped with them. While neither approving nor condemning at present any of the systems in use, the commission believes they should be used on interurban roads only for spacing cars moving in the same direction, or supplementing a proper method of train dispatching on single track.

"Grade Crossings of Highways: The construction of improved highways and the large increase in the number of automobiles have increased the danger in operation of high-speed interurban cars over highway crossings at grade. Additional precautions should be taken by companies to prevent accidents at these points. Some of the companies have equipped all of the important highway grade crossings with a cluster of lights which are burned during hours of darkness. Several are experimenting in the use of bells at these points. At some of the more dangerous the commission has directed that all cars come to a full stop. This is the safest method of operation, but to adopt it at each crossing would restrict the running time so as to interfere seriously with the convenience of passengers. Special attention has been given to the maintenance of the roadways across electric tracks. The majority of the roads have adopted a standard cattle-guard and wing-fence, and the greater portion of the crossings are equipped in this manner.

"Rail-braces and Tie-plates: The increased weight of cars and the speed at which they are run on interurban railroads necessitates careful maintenance of track, especially on curves. Serious accidents which have occurred in the past on steam railroads have resulted in the adoption of tie-plates on curvature. Nearly all of the companies operating interurban roads are using some rail-braces on curves. One of the interurban roads in this district has adopted the use of tie-plates instead of rail-braces for that purpose. Steam railroad experience has proven that the tie-plate is preferable to the rail-brace."

The report of the division of statistics and accounts says in reference to the forms of annual reports:

"The forms for street and interurban railroad corporations were prepared on the same general plan as those for steam railroad corporations, although the details necessarily differed very considerably. The first year's use of these new and extended forms was necessarily attended with a variety of difficulties that will be avoided in the following years. The requirements of a new form of report are certain to receive a variety of interpretations, and to reduce these to uniformity is a matter involving both time and patience. Where the report is a mere skeleton, the variety of interpretations may not be apparent on the face of the reports, but where it goes into considerable detail there are likely to be inconsistencies in it which are disclosed by a careful test. The correction of these will show how the erroneous interpretations arose, and what steps are advisable for their prevention in future reports. Such correction has necessarily thus far, because of the absence of a body of traveling auditors or examiners in the staff of the division, been attempted through correspondence. It thus happens that a vast mass of correspondence has been necessary in the correction of the annual reports rendered by the corporations for the year 1908. Because of the thoroughness with which this work has been done it is expected that much less will be necessary in connection with the reports for 1909. Indeed, the representatives of one considerable group or system of corporations are already making a careful scrutiny of the reports rendered in behalf of those corporations and filing corrections of the errors discovered, preferring to anticipate the results of the test of the reports to be made by this division."

Petrol-driven street cars are being put in service in Karachi, India, with a view to speedier service without the cost of equipping the system with electricity. The cars, seating 46 people, are driven by a Lucas valveless engine of 25 hp, and are capable of making about 10 m.p.h.

THROUGH ROUTES BETWEEN ELECTRIC AND STEAM ROADS

During the hearings before the Committee on Interstate & Foreign Commerce of the House of Representatives, in relation to the railroad rate bill, testimony was given on behalf of electric railways which desired through routes with steam roads by Lewis S. Cass, president of the Waterloo, Cedar Falls & Northern Railway, William G. Dows, president and general manager of the Cedar Rapids & Iowa City Railway & Light Company and W. J. Ferris of Lacrosse, Wis., who is interested in a projected interurban road. The committee was asked to eliminate the clause which provided that the Interstate Commerce Commission shall not establish any through route, classification or rate between street, suburban or interurban electric passenger railways and railroads of a different character. This clause was finally amended and appears in the bill as introduced by Congressman Townsend, of Michigan, as follows:

"The commission shall not, however, establish any through route, classification, or rate between street, suburban or interurban electric passenger railways not engaged in the general business of transporting freight in addition to their passenger and express business, and railroads of a different character."

Bentley W. Warren, of Boston, filed a brief discussing various features of the bill. After the public hearings on the bill, which lasted from Jan. 18 to Feb. 21, the committee began the consideration of the measure in executive session.

TESTIMONY OF LEWIS S. CASS

Mr. Cass testified that he was thoroughly in sympathy with the interstate commerce law as it stood and with the proposed amendment, giving the commission the right to establish through routes and joint fares and joint classifications. Without this right, a great many communities would suffer for the want of equal and fair freight rates. He knew of no interurban railroad in the State of Iowa that did not do what might be termed a commercial railroad business, and a great many interurban roads throughout the country did such a business. Yet in every sense, so far as the passenger business of these lines was concerned, they were interurban electric passenger railways. It seemed to Mr. Cass that they were forms of railways which the committee proposed to exclude from the right of the enforcement of joint rates and through routes with steam connecting carriers. With few exceptions, most of the electric interurban railroads which had joint rates and through routes with steam carriers would be deprived of these rights as soon as they lost the power to enforce the rates. This loss would deprive a number of communities of a chance at markets equal to that of communities located in adjacent and corresponding stations upon trunk lines of railroads.

Responding to inquiries by a member of the committee, Mr. Cass said that the interurban roads of Iowa transacted the same character of general freight business as any steam railroad in the State excepting that they were not so long and did not reach the great markets like Chicago. The steam roads extending to and from Iowa were built for the longest haul and to make Chicago the market place. They carried products from Chicago to Iowa and reloaded the cars with grain and live stock for transportation to Chicago. The people of Iowa had invested their money in roads running across the State at right angles and communities had been established on these short lines. In order that the communities might thrive, they had to send their products to Chicago and to receive products from Chicago, and to buy and sell in competition with the communities located upon the trunk lines of railroad they must have substantially the same rates.

Mr. Cass said that his company had considered itself subject to the interstate commerce law for several years past and its accounts had recently been examined by auditors for the Interstate commission.

The subject of consolidation of properties was brought up by Congressman Charles G. Washburn of Massachusetts, who asked whether Mr. Cass thought that steam and electric lines

should be kept separate as competing factors. Mr. Cass said that he thought the two classes should be kept separate as a matter of public policy. He thought it was for the best interests of the public. When the subject of through passenger rates was suggested, Mr. Cass said what he was advocating principally was the matter of through freight rates. He did not consider the question of passenger rates an important one. Referring to the clause in the bill under discussion, Congressman William C. Adamson, of Georgia, asked whether, if roads of a different character had the same gage and equipment that could be interchanged, they were not nearly enough of the same character to make an arrangement for through routes feasible under the bill as it stood.

Mr. Cass said that of 150 cars owned by the company 75 had been built under Master Car Builders' specifications and 45 were freight cars, interchangeable with steam lines. The company had six steam locomotives and of its trackage, 50 miles of track were operated as a commercial railroad.

Chairman Mann pointed out that the average was a little less than a freight car a mile and asked Mr. Cass whether that was a fair proportion if steam railroads were to be compelled to interchange business.

Mr. Cass thought it a greater proportion than the average small steam railroad owned. He had just retired as vice-president of the Chicago Great Western Railway and had met that situation in connection with the interurban lines of the small steam railroads. He knew from experience that the average electric railroad which was attempting to do a commercial railroad business was better equipped in nearly every respect to serve the public than the average small steam railroad.

Congressman William Richardson of Alabama asked whether the elimination of the clause would not give the great railroad systems a power over the electric lines. Mr. Cass said that to let the clause stand would give the railroad systems the power. If the clause should be struck out, a community, whenever an electric line was in a position to serve it commercially, might make an application for the service, and if the connecting steam roads refused to grant a rate, an appeal could be made.

Congressman Richardson asked whether Mr. Cass thought the commission should have power to create through routes between steam and electric roads. Mr. Cass thought the question of routing a car or of the character of the car did not enter into the subject. He said that there was no reason why a shipment should not be transferred from steam railroad cars to electric railway cars any more than why a shipment should not be transferred from steam railroad cars to the barges of a water line. As vice-president of the Chicago Great Western road he had been ostracized from good railroad society because he would not refuse rates with connecting railroads that were operated by electricity.

Congressman Richardson asked whether it was the idea of Mr. Cass that the same control should be exercised by the Interstate commission over interurban railroads as over steam railroads. Mr. Cass responded in the affirmative. Mr. Richardson asked whether this would not place power in the hands of the great railroad systems to absorb and destroy the short electric lines. Mr. Cass said that if an electric railroad had sufficient earning power to meet its fixed charges and maintain itself in a healthy condition, the only way the steam roads could break it down was by buying its stock and absorbing it. If steam railroads should be given the right to refuse to permit electric roads to enjoy through routes and joint rates and to haul the products to a connection with steam lines, the latter would have power to reduce the earning capacity of electric properties and to destroy their communities commercially.

Congressman Richardson said that it seemed to him that if the electric railway properties were to be governed, they ought to be directed on an entirely different system from the steam railroads.

Mr. Cass said that as he understood it, it was not the intention that the commission should go throughout the coun-

try seeking places to make joint rates and through routes without complaint. But it was the intention, as under the law at the present time, that the commission should have the right to investigate the complaints and to prescribe joint rates and through routes where the carriers were entitled to have them. He wanted the matter left where it stood. All of the interurban roads in Iowa had been built originally for the purpose of transacting commercial railroad business in addition to the passenger business. The steam locomotives owned by the company were used largely in construction work and in clearing snow. They were used to handle freight at times when business was very heavy if the electric equipment was not adequate.

Some questions regarding the meaning of the phraseology of the clause to which objection had been made were discussed and Mr. Cass said that if the United States Supreme Court should hold as the Iowa Court had, that the Waterloo, Cedar Falls & Northern Railway was an interurban railroad, the company would be shut off from 40 per cent of its revenue. Mr. Cass thought that consolidation in competitive transportation should be prohibited wherever it was met and under whatever circumstances. During his connection with the Chicago Great Western road, he made it a practice to encourage the construction of electric lines and established through routes and joint rates willingly with such properties because he discovered that the advantages which the electric roads gave to the communities added very much more to the trunk line business than they took away. Outside of the Chicago Great Western, it had never been the practice on the part of the trunk lines to encourage the construction of electric railways.

TESTIMONY OF WILLIAM G. DOWS

William G. Dows, president and general manager of the Cedar Rapids & Iowa City Railway, said it seemed to him that the clause of the bill under discussion, unless eliminated would cause the withdrawal of through routes on interurban railroads. The Cedar Rapids & Iowa City Railway owned its freight terminals in Cedar Rapids and Iowa City and was built on private right-of-way. It was capable of handling freight in carload lots and it served towns which were not reached by any other railroad. When the road was constructed, an effort was made to have the steam railroads establish joint rates and through routes but they refused to do so. The Interstate Commerce Commission after a hearing ordered the Chicago & Northwestern Railway to establish joint rates and through routes with the electric line, holding that the latter was able to take care of all kinds of freight.

Congressman William H. Stafford of Wisconsin asked whether Mr. Dows considered the line an electric passenger railway, as stated in the bill. Mr. Dows replied that the passenger revenue of the average interurban road was greater than the freight revenue.

Congressman Stafford said that the character of the service, not the revenue, determined the character of the railway. Mr. Dows said that the reason why the passenger revenue of his line was greater than the freight revenue was the character of the service given. With an hourly service, the company stopped its cars anywhere to get passengers. The consequence was that the passenger service that was given for 20 hours a day made the revenue from that branch of the business greater than the freight revenue notwithstanding that the freight revenue was as large as that of the average small railroad in Iowa.

Mr. Dows added that the company had standard equipment and had physical connection in Cedar Rapids with the Chicago, Milwaukee & St. Paul and the Chicago & Northwestern roads, while at Iowa City connection was made with the Chicago, Rock Island & Pacific Railway. Congressman Richardson asked whether the company was equipped with sufficient freight cars to meet the demands of traffic. Mr. Dows said that the company had some freight equipment but it had never found difficulty in securing from other roads any additional equipment that it desired.

Chairman Mann asked if there would be any objection to a provision that if the equipment was interchanged the electric

road should provide its proportion of the equipment. Mr. Dows thought there would be no objection to that. Chairman Mann asked whether the interurban railroads were financially able to purchase the necessary equipment. Mr. Dows said that any of the roads could buy on the car trust plan.

Mr. Dows added that 27½ miles of his line were operated for freight purposes. The company had 20-odd standard freight cars but no locomotives. Its franchise did not limit the kind of power to be used. On one occasion, the company did not have sufficient electric equipment to handle passenger traffic, so it rented from one of the large trunk lines a complete steam train with a locomotive and operated that.

Answering a question as to the differences in construction between steam and interurban railroads, Mr. Dows said the public had understood that the interurban roads could be built for less than the steam properties. It cost more per mile of track for an interurban line than a steam railroad.

Congressman Richardson asked why Mr. Dows thought that the inclusion of the paragraph in the original bill would give the steam railroads great power to destroy interurban properties. Mr. Dows said he knew from what the steam trunk lines had done in the past. They refused to make any joint rate with his company. In some of the communities, people wanted to ship their stock and they had to pay his company the local rate either to Iowa City or Cedar Rapids and then the local rate from one of these points to Chicago instead of having a through rate made from the point of shipment. The decision of the Interstate Commerce Commission required the installation of joint rates and through routes and not only saved the interurban railroad but gave the communities which it served the benefit of the through rate.

STATEMENT OF W. J. FERRIS

W. J. Ferris of La Crosse, Wis., expressed his sympathy with the statements of Mr. Cass and Mr. Dows. He was interested in a franchise which had been secured recently providing for the construction of an interurban line connecting La Crosse, Wis., and Winona, Minn. This line would reach some points that had no railroad facilities at the present time and he believed that it should be possible to secure joint rates and through routes so that goods could be transported to La Crosse and from there on to Chicago by steam railroad with the advantage of through routes and joint rates. The passage of the bill containing the clause to which objection was made would probably stop the construction of this proposed line because reliance had been placed upon the revenue from the interchange of freight with the steam railroads.

STATEMENT OF MARTIN A. KNAPP

Martin A. Knapp, chairman of the Interstate Commerce Commission, appeared before the committee on Feb. 18 and made an extended statement in relation to the effect of the bill as drafted upon steam railroad matters. Congressman Charles E. Townsend, of Michigan, asked whether Mr. Knapp had considered the proposition to except electric roads in the clause prohibiting a railroad from purchasing the stock of a competing line. Mr. Knapp had not considered this proposition. He knew that there had been traffic relations between certain steam roads and electric lines. He thought it would not be wise to deny the commission the right to establish through routes and joint rates between electric and steam properties. Mr. Knapp thought the kind of motive power was not important. If a railroad was engaged in interstate commerce under the first section of the act, it did not matter whether its motive power was steam or electricity.

Mr. Knapp appeared before the committee again on Feb. 19 and made a further statement in relation to various points, including the question of through routes between steam and electric lines. He said that, assuming that under present conditions there would rarely be public need of compelling through rates between steam and electric lines where the latter were wholly or mainly engaged in passenger business, there might be cases where that ought to be done in the public interest and with the rapid development of electric transportation it was altogether probable that in the near future cases would arise where joint rates and through routes should be established between

steam and electric lines such as would not be possible under the limitations in the original bill.

BRIEF OF BENTLEY W. WARREN

Bentley W. Warren, counsel for the Boston & Northern Street Railway and the Old Colony Street Railway, submitted a brief in which he made the following arguments:

"Street railways should not be included among the transportation agencies subject to the act of Congress to regulate commerce, approved Feb. 4, 1887, as amended.

"If there is sufficient reason to include street railways within the act to regulate commerce, they should not be denied any of the benefits of that legislation.

"If street railways are to be included or continued under the jurisdiction of the Interstate Commerce Commission and the several acts of Congress to regulate commerce, it is submitted that they should be excepted from the provision of section 13, as they already are from the provisions of section 12, in the bill under consideration."

Mr. Warren said in part:

"Not only is the kind of business done upon street railways so different from that done upon railroads as to make the application of interstate commerce regulations to the former unnecessary, but the physical differences between the two classes of carriers render impossible such a relation between them as can ever raise street railways to sufficient importance to justify the application to them of federal control. It is not practical to operate over the ordinary street railway standard railroad cars.

"The distinction between the so-called interurban electric railways, which are really railroads operated by electricity, and the ordinary street railway is almost as marked as that between the street railway system in New York City and the New York Central Railroad or the Pennsylvania Railroad.

"Bearing in mind that the primary object for the federal regulation of interstate commerce was to eliminate abuses and introduce uniformity in the transportation of merchandise, there is surely little reason to load down the Interstate Commerce Commission with the oversight of the Massachusetts street railways. The figures show that all these companies in Massachusetts derive less than 1 per cent of their entire earnings in the transportation both of mails and merchandise. Their receipts from that source were actually less than half what they were from miscellaneous items of tolls, from advertising in the cars, etc. It is confidently submitted that the negligible amount of freight business done by the street railways in Massachusetts is undoubtedly true of similar street railways elsewhere; that is, street railways in other parts of the country constructed as are those in Massachusetts, chiefly in the highways.

"In Massachusetts, for example, there are only about 15 points where a street railway either crosses the boundaries between Massachusetts and any one of the five neighboring States or connects at the boundary lines with street railways operating in the neighboring States.

"I have said nothing about the probable conflict between the State laws and regulations and federal laws and regulations. That such a conflict exists and will result in unavoidable confusion and dissatisfaction in many of the States is undeniable. This is peculiarly true of States like Massachusetts, which supervise their street railways very strictly and subject them not only to minute control by State officials, but also in many respects, noticeably in the matter of engaging in the transportation of merchandise, to the control and supervision of city and town officials."

Mr. Warren added that although the freight business done upon street railways is, it is believed, negligible, always keeping in mind the distinction between street railways which are operated on highways and interurban railways, which are railroads operated by electricity, these street railways and such persons as may ship merchandise over them should not be denied the benefits intended to be conferred by the section relating to through routes. He said that if any good reason existed for the exception as to electric passenger railways in the original bill, it must be that the business done upon these

railways was so different from that done upon railroads of a different character as to make the law applicable to the latter inapplicable to the former. Mr. Warren continued:

"If, however, such railways are to be included within the act, and Congress is thereby to adjudge that the interests of the traveling and shipping public require them to be included, Congress should see to it that that public is enabled to utilize to the fullest extent such facilities as are, or may be, under federal regulations, furnished by the street railways. If the street railways and their business are to be wrested from their primary purpose of the local transportation of passengers, and, to a very limited extent, of merchandise, and brought under federal control, that control should be made effective. If there is any public demand for that federal control of street railways, and the demand is to be adequately met by legislation, the power to exercise the control should be placed in the hands of federal authorities, and not made dependent upon the voluntary act of the 'railroads of a different character.'

"The public policy of Massachusetts, as must be well known to the Massachusetts members of the committee on interstate and foreign commerce, has long favored, first by special acts and now for more than 12 years by general acts, the merger and consolidation of street railways. This policy has resulted to the general satisfaction of the public and in greatly improved service and lessened charges for transportation. Experience has shown that it is far better to have one operating company in a city like Boston, or Worcester, or Springfield, than several struggling and competing companies. The consolidation of the small companies has been uniformly encouraged in Massachusetts, subject to the supervision of the railroad commissioners, who are required to pass upon each proposed merger.

"The prohibition in section 13 of the proposed act against the issue of stock and bonds will be similarly objectionable, unless the corporations operating street railways, as that term is defined in the Massachusetts laws, are excepted from its provisions. When the commission recalls the fact that there are somewhere between 1236 and 2206 street, suburban and interurban railway corporations in the United States, they may be able to determine which of these alternatives the Interstate Commerce Commission will adopt—either to make the supervision of the proposed issue purely perfunctory, or subject the corporation and public desiring the expenditure of the proposed capital to an indefinite delay. Certainly no one would expect that nine human beings, charged with the supervision and regulation of the interstate commerce conducted upon 232,000 miles of steam railroads, would have much time or energy to pass upon the necessity or reasonableness of proposed stock and bond issues by this great number of street railways."

ELECTRIC CARRIERS

At a meeting of the committee on Feb. 1, J. C. Lincoln, of St. Louis, president of the National Industrial Traffic League, made an extended statement in reference to the steam railroad situation. He said there was no desire on the part of shippers that the commission should establish joint rates with the average interurban passenger railway, but there were a number of interurban properties in Iowa, operated by electricity, that were purely common carriers, transporting both passengers and freight. Mr. Lincoln referred to the Illinois Traction System and its joint rates with various steam properties. He thought it would be proper to except electric railways in the establishment of joint rates carrying passenger traffic, but not for freight rates.

Congressman Charles E. Townsend, of Michigan, said that his understanding was that the exception applied to a different class of properties, but the suggestion of Mr. Lincoln had created doubt in his mind as to whether this provision would not prohibit the establishment by the commission of through rates for freight between the steam road whether electrified or otherwise and the ordinary street, urban or interurban railway.

Congressman John T. Esch, of Wisconsin, said it seemed to him that the insertion of the words in that section must have resulted from a failure to apprehend the enormous extent of the electric railway industry in the United States.

THE PHILADELPHIA STRIKE

Following the disorder in Philadelphia on Feb. 22 and Feb. 23 the Governor of Pennsylvania called out four companies of the State Mounted Constabulary, numbering 157 men, exclusive of officers, to assist the regular uniformed police of Philadelphia in quelling riots. These men soon enforced order and the company immediately demonstrated its ability to operate more cars and to return to something like its normal schedule. On Tuesday, March 1, 50 per cent of the lines were being operated on regular schedule and service was being maintained on all lines, whereas the company had previously been compelled to abandon service altogether on some lines so lawless did the strikers and their sympathizers become in Kensington and other outlying districts. Besides the 2200 men who did not heed the order of the union for a strike, the company has employed quite a number of men who have met the qualifications necessary for service and 250 men have applied for reinstatement. Whereas only 722 cars were operated on Feb. 20, following the strike order issued at noon on Feb. 19, 925 cars were in service on March 1. The record by days of the number of cars operated follows: Feb. 20, 722; Feb. 21, 777; Feb. 22, 663; Feb. 23, 714; Feb. 24, 744; Feb. 25, 821; Feb. 26, 840; Feb. 27, 968; Feb. 28, 970; March 1, 925. On Feb. 28 the company had 3960 men available to run cars.

On Feb. 25 the directors of the Philadelphia Rapid Transit Company authorized the following reply rejecting the suggestion of a committee of ministers that the strike be settled by submitting the questions at issue to a board of arbitrators:

"Your communication of Feb. 24 has had the careful consideration of our board. We appreciate the spirit which has led you to intervene in the present controversy, and regret the condition existing in our city. If we thought it could be remedied by accepting your good offices we would be prompt to do so. But our knowledge of the situation convinces us that any such adjustment as you recommend would not give lasting peace or result in good service to the public.

"There are but two real questions at the bottom of this strike:

"First. The right of our employees to deal directly with us, without the intervention of an organization officered and controlled by outside men; and

"Second. The right of this company to have the same freedom in hiring and discharging men that the men have in staying with or leaving the company.

"These rights are fundamental and inalienable, and do not submit themselves to any form of arbitration. To surrender them to any outside interest would be to abrogate the management of the corporation, which duty the law imposes upon us as directors.

"An adjustment of all other questions, such as wages, schedules, conditions of labor, etc., was being satisfactorily proceeded with by direct negotiation between our employees and our executive officers when the present strike was precipitated without an hour's warning.

"As soon as normal conditions are restored, should there be any questions needing adjustment they will be taken up directly with our men, and we entertain no doubt of our ability to reach a satisfactory understanding."

A meeting of representatives of 122 local unions, whose members number, perhaps, 100,000 employees, was held in the hall of the Central Labor Union on Feb. 27, and it was voted to order a general strike to begin on March 5 as a sympathetic movement to force a settlement of the street railway strike, and resolutions were adopted urging Councils to request Mayor Reyburn, William H. Carpenter and George H. Earle, Jr., city representatives on the board of directors of the company, to endeavor to bring about arbitration of the differences between the company and its former employees and to end the strike.

As stated in the *ELECTRIC RAILWAY JOURNAL* of Feb. 26, the company has maintained uninterrupted service on its elevated and subway lines. Following the arrival of the State police the company began to operate cars at night on Feb. 25 and

has steadily increased its night service since then. On Feb. 24 the company issued the following statement to its employees:

"Any motorman or conductor in the employ of this company who has been, or may be, injured as the result of any violence attendant upon the present strike, and who has notified the company within 24 hours after being injured, will be cared for by the company as long as he remains incapacitated."

On the same day the company inserted the following advertisement in the newspapers:

"Two thousand positions as motormen and conductors are open in Philadelphia to men of good character. We do not want strike-breakers. Only men who intend to remain permanently in the service are desired. Wages, 22 cents per hour, with a guarantee of early increase. Work day averages 10 hours. Apply Philadelphia Rapid Transit Company, Eighth Street and Susquehanna Avenue, Philadelphia, Pa."

On Feb. 24 George H. Earle, Jr., one of the representatives of the city on the board of directors of the company, declared that arbitration of the differences between the company and its former employees was out of the question on account of the domination of the members of the union. Mr. Earle said:

"I advised Mr. Pratt not to lead the carmen into this mistake, quite as much on their own account as that of the public and the company. I knew that the feeling of the officers was that it was impossible to permit the demoralization of the men to continue; and that they knew that the service would be impaired just as long as the employees were being taught that the company that paid them could be fought and quarreled with at will. I knew and so said that nothing but disorder could stop the cars, but that no community would long permit an interference with its right to unobstructed transportation."

Severe punishment has been dealt by the courts to those who have been convicted of acts of violence in connection with the strike. Judge Davis, in Quarter Sessions, Part No. 1, on Feb. 23 sentenced one man to six years' imprisonment and two others to two years' imprisonment. These were among the first cases taken up. In passing sentence Judge Davis said:

"It may as well be understood now that the questions in dispute between the Philadelphia Rapid Transit Company and its employees cannot be adjusted by the unauthorized interference of outside parties, nor by irresponsible acts of lawlessness, inciting to riot, destruction of property and bodily injury to citizens. If the carmen encourage or approve such conduct they are enemies of the law, the peace and the safety of the community. The law is supreme and will be enforced, and every citizen should aid in its observance."

On March 1 Mr. Kruger explained that there had been no change in the opinion of the directors about the inadvisability of arbitration since the refusal of similar proffers made by the united clergy of the city. The statement issued by the company on March 1 follows:

"At the conclusion of an informal conference of directors of the Philadelphia Rapid Transit Company, Mr. Kruger stated that the company has not changed and will not in any way change its attitude with respect to arbitration already outlined in its reply to the Ministers' Association."

On March 1 Mr. Earle also issued a statement explaining his attitude. He said in part:

"The real difficulty in this matter is not to get peace, but permanent peace. Philadelphia cannot stand any further make-shifts. The company, when I was not a member of the board, made an effort for peace some months since; and the city has been in a turmoil ever since. That must not be repeated. In whatever way settlement is reached, it must be a permanent settlement, and nothing is permanent that is not fair.

"The greatest difficulty is that while the company is a permanent body, the union is a shifting one; and nothing done with it amounts to much if the men change their minds. The problem is a difficult one; but there should be enough ability to work it out in Philadelphia. Personally I shall favor whatever I think will bring us permanent rest and quiet, and that as I have found it is neither weakness nor truculence, but simply good sense and justice."

QUARTERLY MEETING OF THE NEW YORK ASSOCIATION

The eleventh quarterly meeting of the Street Railway Association of the State of New York was held in Rochester on Tuesday, March 1, and Wednesday, March 2. Three sessions were held, consisting of an informal dinner at the Seneca Hotel on Tuesday night and business conferences on Wednesday morning and afternoon at the Rochester Club.

BLOCK SIGNALING

The Wednesday morning session was opened by a paper on "Block Signaling on Electric Railways," prepared by Charles R. Barnes, Inspector of Electric Railways, Public Service Commission, Second District. This paper, which is published elsewhere in this number, was read by J. H. Pardee, secretary of the association.

The discussion of Mr. Barnes' paper was opened by Frank Rhea, signal expert of the General Electric Company, who thought that the system proposed by Mr. Barnes would require many years of inventive thought. There was not a single practical system to-day which would fill his specifications. The subject of signals was being investigated on a comprehensive scale by the board of control of the Interstate Commerce Commission. This study has been going on for three years, but as yet no definite recommendations have been made. However, he considered the conservatism of the board in this respect as a healthful condition. One serious point about the signal question is how far we can go without hampering the running of the railway. With the present earnings, admissible expenditures and maintenance standards, no railway in the United States could afford to install and maintain an ideal system of the type proposed. It was going to be largely a question of being able to spend a good deal of money, but where would this money come from? Mr. Barnes had touched on one important point in stating that electric railway signal problems should not be studied in the light of steam railroad experience. It was not safe to assume that the electric signaling problems can be solved even along similar lines. The existence of a return propulsion current was one thing which had retarded electric railway signal development, because of the patent situation on track currents. At present none of the leading signal companies knows what its rights are. The alternating-current track circuit appeared to be the one which must prevail in direct-current train operation. Up to the present time none of the alternating-current track circuits has proved perfect, and particularly in avoiding inductance through unbalanced bonding. In conclusion, Mr. Rhea said that if automatic train stops should be demanded on the steam railroads, the latter would be unable to continue doing business in accordance with their present income, expenditures and operating methods. The Board of Control of the Interstate Commerce Commission appears to think that a continuous indication to the engine would be desirable, but one of the great difficulties about continuous indication is the permanent maintenance of contact between the engine and the rails. Up to the present such signal systems have been put in only where the conditions were peculiarly favorable. While Mr. Barnes was right in saying that the automatic trips could easily be broken, that fact did not bar their use under the right requirements. The New York subway, on account of its stupendous traffic, has been obliged to change its signal system three or four times, particularly to gain a few seconds in train movement at certain points. Thus one improvement in speed control over a distance of 2000 ft. cost \$78,000 to gain 13 seconds per unit. So far as the great majority of roads were concerned, it seemed better to devote the limited expenditure to home signals alone over a large piece of track rather than to use a more elaborate equipment with both home and distant signals on a short section.

C. P. Nachod said that Mr. Barnes had used the word "signal" in a very high sense, for, according to its etymology, this term means simply to give an indication. If Mr. Barnes' recommendations could be carried out, it would mean an enormously expensive system. It requires far less money to make apparatus which would fail, say, once in 100,000 times, instead

of once in 1,000,000 times. Mr. Barnes apparently would discourage the use of any but perfect signals. As Mr. Rhea had said, the railroads had only a limited amount to spend for signal protection. A signal which failed only once in 100,000 movements was surely a great protection. The electric railways could use intermittent contact systems if more reliance is placed on human co-operation. In these systems the motorman can easily determine whether the signals have failed, whereas the steam engineer does not look behind him to see whether or not he has protected himself. He assumes that the signal system is perfect, whereas the motorman does not.

Mr. Barnes said that he greatly appreciated the remarks of Messrs. Rhea and Nachod. He wanted it understood, however, that he did not wish to discourage the introduction of the present signal systems, as distinctly stated at the end of his paper.

E. J. Dunne, superintendent of distribution, Public Service Railway of New Jersey, said that one type of signal had been used on his lines for the past three years with very good results where the speeds under the contacts do not exceed 10 m. p. h. to 11 m. p. h., but the same signal was giving very bad results on higher speed lines. Thus the linemen spend more time on 6 miles of protected track than on 125 miles of ordinary line. On the other hand, there is very little signal maintenance cost on the line where the cars pass the contacts at 10 m. p. h. His company is now making competitive tests of six signal systems. Among these installations are two recording signals, one of which has given very good results, and one in which the signal circuit is closed through the car wheels, a section of running rail and a storage battery. The cost per block of the installed systems varied from \$300 to \$750.

M. C. Brush, general manager of the Buffalo & Lake Erie Traction Company, said that when he was in charge of another property three or four years ago he was told that no reliance could be placed on any counting signal. The counting mechanisms proved perfectly reliable, but it was necessary to change the overhead contacts to others made on the dash-pot principle to insure their operation at high speeds. Eventually the company installed two different signal systems on its various lines, but used the same overhead contact for both.

Mr. Dunne said that he was using telephones in connection with the signal systems, so that a man could not enter a block without calling the dispatcher. Mr. Brush added that he would never operate signals without a complete telephone system. A man should not be allowed to enter a block without orders.

Mr. Rhea brought up the question of "signal aspect," namely, the use of moving apparatus in addition to lights. Electric railways could easily afford to have a position signal all the time. As the electric railways can always illuminate their signals at little expense, he thought they would go to the position signal ultimately before the steam railroads. Mr. Rhea divided the signals suitable for electric railways into three classes, as follows: Overhead contact, track circuits and automatic control. The contact system is within the reach of many companies, but it is not possible to build good installations for the price most railways are willing to pay. Track circuit signals analogous to those of the steam railroads and without automatic train control constitute an intermediate step more expensive than the overhead contact. It is much more extensive and in some ways is more flexible from the standpoint of safety. As for automatic train control, he was surprised to see how prone some electric railways are to consider it. Possibly the steam railroads might come to use automatic trips through their earlier adoption by electric subways, elevated lines and heavy interurban service. Speaking about clear failures, Mr. Rhea said they could be practically disregarded, particularly in connection with track circuits. During his experience with the Pennsylvania Railroad, at the Philadelphia terminal there had been just two clear failures in 14,000,000 signal indications over a period of 2½ years. One of these failures was never explained, and the other was due to the carelessness of a workman in leaving a wrench inside a moving cylinder.

Mr. Brush said he would absolutely insist upon visible, physical, moving signals aside from the lights. The semaphore should assume the danger position by gravity. He had found it necessary, however, to discard steam semaphores and use an enclosed type which did not interfere with trees on the road, etc. Mr. Dunne agreed with Mr. Brush about the use of semaphores, and added that lamps alone were not reliable, especially as they might burn out at the most unexpected times. Besides, it is very difficult for the motorman to distinguish the lamp colors when he enters a block while facing the sun. A three-wire signal system used by his company sets the distant signal before the home signal.

COMPENSATION FOR HANDLING MAIL.

E. S. Fassett, general manager, United Traction Company, Albany, presented a progress report of the committee on remuneration for handling United States mail, in the absence of J. K. Choate, chairman. Mr. Fassett said that this question had been taken up by a similar committee of the American Street and Interurban Railway Association. That committee learned that while the electric railways were generally dissatisfied with the compensation received for handling United States mail, there was a great diversity of opinion about what was wanted. Hence, before bringing the matter before Congress it was determined to get answers from all companies to four questions. The replies are not intended primarily for statistical purposes, but rather to get the consensus of opinion so that the electric railway representatives can answer intelligently any questions which may come up in a Congressional inquiry. Mr. Fassett thought it might be of assistance to other companies to learn how the United Traction Company had answered the questions of the American Association's committee. The four questions and answers follow, together with interpolated explanations made by Mr. Fassett at the meeting:

Question 1.—Please give a brief description of the mail service given on your road.

Answer 1-A.—We carry mail on our regular passenger cars between the following points daily except Sunday: Albany-Watervliet, 8 trips, 14 pouches, 6.08 miles; Watervliet-Troy, 8 trips, 10 pouches, 1.4 miles; Troy-North Troy, 11 trips, 22 pouches, 3.2 miles; Troy-Waterford, 1 trip, 1 pouch, 4.4 miles.

This mail is delivered to the motorman on our cars and is taken from the motorman at destination by post-office employees. The company's employees do not handle the pouches and are not responsible for anything more than the carrying of the mail on the cars. (We induced the postal people to handle the mail themselves, as the carrying to and from the cars involved both labor cost and responsibility. Now, for example, the post-office men place mail on a car in Albany and telephone the Troy post-office when the pouches are due so that they can call for them.)

Answer 1-b.—We also run one special mail car from Albany to Troy, a distance of 7.42 miles. It leaves Albany at 2 a. m. daily, averages 34 sacks or pouches and carries mail one way only. This mail is also delivered to and taken from the car by post-office employees.

Question 2.—What is the compensation for this service paid your company?

Answer 2.—That part of the service given in answer No. 1-a does pay; the service under answer No. 1-b, at the rate of 16 cents per mile, does not pay. (The original compensation was 3 cents per car-mile, whereas the operating expenses were 14 cents per car-mile. The 16-cent rate was obtained after the company gave notice that it would give up the service in 30 days if the compensation were not raised. The speaker believed that there was no reason why a mail car should not bring the same revenue as a car in regular service.)

Question 3.—What in your opinion is the best method of compensation for the service performed?

Answer 3.—For the service we perform a mileage basis on both classes is satisfactory.

Question 4.—What is the amount you think you should receive?

Answer 4.—The portion of the service under answer 1-a we believe is proper provided the service does not call for more than 150 lb. of mail or practically the equivalent of one passenger; 3 cents a mile being a fair rate for such service. The service called for under answer 1-b, in my opinion, should be paid for at the rate of 25 cents per car-mile, covering the entire mileage of the car from the carhouse, out, to the carhouse, in. This is based on the average passenger mileage receipts of cars on the line on which the service is performed. (In conclusion the speaker said it was fallacious for railway managers to assume that the carrying of United States mail would insure government help in case of labor troubles. On the contrary, experience had shown that the railway would be held responsible for all delays. It was therefore expedient to insert a clause providing for non-responsibility in the contingencies of riot, strike, fire, flood, etc.)

In reply to a question by W. H. Collins, general superintendent of the Fonda, Johnstown & Gloversville Railroad, Mr. Fassett said that while they should have been glad to secure an increase from 3 cents to 25 cents per car-mile, they took all they could get at the time in securing 16 cents per car-mile. In Boston, the compensation had been increased by using a larger car, as the payments were based on cubic capacity.

Mr. Collins said that the second assistant postmaster-general had told him that no changes in compensation could be made except in accordance with the department's regulations. He was told that the cubic foot rate applies only where special mail cars are used. When his company refused to carry mail for 3 cents a mile, the post office instituted a pony express, which costs considerably more than the electric service.

E. J. Cook, general manager, New York State Railways, Rochester lines, said that in 1908 his company had two single-truck cars, which carried mail and made collections from street boxes over prescribed routes. Compensation was on the cubic contents basis, so that the ratio per mile could not be increased without enlarging the cars at considerable expense. These cars interfered with the rush-hour service on account of the box collections, and in the end the company was obliged to discontinue this service. The company also withdrew the special mail carrier rates, which amounted to about 3 cents on the basis of on-duty travel only, but this privilege had been abused, as the men would carry uniforms and pouches in going to and from their homes or to amusement resorts, like baseball parks. His company is now carrying only a few pouches on interurban cars and, as in Albany, the work outside the car is done by postal employees.

In reply to a question by J. C. Calisch, vice-president of the Buffalo & Lake Erie Traction Company, Mr. Fassett said that from his experience with the Short Line Steam Railroad Association, that body was not likely to co-operate effectively with the electric railways in obtaining better mail remuneration. As for transporting letter carriers, the only concession his company makes is to print a special carrier's ticket, but no transfers are given.

Mr. Cook said that he had cut off the letter carriers' tickets after finding that a veritable transfer exchange had been built up in the postoffice.

E. F. Peck, general manager of the Schenectady Railway Company, warned against the installation of mail boxes on interurban cars. He had found them a nuisance, as often people would stop the car simply to mail a postcard.

Albert Eastman, passenger and express agent of the Utica & Mohawk Valley Railway, said that at the request of C. Loomis Allen, general manager, he had prepared some data to show the comparative revenues from mail and express under similar conditions. It was found that the revenue from mail was about 72 per cent of the rate for regular express matter. Recently the postoffice had notified his company that its compensation would be increased owing to an increase in the number of bags handled.

President Peck announced that as the result of a meeting of the American Street & Interurban Railway Association in New

York on January 27, the presidents of the various State associations were made members of the public relations committee of the American Association. Hereafter at the annual conventions of the national body the State representatives will be enabled to discuss officially matters of common interest.

CHARTERED AND SPECIAL CARS

B. E. Wilson, general passenger agent, New York State Railways, Rochester, then presented a report on chartered and special cars. This report is published on page 413 of this issue.

Mr. Fassett, Albany, in opening the discussion, asked whether there was any good reason why the chartered car rate should be less than the regular rate. He thought that if the companies carried people at less than the regular rates, it would make an argument for lower rates. If any one wanted special service it should be worth more than the regular service.

Mr. Eastman, Syracuse, said it was a matter of judgment with the railway whether the chartered car business was desirable. He thought that many persons could be persuaded to charter a car when they would not travel at the regular rates in the regular cars. Mr. Cook, Rochester, said it was easier to run a chartered car on special service than to operate extra cars in the regular service. The former enabled the company to plan in advance to take care of the extra business. John H. Cain, Buffalo, Lockport & Rochester Railway, thought it was often necessary to give inducements to secure special parties.

Mr. Wilson asked what should be considered a round trip in chartered car service. If a party engaged a car for a dance, leaving early in the evening and returning the next morning, should the transportation be considered a round trip or two one-way trips. Mr. Fassett said that no road with which he was connected would grant a round-trip rate for such a service.

Mr. Wilson said it was an advantage to provide that cars could be chartered only at the convenience of the company. This had made it possible to restrict special service to times when it could be conveniently handled.

Mr. Cook asked how it would be logical to establish an extra charge for transportation between certain places. Mr. Fassett said that a distinction could be drawn between special cars and extra service. When there is a circus, for instance, extra cars were provided for the traffic, but these cars were not for the exclusive use of any individuals or parties. J. C. Calisch, Buffalo & Lake Erie Traction Company, said that that company had a party rate in addition to a chartered-car rate. The former rate was used where a special car was not desired.

The association then adjourned for lunch, which was served at the rooms of the Rochester Club, where the meeting was held.

AFTERNOON SESSION

When the meeting reconvened at 2 p. m., Mr. Griffin, Mr. Callaghan and Mr. Collins read their papers. These papers were discussed together and are published elsewhere in this issue.

DISCUSSION ON TRANSFERS

Mr. Duffy, Syracuse, said that the Syracuse Rapid Transit Company had recently adopted a new transfer containing some of the same features as those used in Rochester. In Syracuse, only the day of the month was printed on the face of the transfer, so that the amount of waste was less. He thought that too little attention had been paid by railways to the subject of checking transfers. Mr. Collins had drawn attention to a very important matter in his discussion on this subject. In cities where transfers are used it had been the general practice for conductors to accept almost anything in the way of a transfer. This was especially the case in large cities where the transfer traffic had been increasing year by year. In Syracuse and adjoining cities meetings held recently to instruct conductors in the proper use of transfers had resulted in a very material reduction in the proportion of transfer traffic. The Syracuse Rapid Transit Company followed the practice of paying men their regular wages for attendance at meetings of this character and he considered the money was well expended.

The questions for discussion to be presented by Mr. Duffy (a)

"Selection of Platform Employees"; (b) "Fare Collection and Registration"; (c) "Interdepartment Relations," were then taken up.

ENGAGEMENT OF PLATFORM EMPLOYEES AND RUSH-HOUR TRAFFIC

Mr. Duffy referred to the difficulty experienced by most companies in getting just the right kind of employees. He outlined the conditions under which most companies employ new men, and mentioned the physical examinations, the weeks spent in learning the duties, the payment for a uniform, the employment for rush-hour service, and the gradual advancement to other runs. Interurban lines did not experience the same difficulties as city properties, due to the absence of tripper runs, which is a feature of city operation. At Syracuse 105 cars were operated regularly in the day-time service recently with 35 or 40 extra cars during the rush hour, and 475 platform men were employed. Of the total number of new men hired during 1909 more than 50 per cent had left during the year. If a man continued with the company more than a year he was likely to remain in the service indefinitely. He thought that all companies had had a similar experience.

Mr. Fassett, Albany, brought up the subject of whether there was not some method of distributing the rush-hour traffic. The hours of work of almost all skilled employees were now eight hours per day. In Troy, 4500 girls were employed in collar factories and their day ended at the same hour each night. No railway could in a few minutes take care of the rush of traffic which such a condition imposed. The company could not afford to employ men for the full day in order to take care of the traffic which would be offered in so short a period. It seemed to Mr. Fassett that the only solution of the problem would be the release of people from factories of this character at different hours by dividing the force of employees of large factories into shifts. The problem of rush-hour travel would have to be met by action outside of that of the railways. It had been suggested that the Public Service Commission should order large cars to replace small cars, but Mr. Fassett said that small cars could be unloaded in 30 seconds, while the large cars could not be unloaded in two minutes. Even the railways of Greater New York, with their excellent facilities, had been unable to solve the problem of rush-hour traffic.

Mr. Cook, Rochester, said that the plan of having manufacturers release their employees at different hours had been considered in Cleveland, but that the employers could not be persuaded to make a change of more than one or two minutes for the release of part of their men. Mr. Duffy, Syracuse, said the condition was one of importance to all city companies.

Mr. Fassett, Albany, said that the Public Service Commission had tried to help the situation in Albany by limiting the number of people on a car, but that the effort had been a failure. The public insisted upon the right to board cars whenever it desired. Mr. Barnes, of the Public Service Commission, thought that each case would have to be handled by itself, and that no general treatment of the problem of rush-hour traffic could be formulated.

Mr. Callaghan, Rochester, said that in the discussions before the employees of the Rochester lines he had tried to impress the men with the fact that their positions were just as good as those of bank clerks. They earned just as much when they worked seven days a week as many tradesmen. It was necessary to instill in the minds of platform men the idea that their positions were honorable. If the companies could get the men to realize that their positions were important, fewer men would resign from the service.

Mr. Duffy, Syracuse, said one company had guaranteed the extra men a certain minimum wage per week. The real trouble was with the men who remained in employment for less than one year. Mr. Rockwell, Syracuse, said that for the last two weeks he had been able to keep his extra men at work shoveling snow. Mr. Duffy referred to the New York State law prescribing a maximum 10 hours' work inside of 12 consecutive hours. Mr. Eastman, Syracuse, mentioned a statement compiled by him some time ago of the records of men who stayed in the service and those who left. He also found that if

the company could keep a man a year, the chances were that he would remain in the employ of the company indefinitely.

FARE COLLECTION AND REGISTRATION

Mr. Duffy brought up the next subject, "Fare Collection and Registration." Mr. Fassett, Mr. Callaghan and Mr. Peck participated in the discussion.

INTERDEPARTMENT RELATIONS

Mr. Duffy next took up the subject "Interdepartment Relations." It was the practice for the transportation department to criticise the engineering or the maintenance of way or some other department on certain lines. Managers should try to inculcate a spirit of loyalty to the company rather than too much independence on the part of each department. To this end, meetings held often to discuss the work of the company are of great benefit, particularly in the case of accidents.

NEXT MEETING

Consideration of the topics which were to have been presented by Charles A. Smith, superintendent of the United Traction Company, Albany, N. Y., was postponed until the next meeting. The president then announced that the annual meeting of the association would be held on June 27 and 28 at Cooperstown.

DINNER OF THE NEW YORK ASSOCIATION

The dinner in connection with the eleventh quarterly meeting of the Street Railway Association of the State of New York was held on Tuesday evening, March 1, at the Hotel Seneca. The attendance was about 75 and would have been larger if quite a number of members had not been prevented from coming on account of the heavy floods in Central New York. The dinner was a most pleasant affair enlivened by good speeches and hearty singing. Short addresses were delivered by Don Beach, legal representative of the Rochester railway and lighting interests; Charles R. Barnes, inspector of electric railroads, Public Service Commission, second district; J. W. Hinkley, Jr., president and general manager of the Poughkeepsie City and Wappingers Falls Electric Railway Co.; "Bob" Searles, president of the Rochester Railway & Lighting Company. The delegates were welcomed by George Dietrich, president of the Rochester Chamber of Commerce, who spoke of the good relations between the Rochester railway system and the city.

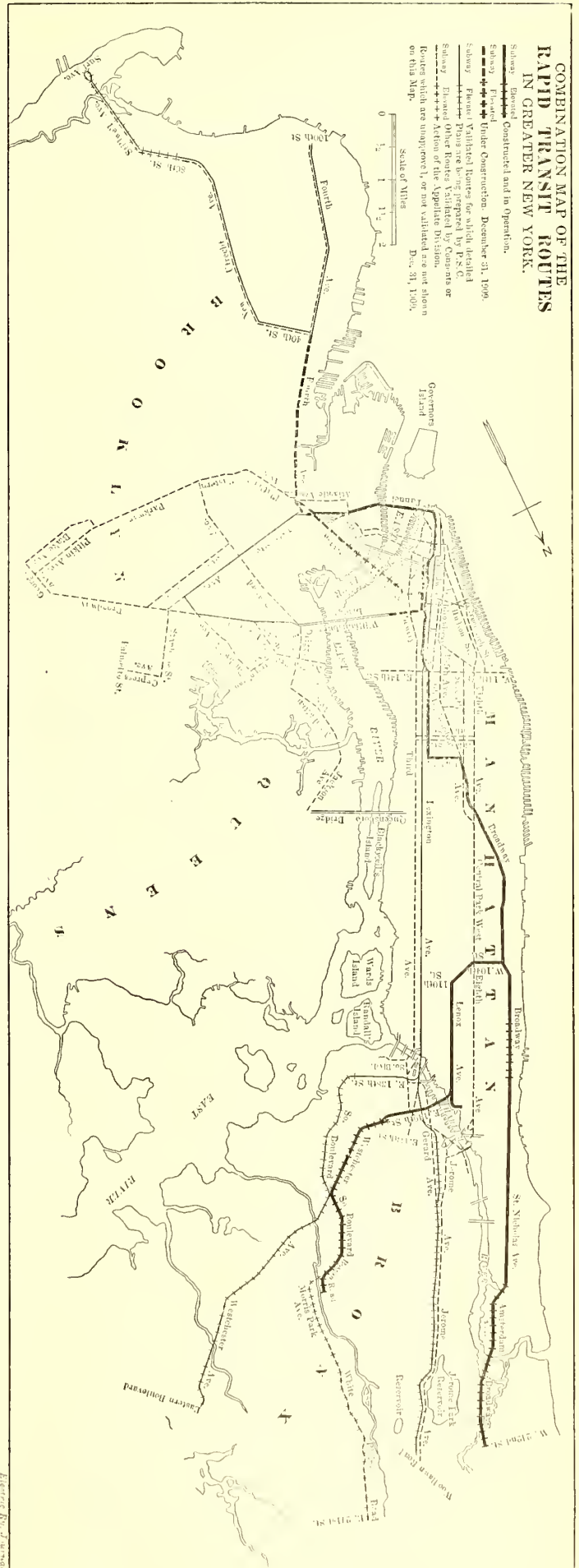
RAPID TRANSIT ROUTES IN NEW YORK CITY

The New York Public Service Commission, First District, has reprinted in pamphlet form an appendix of its annual report for 1909, giving a summary of the facts concerning the legal steps taken upon rapid transit routes up to Dec. 31, 1909.

The historical part of the pamphlet deals with the present subway and while the principal developments described are of a legal nature, a few operating statistics are given. These include the following, showing the number of fare passengers per car mile: 1905, 3.84; 1906, 4.31; 1907, 4.47; 1908, 4.55; 1909, 5.15. With the exception of the results for 1905, which relate to the period from Oct. 27, 1904, to June 30, 1905, the figures relate to the fiscal year ended June 30.

The accompanying map, prepared from one compiled by the commission, shows the existing routes and those under construction and validated for construction. It does not show the lines of the Manhattan Elevated Railway.

The Babahoyo & Guaranda Electric Railway, Baltimore, Md., has been chartered in Maryland for the purpose of building a 40-mile electric railway in Ecuador, South America, and engage in a general development business in that country. Ecuador has guaranteed the principal and interest on 6 per cent bonds running 33 years on the amount of the authorized capital stock, interest to be payable in New York, London or Paris.



NEW SUBSTATION EQUIPMENT OF THE BOSTON ELEVATED RAILWAY COMPANY

The Boston Elevated Railway Company has recently placed a 2000-kw initial capacity substation in operation near the Egleston Square station of the Forest Hills elevated extension to assist in the power supply of the elevated and surface lines of the district lying south of Dudley Street. The inauguration of this service is of special interest on account of the departure which it represents from the company's well-known practice of direct-current power generation and distribution. For many years the electric transportation lines in Boston and its vicinity have been supplied with power from direct-current generating stations located at convenient points on the system, without the use of alternating current except for temporary service. The Egleston Square substation marks the first permanent use of alternating current methods on the Boston system, and while the present source of energy supply for this installation is of

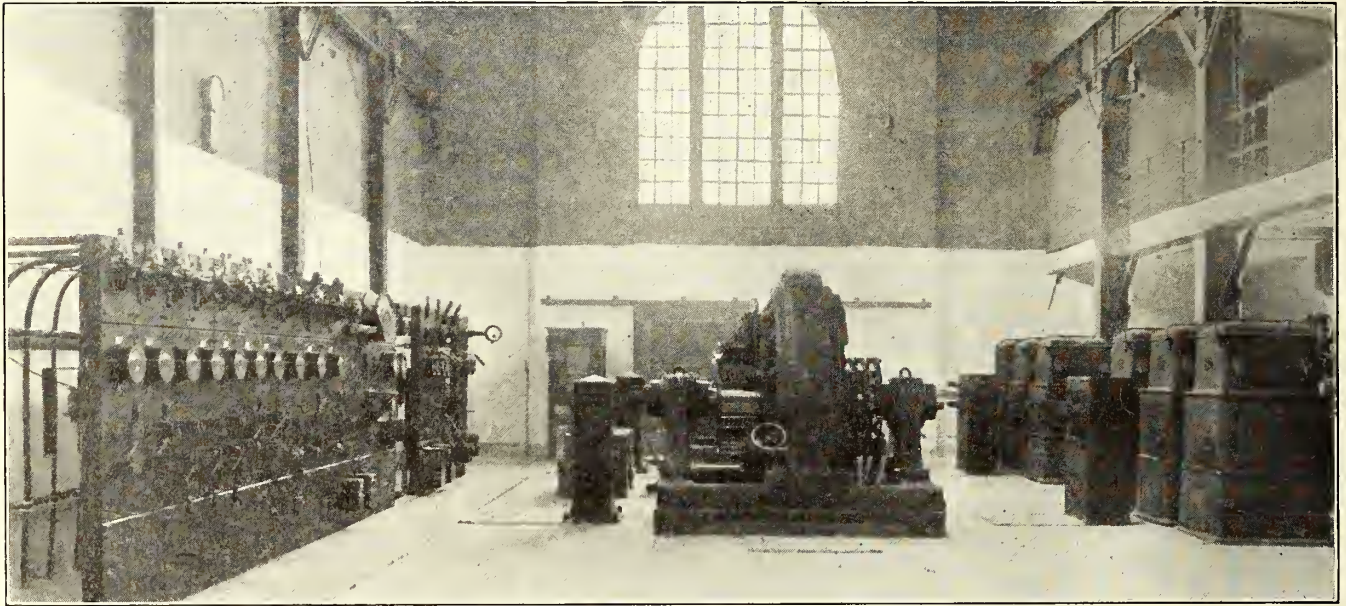
sion capacity has been provided in the building, with provision for an ultimate equipment if necessary of four 2000-kw. rotary converters with transforming and other auxiliary apparatus.

BUILDING

The building is located at the intersection of Washington and Bray streets, Boston, in a residential district traversed by the Forest Hills elevated and surface lines, and is a brick, concrete, and steel structure of an ornamental design, both tapestry and common brick being used. The substation was built large enough for its ultimate capacity in machinery, and is about 93 ft. long by 50 ft. wide, with a sloping roof rising to a maximum height of 44 ft. above the surface of the street. Copper trimmings are provided, as in the company's latest elevated station designs, and special attention was given to securing window ornamentation.

ROTARY CONVERTERS

At present the substation contains two Westinghouse rotary converters of 1000-kw. rating, each machine being of the six-



Egleston Square Substation at Boston—Interior

a somewhat special character, the design and construction of the building and its equipment are calculated to meet the company's future needs without any handicaps from the prospective development of an alternating current generating and distributing system.

The substation is now supplied with energy from a steam-driven turbo-alternator located at the company's Dorchester power station. This unit is the only alternating-current generating machinery in the company's system, and was formerly used for direct-current service as a turbo-generator wound for 600 volts and delivering current directly to the trolley and feeder system in the vicinity of the power plant. Recently this machine was rebuilt for alternating current service, delivering 25-cycle energy at 13,200 volts for transmission to Egleston Square through an underground cable line of No. 1 copper, assembled in a three-phase paper-insulated, lead-covered sheath and traversing a distance of about three miles. The turbine is a two-stage Curtis-General Electric outfit with a normal speed of 750 r.p.m. and has a maximum capacity of about 3500 kw. The company recently purchased a large tract of land in South Boston, at the water front, with the expectation of ultimately building a great central generating station at this point and converting the system into one of alternating current production and transmission, with distribution from substations either supplementing or superseding the less economical means of existing stations. While the details of this probable development have not yet been made public, the general location and arrangement of the Egleston Square installation accords with anticipated power requirements, and a large amount of exten-

sion capacity has been provided in the building, with provision for an ultimate equipment if necessary of four 2000-kw. rotary converters with transforming and other auxiliary apparatus.

The usual anti-hunting devices are provided. On their alternating current sides these machines receive energy at about 400 volts. For each rotary is installed a bank of three 375 kva. air-blast Westinghouse transformers, with a 13,200/400 voltage ratio. Starting switches are provided with connections for half, two-thirds and full voltage from the secondary transformer taps. The guaranteed efficiencies of the rotaries are:

Half Load	Three-quarters Load	Full Load
95 per cent.	96 per cent.	96½ per cent.

Air for transformer cooling is supplied by three 24-in. squirrel cage fans, which are each direct driven by a 71/2 hp., 400-volt Western Electric induction motor. The fans were supplied by the Massachusetts Fan Company, of Watertown, Mass., and embody a recent design having considerable capacity in a limited area, with interblades extending almost to the center of each fan structure. This construction gives the entering air a slowly whirling motion and a comparatively rapid radial motion toward its shallow peripheral blades, which results in the motion of a relatively large amount of air for the power expended.

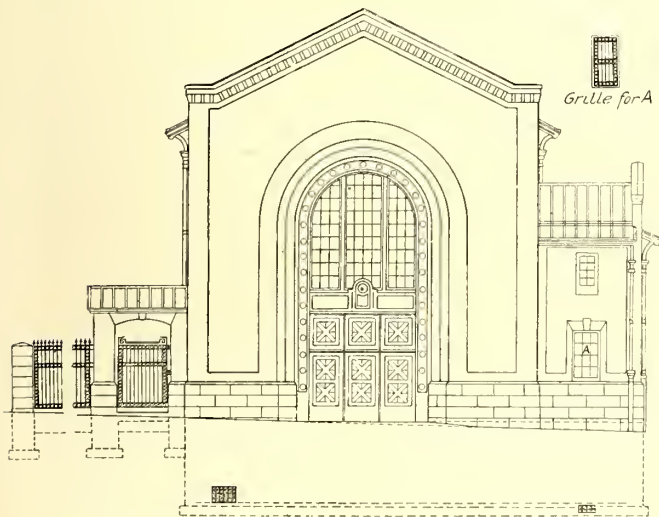
ARRANGEMENT OF MACHINERY

The substation interior is divided into a main operating room, a sectionalized basement, a bay for high tension oil switch and auxiliary wiring, and a bus bar compartment gallery located 12 ft. above the main floor. In general the course of the electrical energy through the building is from the north to the south side, with little or no doubling back. The operating room has

a span of 37 ft. and is served by a 21-ton Whiting hand-operated crane throughout its entire length. The interior walls are faced with white enamelled tile for a height of about 12 ft. above the floor, the balance of the wall being of pressed brick. The crane is carried on a runway supported on I-beams, the latter being carried on steel columns. The bus bar compartments are carried on a concrete gallery and all machinery foundations are of concrete.

ELECTRICAL CONNECTIONS

The line from Dorchester power station enters the basement of the building, terminating in a cable pot head, from which the leads rise to the switch and bus-bar compartments on the north side of the building. Knife selector switches for disconnecting service are provided in each phase between the pot head and the bus bars, so that the entire substation may be positively cut off from the supply line when desired. After passing the selector switches, which are located in fire-proof compartments, the phases rise to 13,200-volt, three-pole oil circuit breaker equipments, of solenoid operated type, with automatic actuation and overload inverse time limit relay attachments. Another selector switch is included in each phase beyond the oil switch, giving a knife switch installation on each side of the latter and rendering repairs absolutely safe. After passing through the second set of knife switches the line con-



Egleston Square Substation at Boston—Side Elevation

nects with the bus bars. From the latter, which are horizontal, each in a separate compartment with soapstone barriers and concrete bases, leads pass downward through disconnecting knife switches to the automatic oil switches to the primary sides of the transformer banks for each rotary. From the transformer secondaries the leads are carried under the floor past the starting switch stands to the a.c. rings of the rotaries, and the d.c. output of the rotaries is then carried under the floor to the main switchboard, which is located near the south wall of the operating room. Wired glass doors are provided for oil switch compartments.

SWITCHBOARD

The switchboard contains all the latest standard indicating and recording equipment, and is built in 17 panels, ten of which are used for direct current feeder distribution service, and the remainder for the rotary and station equipment. Each of the feeder panels is equipped with a circuit-breaker of the carbon type, single pole positive switch and Weston ammeter. Two of the panels are used for supplying power to the elevated lines near the substation, and the rest of the active feeder panels are operated in connection with the surface line service. Each circuit-breaker is wired to an electric gong located on the board, with automatic alarm in case of an opening. A small plug board included in the equipment permits the operator to keep any breaker open if desired, without ringing the bell. The station panels contain recording wattmeters for the total

direct current output of the rotaries, the substation power and lighting output, and a curve-drawing d.c. voltmeter is installed, together with a totalizing d.c. ammeter between the rotaries and the distributing busses. The latter has a capacity of 10,000 amperes at 600 volts. Polyphase recording wattmeters are also included for the a.c. sides of the rotaries. The oil switches are operated by a 55-cell battery, supplied by the Electric Storage Battery Company, of Philadelphia. The battery is located in a small chamber on the level of the bus bar gallery, and is charged twice a week through a rectifier installation of General Electric manufacture. The negative and equalizer switches of each rotary are mounted on a common pedestal and each machine is provided with a field break-up switch for use in starting with the proper polarization. The station lighting service is controlled from a separate slate panel mounted on the wall behind the switchboard, the different parts of the building being well-subdivided. Relays are included in the switchboard equipment for facilitating the control of the oil switches, and power factor indicators and a.c. ammeters are included in the instrument layout. The d.c. feeders pass out of the operating room to the basement and thence to the surface and elevated lines by underground conduits. All the frames of the a.c. equipment are grounded to a common ground bus located in the basement. Part of the basement is used as an air space for the supply of the transformer cooling service. The substation is lighted by ten Cooper-Hewitt mercury vapor lamps installed 25 ft. above the floor and operated in a single series circuit from the 600-volt d.c. bus bar.

MISCELLANEOUS.

The elevated feeders are each of 2,000,000 circ. mils, and two 3,000,000 circ. mil cables are brought into the substation from the rail and ground returns of the outside elevated and surface service. At present the substation is operated mainly on the morning and evening peaks, which occur between 7 and 9.30 a. m. and from 3 to 7.30 p. m., in general. Ground was broken for the construction of the substation in September, 1909, and on Dec. 30 the machinery was placed in operation. When the company begins the operation of eight-car trains on its elevated lines the new substation will be operated on longer shifts. One man per shift handles the work at present.

FRENCHMAN'S ISLAND BEING IMPROVED AS A PLEASURE RESORT

A contract has been let by the Oneida Lake Terminal Company, Syracuse, N. Y., a part of the Beebe electric railway system, to the American Steel & Wire Company, New York, N. Y., for the delivery and laying of 5700 lineal feet of three-conductor armored submarine cable from a point at South Bay to Frenchman's Island in Oneida Lake, to convey power for lighting that island. The company is spending a large sum in the development of Frenchman's Island as a high-class family recreation park, and as a part of this scheme more than 10,000 16 c.p. incandescent lights are to be strung there. The cable is for three-phase, 25 cycle current, and 300 kw. will be delivered continuously at a power factor of 90, 6600 volts, with an ohmic drop of not more than 2½ per cent, and a rise in temperature of not more than 20 deg. Cent. Current is to be obtained from the service of the Niagara, Lockport & Ontario Power Company at North Syracuse at 33,000 volts and there stepped down to 6600 volts. Transformers will be put in at Frenchman's Island to reduce the current to 110 volts.

Oneida Lake is one of four large inland bodies of water reached by various roads in the Beebe system. It is only 12 miles from Syracuse and is on the Syracuse & South Bay Electric Railroad. The Beebe system operates a frequent steamer service on Oneida Lake during the summer season. Year-around traffic on that line will be materially increased by the purchase of a site at South Bay for a large club house for the Onondaga Angler's Association, which has 1500 members. This club house is to be erected in the early spring and will cost about \$50,000.

CONSTITUTIONALITY OF THE CORPORATION TAX LAW

A case in which the application of the corporation tax law to the municipally-owned subway of New York will be tested has been appealed to the United States Supreme Court. This case is in addition to several other cases pending to test the constitutionality of the law of which the only other one involving a public service corporation, however, is that affecting the Coney Island & Brooklyn Railroad. A report of the action in the latter case was published in the *ELECTRIC RAILWAY JOURNAL* of Feb. 12, 1910, page 277.

On Feb. 16 there was filed with the United States Supreme Court an appeal from a decision of the United States Circuit Court for the Southern District of New York in the case of Arthur Lyman and Arthur T. Lyman as trustees of the last will and testament of George Baty Blake, deceased, appellants vs. Interborough Rapid Transit Company et al. Arguments will be heard by the Supreme Court on this case, as well as on the other cases, during the week beginning March 14.

The bill of complaint in the Interborough case, in which Evan Shelby, of New York, is solicitor for the complainants, sets forth that Arthur Lyman and Arthur T. Lyman, of Waltham, Mass., citizens of Massachusetts, are the owners as trustees of 150 shares of capital stock of the Interborough Rapid Transit Company of New York. The bill shows that the company was organized under a special act of the Legislature of New York. In this act, specific provision was made for the incorporation of companies to take over and exercise the rights and privileges connected with the leasing, operation and maintenance of any rapid transit railway, which might be constructed by a municipality under the provisions of the act. The bill describes the extent of the railroad operations of the company, comprising the municipality owned subway, the leased Manhattan Elevated Railway, the New York & Queens County Railway, a majority of whose capital stock is owned, and the New York City Interborough Railway, a majority of whose stock is also owned.

While some of the provisions of the bill follow closely those advanced in the case affecting the Coney Island & Brooklyn Railroad, several bring out the points in which the case is different from any others that have been taken before the Supreme Court. For instance, one section of the act under which the company was incorporated provided that the person, firm or corporation operating any road of the character described in the act "shall be exempt from taxation in respect to his, their or its interest under said contract and in respect to the rolling stock and all other equipment of said road," but this exemption shall not extend to real property. The company pays interest upon the city bonds issued for building the subway.

A valid agreement is said to exist between the State of New York, the city of New York and the Interborough Rapid Transit Company, exempting the company from any and all taxation in respect to its interest in the rapid transit railroads in the city of New York. This exemption from taxation has recently been upheld by the Court of Appeals of the State of New York in the proceeding instituted by the company to review a special franchise tax assessed against it by reason of its interest in the rapid transit railroad.

One paragraph in the bill states: "Your orators further aver that the said tax imposed upon the defendant Interborough Rapid Transit Company by the provisions of said act of Congress, to the extent that it is measured by the income derived from the operation by the said company of the rapid transit railroad in the city of New York, as aforesaid, is a tax imposed upon the franchise of said company to hold and operate a municipal property created and existing for the purpose of carrying on a municipal enterprise; that it is a tax upon the income derived by the said Interborough Rapid Transit Company from said property; that as such it is a tax upon an incident to said property, and is a tax upon municipal property, and is therefore not a tax that can be lawfully imposed by the Congress of the United States under the constitution of the United States."

The court is therefore asked to decree that the provisions of the act concerning the tax be declared unconstitutional, null and void, and that the company be restrained from voluntarily complying therewith.

NEAR-STOP OPERATION *

BY W. R. W. GRIFFIN, GENERAL SUPERINTENDENT, NEW YORK STATE RAILWAYS, ROCHESTER

In the general operation of a street railroad the question of location of passenger stops matters little, provided there be but one stop at an intersection and a practically uninterrupted movement up to the point of stop.

This being the case, the near stop or far stop is purely a question of sentiment and local education, together with physical conditions at the stop for proper boarding and alighting, and it does not enter for or against ease of operation as far as proper transportation is concerned.

But this condition is met seldom, especially in our larger cities at prominent intersections where all classes of traffic are heavy and in diverse directions.

In such cases the municipal authorities, for the safety of pedestrians as well as all other traffic, make ordinances and rules governing the movement across such intersections, the principal rule of which is, and should be, the halting or stoppage of all traffic before crossing, and that the movement be made under the direction of a municipal traffic officer.

Where street car traffic is heavy, necessitating a large number of cars in short space of time, the time of movement over a given stretch of track very often determines the regularity of service to a large portion of the outlying district. And whenever it so happens that this stretch of track is common to a large portion of the lines operated, it becomes necessary to eliminate all possible dead time or unnecessary stops.

The method of operation in Rochester previous to Nov. 16, 1909, was to make the near or safety stop, move by the direction of the city traffic officer, and then to make the far or loading stop.

This necessitated making seven stops in a little over 1000 ft. on Main Street, between State and St. Paul, and the number of cars required to operate the schedules had then reached the limit of free movement. The holidays came, requiring still more cars. The company had to work out some plan of relief, and eventually adopted the near stop.

Before the adoption of this plan, checkings were made during the rush hour of the average delay at the first or safety stop, and of the average time required to load and unload all passengers handled at the several intersections.

The check of average delay of the near or safety stop at the corner of Main and St. Paul (corner) the slowest showed 35.2 seconds, and of the far or loading stop 24.7 seconds during the 15 minutes' peak of the rush hour at night.

This check showed that the near or safety stop afforded ample time to do all the loading and unloading at this corner and, that being the case, the car service could be benefited by using the 24.7 seconds' loading time in car movement.

The company also figured that some of the near stop delay was due to blockade of the loading stop and that the elimination of the latter stop would lessen the near stop delay in actual operation. This proved to be the case as the first night's operation showed a 20 per cent quicker and freer movement, and this was maintained until the schedules were closed up to a required movement of 25 seconds headway during the 15 minutes' peak of the rush hour. This movement proved to be too rapid for the traffic direction, which never got faster than 28 seconds headway, working under the existing traffic rules and regulations.

As stated, successful operation depends more on the uninterrupted movement from and to the point of stop, than upon any other element after once the car has completed loading and un-

* Abstract of paper presented at the quarterly meeting of the Street Railway Association of the State of New York, Rochester, March 2, 1910.

loading. Checkings on Rochester's heaviest corners show this loading and unloading time to be an average of about 13.5 seconds per stop or 2.2 seconds per passenger handled during the rush hour at night.

The successful operation of the near stop, as well as the far stop, requires the very best possible co-operation of the city's traffic officers and no doubt, on heavy traffic streets, the near stop operation is by far the safest and will cause less serious accidents and personal damage.

METHODS OF CHECKING TICKETS AND OTHER PASSENGER REVENUE *

BY J. C. COLLINS, SECRETARY AND AUDITOR, NEW YORK STATE RAILWAYS, ROCHESTER

My subject is, in other words, the expeditious audit of conductors' returns and prompt report of the results to the operating men, in order that they may have the figures of the different lines as early the next day as possible, and be able to correct or regulate the traffic according to the figures shown. This is especially true where the change of a schedule may show too many miles run or car-hours made; or where an extra train may be needed on an interurban run.

This sounds very easy, but unless the system is simple, the records correct and the work done daily, the results cannot be shown promptly, and two or three days' losses are made before correction is possible. If these reports are prepared the next day and studied carefully by the transportation department, only one day elapses before a change of schedule can be made.

With the advent of the Public Service Commission it became more important than ever before to enter into the most minute detail. With an accurate record of the conductors' returns, properly classified, there is no question that may be asked by the commission that cannot be promptly answered.

In preparing returns promptly the next day, we have found the receiver system a very valuable and satisfactory method. It not only facilitates the prompt issue of what we call our "daily report," but at the same time saves disagreement between the conductor and the auditing office as to what was turned in. This system may be a little more expensive than others, but in our experience it has justified any difference there may be between the cost of employing a number of girls to do the work, and of two men to do it at night.

Suppose we start with our method where the work originates—with the car record. This record is placed in the car by the night watchman. It contains space for car number, date, time, commencing and closing numbers of the car registers (which in our case are 5- and 3-cent registers), and the line and the badge number of each conductor operating the car. When the car pulls in at night a man known as the register taker enters the car as soon as possible, removes this record, compares it with the register, O.K.'s the card, and sends it to the auditor's office. This is checked against the trip sheets for register readings, and then compared with the car record for the previous day to see that there is no discrepancy between the commencing and closing numbers.

The next step is the conductor's trip report, which is the basis for compiling the earnings, passenger and transfer statistics. Our trip sheet shows the station number, the car number; also, under head of registered fares, tickets, 5-cent, 3-cent and transfers, total passengers and total cash for each trip; also the commencing and closing number of transfers issued, the train number, motorman's and conductor's badge numbers and names, the total time worked, date, run number and line.

On the back of the trip sheet is the register record, giving the car number, beginning and closing numbers of each register and the difference; also the total of each register. Where the line may have a suburban end, the registered cash fares, tickets and total passengers, also total cash, are shown.

The trip sheet, after being totaled by the conductor, is turned in by him to the receiver, together with his cash, tickets, collected transfers and unused pads of transfers. The receiver compares the differences as shown by the register record on the back of the trip sheet with the conductor's returns, and multiplies the 5- and 3-cent cash fares to see that they correspond with the cash. He then puts his initials on the sheet in indelible pencil.

The receiver has a sheet which is called "audit of conductors' collections" for each line in the city. This sheet shows the names of the conductors, and the various items of cash fares, tickets and transfers. On this sheet the receiver lists the different conductors' trip sheets, totals it and forwards to the auditor's office together with the tickets and trip sheets, the money being sent to the cashier.

The auditor's office verifies the trip sheets with the receiver's record, counting the tickets and examining them to see that they are properly canceled and good only on the line on which they were used.

The summary of the receiver's sheets for each line is then made on a separate blank, which gives the detail of revenue tickets, revenue passengers, free tickets, non-revenue transfers, cash fares and total passengers. This sheet gives—on the reverse side—a recapitulation of earnings, showing the cash receipts and ticket values and the total earnings of each line. This sheet is checked and verified, and signed by the clerks who do the checking and verifying. This summary of receiver's sheets is also used for the various passenger statistics, and is posted daily in our statistical record. From these sheets the daily earnings report is also compiled.

Our method of treating ticket sales is to credit them to earnings when the tickets are collected, not when they are sold. If the ticket sales are credited directly to earnings, then the record of passengers carried for that day is not correct. On an interurban road, in comparing one day with another, you will be comparing one day's sales against another day's passengers carried.

We had considerable trouble, some time ago, from the loss of transfer envelopes. Our method provided that at the end of each trip the conductor should put the transfers collected in an envelope, seal it, and deposit it in a box at one end of the car. This envelope was taken out by the man who took the register statement when the car pulled in at night. We found a number of discrepancies between the conductors' records and the envelopes turned in to the office. Sometimes this was due to the conductors, and sometimes to the man who collected the transfers.

To correct this and avoid the many disputes that occurred, the conductor is now required to turn in his collected transfers at night, at the same time that he accounts for his money. To save any discrepancy between the number of transfers turned in and the number the conductor's record called for, we adopted a gummed band, on the inside of which we had printed, at the head, "transfers collected" and the various trips. These trips were numbered from "No. 1" up, and opposite each trip number were the words "in" and "out." At the end of the trip the conductor places his transfers in the envelope and enters on the envelope certain data, together with the number of transfers in the envelope; and the number as marked on the envelope is also marked on this band under the head of "in" or "out," according to the trip number. At the end of the day the band is placed around the envelopes and the ends are sealed. The outside of the band shows the date, conductor's name, badge number, line, car number, number of envelopes and the name of the person receiving the envelopes. The receiver to whom these are turned in counts the number of envelopes and checks them off against the number reported on the band, without disturbing the seal.

The package is then sent to the auditing office, and the clerk again verifies the number of envelopes. By this method there can be no question of lost envelopes, eliminating any dispute between the conductor and the auditing office.

The clerk in the auditing room opens the envelopes and com-

* Abstract of paper presented at the quarterly meeting of the Street Railway Association of the State of New York, Rochester, March 2, 1910.

often lasted as long as two hours through the asking of questions by employees. The management knew from the experience of previous meetings that many times employees would not ask questions because they feared to display ignorance. By assuring them that the officials had omitted to refer to features which needed explanation and were only reminded of them by employees asking questions, a great number were induced to make inquiries. In this way certain things which were apparently clear were found to involve some points which needed explanation. The instructors were astonished at some of the questions that were asked concerning features about transfers which had not occurred to the officials even after long study.

To assist conductors where an improperly punched transfer was presented, the conductor, after taking the number and color of such transfer, presented a card to the passenger reading as follows:

TO OUR PATRONS
THIS CONDUCTOR IS
GOVERNED BY RULES he is NOT AUTHORIZED TO CHANGE

In case of dispute KINDLY PAY FARE and send complaint with this card to the General Superintendent of Transportation for adjustment, 267 State Street. Both 'phones 887.

NEW YORK STATE RAILWAYS,
Rochester Lines.

This Conductor's No. is _____.

When given to the passenger this card had the badge number properly filled out in the space left for that purpose.

The day the new transfer was put into effect, cards headed "Don't Blame the Conductor" were posted on the windows of all cars. These cards informed the public that the conductors were working under rules which they could not change and requested passengers with complaints of any kind to present their grievance to the office. This slogan "Don't Blame the Conductor" was undoubtedly one of the happiest thoughts that could have occurred, as it became general all over the town and no doubt relieved the conductors from many disputes and troubles.

REPORT OF THE COMMITTEE OF THE STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK ON RELATIONS WITH THE AMERICAN ASSOCIATION

The report of the committee appointed by the Street Railway Association of the State of New York to represent the association at a conference with the executive committee of the American Street & Interurban Railway Association and representatives of other State associations, presented its report at the meeting of the New York association March 2 at Rochester. The report was signed by the committee, consisting of E. F. Peck, C. Loomis Allen, J. W. Hinkley, Jr., and J. H. Pardee, and was as follows:

"A conference was held on Jan. 27, 1910, of representatives of various State organizations and the committee on public relations of the American Street & Interurban Railway Association. As a result of this conference recommendations were made to the executive committee that the presidents of the various State associations be appointed as members of the committee on public relations. By means of membership on this committee, matters of mutual interest to the State associations and the American association can be discussed and proper action taken.

"The recommendation made by the joint committee was favorably acted upon by the executive committee of the American Street & Interurban Railway Association, and on Feb. 16, 1910, President Jas. F. Shaw of the American Street & Interurban Railway Association confirmed the appointment of presidents of the various State organizations as members of the committee on public relations."

A report of this meeting was published in the *ELECTRIC RAILWAY JOURNAL* for March 5, 1910.

CHARTERED OR SPECIAL CARS*

BY B. E. WILSON, GENERAL PASSENGER AGENT, NEW YORK STATE RAILWAYS.

It is generally admitted that the best business for a railway company to secure is the regular, every-day travel, but I doubt if there is a company represented at this meeting that is not confronted with the proposition of furnishing chartered or special car service to care for the movement of picnics, pleasure parties, funerals, or service at hours not covered by the regular schedule. The question is, what is the proper basis upon which to cater to this special service. Should the rates and conditions be such that this particular class of business would grow and in the end make demands for additional equipment and an increased list of extra motormen and conductors? It is certain that local conditions should govern the policy of each company. Nevertheless, the basis upon which special service is to be furnished can and should be of a stimulating rather than a depressing nature. It should also be remembered that the effects upon the regular service and patrons of the road should be given proper consideration.

Funeral or picnic parties, with a distinctly different purpose in view, do not want to be transported by the regular, every-day service, and why should they? Picknickers, upon pleasure bent, do not care to ride on the same cars that are used by the regular riders. Imagine children, on their way to a Sunday School picnic, riding in the same car in which prisoners, fastened with iron shackles to a police officer, are being taken to a jail or a police court; or on a car in which some poor unfortunate, with blood trickling over his face, is being conveyed to a hospital. Both of these occurrences are common upon lines operating in districts without ambulance service. Again, should the members of a funeral party necessarily allow their grieved feelings to affect other passengers.

The special car service is a subject which, in my opinion, has never been given the proper attention. Are the rates and conditions under which cars are chartered, consistent? Are the rates higher than would be demanded under regular service? If so, why are they? Is it the desire of the company to carry the picnic, the funeral and the hospital in one car? Have not the passengers using the regular service some rights?

The rates and conditions governing special car service should not only be based upon earnings of the cars themselves, but upon the influence of these cars upon the general service. Make the special car rates such that they will stimulate and not retard the promotion of picnics and outings. What better means is there of getting earnings out of idle equipment, and what better opportunity of protecting regular travel against unusual loads? Perhaps your equipment is always busy. If so, you had better purchase more, for you must be giving poor service at some time or other.

Cars should be chartered only when they can be spared from the regular service. I find that several companies have this in mind, for their conditions governing chartering of cars state that cars will be chartered only when they can conveniently be supplied by the company. Personally, I cannot see where it would be possible for any company to build up a special car business that would support equipment to be used for that purpose alone, unless it were funeral car service. Place the rates on the funeral cars where they will not be prohibitive to a small funeral or for persons of moderate circumstances, for it will be from this class that the patronage will come. It is a common occurrence for a man of means to engage a car for the sake of exclusiveness, but remember he, too, has a limit.

The proof that too little attention has been paid to special car service is contained in the following abstracts from tariffs issued by companies, as regards chartering and arranging for special cars. Note the differing conditions under which this service is offered. On referring to about 35 tariffs, I found that no two were alike.

* Paper presented at the quarterly meeting of the Street Railway Association of the State of New York, Rochester, March 2, 1910.

Toledo & Western Railway Company.—This company arranges for special or chartered service on the party ticket plan. One-way party tickets, for 10 or more passengers, traveling together, are sold between all points, at 1½ cents per mile, or fraction thereof, adding where necessary to make rate end in 0 or 5. No party rate is made at a rate less than 10 cents per passenger. Round-trip party tickets are sold by this company as follows:

- 10-49 (inclusive) traveling together at 1½ fare for round trip.
 - 50-99 (inclusive) traveling together at 1¼ fare for round trip.
 - 100-149 (inclusive) traveling together at 1 fare for round trip.
 - 150-200 or more traveling together at 4/5 single fare for round trip.
- No excursion ticket is sold at less than 25 cents.

Public Service Railway Company.—Cars are chartered on the basis of \$3 per hour, or 5 cents per minute, covering actual operation, round-trip time for one-way trip. If a lay-over is made at the destination or the car has to return for the party, a charge is made for an additional round-trip time. This company quotes a minimum of \$6 for any service. A chart, in blue print form, showing the running time between all points, is used in making chartered car charges. Orders for cars are made in triplicate, one copy going to the party engaging the car, one copy to the auditor and the remaining copy to the supervisor of the car house. A deposit of \$3 is demanded in each arrangement, the conductors collect the balance due and in turn give a receipt. The conductor then turns in the money at the car house.

Schenectady Railway Company.—Chartered car orders are made out in duplicate. The original copy is sent to the car barn. After movement, the trip sheets, money and order are sent to the superintendent, who in turn forwards them to the cashier, together with duplicate order attached. In the city of Schenectady a straight 5-cent fare is charged, with minimum charges as per following table:

Type of Car.	Seating Capacity.	One-Way.	Round-Trip.
Small, closed.....	26	\$4.00	\$6.00
Medium, closed.....	40-42	5.00	7.00
Large, closed.....	54-56	5.00	8.00
Small, open.....	45	5.00	7.00
Large, open.....	65	6.00	9.00
Chair car.....	24	7.50	10.00

When trip is not continuous and car is subject to order of party, an extra charge of 50 cents per hour is made for lay-over time. Between midnight and 6 a. m., a minimum charge of \$10 is made. Advertising cars or trolley trips within the 5-cent fare limit of the city of Schenectady are chartered for the first hour at \$6, with an extra charge of \$1.50 for each additional quarter of an hour or fraction thereof. With regard to the suburban service, tariff sheets give definite rates between stations or stops on the basis of seating accommodations and distances. For a car seating from 52 to 56 passengers, the charge for one-way between Schenectady and Watervliet is \$15. If regular fares were charged for the full complement of passengers, the total revenue for the car would be \$11.20. Likewise, the round-trip chartered rate is \$25 for the same service, against \$19.60, if regular fares were collected.

Detroit United Railway.—This company charters city line cars on the basis of \$3 per hour, this time covering the leaving and returning times at the car houses. For funeral cars a charge of \$15 is made for service to and from cemeteries within the city limits, or \$20 to and from cemeteries within 7 or 8 miles of the center of city. The following conditions govern the chartered service: Number of passengers limited to 60; no advertising streamers to be carried on cars; an extra charge of \$5 per hour for service between the hours of 1 a. m. and 5 a. m. For round-trip service, where rates of \$15 and \$16 are charged, a charge of \$1 per hour is made for all time over four hours. For service where a rate of \$25 or more is charged, a reduction of \$5 per car is allowed on each car ordered, in addition to the first car. Comparing the Detroit system of chartered car service against regular fares we find that the chartered car rate, one-way Detroit to Toledo, is \$33, while on the regular fare plan the revenue from 60 passengers would be \$48. Likewise, the round-trip chartered plan would be \$55, whereas the regular fare plan would give \$90.

Indianapolis & Cincinnati Traction Company.—This com-

pany's tariff states the following conditions as regards special or chartered cars: "Special cars are furnished on reasonable notice, where practicable. Agents will quote rates, but all final arrangements must be made with traffic manager, or general agent. Special cars are subject to a minimum of 40 passengers per car. If a car is chartered for a round trip, the rate per passenger would be 5 cents, plus the full first-class fare. If chartered for single trip, the charge will be, per passenger, the first-class fare at a minimum cost of 40 cents. Between midnight and 5 a. m., an additional charge of 5 cents per half hour, per passenger, is made, the charge to be added to the minimum charge per passenger when the rate per passenger is less than the minimum."

Terre Haute, Indianapolis & Eastern Traction Company.—Special tickets are made out for an entire party at a rate of 1 cent per mile per passenger (round-trip mileage), a minimum of 60 passengers per car on the Northwestern Division, and 55 passengers on other divisions, with a minimum charge for the service at all times of \$25 per car. All additional passengers are charged at the same rate of 1 cent per mile, the fare to end in 0 or 5. Cars used one way only are charged 75 per cent of the round-trip mileage. Agents contract for special cars only when approved by superintendent. A comparison of this company's chartered rates against its regular fares shows the following: Chartered car, Indianapolis to Youngstown, one way, \$66; regular fares, \$77; round-trip chartered, \$88; regular fares, \$148.50.

Erie Railroad Company.—Chartered or special cars are arranged for on the per capita basis. In other words, regular fares are charged and the car in each case is to earn not less than \$1 per mile, with a minimum charge of \$25.

New York State Railways—Rochester Lines.—City service cars are chartered at the convenience of the company on application to the general passenger agent, at the following rates, between any two points in the city of Rochester: One way, \$4, and round trip, \$7. The chartered car service is limited to transportation only and does not include the use of the car during lay-overs or the time between the outbound and the return trip; and it does not include transfer privileges.

The Rochester Company's interurban chartered car service is at all times subject to the convenience of the company and arrangements can be made only by application through the office of the general passenger agent. Chartered car rates, covering points between any two stations, are computed on the basis of 75 cents per mile, using round-trip mileage between the points of service. When this total mileage contains a fraction less than one-half, the fraction is dropped; when the fraction is greater than one-half the charge is made for a whole mile. A minimum charge of \$20 is made for any service. Interurban chartered car service is limited to the time the car is in operation from start to destination, and does not include lay-over or time between outbound and return trips. The number of persons to be carried in any one chartered car is limited to 50. Each additional passenger carried is charged regular fare.

In arranging for chartered car service, each applicant must sign a chartered car application form covering all details of the service required. The application also contains a clause releasing the company from any claim that might be made for failure to furnish service, in consequence of strike, lockout, want of power, or any other unavoidable contingency. The application also stipulates that no liquors shall be taken on the car and that fireworks shall not be used; that yelling or disorderly conduct shall not be indulged in, nor vocal or instrumental music of any character be given while on the car.

As soon as the application is signed by the person engaging the service, a chartered car ticket, consisting of two coupons, is given the applicant. This ticket not only serves as a receipt for money paid on account of the service, but also shows the exact routing. The coupons are surrendered to the conductor, one for the outgoing trip and one for the return trip. The conductor on receiving same fills out a form on the back, to show the mileage made, time out and time in, as well as the number of passengers carried. The tickets are then turned

in to the receiver the same as any other car earnings. While the chartered car application and tickets are made out in the office of the general passenger agent, both bear the signature of the cashier, to whom the money is actually paid for service.

The transportation department receives its instructions concerning service in the form of a chartered car order, which is made in duplicate. This order is issued to the division superintendent with advice as to the number of cars, type, routing, party for whom service is engaged and person in charge. The chartered car order also shows the number of the chartered car application, which is held in the office of the general passenger agent, and the number or numbers of chartered car tickets which are to be surrendered for the service.

for actual operating time, with a minimum charge of \$6. This arrangement is preferable to that of making a flat charge for one-way and round-trip service between any two points, in that the person engaging the service can, if desired, designate the route and pay for the service accordingly.

Conditions that should be added are that the service should be paid for in advance; that the person engaging the service should receive a chartered car ticket, which would be surrendered to the conductor, who would turn the same in to the receiver or cashier, with a notation on the back of the ticket as to the number of passengers carried, etc. The number of passengers to be carried should also be stipulated and a minimum charge given for the one-way service. If the plan of the

FORM 287
NEW YORK STATE RAILWAYS
ROCHESTER LINES
AGENTS STUB
CHARTERED CAR TICKET AND RECEIPT
No. _____
ISSUED TO _____
DATE _____
RATE _____
FOR CHARTERED CAR SERVICE
FROM _____

NEW YORK STATE RAILWAYS
ROCHESTER LINES
CHARTERED CAR TICKET AND RECEIPT
No. _____
Good for Chartered Car Service as per conditions of Ticket attached.
FROM _____ TO _____
ON _____ 190 _____
TO BE GIVEN TO CONDUCTOR IN CHARGE OF CAR

FORM 287
NEW YORK STATE RAILWAYS
ROCHESTER LINES
CHARTERED CAR TICKET AND RECEIPT
No. _____
ROCHESTER, N. Y., _____ 190 _____
RECEIVED OF _____
_____ DOLLARS
FOR A CHARTERED CAR ON _____
FROM _____ TO _____
RETURN TO _____
CASHIER
This receipt is issued in accordance with Chartered Car Application No. _____ signed by and is subject to conditions of same.
This Ticket or Receipt is to be given to the Conductor to turn in as his voucher.
B. E. WILSON, GENERAL PASSENGER AGENT
I ACCEPT THE ABOVE CONDITIONS

NEW YORK STATE RAILWAYS
ROCHESTER LINES
OFFICE OF GENERAL PASSENGER AGENT
Chartered Car Application No. _____

The undersigned applies for chartered car service as follows:
Number of Cars _____ Type _____
To be Run _____ Date _____ 19____
From _____
Time _____
To _____
Via _____
Returning from _____
Time _____
To _____
Via _____
Ordered for _____
Price \$ _____ per Car _____ Total \$ _____
Remarks _____

In consideration of the acceptance of this application by the Company, agrees with it, that it shall not be liable for a failure to furnish said cars in consequence of strikes, lock-outs, want of power or any other unavoidable contingency.
It is also a part of this contract that liquors shall not be taken; fireworks shall not be used; yelling or disorderly conduct not indulged in, nor vocal or instrumental music of any character or kind while on the car.
This application is subject to rulings of Passenger Tariff now in effect and on file with the Public Service Commission.
Applicant _____
Address _____
Received Payment Date _____ 19____
_____ Cashier
Chartered Car Ticket No. _____ Issued _____
" " Supt's Order No. _____ Issued _____
Above arrangement approved
Date _____ 19____
General Passenger Agent.

Form of Receipt for Chartered Car, Rochester

NEW YORK STATE RAILWAYS
ROCHESTER LINES
CHARTERED CAR ORDER

No. _____ 190 _____
Superintendent _____ Division _____
This order is issued in accordance with chartered car application No. _____ and chartered car ticket Nos. _____
Please arrange for service noted below:
Number of Cars _____ Type _____
To be run _____ Date _____
From _____ Time _____
To _____ Via _____
Returning from _____ Time _____
To _____ Via _____
Ordered for _____ By _____
Remarks _____
General Passenger Agent.

Form of Chartered Car Order Issued to Superintendent by General Passenger Agent. (Duplicate Stays in the General Passenger Agent's Book)

Application for Chartered Car, Rochester

This entire arrangement calls for payment for the service in advance. At the end of each month a complete report of the chartered car service is made in the office of the general passenger agent, by drawing off the details from the applications. This report is sent to the auditing department, thereby making a complete check in all departments interested.

GENERAL

An analysis of the rates and conditions given would, I think, show as far as city operation is concerned, that the practice of the Public Service Railway of New Jersey, with slight modifications, comes the nearest to answering all purposes. This company makes a charge of \$3 per hour, or 5 cents per minute,

Public Service Railway were to be adopted by any company, the chart showing the operating time between all points should not be forgotten.

The writer appreciates the fact that to find a proper or satisfactory standard for interurban service is a different problem. The rate per passenger or car-mile would, of course, have to be subject to the physical conditions of the line. In other words, if the car houses are located such that a considerable amount of dead mileage is necessary, the rates must be based accordingly. A definite rate per mile would seem to be a proper basis for interurban service. It should be such that the actual miles operated to furnish the service will be covered by

a rate per mile at least equal to the average earnings per car-mile of cars in regular service. The charges should be paid for in advance and a ticket issued to the person engaging the service for transmission to the conductor in charge of the car.

While the rate per mile basis is recommended for interurban service, the chartered car conditions or rulings in the tariffs might be on the per capita basis, charging regular fares, with the condition that the car in each case is to earn a certain rate per mile, with a stipulated minimum charge, say, \$25, for any service. This arrangement would allow a person to deposit a certified check to cover special service, regular fares could be collected on the car and if the total fares collected did not over the rate, the amount of the difference could be deducted from the check and the balance returned; or, if the fares collected exceeded the guaranty rate, the check could be returned intact. This arrangement would eliminate the overloading of special cars for the purpose of lowering the fare per passenger.

The arranging of all special service should be restricted to an officer of the company who is at all times acquainted with the demand that may be made upon equipment at the date when special service is requested.

BLOCK SIGNALING ON ELECTRIC RAILWAYS *

BY CHARLES R. BARNES, INSPECTOR OF ELECTRIC RAILROADS, PUBLIC SERVICE COMMISSION OF NEW YORK, SECOND DISTRICT.

At the last quarterly meeting of your association, held in Albany, I was obliged to ask your indulgence because I was unable to present a paper for discussion at that meeting on the question of block signals for electric railroads. I am again called upon to ask your indulgence for the superficial manner in which this important subject is treated now owing to the pressure of official duties. The statements which follow are made not as a representative of the Public Service Commission. Neither the commission nor any of its members has in any way endorsed the statements or opinions herein expressed.

The definition of a "block signal system" as presented in the modern electric dictionary of the English language is as follows: "A method of signaling especially designed to prevent collisions between trains traveling on the same line of rails." There is no block signal system in use on any of the railroads in this country which complies with the requirements mentioned in the foregoing definition; namely, "prevent collisions between trains traveling on the same line of rails." This statement needs no argument in its defense, as the records of collisions on roads equipped with the modern signal systems prove that they do occur in large numbers on some roads and that the possibility of such occurrence exists on all the roads so equipped. It is considered unnecessary in a paper to be presented to street railway men to describe the different kinds of signal systems in use on the various roads, both steam and electric in this country. It is, however, considered necessary to emphasize the foregoing remarks by stating that inherent defects which exist in all of them permit collisions.

The more important defects in signal systems as at present constructed and operated are:

First. That all systems, manual or automatic, depend upon the co-operation of human elements to accomplish what they are designed to do, namely, prevent collisions.

Second. Nearly all of the automatic signals in use are moved in one direction by motive power. The movement in the other direction is dependent upon the relationship existing between the signal engineers and Divine Providence. Under the present methods of automatic block signaling, an engineer entering a block has no positive knowledge that the signal at the outgoing end of that block is set at "danger." He has no positive knowledge when approaching a signal at "safety" whether such signal was set at "safety" for him to proceed or whether it remained at "safety" after its last operation.

Third. There is no signal system in use on any of the rail-

roads in this country which positively provides for emergencies which may result in collision, such as that engineers may disregard danger signals or become incapacitated.

Several attempts have been made to obviate the third defect. The most important device for that purpose is the track-trip used in the subway in New York City. By this means, the train line will be opened and an emergency stop made if the motorman attempts to pass a danger signal. To illustrate the defects of the system in use on this railroad and its unreliability, it need only be pointed out that the tripping devices can be broken in such a manner as to prevent their operation for the purpose intended. Such breakages could be discovered only by close observation.

The traffic on the steam railroads of this country has been steadily increasing for a number of years past with the result that at times their operating officials must strain every point to move the traffic. To accomplish this, safety of operation has been seriously impaired in some cases. This statement is not intended as a reflection upon the judgment or ability of railroad officials generally, but is presented as a fact and one which from the standpoint of operating officials no doubt is justified. That it is a fact is demonstrated by the modification of the "31" train order in use on many roads of the "19" order; also by the use of "permissive" block signaling on roads equipped with signal systems.

Discussion of the subject of block signals with signal engineers leads me to believe that the inventive genius of these men can and would develop a signal system which would absolutely prevent collisions on railroads under all conditions. Further discussion of the subject with railway operating officials develops the fact that they consider such a system among the future possibilities. They feel, however, that the companies would not adopt such a system, as it would become impossible from the present operating standpoint to move the trains on time, and public opinion would not endorse the adoption of any means which would increase the possibility of delay to train movement. I am firmly of the opinion that a signal system can be devised and maintained in such a manner as to interfere with train movement only when absolute safety requires. I am further of the opinion that the passenger would prefer to arrive at his destination an hour late than to be brought there on time in a box.

The Interstate Commerce Commission, realizing the number of collisions occurring on the roads throughout this country, has appointed a committee of eminent experts to investigate this subject thoroughly, with authority to make such recommendations for improvement in the present block signal systems as in their judgment may be necessary. No doubt much benefit will be derived, both to the railways and to the general public, by this committee's researches and the ensuing recommendations. Reference is made to the work of this committee at this time only to show that the defects in the present block signal system are recognized and that the necessity for improvement exists.

At this point in the discussion it is pertinent to ask: "What has all this to do with the topic under which this paper is presented, namely, 'Block signaling on electric railroads?'" The foregoing has been presented because there is a tendency among some of the managers of the interurban electric railroads literally to follow in the footsteps of their brothers—the operating officials of the steam railroads. In my judgment this practice is a mistake. The revenue of the interurban railway companies is in most cases confined to receipts from passenger earnings, so that the financial results of collisions to them are more serious than to the steam railroads, which have large additional revenue from freight business. In plain words, the steam railroads can afford to adopt certain methods of operation and pay the losses incident to them, whereas a collision occurring from the same method of operation on an interurban road might place the company in the hands of a receiver.

There is no intention to discourage the introduction of any of the present block signal systems on the electric railways of this State, as safety of operation would be increased on a

* Paper presented at the quarterly meeting of the Street Railway Association of the State of New York, Rochester, March 2, 1910.

number of them by the use of some of the devices now on the market. What is intended by this paper, however, is to impress on the minds of the electric railway men of this association that nothing should be left undone which will add in any way to the safety of passengers on the roads under their charge; also that the numerous fatal collisions occurring on steam railroads throughout the country and on some of the interurban electric railways outside the State of New York, will bring about the development of a block signal system which will absolutely prevent such occurrences. A crystallization of public sentiment would compel the adoption of an improved system.

Having pointed to some of the defects of the present block signals, I feel it incumbent upon me to suggest some of the essential elements of a signal system which in my judgment would fill the requirement mentioned.

Briefly stated, such a system on a steam railroad should consist of home and distant signals, normally at danger and so constructed that when an engineer is approaching the distant signal and the block is clear, the signal at the outgoing end of the block would be locked in the danger position. The locking of this signal would be a means to cause the home and distant signals at the entering end of the block to go to safety. The system would include a tripping device arranged so as to operate the throttle and the air. This tripping device should form a part of the block signal system and be so interlocked with it that if it is not in the operative position at the outgoing end of the block, the home and distant signal at the approaching end could not be brought to "safety." All engines should be equipped with a device to be operated by the aforementioned trip, the operating device on the engine to be so constructed that if it is not in the operating position the engine cannot be started, and if after the engine is started it is broken or moved from the operating position, the steam will be shut off and the air applied. All of the signals should be controlled from a central office so that a train can be stopped at any point.

While the suggestions given above apply to the equipment of a steam railroad, the main principles of such a signal system are equally applicable to electric interurban railway work.

NEW ENGLAND STREET RAILWAY CLUB MEETING

The regular monthly meeting of the New England Street Railway Club was held at the American House, Boston, on Feb. 24, with President W. D. Wright in the chair. After the usual dinner and business meeting an illustrated talk was given by C. B. Edwards, chief engineer of the Fore River Shipbuilding Company, Quincy, Mass., on the power plant of the U. S. Battleship *North Dakota*. Following Mr. Edwards, a paper was read by Milan V. Ayres, electrical engineer of the Boston & Worcester Street Railway Company, upon "The Lawyer and the Engineer." Mr. Ayres traced the influence of engineering progress upon the social fabric, emphasizing the changes in industrialism introduced by the invention of the steam engine. He pointed out that the progress of engineering has caused profound changes in all departments of the law, especially in the subject of torts. Since the time of James Watt, this subject has grown from one of the least considered subdivisions of the law into a department so great that it absorbs a majority of the time of the superior court in many large cities. Yet so slowly do new ideas gain acceptance, that the people hardly yet recognize that engineering is entitled to a place among the professions, even now being in the speaker's opinion the greatest of them all.

After reviewing the ruling power of the modern lawyer in the administration of affairs, Mr. Ayres turned to the difficulties which surround the lawyer in the conduct of cases depending upon engineering technicalities. He defined the lawyer as one skilled in the application of man-made laws to the control of mankind, and the engineer as one skilled in the application of the laws of nature to the needs of mankind. The work of the one is creative and of the other conservative. Points of contact between the legal and the engineering profes-

sion are not limited to one department of the law or one branch of engineering. The legality of a contract is the business of the lawyer; but if the subject matter is of an engineering nature, engineering knowledge may be even more necessary than legal knowledge in framing its terms. It would be easy to draw a contract which would sound all right to the lawyer, but would be impossible of fulfillment for engineering reasons. The same thing is true of franchises, for these are a special form of contract. The speaker cited a franchise in which provisions for street lighting were copied undoubtedly from a prior contract between the city and an electric light company. This franchise described a lighting system to be installed by the railway which in fact could not have been operated from its power house except by the installation of special and costly apparatus for the purpose; yet to the counsel for each party the contract was all right. On the other hand, in operating under the terms of an agreement, in testing to see if the terms are being met, and in arbitrating between parties to a dispute growing out of a contract, the engineer needs the judicial frame of mind and often a knowledge of legal terms.

Torts are the prodigal sons of engineering, and the engineer's first duty is the prevention of the tort by the avoidance of accident. To do this the engineer needs enough legal knowledge as will suffice to imbue him with a due appreciation of the cost of accidents, and his client no less. It is principally due to the imperfections of engineering that the law of torts owes its importance. America has more accidents, more persons killed by accidents and more money lost by accidents, in proportion to the volume of business, than any other country. Our laws relating to the prevention of accidents and those dealing with damage claims are about the worst in the world.

Much can be done by both the lawyer and the engineer to avert accidents, but they can never be wholly eliminated. When accidents do occur the fields of the lawyer and of the engineer are intermingled. The engineer is likely to be the first on the scene, and he needs a knowledge of law in order to secure and preserve the necessary evidence. He should combine the analytical power and special skill of engineering with the knowledge of the lawyer as to the nature of evidence in order that useful and essential evidence shall be obtained. On the other hand, the lawyer is liable to overlook important data in the search for immaterial evidence. In trying a case with technical bearings a lawyer needs engineering knowledge in order to make proper use of his own expert witnesses and to be able to ridicule any incompetent so-called experts which the other side may introduce. The engineer who is called to the witness stand as a technical expert should have enough knowledge of the law to appreciate the bearing of his testimony on the case, and particularly such knowledge of the nature of evidence and such an appreciation of the mental limitations of a jury as will lead him to give his answers without any unnecessary detail, yet with the greatest possible clearness of expression. In like manner the lawyer needs to combine with his legal and forensic abilities the knowledge of the engineer and the rarest gifts of the teacher, that he may explain scientific technicalities without superfluous detail yet with clearness.

Closely related to the work of the lawyer in relation to contracts and franchises is the work of organizing corporations, securing rights of way and special charters. Much work of this kind generally has to be done at the inception of an enterprise, especially of a public service character. The project itself is largely one of engineering. At hearings before State commissions, county and municipal authorities, the engineering features have to be explained in detail. It is customary for lawyers to do this work, calling in the engineers as special witnesses to explain the plans and estimates. This requires exhaustive study, and the man who advocates an enterprise of this kind before a public board might perhaps better be an engineer than a lawyer, provided he were gifted with the power of speech and argument. In conclusion the speaker touched upon the progressiveness of engineering and its growing influence in human affairs.

JAPANESE ELECTRIC RAILWAY STATISTICS

The accompanying table is a report on the operations of 16 Japanese electric railways for the first half of the year 1908. The Tokyo system is the largest, with a daily schedule requirement of 712 cars for 426,684 passengers carried on 97 miles of track. The daily mileage in Tokyo averages 80,252.4, but the number of passengers per car-mile is only 5.3, as compared with 6.4 on the Tosa Railway. The Tokyo Tramways

A NEW OIL AND TRANSFORMER DRYING DEVICE

Experience has demonstrated that it is practically impossible to prevent moisture from condensation from being deposited in transformers during transportation or storage, and the device shown diagrammatically in the accompanying cut is manufactured by the General Electric Company to dry them before use. It consists of a hot air furnace, blower, dust collector, driving motor, and necessary piping, pulleys and belt.

TRAFFIC RETURNS OF JAPANESE ELECTRIC RAILWAYS.

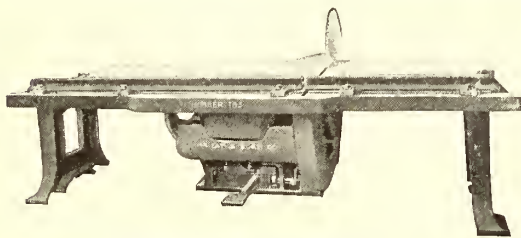
City—	Cars used daily	Passengers daily	Mileage	Car miles daily	Passengers per car-mile	Revenue	Daily revenue per mile	Daily revenue per car	Revenue per car-mile
Tokyo	712.	426,684	97.126	80,252.4	5.3	\$2,794,200.000	\$166.320	\$21.57	\$0.191
Tamagawa	7.	1,778	8.9	69.4.0	2.5	24,325.640	23.110	19.09	0.192
Kyoto	55.5	14,614	19.6	3,670.0	3.9	175,045.580	49.610	17.32	0.262
Keihin	26.	20,337	32.5	4,626.0	4.4	293,833.220	62.771	62.09	0.353
Yokohama	18.	18,430	6.45	2,107.9	8.7	97,732.850	82.750	29.83	0.255
Yenoshima	6.5	1,109	6.8	415.9	2.6	21,323.200	18.850	18.02	0.281
Odawara	97.	1,142	9.01	754.7	1.5	41,899.910	2.340	2.37	0.305
Hanshin	28.25	23,472	38.3	6,594.7	3.5	451,543.310	127.680	14.83	0.376
Kawagoye	4.	694	8.	452.8	1.5	16,193.020	11.000	22.24	0.196
Ise	13.	2,514	11.9	906.6	2.7	51,177.670	35.540	21.63	0.310
Nagoya	24.7	4,836	7.9	2,093.6	2.3	59,911.580	41.180	13.32	0.157
Seto	2.	405	10.	189.3	2.1	17,055.080	9.475	46.85	0.495
Sundzu	5.	871	3.7	260.9	3.3	9,634.165	14.684	10.58	0.203
Iwamura	3.	105	15.4	14.5.0	0.7	3,670.930	1.390	6.72	0.101
Tosa	11.	6,373	9.3	988.7	6.4	31,989.050	18.900	15.97	0.177
Bungo	4.4	1,043	7.5	85.5.4	1.2	37,344.360	27.350	46.63	0.239

lead in the daily revenue per mile, with 166.32 yen, but are far behind most of the other companies in the daily earnings per car and the earnings per car-mile, which reach the maxima of 62.09 yen (Keihin Railway) and 0.495 yen (Seto Railway), respectively. All revenue figures in the table are given in the yen, which has a current value of about 50 cents.

AN AUTOMATIC RAILWAY CUTTING-OFF SAW

The accompanying cut shows a cutting-off saw made by the J. A. Fay & Egan Company, Cincinnati, Ohio, for cutting off large timbers up to 16 in. x 19 in. and material required in car and general construction work. The carriage is mounted on planed ways on the frame and is moved back and forth by double rack and pinion driven by friction. This arrangement permits the carriage to be advanced at a regular speed for cutting off, by pressure upon the foot treadle, and as soon as the treadle is released the carriage returns. The feed of the machine is driven by gears, no sprockets or chain being used. The carriage is driven by a cut rack and pinion, with the pinion located at the center of the travel of the carriage.

One of the good features on this machine is the traversing

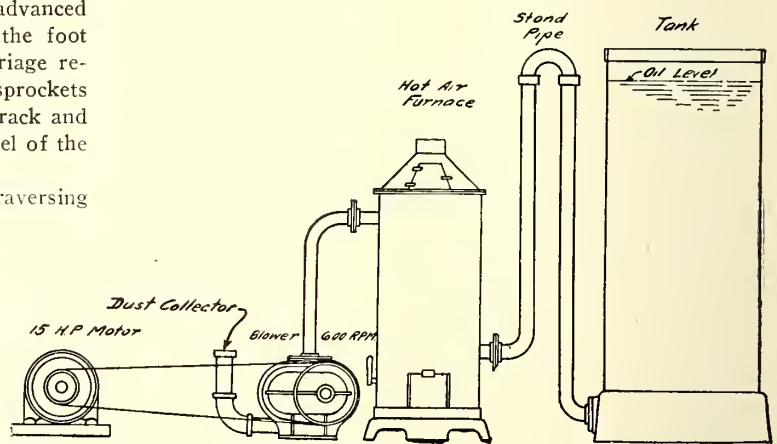


Railway Cutting-Off Saw

of the saw carriage by friction, so that the rate of advance is always under control of the operator while the saw is running, and the movement of the carriage is automatically stopped in either direction. The table is equipped with adjustable idler rollers permitting the material to be easily moved across its freight traffic.

The West Hartlepool Corporation, Hartlepool, England, has had under discussion for some time the question of the purchase of certain sections of the local electric tramways, which are at present in the hands of the Hartlepool Electric Tramways. There has been no discussion of the subject in open Council meetings, the matter having been dealt with wholly in committee. A decision has, however, been come to to promote a bill in the coming session of Parliament for the purpose of obtaining the necessary powers to purchase.

The hot air furnace contains a 3-in. wrought iron coil suitably supported inside a sheet iron casing, the whole being mounted on a cast-iron base. The furnace is designed in a manner similar to a self-feeding stove, two doors being provided, one at the top of the furnace for the admission of fuel, and one at the bottom for removing the ashes and also regulating the draft. Wood and charcoal have proved very satisfactory as fuel, but hard coal may also be used if forced draft is provided. This can be easily accomplished. The blower has a normal capacity of 300 cu. ft. of free air per minute delivered at a pressure of 6 lb. per square inch, is designed for a speed of 600 r.p.m., and requires 15 hp to drive it when delivering normal output. The dust collector or air filter consists of a perforated sheet metal pipe 4½ in. in diameter, con-



Oil and Transformer Drying Device

nected to the blower with a suitable elbow, and forms the point of entrance of the air to the blower. Cheese cloth is tied around the pipe. The piping between the furnace and oil tank is extended above the oil level to prevent flooding the furnace with oil if the valve in the base of the tank is not closed when the blower is stopped.

The method of its operation is as follows: After the fire has been started in the furnace the fan should be put into operation. The air is drawn through the dust collector which frees it from all impurities and is then heated in the furnace to approximately 100 deg. C. The hot air being forced through the transformer and oil at a pressure of 6 lbs. per square inch, absorbs all the moisture and raises the di-electric strength of both the oil and windings to its original value. No hard and fast rule can be given as to the time actually required for thoroughly drying the transformer, but it is believed for ordi-

nary cases of moisture, that a 10-hour run after maximum temperature is attained will be sufficient. Break-down tests should be made from time to time on samples of the oil taken from the transformer and the drying continued until the oil is able to withstand a puncturing test, the value of which is prescribed by the transformer manufacturer.

A NEW AUTOMATIC TRAIN STOP

The Automatic Train Stop Company, New York, has recently brought out an automatic train stop which cuts off the power and applies the emergency brakes when a train overruns a danger signal or when a running rail in the section ahead is broken. In this system, the contact rail or trolley wire from which the cars obtain power is cut into sections, the end of each section being connected to the adjacent end of the next section through a circuit breaker. These breakers are normally closed so that the regular operation of the road is not different from that of the ordinary electric railway. If, however, a motorman of one train attempts to run too close to the preceding train, the breakers feeding the section upon which he is then operating will open and cut off his power, while a device in the car equipment applies the brakes for an emergency stop. The successful operation of this system therefore assumes the presence of some form of automatic brake and some form of signal apparatus. It should be understood that

closed, or if all are closed, the relay *A2* will be closed. If, however, both *S2* and *S3* (or *S2* and *T3*) are opened, the armature of *A2* will drop and the circuit-breaker *C2* will open.

The relay *B2* is fed from *A3* as described above and it will be noted in the diagram that the opening of this relay also opens the circuit-breaker *C2*. If, however, both relays *A2* and *B2* drop their armatures, the circuit-breaker *C2* again receives power and is closed provided the power rail between *C2* and *C3* is alive. *S* and *T* are ordinary track relays of the type usually employed in signal systems and may be a part of such signal system if desired. These relays are energized from the battery *D* through the signal rails.

If a train is located as indicated by "Train 2," its wheels will short-circuit the battery *D5* and therefore drop the armatures of relay *S3*. This opens the branch feed to relay *A2*, but does not otherwise affect the system. If, however, "Train 1" moves past signal 2 into section 3, its wheels short-circuit battery *D3*. This causes the armature of *S2* to drop which opens the other feed to *A2*, which, releasing its armature, opens *C2*. The current is also cut off from *B1*, which opens *C1*, thus cutting off the power from both ends of the rail feeding "Train 1," which then comes to a stop. If "Train 2" then proceeds and passes out of sections 5 and 6, the relay *S3* picks up, thereby closing the circuit to *A2* and *B1*, which pick up their armatures. The circuit-breaker *C2* then closes upon which *C1* will close and normal operation is resumed.

It will be noted that in the above operation *A2* and *B2* are

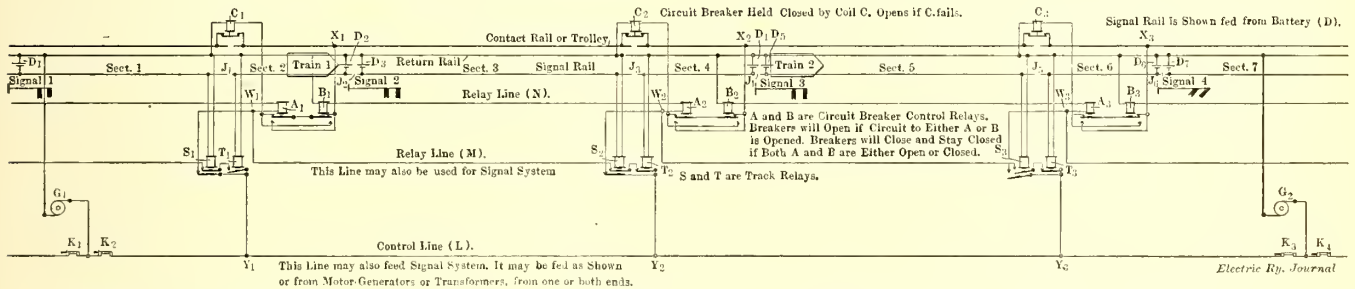


Diagram of Automatic Train Stop System with Normally Closed Circuits, for Operation in One Direction

the full conductivity of the power circuit is available and that as long as the trains are not run within a predetermined distance of the train ahead, the circuit breakers mentioned will not operate. The system has also been designed for the protection of interurban roads equipped with a signal system, in which both track rails are used for the return circuit.

Referring to the wiring diagram, it will be noted that the two track rails are marked "Signal Rail" and "Return Rail," the former being cut into sections for signal circuits and the latter continuous for the return of the power and signal circuits. The joints in the signal rail indicated at points *J* may be either insulated joints or some form of inductive bond if alternating current is used for signals. The various sections of the signal rail are each fed from the battery *D*, but the source of power may also be a feed from either an a.c. or d.c. signal line. The contact rail or trolley wire is also cut into sections, the adjacent ends being normally connected through a circuit-breaker *C*. It will be noted that the break in the contact rail occurs at a point opposite alternate joints in the signal rail. Thus, if breaker *C2* and *C3* are opened, the line between the joints *J3* and *J5* is dead and the train indicated as "Train 2" will be without power. It is through the control of these breakers that this train stop system is operated.

With no trains on the line all the breakers are held closed by the current flowing through their coils. This current, for example in the case of *C2* is supplied from the contact rail at the point *X2*, passes through the front contacts of relays *A2* and *B2* through *C2* to the return rail. The relay *A2* is held closed by the control current fed from the control line at point *Y2* passing through the lower armature of track relay *S2* as shown, then through *A2* and *B1* to ground. At point *W2* is a branch feed supplied from point *Y3* through the upper armatures of *S3* and *T3*. Thus if either *S2* or both *S3* and *T3* are

not both opened at the same time. If, however, the control line *L* be cut off, the current to both of these relays will cease and both armatures will fall against their back stops. This will keep the breakers closed or close them if they are open. This feature is introduced to provide means of cutting the system out of service if for any reason this course is found necessary. It may be omitted without in any way affecting the scheme. If the signal system is fed from the same line as the stop system (Line *L*) the above feature is attractive, as in that case opening the line *L* will set all signals to danger and at the same time cut out the stop system.

The distance from *J2* to *J3* must be at least safe braking distance, and the distance from *J1* to *J2* must be at least the length of the maximum train, as otherwise a portion of the train might remain on the live section of contact rail to the rear of *C1*. With these two limitations the length of the sections can be anything required for the service in hand. By variations in the apparatus this train stop system can be applied to either a.c. or d.c. line using a single-power conductor or to three-phase or similar installations. This system protects a train against accidents due to a broken rail or the removal of special wagner from the track. Whether the semaphore signal shows danger or not, the trains are protected in all cases.

A table of London tramway statistics has been issued by the British Board of Trade. From 1878 to March 31, 1909, the route length of line open for traffic had increased from 269 to 2526 miles; the capital expenditure from £4,207,350 to £71,023,239; the number of passengers carried from 146,000,000 to 2,660,000,000, and the net receipts from £230,956 to £4,595,779. In 1909 the mileage of electric line open was 2286 miles out of a total of 2464; in 1910 it is 2360 miles out of 2526.

LONDON LETTER

(From Our Regular Correspondent)

Albert Stanley, general manager of the Underground Railways Company, whose appointment as general manager of the London United Tramways to succeed Sir Clifton Robinson was announced in the *ELECTRIC RAILWAY JOURNAL* of Feb. 26, 1910, is constantly seeking to increase the efficiency of the underground railways in London. Mr. Stanley has begun a service with express trains on the Great Northern, Piccadilly & Brompton Railway by which the journey from Finsbury Park to Hammersmith, 9 miles, has been reduced to 30 minutes. The express trains are operated from 7 a. m. to 10 a. m. and from 5 p. m. to 8 p. m. Serious consideration is also being given by the Underground Railways Company to the substitution of escalators for lifts at stations, and plans have been completed for the installation of an escalator at the King's Cross Station of the Piccadilly tube as an experiment. As each escalator is capable of doing the work of five or six lifts it is hoped by installing escalators to encourage traffic by eliminating the vexatious delays experienced by travelers in waiting for lifts. The escalators are less expensive to maintain and operate than the elevators. All of the lines of the District Railway show increases in traffic, thus attesting to their increasing popularity.

Sir Clifton Robinson explains that while much of his work in applying electric traction to tramways has been of a pioneer character he regards his connection with the London United Tramways as completed, and has stated that he has been commissioned by Sir Edgar Speyer, with whom he was associated as a director of the Underground Railways Company, to go to the Philippines in connection with some enterprise there.

At the half-yearly meeting of the Brighton Railway Company, the Earl of Bessborough made some interesting remarks regarding the success of the electrification of the section of the Brighton Railway between London Bridge and Victoria Stations. The system has been referred to frequently in the *ELECTRIC RAILWAY JOURNAL*. The Earl said in part:

"The electric train services between London Bridge and Victoria were commenced on Dec. 1 and met with immediate and considerable response on the part of the public, particularly in the populous districts of Denmark Hill, Peckham Rye, and Queen's Road, through which the electrically equipped line runs. In the first week the number of passengers carried increased more than 40,000, and it is obvious that neither curiosity nor the novelty of the system has been the attraction, as week by week there has been a steady and continuous gain. The increase in the number of passengers during the first two months, as compared with the corresponding period of 1908-9 amounts to 440,536 passengers, or 63 per cent. The increase in the first month was 189,000 passengers, or 55 per cent, and in the second month 251,000, or 71 per cent. From the opening day the services have run with great regularity and without breakdown of any importance whatsoever. Every credit must be given to the principal contractors, the Allgemeine Company of Berlin, for the very thorough and careful manner in which the constructional work has been done and the equipment installed.

"It is satisfactory to know that the distinguished president, Dr. Rathenau, and the managing director, Mr. Hams-pohn, of the Allgemeine Company, who were recently in London, are most appreciative of the way in which the work has been carried out by the sub-contractors, R. W. Blackwell & Company, and have testified to the excellence of the overhead structure, to the perfection of the electrical work, and to the solidity, comfort and smooth running of the rolling stock, for which latter the Metropolitan Amalgamated Carriage Company, Birmingham, was responsible. I must not forget to say that the system was introduced to our notice by Philip Dawson, and that it was he who adapted its designs to the requirements of this railway. He has supervised the work throughout, and thanks are due to him for the capable way in which he has carried out his duties, and has dealt with and solved many difficult problems presented by the peculiar conditions of the line. I believe I am right in saying that this is the first recorded

instance where electric traction established on an ordinary steam railroad has worked from the commencement so smoothly and uninterruptedly.

"The traffic results I have given you show that in the first two months of electrical working we have got back nearly the whole of our lost traffic on that section, and naturally these results have led the board to think of the advisability of extensions, a question which I may say is already engaging our serious and earnest attention."

At the meeting referred to Lord Bessborough was asked if there was any likelihood of the East London Railway, from Liverpool Street to New Cross, being electrified, and if the directors of the Brighton Railway would co-operate with the co-lessees. The answer was that the directors certainly would not refuse to co-operate, and when more definite results of the electrification are obtainable it is possible that an arrangement will be made. The co-lessees of the East London Railway are the Metropolitan Railway, the District Railway, the London, Brighton & South Coast Railway, the Great Eastern Railway, the South Eastern Railway and the London, Chatham & Dover Railway.

Powers for other underground railways are being sought in the new Parliament, notably a line from the Strand to the Crystal Palace under the Kearney High Speed system, and from London to Waltham Abbey. If powers are granted for the railway from London to Waltham Abbey, it will be worked by the Metropolitan Railway, of which it will virtually be an extension, though it will be constructed and owned by the Great Eastern Railway, which controls railway service in that part of London in which the new line is projected. It is certainly to be hoped that the electrification of suburban railways around London will be more vigorously pushed in the next few years. Anxiety on the part of engineers and railway managers regarding the results of the electrification of the Brighton Railway caused delay in the past.

In the *ELECTRIC RAILWAY JOURNAL* of Jan. 1, 1910, page 49, it was noted that the British Electrical Federation Company, in an endeavor to increase the earnings of its systems in Great Britain, had introduced a new system of farthing fares, by dividing the routes of the various lines into farthing zones. Although the new plan has been successful in some parts of England in the West Bromwich, Oldbury, Tipton, Darlington, Wednesbury and Smethwick districts many people have pledged themselves not to use the tramways for three months or until the old fares, including half fares for children, are resumed. It is stated that in the districts mentioned the cars are not as well patronized as formerly and the Kidderminster Chamber of Commerce has called public attention to the change of affairs in that town.

The London County Council has received from its highways committee a report regarding a communication from the County Council to the Board of Trade and the Commissioner of Police about the operation of trail cars. The Board of Trade has agreed to the use of single-deck trail cars on the route from Euston Road to Hampstead Heath as an experiment, provided the Commissioner of Police concurs in the proposal, the trail cars to be run between the hours of 10 a. m. and 5 p. m., the Council reserving the right to withdraw its consent at any time. The committee has also recommended the Council to enter into a contract for the supply of the necessary couplers. The finance committee of the London County Council has reported with reference to the Act serving notice upon the London United Tramways, Ltd., that it intends to acquire the lines of that company within the metropolitan area, that the highways committee be authorized to conduct the negotiations and to arbitrate, if necessary, the price to be paid for the tramways or that portion of them authorized by the London United Tramways Act of 1873-1908. It is also pointed out that arrangements could advantageously be made to connect the company's lines with the lines of the Council. The London County Council Tramways receive considerable attention in the daily papers. Both the Moderates and Progressives claim to have done the most valuable work, and each party accuses the other where experiments have failed and of lack of progress so as to influence votes.

A. C. S.

News of Electric Railways

Cleveland Traction Situation

There has been some question as to how the Cleveland Railway would be able to comply with the section of the new ordinance which requires that a fund of at least \$500,000 should be maintained for the payment of interest and dividends. Figures compiled in the office of the receiver show that all of the funds now on hand would be required to pay the back dividends and the remainder of the claims, leaving possibly a small deficit. On Feb. 26, however, officials of the company announced that arrangements were being made by which local banks would loan the company \$500,000. In addition the company has about \$70,000 which will all be carried in the capital account.

At a conference between Judge Tayler, Receiver Bicknell and representatives of the Cleveland Railway on Feb. 23, it was announced that the receiver has in the treasury about \$800,000. Of this amount \$150,000 is due for interest on bonds. The remainder is insufficient to pay the dividends of 1½ per cent to the stockholders of the Cleveland Railway and 7½ per cent to the holders of stock guaranteed by the Municipal Traction Company. Judge Tayler hoped to be able to lift the receivership on March 1, 1910, but the conditions confronting him have delayed matters somewhat.

Neither the City Council nor the street railway commissioner has announced what fare will be charged the people of Collinwood. If the matter is left to Horace E. Andrews, president of the Cleveland Railway, the fare will probably remain at 3 cents. Some of the other officials are said to feel that the company should operate at the low fare only where the ordinance stipulates a low fare.

On Feb. 23, attorneys for the Cleveland Railway filed a formal demand with Judge Tayler for the return of the property to the company. The motion sets out that a franchise has been granted the company and that the controversy has been satisfactorily adjusted.

Since the low fare has been in effect conductors have retained a 5-cent fare where the exact change has not been proffered when fares have been paid in cash, and a resolution has been introduced in the City Council demanding that change be given and that no fare of more than 3 cents shall be collected. City Solicitor Baker has rendered an opinion to the effect that the Council has the authority to adopt and enforce the resolution. By charging 5 cents fare when payment was made in cash the company hoped to induce people to purchase tickets, as much time is consumed in making change and delays frequently result.

The directors of the Cleveland Railway have provided for placing an order for 50 new cars at once. With the 25 which the receiver ordered for delivery shortly, relief should be afforded very soon.

The tickets to be used by the company will be white board printed in black. They will be sold in strips of five for 15 cents. It is possible, however, that after the accounts with the receiver are adjusted the company will again use the metal disks.

Mr. Bicknell has stated that he will not be the expert for the street railway commissioner. No other name has been mentioned so far.

The directors of the Cleveland Railway have decided to ask the City Council to approve an increase of about 10 per cent in the capital stock of the company to cover the immediate necessities of the system. Means for taking care of the bonds of the East Cleveland Railway which mature soon were also discussed. Judge Tayler will probably be requested to authorize an issue of notes for this purpose.

Transit Affairs in New York

Mayor Gaynor, Controller Prendergast and John P. Mitchell, president of the Board of Aldermen, who compose the select committee of the Board of Estimate, conferred recently with the Public Service Commission in regard to subway matters. An application for a change in the plans

of the Broadway-Lexington Avenue route is now pending before the Appellate Division of the Supreme Court. This change contemplates a double-deck subway from Houston Street to 103d Street, and from 113th Street to the Harlem River. The commissioners appointed by the court have reported in favor of the change, which will avoid much interference with property and consequent expense for damages. Twelve routes of the 29 validated are proposed for immediate construction by the commission. These involve 40 miles of subways, and will, it is estimated, cost \$100,000,000. Eight of these routes are included in the Broadway-Lexington Avenue system in Manhattan and the Bronx, and two in the Broadway-Lafayette system in Brooklyn. The other two are the Fort Hamilton and Coney Island extensions of the Fourth Avenue system in Brooklyn. Six routes have been adopted and approved by the commission, but not yet validated, while plans have been prepared for crosstown subways under Twenty-third and Fifty-ninth Streets, but action was deferred on them in view of the possible use of these streets for moving platforms. The commission estimates that New York City will save at least \$10,000,000 by the order issued by the Appellate Division in favor of the double-decking of the proposed Broadway-Lexington Avenue subway. If the four tracks were placed on a level they would occupy 65 ft. of the street width, and in consequence interfere with abutting properties.

The Public Service Commission has postponed the hearing of the Manhattan Bridge Three-Cent Line for a certificate of convenience and necessity, to operate over the Manhattan Bridge so as to inquire more minutely regarding the probable earnings of the company and the details of the equipment of the company.

Association Meetings

Central Electric Traffic Association.—Indianapolis, Ind., March 11 and 12.

Central Electric Accounting Conference.—Fort Wayne, Ind., March 12.

New England Street Railway Club.—Boston, Mass., March 24.

Central Electric Railway Association.—South Bend, Ind., March 24.

Missouri Electric, Gas, Street Railway & Water Works Association.—Jefferson City, Mo., April 14, 15 and 16.

Iowa Street & Interurban Railway Association.—Sioux City, Ia., April 21 and 22.

Oklahoma Public Utilities Association.—Sapulpa, Okla., May 10.

Pacific Claim Agents' Association.—San Francisco, Cal., May 20 and 21.

Street Railway Association of the State of New York.—Cooperstown, N. Y., June 27 and 28.

New Road Opened in Atlantic City.—The Venice Park Railroad, which extends from the line of the Atlantic City & Shore Railroad on Marmora Avenue, Atlantic City, across the Penrose Canal to Venice Park, a distance of less than a mile, has been placed in operation.

Storage Battery Cars in New York.—Arrangements have been made for establishing an experimental service over the Twenty-eighth & Twenty-ninth Street Crosstown Railroad with the Edison-Beach storage battery car described in the *ELECTRIC RAILWAY JOURNAL* of Jan. 20, 1910, page 183.

New Franchise Desired in Santa Barbara.—The Santa Barbara (Cal.) Consolidated Railroad has applied to the City Council of Santa Barbara for a 50-year franchise to replace a number of franchises granted to the company and its constituents which cover in most cases an unexpired term of 35 years. If the new franchise is granted the company proposes to expend \$150,000 in rehabilitating its system.

Boston, Lowell & Lawrence Railroad Petition Renewed.—James F. Jackson, former chairman of the Massachusetts Railroad Commission, who is counsel for the Boston, Lowell & Lawrence Electric Railroad, has requested the Railroad Commission of Massachusetts to reopen hearings on the petition of the company for a certificate of expediency. It is urged that new evidence of the need of the road is to be forthcoming. The decision of the commission against the company was noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 26, 1910, page 367.

Annual A. I. E. E. Dinner.—The annual dinner of the American Institute of Electrical Engineers, given in honor of Prof. Elihu Thomson, first recipient of the Edison Medal, was held on Thursday evening, Feb. 24, 1910, at the Hotel Astor, New York, N. Y. There were about 500 people present. L. B. Stillwell presided and T. Commerford Martin acted as toastmaster. The other speakers were: Dr. Charles Baskerville, professor of chemistry at New York University; Samuel Insull, of the Chicago Edison Company and president of the Edison Medal Association, and Professor Thomson. A telegram of congratulation, sent to Professor Thomson by Mr. Edison, was read at the dinner.

Non-Resident Lecturer at University of Minnesota.—F. W. Darlington, Pittsburgh, Pa., lectured before the students in electrical engineering at the University of Minnesota on Feb. 23, 1910, on "The Electrification of Steam Railways." He discussed the general operating characteristics of direct, single-phase and three-phase railway motors, and compared the relative costs of the locomotives and of the generating and distributing systems. The most economical system depends upon the weight of trains, frequency of service, length and steepness of grades and other conditions. Direct-current and single-phase motors have an advantage over three-phase motors, their variable speed being an important factor in maintaining schedules and in making up time on level or down grade.

Toledo Franchise Negotiations.—Two meetings of the directors of the Toledo Railways & Light Company, Toledo, Ohio, have been held recently, but only routine business has been considered, according to the announcements. The Council of Toledo has decided to have the City Solicitor prepare an ordinance such as the city would be willing to grant the company. Albion E. Lang, president of the company, is reported to have expressed himself as being pleased with the idea of the city taking the initiative, and the bondholders' protective committee of the company has notified the Mayor that it is ready to consider any franchise which the city may proffer as a basis for negotiations. The directors of the company are said to be willing to spend about \$600,000 in improvements and extensions within the next year if the bondholders' protective committee approves the plan.

Steam Railroads' Position on Wage Question.—Representatives of the Eastern railroads issued a pamphlet on Feb. 25, 1910, which gives the railroads' side of the wage question. The occasion for this is the recent action of the trainmen and conductors in demanding higher pay and shorter hours. The principal subjects discussed in the pamphlet are the decrease in freight and passenger rates, the increase in the cost of operation and the wages of railroad employees as compared with the wages paid in other industries. The position of the railroads is that, in the face of a steady decline in rates and a steady advance in the cost of operation, they are not able to grant general wage increases in addition to those already made. There were general increases in the latter part of 1906 and the early part of 1907, and there was no subsequent decrease in the wage rate on railroads, as there was in other industries, at the time of the 1907 panic.

Catalogs Discussed by the Technical Publicity Association.—The last meeting of the Technical Publicity Association of New York was devoted to the discussion of the subject of catalogs. Considerable sentiment was expressed in favor of adopting standard sizes for commercial literature of this sort. The lack of system of the sizes of the many different catalogs makes them difficult to file. A paper on the subject by Martin P. Rice, of the publication bureau of the General Electric Company, Schenectady, N. Y., was

read, and many attractive specimens of current catalogs were exhibited by the speaker and other members of the association. The sizes recommended were 5 in. x 8 in., 6 in. x 9 in. and 9 in. x 12 in. One speaker declared that any book more than ¼ in. thick should bear its title on the back. The next meeting of the association will be held on March 10, 1910, to discuss the proposed increase in postal charges for second-class matter.

Application for Charter for Philadelphia Elevated Railroad and Subway Heard.—The application of the Philadelphia & Suburban Elevated Railroad for a charter to build a subway in Broad Street, Philadelphia, with elevated feeders from York Street to Wayne Junction and Frankford was heard by the State Charter Board of Pennsylvania, composed of the Governor, Attorney-General and Secretary of the Commonwealth, in Harrisburg, Pa., on March 1, 1910. S. S. Neff, president of the company, and E. O. Lewis of counsel appeared before the board. Mr. Neff stated that a certified check for \$50,000 had been deposited with the West End Trust Company, Philadelphia, as an evidence of good faith. If the charter was granted and the necessary franchises secured from the City Council of Philadelphia, Mr. Neff promised to begin construction work in September, 1910, and to have the system in operation in 2½ years. He said that the running time to Frankford would be 21 minutes, as compared with 60 minutes on the street railways and 45 minutes on the suburban steam lines. At the hearing before the State Charter Board on March 1, counsel for the company said that the interests which financed the London subway lines would finance the lines in Philadelphia, and that if a favorable franchise was granted from \$16,000,000 to \$20,000,000 would be available immediately for construction. J. C. Bell for the company declared that Philadelphia had only 12 miles of elevated railway, as compared with 118 miles in New York, 71 in Brooklyn, 128 in Chicago and 24 in Boston.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The committee on metropolitan affairs has completed its hearing upon the various Boston subway, tunnel and elevated railway bills which were reported upon early in January by the joint board consisting of the Massachusetts Railroad and the Boston Transit Commissions. The majority of these measures were found to be unworthy of enactment into law. No one appeared on behalf of the subways petitioned for between the center of Boston and the outlying suburbs, or to advocate the removal of sections of the elevated railway in Boston. The advocates of a subway loop between Park Street, Scollay Square and the Cambridge bridge in connection with the Boston terminus of the Cambridge subway asked the committee to refer the project to the Railroad and the Transit Commissions for report to the Legislature of 1911. A resolve to authorize the Boston Transit Commission to make engineering studies for a cross-town tunnel between the Park Street and South Station districts, forming a longitudinal eastward extension of the Cambridge subway, was not opposed. Corporation Counsel Babson appeared on behalf of Mayor John F. Fitzgerald of Boston, recommending that this tunnel be extended to Dorchester Avenue in order to accommodate traffic from the Dorchester and South Boston districts.

Ohio.—C. B. Winters of Erie County has prepared a public utilities bill which may take the place of the Woods bill now before the Legislature. Under the bill the State Railroad Commission would be retained and its powers enlarged. On the evening of Feb. 24 a hearing was given the Woods bill in the Senate chamber. It was asserted by speakers that the law would prove a burden to the State rather than a means of raising taxes and that there was no public demand for such a law. A bill introduced by Representative Jones will give interurban railways the right of eminent domain in municipalities to condemn property for freight and passenger depots. On Feb. 23, representatives of the steam railways and the electric railways objected to the Langdon bill, which would take the taxing power away from the county auditors and the state board of equalization, and centralize it in a board to be appointed by the Governor.

Financial and Corporate

New York Stock and Money Market

March 1, 1910.

The stock market was stronger in tone to-day and more inclined to advance than at any time during the past two weeks, but the dealing was largely professional. During the past week the market has been practically stagnant and outside buying has not been in evidence. The traction shares have remained active and, with the exception of Third Avenue, price changes have been fractional. The price of the latter was, of course, lowered on account of the foreclosure sale. The low point to-day was 7½ and the closing price was 8¾.

The money market is very easy. Quotations to-day were: Call, 2½ to 3 per cent; 90 days, 3½ to 3¾ per cent.

Other Markets

The market for Rapid Transit and Union Traction has been uncertain in Philadelphia during the past week owing to the strike. The selling pressure was heavy, but large financial interests have prevented serious price declines.

In the Boston market, Massachusetts Electric continues to be the most active traction issue. During the past week both the common and preferred have been a trifle stronger. There has also been some dealing in Boston Elevated at former prices.

During the week there has been but little trading in tractions in Chicago. There has been some trading in Series 2 Chicago Railways, and the price during the week has declined about 2 points.

In Baltimore, there has been no trading in traction securities, except in the bonds of the United Railways. For these the prices have not changed.

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

	Feb. 21.	Mar. 1.
American Railways Company.....	847	847
Aurora, Elgin & Chicago Railroad (common).....	857	859
Aurora, Elgin & Chicago Railroad (preferred).....	893	894½
Boston Elevated Railway.....	129½	130½
Boston & Suburban Electric Companies.....	216½	216½
Boston & Suburban Electric Companies (preferred).....	72	275
Boston & Worcester Electric Companies (common).....	211	211
Boston & Worcester Electric Companies (preferred).....	244	244
Brooklyn Rapid Transit Company.....	73¾	75¾
Brooklyn Rapid Transit Company, 1st pref. conv. 4s.....	83	84
Capital Traction Company, Washington.....	*134	2134
Chicago City Railway.....	2195	2190
Chicago & Oak Park Elevated Railroad (common).....	*2	*2
Chicago & Oak Park Elevated Railroad (preferred).....	*10	*10
Chicago Railways, ptcptg., ctf. 1.....	2106½	2106
Chicago Railways, ptcptg., ctf. 2.....	232	234
Chicago Railways, ptcptg., ctf. 3.....	215	218
Chicago Railways, ptcptg., ctf. 4s.....	*9	29
Cleveland Railways.....	*91½	*91½
Consolidated Traction of New Jersey.....	276	276½
Consolidated Traction of New Jersey, 5 per cent bonds.....	2105½	2105½
Detroit United Railway.....	*62	*62
General Electric Company.....	154½	153¾
Georgia Railway & Electric Company (common).....	2108	2107
Georgia Railway & Electric Company (preferred).....	288	288
Interborough-Metropolitan Company (common).....	22	22½
Interborough-Metropolitan Company (preferred).....	53¾	55½
Interborough-Metropolitan Company (4½s).....	82½	81¾
Kansas City Railway & Light Company (common).....	230	230
Kansas City Railway & Light Company (preferred).....	268	269½
Manhattan Railway.....	*136¾	137
Massachusetts Electric Companies (common).....	218¼	218¼
Massachusetts Electric Companies (preferred).....	283½	283
Metropolitan West Side, Chicago (common).....	217	216½
Metropolitan West Side, Chicago (preferred).....	255	253
Metropolitan Street Railway.....	*16	*16
Milwaukee Electric Railway & Light (preferred).....	*110	*110
North American Company.....	80¼	80
Northwestern Elevated Railroad (common).....	217½	217
Northwestern Elevated Railroad (preferred).....	270	250
Philadelphia Company, Pittsburg (common).....	251½	251¼
Philadelphia Company, Pittsburg (preferred).....	245	245
Philadelphia Rapid Transit Company.....	224½	224¾
Philadelphia Traction Company.....	89	89
Public Service Corporation, 5 per cent col. notes.....	*100½	*100½
Public Service Corporation, ctf. s.....	2104½	2105
Seattle Electric Company (common).....	2116	2115¾
Seattle Electric Company (preferred).....	2105	2105
South Side Elevated Railroad (Chicago).....	253	254
Third Avenue Railroad, New York.....	*10	8½
Toledo Railways & Light Company.....	*11¾	11¾
Twin City Rapid Transit, Minneapolis (common).....	2113¾	*113¾
Union Traction Company, Philadelphia.....	249½	250½
United Rys. & Electric Company, Baltimore.....	214	214
United Rys. Inv. Co. (common).....	37	37
United Rys. Inv. Co. (preferred).....	68	67
Washington Ry. & Electric Company (common).....	*37	237½
Washington Ry. & Electric Company (preferred).....	*87½	299
West End Street Railway, Boston (common).....	295	295
West End Street Railway, Boston (preferred).....	2106	2106
Westinghouse Elec. & Mfg. Company.....	70½	71
Westinghouse Elec. & Mfg. Company (1st pref.).....	*120	*129

a Asked.

* Last Sale.

Chicago City & Connecting Railways Bonds

J. P. Morgan & Company, New York, N. Y., and the First Trust & Savings Bank, Chicago, Ill., are offering for subscription at 95 and interest the new \$22,000,000 issue of collateral trust bonds of the Chicago City & Connecting Railways. The following statement has been issued in explanation of the new issue:

"The above securities are held by the First Trust & Savings Bank under a trust indenture which creates a first lien upon such securities for the payment of the principal and interest of these bonds.

"These deposited securities are issues of corporations owning and operating a total of 407 miles of high-grade street railway in the southern division of the city of Chicago and vicinity.

"The amount at which the city could purchase these properties for municipal operation at the earliest date permissible under the terms of the ordinances, Feb. 1, 1911, will be in excess of \$50,000,000.

"Should the city acquire these properties at that date the purchase price would be in excess of \$50,000,000, while should any license company purchase them the price payable, in terms of the ordinances already referred to, would include an additional 20 per cent or in aggregate would be \$60,000,000.

"The interest of the Chicago City & Connecting Railways in this purchase price of \$50,000,000, after deduction of all first mortgage bonds, which are first liens on the properties, and the equity applicable to the Chicago City Railway minority stockholders, will be in excess of \$23,000,000.

"After 1915 a sinking fund will also be provided, which by 1927 will result in reducing the \$22,000,000 issue to \$20,740,000, thus increasing the large margin over the purchase price should the city purchase the property, which purchase price, with the value of the Hammond, Whiting & East Chicago Railway, will exceed the outstanding bonds by about \$4,000,000.

"The earnings of the properties for the year ended Jan. 31, 1910, applicable after the payment of all prior charges to the securities now owned by the Chicago City & Connecting Railways, aggregated \$2,177,000, or approximately twice the amount required to meet the interest on the proposed issue of \$22,000,000 5 per cent collateral trust bonds.

"The control of these deposited securities is vested in Elbert H. Gary, Albert J. Earling, and Samuel M. Felton, as trustees, subject to all the provisions of the trust indenture."

Combined Earnings of Stone & Webster Companies

Stone & Webster, Boston, Mass., have made public the following statement of the capitalization and earnings of the 30 public service companies under their management for the year ended Dec. 31, 1909:

COMBINED CAPITALIZATION—THIRTY COMPANIES.	
Bonds and coupon notes outstanding.....	\$62,997,500
Preferred capital and common stocks outstanding.....	63,198,120
Total.....	\$126,195,620
TOTAL EARNINGS AND EXPENSES, 1909.	
Gross earnings.....	\$20,241,974
Operating expenses.....	11,582,862
Net earnings.....	\$8,659,112
Interest charges and taxes.....	4,490,350
Balance.....	\$4,162,762
Dividends paid.....	1,972,186
Balance.....	\$2,190,576
Total disbursements for the year 1909 for interest on bonds and notes and for dividends.....	\$5,298,016
Miles of equivalent single track operated.....	1,005
Passengers carried.....	274,567,000
Total connected electric lighting load equivalent to 1,778,000 16-cp lamps.	
Total commercial power load, approximately, 83,638 hp.	
Total combined power station capacity, approximately, of which 55,868 hp is generated by water power, 167,262 hp.	

Belton & Temple Traction Company, Belton, Tex.—Judge Maxcy in the Federal Court at Austin, Tex., has appointed a receiver for the Belton & Temple Traction Company in foreclosure proceedings brought against the company under the first mortgage for \$300,000.

Brooklyn (N. Y.) Rapid Transit Company.—D. C. Herrick, as referee, has decided that the Brooklyn Heights Railroad is entitled to recover \$3,356,938 from Brooklyn City Railroad, terminating the action begun 10 years ago. Of the judgment \$1,740,258 is for principal and \$1,616,680 is for interest. The suit involves several interesting points. In February, 1893, the Brooklyn Rapid Transit Company leased the Brooklyn City Railroad under an agreement which provided that among other considerations the subsidiary line was to expend proceeds of sale of \$6,000,000 stock and bonds in electrifying its road and making other improvements. The leased road was taken over on June 6, 1893. Between these two dates the Brooklyn City Railroad expended large sums for improvements which it maintained should be subtracted from the \$6,000,000 agreed upon when lease was made. The Brooklyn Rapid Transit Company held that the leased road was to expend the entire amount after control passed. The executive committee of the Brooklyn City Railroad has decided to appeal from the decision of Mr. Herrick as referee.

Calgary Street Railway, Calgary, Alberta, Can.—The statement of earnings for the six months ended Dec. 31, 1909, shows gross passenger earnings of \$56,580 and miscellaneous earnings of \$925, making total gross earnings of \$57,505. Total expenditures, including interest, were \$47,504, leaving a balance of \$10,001. The number of passengers carried during the six months was 1,274,928.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—George W. McClellan and other holders of preferred stock of the Columbus, Delaware & Marion Railway have filed in the Common Pleas Court at Columbus an application to have Eli M. West, receiver of the company, commence action to have certain mortgages against the company's property declared fraudulent.

El Paso (Tex.) Electric Company.—An initial semi-annual dividend of 2 per cent has been declared on the \$1,000,000 of common stock of the El Paso Electric Company, payable on March 15, 1910, to stock of record on Feb. 28, 1910.

Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad, New York, N. Y.—The sale of the property of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad under foreclosure has been postponed by Judge Lacombe of the United States Circuit Court until May 16, 1910.

Indiana Union Traction Company, Anderson, Ind.—The annual report for the year ended Dec. 31, 1909, shows gross earnings of \$2,103,018, as compared with \$1,902,339 for 1908, and \$2,089,232 for 1907. Of the total for 1909 the gross earnings of properties leased after June 15, 1904, were \$158,334 and the gross earnings of other properties were \$1,944,684. Operating expenses of all the properties were \$1,113,428, as compared with \$1,058,745 in 1908. From the net earnings of \$989,590 there was deducted \$730,183 for interest on underlying bonds and taxes, leaving a net income in excess of taxes and interest on bonds of underlying or subsidiary companies amounting to \$259,407. Dividends on the stocks of the Union Traction Company of Indiana and the Muncie, Hartford & Fort Wayne Railway and interest on the Indiana Union Traction Company bonds amounted to \$218,573, leaving a surplus for the year of \$40,834. This surplus compares with a deficit of \$10,663 in the preceding year and a surplus of \$20,022 in the year 1907.

Johnstown (Pa.) Passenger Railway.—The Johnstown Traction Company was incorporated with a capital stock of \$500,000 at Harrisburg, Pa., on Feb. 24, 1910, as the successor to the Johnstown Passenger Railway, which was recently leased to the American Railways, Philadelphia, Pa.

Metropolitan Street Railway, New York, N. Y.—Judge Ward, of the United States Circuit Court of Appeals, has handed down the opinion of the court to the effect that the purchasers of the property of the Metropolitan Street Railway will be required to have \$10,000,000; otherwise the sale will not go on. The decision is in favor of the Morton Trust Company which objected to Judge Lacombe's decree of foreclosure, in that it directed the sale of property which, it is claimed, is not held by the Guaranty Trust Company. The lower court provided that all claims on accounting should be held superior to the equity of the first

mortgage, and should be paid by the purchasers of the property of the Metropolitan Street Railway Company. Parker, Hatch & Sheehan, counsel for the Twenty-third Street Railway, have filed a petition in the United States Circuit Court in answer to the receivers of the Metropolitan Street Railway asking for instructions in regard to the payment of the special franchise taxes. The petition asks the court to direct the payment of the taxes levied against the Twenty-third Street Railway and the Fulton Ferry Railway, amounting to \$368,595, in order that the franchises may not be jeopardized.

New York City Railway, New York, N. Y.—Judges Coxe, Ward and Noyes, of the United States Circuit Court of Appeals, have reserved decision on the appeal of W. W. Ladd, as receiver for the New York City Railway, from the decision of the Circuit Court confirming reports of the special master disallowing claims of the New York City Railway on promissory notes amounting to \$893,000 made by the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway. The notes are held by the Central Trust Company as part of the security on a mortgage for \$6,000,000 given by the Third Avenue Railroad and which amount, it is claimed, was advanced to the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway for equipment and other purposes.

Pittsfield (Mass.) Electric Street Railway.—The New England Investment & Security Company has exercised the option which it took recently on the stock of the Pittsfield Electric Street Railway and new officers and directors have been elected as follows: L. S. Storrs, president; L. Candee, treasurer; T. J. Harmer, clerk; L. S. Storrs, J. T. Harmer, B. W. Warren, P. C. Dolan, Wm. L. Adams and C. Q. Richmond, directors. There is still a vacancy in the board of directors.

Third Avenue Railroad, New York, N. Y.—The property of the Third Avenue Railroad was sold under foreclosure on March 1, 1910, for \$26,000,000 to John M. Bowers, representing the reorganization committee chosen by the holders of \$37,560,000 general mortgage bonds of the Third Avenue Railroad issued in 1900. James M. Wallace, president of the Central Trust Company, is chairman of the reorganization committee.

West Penn Railways, Connellsville, Pa.—At the annual meeting of the West Penn Railways on Feb. 23, 1910, the stockholders approved the proposal of the American Water Works & Guarantee Company to form a new company to be known as the West Penn Traction Company, with a capital stock of \$10,000,000, mention of which was made in the ELECTRIC RAILWAY JOURNAL of Feb. 19, 1910, page 330. Under the plan the holders of the \$3,250,000 of common stock of the West Penn Railways will turn in their holdings and receive 50 per cent in preferred stock of the West Penn Traction Company and 100 per cent in common stock. Almost all of the common stock has already been deposited under this arrangement. The American Water Works & Guarantee Company also agrees to buy all of the bonds of the new company, and plans are being made for issuing about \$3,000,000 of bonds for extensions and improvements.

Winnipeg (Man.) Electric Railway.—The gross earnings during 1909 were \$2,623,731, an increase of \$417,637, or 18.93 per cent over 1908. The operating expenses were 50.34 per cent of the gross earnings. They amounted to \$1,320,665, an increase of \$231,793, or 21.29 per cent over 1908. Net earnings were \$1,303,066, an increase of \$185,844, or 16.63 per cent. Fixed charges were \$439,660. From the net income dividends aggregating \$600,000 were paid, leaving a surplus of \$263,406. The number of passengers carried was 26,382,773, an increase of 4,363,266 over the record for 1908. The number of transfers used was 8,925,849, as compared with 7,777,315 for 1908. The annual report to stockholders shows the following railway earnings per capita during the last five years: 1909, \$10.03; 1908, \$9.80; 1907, \$9.84; 1906, \$8.30; 1905, \$6.80. President William Mackenzie states in his report that the properties of the company have been maintained efficiently. All expenses in connection with the breakdown of the water plant at Pinawa Channel on the Winnipeg River on Nov. 23, 1909, have been charged to operating expenses.

Traffic and Transportation

Street Railway Regulations in Washington Amended

The Interstate Commerce Commission adopted the following orders on Feb. 18, 1910, amending and supplementing the regulations for the operation of street cars in the District of Columbia:

"It is ordered, That the following, to be known as Section 27 of the rules and regulations for the operation and equipment of street railway cars in the District of Columbia, be, and is hereby, adopted:

"Section 27. That on and after March 1, 1910, every car operated on the lines of the street railways in the District of Columbia shall be in charge of a separate conductor, Provided that this regulation shall not apply to trailer cars operated on the lines of interurban railway companies."

"It is Ordered, That the following, to be known as Section 25 of the regulations for the operation and equipment of street railway cars in the District of Columbia be, and is hereby adopted:

"Section 25. When a car or train operating in the suburbs of Washington within the District of Columbia is delayed under circumstances under which it may be overtaken by another car or train, the conductor or other employee carrying a red light at night and a red flag by day must go back immediately a distance of at least 300 feet and stop the following car or train."

"It is Ordered, That the following, to be known as Section 1-a of the regulations for the operation and equipment of street railway cars in the District of Columbia be, and is hereby, adopted:

"Section 1-a. Section 1 of the rules and regulations for the operation and equipment of street railway cars in the District of Columbia shall not be applicable to the cars which are operated by the Washington, Alexandria & Mt. Vernon Railway and the Great Falls & Old Dominion Railroad.

"All motor cars which are operated in the District of Columbia by the Washington, Alexandria & Mt. Vernon Railway and the Great Falls & Old Dominion Railroad shall be equipped with some form of pilot such as is commonly used on interurban cars, said pilot to have a clearance of not more than five inches above the rails, and the front end of said pilot not to extend beyond the farthest outside limit of the bumper of the car.

"The speed at which the cars of the Washington, Alexandria & Mt. Vernon Railway and the Great Falls & Old Dominion Railroad shall be operated in Washington shall not exceed 10 mph. To be effective May 18, 1910."

"In order that the regulations of the Interstate Commerce Commission governing the operation and equipment of street railway cars within the District of Columbia may be properly enforced,

"It is Ordered, That the cars operated by the various street railways in the District of Columbia shall be subject at all times to inspection by the duly accredited representatives of this commission."

"It is Ordered, That Section 1 of the rules and regulations for the operation and equipment of street railway cars in the District of Columbia be amended by adding to the first paragraph the following:

"Provided, that the cars of the Washington, Baltimore & Annapolis Electric Railway may be equipped with some form of pilot such as is commonly used on interurban cars (in addition to the front automatic or platform-operated projecting pick-up fenders required in Sec. 1 of these regulations) in lieu of the automatic wheel guard and there shall be a clearance of not more than 5 inches between the rail and the lowest portion of said pilot."

Pittsfield Electric Street Railway

Following the recent serious accident on the Pittsfield (Mass.) Electric Street Railway, as a result of which an order was issued by the Railroad Commission of Massachusetts forbidding the operation of one branch of the system temporarily, negotiations were begun in behalf of the New England Investment & Security Company for that

company to take over the property. These negotiations have been successfully concluded and new officers and directors have been elected for the company. In explanation of the policy of the New England Security & Investment Company in regard to the Pittsfield Electric Street Railway, L. S. Storrs, president of the New England Security & Investment Company, who has been elected president of the Pittsfield Electric Street Railway, has issued the following statement:

"It is our intention to reorganize the Pittsfield Electric Street Railway, placing the operations in charge of the operating officials of the Berkshire Street Railway and of adapting it so far as is consistent with the different class of service of the two companies with the same standard of operation and maintenance on both. Our experts are now on the ground making a complete examination of all the equipment and all necessary repairs will be started as soon as they have reported. I have noticed newspaper references to the lack of power on the Pittsfield Electric Street Railway, and if such is found to be the case, it is quite probable that we may be able to supply such deficiency from the powerhouse of the Berkshire Street Railway. There is no question but that connections between the tracks of the two companies will enable the combined company to offer a more satisfactory service to the community, and our engineers are now making plans for such connections in order that the necessary petitions may be filed with the city.

"I believe that no new arrangement of schedules will be found desirable until such connections are made, however, for the gentlemen who have had charge of the property in the past have been connected with the company for a number of years and have, of course, given the matter of the city service their best efforts.

"The members of our organization have not had opportunity to make a study of the conditions entering into the consideration of the most convenient service for the patrons of the Pittsfield Electric Street Railway, but all of our efforts will be devoted to such study, and until we have been able to reach some positive conclusions we must ask the public to bear with us and aid us by suggestions, if possible, rather than by making general complaints with the service.

"It is our desire to give Pittsfield a transportation service that will be of material benefit to the growth of the entire community, and we believe that with the combined facilities now at our disposal we will be able to accomplish this result."

Investigation of Service in Albany Asked

The Common Council of Albany, N. Y., has adopted a resolution to ask the Public Service Commission of the Second District of New York to inquire into the adequacy of the service furnished by the United Traction Company on its lines in Albany. The following allegations are made by the Council:

"1. Insufficiency of seating capacity on practically every line in Albany, especially during the hours of increased travel when it is necessary for the people in large numbers to use the cars of the company in going to and returning from places of business. This insufficiency of seating capacity causes serious inconvenience by reason of the fact that the proportion of passengers who are obliged to stand in the cars is unreasonably large.

"2. The class of cars run is entirely inadequate to provide proper transportation for a city of the size and dignity of Albany. Cars such as are used in this city at present have been retired from service on popular lines in Buffalo, Rochester and other cities for several years. Cars are not only too small to furnish seats to a proper proportion of passengers, but the limited size of the platform causes additional inconvenience and delay to persons boarding and leaving same. In other cities in sections of heavy travel, passengers are taken on at rear of cars and leave at front end. Cars are not properly lighted or ventilated. In the cities above referred to, passengers during hours of darkness can read in comfort as far as sufficiency of light is concerned. Cars which are run through city streets should present an appearance in keeping with the surroundings.

The poorly lighted cars are to say the least, no ornament to the streets of this city.

"3. Cars are not run with proper regularity and become 'bunched,' causing serious inconvenience, especially during inclement weather, as people are obliged to wait on street corners unreasonable lengths of time for these cars."

Proposed Mill Creek Valley Franchises

The Mill Creek Valley Division of the Ohio Traction Company serves a number of small towns near Cincinnati. These towns propose to grant new franchises to the company on condition that portions of the line be reconstructed and a cut-off be built through the northern part of Carthage, so that the running time can be reduced. Extra stops will be eliminated and the legal running speed will be increased to 18 mph. The people along the lines request a lower fare to Cincinnati and a schedule has been prepared which would provide a 5-cent fare between all villages and a low cash fare to Cincinnati or a higher rate of cash fare with a reduction when tickets are purchased. The following table presents the old and proposed tariffs:

Miles from Cincinnati.	To	Present fare.	Proposed fare schedules.—	
			Cash.	Cash or tickets.
5.5	St. Bernard	10 cts.	5 cts.	5 cts.
7.5	Carthage	10 cts.	5 cts.	5 cts.
8.8	Hartwell	10 cts.	7 cts.	10 cts. or 16 tickets for \$1
11.3	Lockland	10 cts.	8 cts.	10 cts. or 15 tickets for \$1
10.4	Wyoming	10 cts.	8 cts.	10 cts. or 14 tickets for \$1
12.5	Glendale	15 cts.	12 cts.	15 cts. or 9 tickets for \$1

It is proposed to make the franchises uniform for all the towns and not to issue special school or work tickets.

Accident in Hudson River Tunnel.—More than 15 passengers were injured in a collision between two trains of the Hudson & Manhattan Railroad at the Twenty-third Street station of the company in New York, on March 1, 1910.

Altoona & Logan Valley Electric Railway Increases Wages.—The Altoona & Logan Valley Electric Railway, Altoona, Pa., has increased the wages of its motormen and conductors 1 cent an hour, making the new scale 18 cents an hour for the first year, 20 cents for the second year and 21 cents for the third year.

Increase in Wages in Sacramento.—The Sacramento Electric, Gas & Railway Company has increased the wages of its conductors and motormen 2 cents an hour. Under the new scale the men receive 29 cents an hour the first year, 30 cents the second year, 31 cents the third year, 32 cents the fourth year and thereafter. The men have agreed that the new rate shall continue in force for five years.

Proposed Trip From Utica to Indianapolis.—A party of business men from Utica, N. Y., and vicinity are planning to take a trip in two private cars of the Oneida Railway about May 1, 1910, from Utica to Indianapolis, Ind.; Louisville, Ky.; Toledo, Ohio; Detroit, Mich., and return by way of Toledo and Cleveland, Ohio. The trip will extend over about two weeks. The purpose of the trip is primarily to advertise Utica.

Complaint Against Fare on the Utica & Mohawk Valley Railway.—The Public Service Commission of the Second District of New York has received a complaint from the residents in the vicinity of Stop 3 on the Utica & Mohawk Valley Railway between Utica and Frankfort. The fare from Utica to Stop 3 is 10 cents, whereas on the east, west and south the fare for a greater distance is only 5 cents. The petitioners allege that the charge to Stop 3 is an unfair discrimination against that stop and ask the commission to make an order reducing the fare to 5 cents from Utica to Stop 3.

Schenectady Railway Asks Permission to Use Franchise to Relieve Congestion.—The Schenectady (N. Y.) Railway has applied to the Public Service Commission of the Second District of New York for permission to exercise a franchise on Edison Avenue in Schenectady, to facilitate and improve conditions for handling traffic in that city in accordance with one of the suggestions in the report on transit conditions in Schenectady, made by the commission. The franchise on Edison Avenue was granted in 1907. The conclusions of the commission in its report on traffic condi-

tions in Schenectady were published in the *ELECTRIC RAILWAY JOURNAL* of Jan. 15, 1910, page 128.

Folder of the Terre Haute, Indianapolis & Eastern Traction Company.—J. H. Crall, general passenger and freight agent of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has issued an advertising folder 28 in. long by 2 in. wide calling attention to the facilities of the company which folds to 2¾ in. by 2 in. The front of the folder contains the trademark of the company and the word "why" followed on the second page with the words "You should travel and transport your freight via the Terre Haute, Indianapolis & Eastern Traction Company." The reasons are then given very briefly in large type. The back of the folder contains only the trademark of the company.

Memorandum in Nahant and Lynn Fare Case.—The Massachusetts Railroad Commission has issued a memorandum in regard to the petition of citizens of Lynn and Nahant for reduced fares upon the Nahant & Lynn Street Railway, sustaining the company for the present by declining to make any recommendation at this time. The board says: "In the above-entitled matter, after hearing the board made a memorandum under date of Oct. 4, 1909. Since the annual report of the company for the year ending Sept. 30, 1909, has been filed the board has given attention to the same, and after study finds no occasion at this date to make a recommendation with respect to fares. The petition is not dismissed, but continued without prejudice.

New Operating Organization of Chicago Railways Company.—The growth of the lines and service of the Chicago Railways Company has made it necessary to divide the operation of the system into three departments, classified geographically by the territory served. Superintendents have been appointed to each division, and these men will be held responsible for the operation of all cars, maintenance of equipment, etc. Under R. R. Herzog as general superintendent, Henry L. Beach will have charge of the north division as superintendent, including all lines and car houses north and east of the North Branch of the Chicago River; Benjamin Phillips will have charge of the west division as superintendent with lines and car houses south of Lake Street and west of Chicago River, and E. L. Crawford will have charge of the northwest division, including the lines and barns north of Madison Street and west of the Chicago River.

New Time-Table of Toledo & Chicago Interurban Railway.—G. M. Patterson, general freight and passenger agent of the Toledo & Chicago Interurban Railway, Kendallville, Ind., has recently issued a table folder of a form recently adopted by the company to cover both local and interline business. Heretofore the company has issued a small local folder and a large interline folder. The new folder shows the time of the company's own trains and the time of the steam railroad trains leaving junction points, and contains a condensed through time-table of connecting interurban railways, valuable information concerning cities and towns through which the road operates, general information about operation, a map of the Toledo & Chicago Interurban Railway and the steam and electric connecting railways. The only advertising solicited for this folder was that which would benefit the traveling public, viz., hotel directory and express advertisements.

Time Extended for Complying with Subway Service Order.—The Public Service Commission of the First District of New York on Feb. 25, 1910, granted the Interborough Rapid Transit Company a postponement until March 3, 1910, for the installation of a 2-minute headway on all subway trains south of Ninety-sixth Street between the close of the morning rush hours and the beginning of the evening rush, as fixed in the order of the commission issued on Feb. 18, 1910, which was published in the *ELECTRIC RAILWAY JOURNAL* of Feb. 26, 1910, page 356. The postponement was granted to allow experiments to be made to see whether the statement of the company that it is a physical impossibility thus to operate its trains is well founded or not. The hearing which was to have been held before the commission on Feb. 24, 1910, to inquire into the service on the elevated lines of the Interborough Rapid Transit Company has been postponed until March 10, 1910.

Personal Mention

Mr. George L. Radcliffe has been appointed superintendent of the Cleveland (Ohio) Railway to succeed Mr. W. T. Cook, and entered upon his duties on March 1, 1910.

Mr. C. Q. Richmond, vice-president and general manager of the Berkshire Street Railway, Pittsfield, Mass., has also been appointed general manager of the Pittsfield Electric Street Railway to succeed Mr. F. J. Dolan.

Mr. H. B. Noyes has resigned as chief engineer of the Omaha & Council Bluffs Street Railway, Omaha, Neb., to become president of the Gate City Construction Company, Denver, Col., which will engage in general contracting.

Mr. Benjamin Phillips has been appointed superintendent of the west division of the Chicago (Ill.) Railways in charge of the lines and car houses of the company south of Lake Street and west of the Chicago River. This is a new position with the company.

Mr. L. S. Storrs, president of the New England Investment & Security Company, president of the Springfield Street Railway and president of the Berkshire Street Railway, has also been elected president of the Pittsfield (Mass.) Electric Street Railway, to succeed Mr. P. C. Dolan.

Mr. Milton Trueman has been appointed superintendent of the Toledo division of the Lake Shore Electric Railway, Cleveland, Ohio. Mr. Trueman has been connected with the Lake Shore Electric Railway since the construction of the road and for several years has been trainmaster of the company.

Mr. Henry L. Beach has been appointed superintendent of the north division of the Chicago (Ill.) Railways, in charge of all the lines and car houses of the company north and east of the north branch of the Chicago River. Mr. Beach has been connected with the company for many years, and the position to which he is appointed is a new one.

Mr. E. L. Crawford has been appointed superintendent of the northwest division of the Chicago (Ill.) Railways, in charge of the lines and car houses of the company north of Madison Street and west of the Chicago River. Mr. Crawford was formerly foreman of the Larabie Street car houses of the company, and has been connected with the company for many years. The position to which he is appointed is a new one.

Mr. S. J. Jones has been appointed trainmaster of the Oregon Water Power Division of the Portland Railway, Light & Power Company, Portland, Ore., in charge of the transportation and track maintenance departments, with offices at the East Side freight station in Portland, reporting to Mr. C. J. Franklin, general superintendent. Freight and ticket agents of the company report to the traffic manager as heretofore.

Mr. Charles Sigler, heretofore electrical engineer and master mechanic of the Winona Interurban Railway, Warsaw, Ind., has been appointed superintendent of motive power and master mechanic of the company, with offices and shops at Winona Lake, Ind., effective on March 1, 1910. Mr. Sigler will not assume the duties of superintendent of motive power of the Salt Lake & Ogden Railway, Salt Lake, Utah, as previously reported.

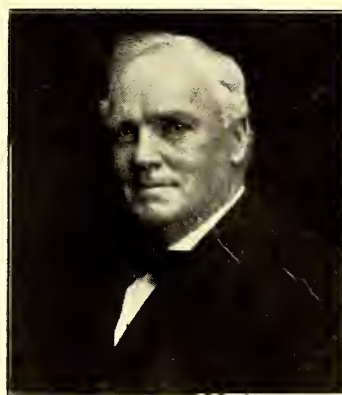
Mr. E. R. Sutherland, who has been connected with the office of the American Street & Interurban Railway Association for 11 months, has accepted the position of general assistant to the superintendent of the Ohio River Electric Railway & Power Company, Pomeroy, Ohio. Mr. Sutherland was graduated from the Virginia Military Institute in 1906 and received the degree of M.E. from Cornell University in 1909, and acted for a time as assistant to Prof. H. H. Norris, professor of electrical engineering at Cornell. Mr. Sutherland will enter on his duties with the Ohio River Electric Railway & Power Company on March 5, 1910.

Mr. Emil G. Schmidt has resigned as vice-president of the Rockford & Interurban Railway, Rockford, Ill.; vice-president and manager of the Peoria Gas & Electric Company, Peoria, Ill.; vice-president of the Evansville Gas & Electric Company, Evansville, Ind., and as vice-president

and general manager of the Springfield Gas Light Company, Springfield Consolidated Railway, Springfield Gas Light Company, Springfield Light, Heat & Power Company, Springfield, Ill., effective on Aug. 1, 1910. Mr. Schmidt proposes to spend two months with his family at Middle Bass Island, Ohio, and will probably then go to California.

Mr. H. C. Hoagland, who recently went to Muskogee, Okla., as special agent for H. M. Byllesby & Company to investigate the water-power of streams in the vicinity of Muskogee, as noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 12, 1910, has been appointed general manager of the Muskogee Gas & Electric Company, which is controlled by H. M. Byllesby & Company, Chicago, Ill. Mr. Hoagland has, however, severed his connection as vice-president and general manager of the North Missouri Central Railway Company, which contemplates the construction of a 60-mile electric railway in Missouri, to which position he was elected after he resigned as chief electrical and mechanical engineer of the Illinois Traction System.

Mr. John M. Egan has been elected president of the Kansas City Railway & Light Company, Kansas City, Mo., to succeed Mr. Bernard Corrigan, resigned. Mr. Egan is well known in Kansas City, having been connected with the



J. M. Egan

Armour Swift interests, and later head of the Union Station Company, Kansas City. He was born in Springfield, Mass., on March 26, 1848. In May, 1863, Mr. Egan joined his father in the employ of the Illinois Central Railroad and remained with the company until 1869. From January, 1870, to January, 1877, he held consecutively the positions of clerk, assistant engineer, division engineer, division engineer's and chief engineer's assistant with the North Missouri Railroad, now a part of the Wabash

Railroad. It was here that Mr. Egan became acquainted with Mr. William C. Van Horne. In January, 1877, Mr. Egan entered the employ of the Southern Minnesota Railroad, now a part of the Chicago, Milwaukee & St. Paul Railroad. When Mr. Van Horne took charge of the Canadian Pacific Railroad, in 1882, Mr. Egan was made general superintendent of the Western division of the company, with headquarters at Winnipeg, Man., and remained with the company until 1886, during which time he had charge of the work of extending the railroad from the northern shore of Lake Superior to the western slope of the Rocky Mountains, involving the construction of 1500 miles of railroad. In September, 1886, he became general superintendent of the St. Paul, Minneapolis & Manitoba Railroad, with headquarters at St. Paul, in charge of construction work and the extension of the line from Minot, N. D., to Helena, Mont. In February, 1888, Mr. Egan became general manager of the Chicago, St. Paul & Kansas City Railroad, a position which he retained until September, 1890, when he was made president and general manager of the company. Later Mr. Egan was assistant to the president of the Lake Superior & Ishpeming Railroad at Marquette, Mich. In November, 1896, he became vice-president of the Central of Georgia Railroad, and also held the same position in the Ocean Steamship Company. In April, 1900, he was made president of the Central of Georgia Railroad, and in June, 1902, he was also made president of the Ocean Steamship Company. In July, 1904, Mr. Egan became connected with the companies in Kansas City controlling the Armour-Swift-Burlington holdings in the North End, and in Clay County, and on June 4, 1904, he was elected president of the Kansas City Terminal Railway. He resigned this position on Feb. 6, 1907, to go to Brazil, and returned to the United States in November, 1908, when the English capitalists who controlled the property in Brazil relinquished their ownership.

Construction News

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

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

RECENT INCORPORATIONS

***Eureka Springs Electric Company, Little Rock, Ark.**—Incorporated in Arkansas to build an electric railway in Little Rock. Capital stock, \$100,000. Incorporators: Henry C. Brent, A. M. Barrow and Justin D. Bowerstock.

***Fullerton & Richfield Railway, Los Angeles, Cal.**—Incorporated in California to build an electric railway between Fullerton and Richfield. Capital stock, \$130,000. Directors: A. G. Wells, G. Holterhof, Jr., W. H. Brewer, J. L. Hibbard and C. W. Jones.

***Vallejo (Val.) Traction Company.**—Incorporated in California to build an electric railway through the eastern section of Vallejo to the White Sulphur Springs. Capital stock, \$200,000. Incorporators: Joseph Levison, M. H. Meacham, Theodore Bell and E. Hennessey, all of Napa, and C. G. Doty, Vallejo.

***Southern Iowa Traction Company, Albia, Ia.**—Incorporated in New Jersey for the purpose of converting the Centerville & Albia Railroad, which formerly operated a steam railroad between these points, into an electric railway. Capital stock, \$300,000. Officers: William A. Boland, president; Dr. J. L. Sawyer, vice-president, and George M. Barnett, treasurer.

***Lansing & Northeastern Electric Railway, Lansing, Mich.**—Incorporated in Michigan to build a 30-mile electric railway from Lansing to Owosso, with two proposed extensions, one from Morrice via Durand to Flint, the other from Owosso to Saginaw. Capital stock, \$500,000. Incorporators: G. G. Moore, K. Lathrop and S. W. Ladd, Detroit, and T. W. Atwood, Caro.

***Isothermal Traction Company, Rutherfordton, N. C.**—Chartered in North Carolina to construct an electric railway from Rutherfordton to Gastonia, a distance of 50 miles. Capital stock, \$100,000. Incorporators: K. S. Kinch, J. F. Fleck and W. A. Harrell.

Johnstown (Pa.) Traction Company.—Chartered on Feb. 24 to take over the lines of the old Johnstown Passenger Railway, recently purchased by the American Railways. Capital stock, \$500,000. Directors: E. M. Du Pont, president; G. Nelson Smith, S. E. Young, Joseph McAneny and Percy A. Rose.

Scranton & Binghamton Traction Company, Scranton, Pa.—Incorporated in Pennsylvania to operate a 62-mile electric railway from Binghamton, N. Y., to Scranton, Pa. Capital stock, \$10,000. W. L. Connel, Scranton, president. [E. R. J., Feb. 5, '10.]

***People's Utility Company, Mannington, W. Va.**—Incorporated in West Virginia for the purpose of building an electric railway in Mannington and other parts of Marion and Wetzel Counties. Capital stock, \$500,000. Incorporators: W. R. Martin, C. R. Phillips, W. T. Smith, N. H. Smith, Mannington, and I. D. Morgan, New Martinsville.

FRANCHISES

***Vallejo, Cal.**—The Vallejo Traction Company has applied for a franchise to build an electric railway from the water front in Vallejo to the White Sulphur Springs. H. M. Meacham, Vallejo, president.

Portland, Ind.—The Fort Wayne & Springfield Railway, Decatur, has been granted the right to build an extension of its electric railway from Decatur to Portland. W. H. Flederjohann, general manager.

Paw Paw, Mich.—The Common Council has granted to William Plumb and H. H. Tucker a franchise to build an electric railway in Paw Paw. The promoters expect to continue this railway to Kalamazoo, Lawrence, Hartford and Benton Harbor. [E. R. J., Dec. 25, '09.]

Fremont, Neb.—The Nebraska Transportation Company, Omaha, has applied to the Fremont Council for an electric railway franchise. C. W. Baker, president. [E. R. J., Nov. 20, '09.]

Englewood, N. J.—The Council has granted the Hudson River Traction Company, Hackensack, the right to extend its line in Englewood to the city limits, just above Hudson Avenue. [E. R. J., Feb. 19, '10.]

Bucyrus, Ohio.—The City Council has granted the Cleveland, Southwestern & Columbus Railway, Columbus, a 25-year franchise to operate electric railways over nine streets in Bucyrus.

Spartanburg, S. C.—F. H. Knox, vice-president and general manager of the Spartanburg Railway, Gas & Electric Company, Spartanburg, has asked the City Council for a two months' extension of time in which to complete its extension to Saxon Mills.

Houston, Tex.—The Houston-Galveston Electric Railway, Houston, has applied to the City Council for right of way over certain streets in Houston. [E. R. J., Jan. 1, '10.]

San Marcos, Tex.—C. L. Hopkins, San Marcos, has been granted a 20-year franchise to construct an electric railway in San Marcos provided the railway is completed and in operation within one year. [E. R. J., Feb. 29, '10.]

Provo, Utah.—Jesse Knight has recently been granted franchises in Payson, Spanish Fork, Pleasant Grove, American Fork and Lehi. Franchises are still to be obtained from the intermediate points between Provo and Springville. Application has just been made for a franchise in Salt Lake City. This is part of a plan to build an electric railway from the south to the north boundaries of Utah County, and as soon as all franchises are secured the company will be organized. [E. R. J., Feb. 29, '10.]

TRACK AND ROADWAY

Geary Street, Park & Ocean Railway, San Francisco, Cal.—The board of public works has been requested to furnish the Board of Supervisors with an estimate of the cost of preparation of plans and specifications for the reconstruction of the Geary Street, Park & Ocean Railway which is now to be municipally operated.

Vallejo & Northern Railway, Vallejo, Cal.—It is announced that the bonds for the construction of this railway from Vallejo to Sacramento via Fairfield and Woodland have been placed and that the line will be built this year as a completion of the Northern Electric Railway, Chico, which will eventually extend from Redding to Vallejo.

Middle Georgia Interurban Railway, Atlanta, Ga.—This company has filed with the Railroad Commission in Atlanta, a petition to be allowed to issue first mortgage bonds to the extent of \$1,050,000, also for the right to issue stock to the extent of \$200,000. The matter will be heard by the Commission on March 9. This is the first definite step in the direction of building the projected electric railway from Griffin to Social Circle via Jackson, Indian Springs and Monticello. Grading of the line has been completed for two-thirds of the way from Indian Springs to Jackson. [E. R. J., July 31, '09.]

Egyptian Traction Company, Eldorado, Ill.—This company advises that work will begin in about three months on its projected railway which is to connect Murphysboro, Marion, Carrier Mills, Harrisburg, Eldorado, Ridgway, New Haven, Ill., and Mount Vernon, Ind. It will also reach White City, an amusement resort at Harrisburg. Officers: Geo. E. Leggett, Winchester, Ind., president and general manager; John W. Murphy, Eldorado, Ill., vice-president; G. E. K. Hixon, Eldorado, secretary; J. D. Stayton, Eldorado, treasurer, and Geo. Clark, Harrisburg, Ill., chief engineer. [E. R. J., Jan. 22, '10.]

Murphysboro (Ill.) Electric Railway.—Plans are being considered by this company to extend its line from Murphysboro to Herrin, Du Quoin, Harrisburg, Pinckneyville and back to Murphysboro, completing a loop. Surveying will start at once. A. B. Minton, president.

Bloomington, Pontiac & Joliet Electric Railway, Pontiac, Ill.—This company advises that it will complete track-laying on its extension between Pontiac and Chenoa as soon as the weather permits. This line will be extended to Lexington, 19 miles from Pontiac. F. E. Fisher, general manager.

Winona Interurban Railway, Winona Lake, Ind.—It is reported that this company will soon begin work on its

projected 14-mile extension between Bremen and Milford. J. B. Crawford, Warsaw, purchasing agent.

Albia (Ia.) Interurban Railway.—This company is building a 10-mile extension from Albia to Buxton. The En-projected 14-mile extension between Bremen and Milford tract. W. E. Grant, general manager.

Hutchinson (Kan.) Interurban Railway.—Work was begun on Feb. 15 by this company on the construction of 2 miles of new single track.

Louisville (Ky.) Railway.—This company is said to be considering plans for the building of an 8-mile extension from Fern Creek to Mt. Washington.

Battle Creek, Coldwater & Southern Railway, Battle Creek, Mich.—A bonus of \$15,000 has been raised in Coldwater to aid this company in building a 28-mile railway from Battle Creek to Coldwater. C. E. Flynn, Erie, president. [E. R. J., July 17, '09.]

Twin City & Lake Superior Railway, Minneapolis, Minn.—This company has filed in St. Paul a \$4,000,000 trust deed in favor of the American Trust & Savings Bank, Chicago. This proposed 130-mile electric railway will extend from Minneapolis to Duluth and Superior. About 60 miles of the route have been graded. L. N. Loomis, Minneapolis, president. [E. R. J., Jan. 1, '10.]

Metropolitan Street Railway, Kansas City, Mo.—This company advises that it will soon place contracts for building 3 miles of single track. W. W. Wheatley, Kansas City, general manager.

St. Louis, Montesano & Southern Railway, St. Louis, Mo.—Judge Wurdeman, of the Clayton Circuit Court, has appointed Peter Kerth receiver for this company, which was organized to build a 63-mile electric railway from St. Louis to Flat River. Authorized capital stock, \$3,000,000 common and \$1,000,000 preferred. Bond issue of \$2,500,000. [E. R. J., June 19, '09.]

Mountain Railway, West Orange, N. J.—This company advises that it will build ½-mile of track from its present terminus at St. Cloud to the South Mountain Reservation, Essex County Park. Frank Brewer, West Orange, vice-president. [E. R. J., June 12, '09.]

Citizens' Traction & Power Company, Albuquerque, N. Mex.—This company was organized and has awarded a contract to J. H. Barrett, Pittsburgh, Pa., to build a 2-mile street railway in Albuquerque. Later a charter will be applied for to build a comprehensive system covering the entire city and a power plant will be installed. For the present power will be purchased. Officers: A. W. Hayden, president; D. H. Boatright, vice-president; J. C. Baldrige, treasurer, and Isaac Barth, secretary. [E. R. J., Feb. 29, '10.]

International Railway, Buffalo, N. Y.—This company has recently placed contracts with the Lorain Steel Company for 1500 tons of 124-432 girder rail and with the Rail Joint Company for continuous joints to splice this rail. The Kettle River Company has been awarded the contract for 21,000 long-leaf, zinc-treated ties. The company is about to order screw spikes, tie plates and drive screws sufficient to put down this rail. About one-half mile of the above rail will be used in constructing a new route in the city, the balance in rehabilitating city lines.

***Queenston & Niagara Electric Railway, Niagara Falls, Ont.**—This company is reported to have been organized to construct a 7-mile electric railway between Queenston and Niagara-on-the-Lake along the lower Niagara Gorge to Lake Ontario.

McKeesport, Clairton & Westmoreland Railway, McKeesport, Pa.—This company has been formed as a subsidiary company of the Pittsburgh (Pa.) Railways, to build an electric railway to connect McKeesport, Clairton, Elizabeth, Riverview, Monongahela, Monessen and Webster. Two parties of surveyors are now at work.

Phoenixville, Valley Forge & Stafford Street Railway, Phoenixville, Pa.—This company has secured all rights of way to build its railway between Phoenixville and Valley Forge. Thomas E. O'Connell, West Chester, president. [E. R. J., Jan. 29, '10.]

Chambersburg, Greencastle & Waynesboro Electric Railway, Waynesboro, Pa.—The directors of this company have

recently increased the authorized stock to \$2,500,000 and the bonded indebtedness to the same amount. A plan is being considered to build an extension from Pen Mar to Highfield, Monterey and Blue Ridge Summit.

Aberdeen (S. D.) Street Railway.—This company advises that within the next month contracts will be let for the construction of 4 miles of track. Charles N. Herreid, Aberdeen, president and general manager. [E. R. J., Dec. 4, '09.]

Nashville & Adairville Railway, Nashville, Tenn.—This company has been granted an amendment to its charter giving it the right to extend its proposed railway into Kentucky and connect at Owensboro with the Illinois Central Electric Railway, Canton. [E. R. J., Jan. 1, '10.]

SHOPS AND BUILDINGS

Central California Traction Company, San Francisco, Cal.—This company is negotiating for the purchase of a strip of land 226 ft. wide, extending from Front Street and X Street to low-water mark of the Sacramento River, upon which it will build a wharf and a warehouse during the summer. The dock will be for the use of steamer lines co-operating with this company in the handling of freight. George W. Petier, San Francisco, vice-president.

Augusta Railway & Electric Company, Augusta, Ga.—This company announces that the contract for erecting a terminal station and office building in Augusta has been awarded to the Blue Ridge Construction Company. Estimated cost is \$27,000. James R. League, Augusta, general manager.

Indiana Union Traction Company, Anderson, Ind.—This company will erect a three-story brick passenger and freight station on East Main Street, Elmwood.

Port Arthur & Fort William Railway, Port Arthur, Ont.—This company states that it is building a new car house in Port Arthur. N. C. Pilchor, Port Arthur, purchasing agent.

Citizens' Railway Company, Waco, Tex.—This company is planning to build a repair shop and car house at Waco. The estimated cost is \$75,000. Preston Graves, Peirce Building, St. Louis, Mo., purchasing agent.

POWER HOUSES AND SUBSTATIONS

San Diego (Cal.) Electric Railway.—This company has recently placed an order with the Allis-Chalmers Company for a 1200-kw vertical cross-compound condensing engine, 28 x 60 x 48, direct connected to a General Electric generator. The engine will operate at 80 r.p.m., and will be supplied with steam at 160-lb. pressure and a vacuum of 26 in. will be maintained.

Pueblo & Suburban Traction & Lighting Company, Pueblo, Col.—This company advises that it expects to purchase during the next four weeks coal-handling machinery. T. C. Roberts, Pueblo, superintendent of power plant.

Metropolitan Street Railway, Kansas City, Mo.—This company states that it expects soon to purchase one 2000-kw rotary converter and accessories. W. W. Wheatley, Kansas City, general manager.

Port Arthur & Fort William Railway, Port Arthur, Ont.—This company advises it has purchased for installation this month an 800-amp-hr. battery and booster from the Gould Storage Battery Company. The company has recently installed a 300-kw motor generator set purchased from the Allis-Chalmers-Bullock Company. N. C. Pilchor, Port Arthur, purchasing agent.

Aberdeen (S. D.) Street Railway.—During the next month this company will be ready to let contracts for equipment and the construction of a power plant in Aberdeen. Charles N. Herreid, Aberdeen, president.

Wisconsin Traction, Light, Heat & Power Company, Appleton, Wis.—This company is increasing the capacity of its power plant in Appleton by the installation of two low-pressure steam turbines. These will be furnished by the Allis-Chalmers Company and will each have a capacity of 1250 kw at 3600 r.p.m., 60-cycle, three-phase, 2300 volts. Steam will be received from existing compound engines at 17-lb. absolute, and the turbines will exhaust into a 28-in. vacuum.

Manufactures & Supplies

ROLLING STOCK

Guaymas (Mexico) Street Railway has ordered three new cars.

San Diego (Cal.) Electric Railway is building 10 flat cars, each of 50,000 lb. capacity, at its shops in National City.

Ensley (Ala.) Street Railway is considering the purchase of a gasoline or gasoline-electric car to seat from 25 to 40 passengers.

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky., contemplates the purchase of some single-truck cars during 1910.

Stone & Webster Engineering Corporation, Boston, Mass., will place an order immediately for 10 city cars and 15 interurban cars for its Texas properties.

Indiana Union Traction Company, Anderson, Ind., will soon prepare designs for building in its own shops a 60-ft. passenger car for limited high-speed service.

Kansas City Railway & Light Company, Kansas City, Mo., is in the market for 100 60-hp motors and 25 pairs of trucks to be used under cars which the company already has.

East Shore & Suburban Railway, Richmond, Cal., expects to buy two 50-ft. city and suburban cars, three sets each of trucks, four motor car equipments and air brakes, within the next two weeks.

Cape Girardeau-Jackson Interurban Railway, Cape Girardeau, Mo., expects to buy two sets of trucks, two motor equipments complete, trolley bases, controllers and other car material within the next four weeks.

Port Arthur & Fort William Electric Railway, Port Arthur, Ont., mentioned in the *ELECTRIC RAILWAY JOURNAL* of Oct. 23, 1909, as contemplating the purchase of some cars, has placed an order with the Preston Car & Coach Company, Preston, Ont., for four 42-ft. pay-as-you-enter cars.

Cincinnati (Ohio) Traction Company has placed an order with the Cincinnati Car Company for 50 single-truck, open car bodies, to be built according to the dimensions of the type of car in service at present in Cincinnati. It was mentioned in the *ELECTRIC RAILWAY JOURNAL* of Dec. 18, 1909, that this company would purchase new equipment.

Michigan United Railways, Jackson, Mich., mentioned in the *ELECTRIC RAILWAY JOURNAL* of Jan. 15, 1910, as contemplating the purchase of 15 or 20 cars, is preparing specifications for 20 city cars and one interurban car, and will purchase two sets of trucks and 60 new motors, in addition to the cars, within a month, it is reported. The purchase of this equipment will involve an expenditure of about \$158,000.

Third Avenue Railroad, New York, N. Y., mentioned in the *ELECTRIC RAILWAY JOURNAL* of Jan. 15, 1910, as having ordered 100 convertible, pay-as-you-enter cars from The J. G. Brill Company, will have the following details on the new cars:

Length of body.....30 ft. 1 in.	Heaters.....Consolidated
Length over bumpers...43 ft.	Headlights....United States
Width over sills....8 ft. 2 in.	Journal boxes....Symington
Air brakes,	Motors (two per car),
National B. & E. Co.	West 310 and GE 210-A
Axles.....M. C. B. type	Seats.....Brill Winner
Brakeshoes,	Step treads..Universal safety
Am. B. S. & Fdy. Co.	Trucks,
Curtain fix....Curtain S. Co.	Brill No. 39-E single motor
Curtain material...Pantasote	Varnish.....Murphy
Destination signs....Hunter	Push button....Consolidated
Wheelguards.....H-B	Steel wheels.....Midvale
Gears and pinions.....Solid	Headlinings.....Agasote
Hand brakes.....Peacock	

Public Service Railway, Newark, N. J., reported in the *ELECTRIC RAILWAY JOURNAL* of Jan. 29, 1910, as having ordered 100 single-end, double-truck, pay-as-you-enter cars from the Cincinnati Car Company, has drawn up the following specifications:

Wheel base.....5 ft. 10 in.	Curtain material...Pantasote
Length of body.....32 ft.	Destination signs..Keystone
Length over all.....44 ft.	Hand brakes,
Width over all.....8 ft. 6 in.	Sterling Little Giant
Height, sill to trolley base.....8 ft. 6 in.	Headlights...Dayton No. 1561
Body,	Markers....Lintern tail lamp
Composite, wood and metal	Motors...Four West. 101-B-2
Underframe.....Composite	Registers...Sterling-Meaker
Axles.....4½ in.	Roofs.....Monitor type
Control.....K-6	Seats....Longitudinal rattan
Couplers....Cincinnati radial	Trolley poles and attachments.....One No. 11 base
Curtain fix.Protected groove	Varnish.....Murphy

TRADE NOTES

Standard Railway & Timber Company, Dover, Del., has been incorporated in Delaware by J. H. Scott, Tacoma, Wash.; E. H. Brehm, Seattle, Wash., and Joseph Irving, Everett, Wash., with a capital of \$500,000.

Allis-Chalmers Company, Milwaukee, Wis., reports that its Type OB air compressor governors are being installed on 10 cars which the Northern Ohio Traction & Light Company, Akron, Ohio, is overhauling, to replace the governors which were in use on the cars.

Ohio Brass Company, Mansfield, Ohio, has recently placed the following Tomlinson M. C. B. radial couplers: Spokane & Inland Empire Railroad, Spokane, Wash., 86; Oklahoma (Okla.) Railway, 12; Seattle & Everett Interurban Railway, Seattle, Wash., 12; Louisville & Eastern Railroad, Louisville, Ky., 6; Terre Haute, Indianapolis & Eastern, Terre Haute, Ind., 12.

Robert Long, South American representative of the National Brake & Electric Company, Milwaukee, Wis., has returned to the United States after a residence in different parts of South America of 2½ years, and expects to remain in this country two or three months before returning to South America. Mr. Long reports that the National Brake & Electric Company has more than 800 air brake equipments in different parts of South America.

Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., which manufactures many different railway shop devices and gear cases, etc., is now giving particular attention to the manufacture of brake and controller handles of all the important types. The air brake and reversing handles are made of bronze or malleable iron. The controller handles include bronze, adjustable type; malleable iron, adjustable type, and malleable iron with bronze bushings.

Electric Storage Battery Company, Philadelphia, Pa., has appointed Pierson, Roeding & Company, San Francisco, Seattle and Los Angeles, as its sole Pacific Coast selling agent. George R. Murphy, now interested with Pierson, Roeding & Company, who will represent the Electric Storage Battery Company in the sale of its batteries on the coast, has had 10 years' experience in various departments of the Electric Storage Battery Company's organization, and will devote himself exclusively to the battery business, with offices at the company's former address, Crocker Building, San Francisco. The Pacific Coast branches of the Electric Storage Battery Company's construction, operating and Exide inspection departments will be continued under the company's own control, with offices at 590 Howard Street, San Francisco. Pierson, Roeding & Company will operate the Exide battery depot at 590 Howard Street, San Francisco, and will carry an ample stock to insure prompt shipments. Charles Blizard, third vice-president and general sales manager of the Electric Storage Battery Company, has returned East after an extended trip through the West. Mr. Blizard visited the sales offices of the company at Cleveland, Chicago and San Francisco and spent some time in Seattle and Los Angeles.

C. C. Steinbrenner has recently been elected vice-president of the Galena-Signal Oil Company, Franklin, Pa. Mr. Steinbrenner was born in Cleveland, Ohio, on Sept. 20, 1863, and was educated at the public schools of that city. From 1877 to 1880 he served as printer's apprentice and studied bookkeeping and stenography at night. In the spring of 1881 he was employed as stenographer and assistant clerk with the motive power department of the Pennsyl-

vania Railroad. Subsequently he became clerk in the office of the county auditor at Cleveland. In 1882 he returned to the Pennsylvania Railroad at Wellsville as assistant shop clerk. He next became assistant clerk in the office of the superintendent of machinery of the Cleveland, Cincinnati, Chicago & St. Louis Railroad at Cleveland. In 1885 he was promoted to be secretary to that official and stenographer to the general attorney of the company. In 1890 Mr. Steinbrenner was made chief clerk of the motive power department of the Cleveland, Cincinnati, Chicago & St. Louis Railroad, with offices in Indianapolis. In May, 1893, he became chief clerk of the motive power department of the Illinois Central Railroad at Chicago, but resigned that position in December, 1894, to become auditor of the railway department for the Galena-Signal Oil Company, and continued in this position until his election as vice-president of the company.

ADVERTISING LITERATURE

Hayes Track Appliance Company, Geneva, N. Y., is distributing a circular about its models of hand-operated details.

B. F. Sturtevant Company, Hyde Park, Mass., is distributing a card calling attention to its electric dust blowing set.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued list No. 100, covering its rail and equipment department.

Albert & J. M. Anderson Manufacturing Company, Boston, Mass., is mailing two circulars on trolley ears and Brooklyn strain insulators.

MacGovern, Archer & Company, New York, N. Y., have issued Bulletin No. 14, in which attention is called to the fact that the company has on hand several dynamos for immediate shipment.

Ohmer Fare Register Company, Dayton, Ohio, has issued a series of folders in which are described indicating, recording and printing registers and equipments for pay-as-you-enter and pay-within cars.

Western Electric Company, New York, N. Y., has issued Bulletin No. 5352, 8 in. x 10 in., with 28 pages, which is devoted to Hawthorn fan motors for 1910. It is well illustrated and contains a description of each fan motor which is shown.

Cutler-Hammer Clutch Company, Milwaukee, Wis., has issued a folder in which its lifting magnets are described and illustrated. A feature of the publication is the cross-section 10 in. wide by 7½ in. high of a Cutler-Hammer lifting magnet, with an index to the details of the magnet.

W. R. Garton & Company, Chicago, Ill., have issued a folder containing list prices of their tantalum, gem and standard carbon lamps, and discounts on their "Brilliant" Mazda lamps. Another folder, just issued, contains list prices of "Brilliant" Mazda lamps alone. In addition, the company has printed "Condulet Talk No. 146," in which is described type O-162,200 condulet for two-wire molding.

Watson-Stillman Company, New York, N. Y., has issued a 120-page illustrated catalog under the title of "Hydraulic Valves and Fittings." It contains many types and combinations of hydraulic valves and fittings; also advice as to the best piping arrangements, how the valve arrangement may operate a number of cylinders or machines automatically and what types or combinations of valves are best suited to certain work.

H. W. Johns-Manville Company, Cleveland, Ohio, in the second issue of the "J.-M. Packing Expert," dated February, 1910, continues the "Story of Asbestos." The publication also contains an article in which the company tells about the location of its factories. It is accompanied by an engraving showing the city plant at Milwaukee. The company is mailing postal cards in the form of shipping tags, on which are printed blank forms for any one desiring Catalog No. 101.

National Brake & Electric Company, Milwaukee, Wis., has issued Publication No. 387, which is devoted to motor-driven air compressors, type "3 V S." The parts of the compressor are described and illustrated. In addition, the catalog contains descriptions of the company's portable air

compressor outfits, gas compressors for high pressure, gas transmission and air compressors for air-lift pumps. Tables are also presented giving dimensions, capacities and other data relating to motor compressors; also capacities and cylinder dimensions at various pressures.

Kerr Turbine Company, Wellsville, N. Y., has issued two bulletins, No. 9, "Turbo-Blower Units," and No. 10, "Steam Turbine Generators, Steam Turbine Centrifugal Pumps." The first bulletin illustrates practical outfits for forced and induced draft, gas works service and for furnishing blast for cupolas. The other includes generating sets for electric power and lighting, and pumping units for boiler feeding, fire service, water supply, circulating condenser water, draining sumps, and for other service where water must be delivered at moderate or high pressure or against considerable head.

W. S. Rockwell & Company, New York, N. Y., have published Catalog No. 3 on fuel oil and gas burning appliances. "Oil as Fuel" is the subject with which the catalog is introduced. Each piece of apparatus included in the title of the catalog is briefly described and illustrated and is accompanied by specifications and code words. A number of tables are presented giving the capacities of the various sizes of oil storage tanks manufactured by the company. In addition, a line drawing has been inserted to show the appliances necessary and the method of delivering and burning fuel oil. This insert is supplemented by valuable tables and other useful information. On the last page of the publication Rockwell & Company call attention to the catalogs on the various types of oil and gas furnaces which they manufacture.

Eureka Tempered Copper Works, North East, Pa., have issued illustrated catalog and price list No. 5 dated Jan. 1, 1910. It contains 168 pages and is profusely illustrated. A heavy paper has been used, and the publication is enclosed in an artistic illuminated cover. The contents are divided into six sections. These divisions convey an excellent idea of the extent of the products which the works are prepared to supply. The subjects of the sections in the order of their arrangement in the catalog follow: Section 1, cast commutator bars, drop forged commutator bars; copper, bronze and brass castings. Section 2, new commutators, refilled commutators, assembled commutators, mica and mica insulation. Section 3, brush commutators, lighting segments, copper brushes, brush copper. Section 4, trolley wheels, bushings, bearings. Section 5, clinch and solder ears, feed and strain ears, splice ears and sleeves, wire connectors, section switches. Section 6, controller segments and fingers, brush holders.

J. G. Brill Company, Philadelphia, Pa., in *Brill's Magazine* for February, 1910, publishes the second of the series of biographical sketches of officers of street railways in the United States. The subject in the February issue is Charles O. Kruger, president and general manager of the Philadelphia Rapid Transit Company. The sketch is accompanied with an excellent portrait of Mr. Kruger as a supplement. The magazine also contains the fourteenth of the series of articles on the type of car adopted for use in large cities of the world. This time the city considered is Lisbon, Portugal. The second article in the magazine is entitled "How Light-Weight Equipment Behaves in Service—A Severe 10-Year Test," and the experience of the Metropolitan Street Railway, New York, N. Y., with light-weight cars is reviewed. These cars weigh only 27,040 lbs. or 751 lb. per seated passenger, and were reconstructed for pay-as-you-enter operation. Other articles are "Wason Cars for Guatemala" and "Some Recent Types of Open Cars." The J. G. Brill Company has also issued a booklet in which its high-speed truck No. 27-M.C.B. is described. This truck was called to the attention of operators of high-speed lines at the convention of the American Street & Interurban Railway Association in Denver in October, 1909. It is of M.C.B. type with distinctive Brill features, and is built for all classes of high-speed motor and trail service. The subject matter of the booklet is divided into three sections: "The Truck and Its Frame," "Bolster and Spring Plank" and "The Brake Arrangement." Drawings, tables and specifications add to the value of the publication.

TABLE OF MONTHLY EARNINGS.

Notice:—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. *Including Taxes. †Deficit. ‡Includes Ferry earnings up to April 1, 1909. xIncludes other income received.

Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income	Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Jan. '09 1 " " '08	164,944 147,895	*94,500 *84,710	70,444 63,185	43,292 43,952	27,152 19,233	LIMA, OHIO. Western Ohio Ry.	1m., Dec. '09 1 " " '08 6 " " '09 6 " " '08	40,623 36,232 268,463 240,524	22,688 21,360 138,578 128,198	17,935 14,872 129,885 112,326	15,402 14,866 92,559 91,180	2,533 6 37,226 21,146
BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	39,149 37,353 406,867 362,252	21,034 19,651 228,093 206,759	18,114 17,702 178,775 155,493	8,522 8,847 99,799 99,692	9,592 8,855 78,975 55,801	MONTREAL, CAN. Montreal St. Ry.	1m., Jan. '10 1 " " '09 4 " " '10 4 " " '09	325,621 295,453 1,352,062 1,230,524	205,060 199,644 791,939 748,839	120,561 95,809 560,124 481,685	35,690 33,536 132,035 124,105	84,871 62,273 428,088 357,580
BINGHAMTON, N.Y. Binghamton St. Ry.	1m., Jan. '10 1 " " '09	27,180 26,293	16,724 14,415	10,466 11,878	8,921 8,904	1,535 2,974	NORFOLK, VA. Norfolk & Portsmouth Trac. Co.	1m., Jan. '10 1 " " '09	156,372 -1157,439	86,661 93,167	69,711 64,272	65,771 67,087	3,940 ‡2,815
CHARLESTON, S. C. Charleston Con. Ry., Gas & Elec. Co.	1m., Jan. '10 1 " " '09 11 " " '10 11 " " '09	69,340 59,645 719,429 697,303	46,525 38,828 462,042 451,854	22,815 20,817 257,387 245,449	13,917 13,817 153,083 151,808	8,899 7,000 104,304 93,640	PADUCAH, KY. Paducah Traction & Light Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	20,884 20,751 227,344 226,614	12,556 9,379 135,753 133,393	8,328 11,372 91,591 93,220	6,711 6,705 81,644 82,550	1,617 4,668 9,947 10,671
CHICAGO, ILL. Aurora, Elgin & Chicago Railroad.	1m., Dec. '09 1 " " '08 6 " " '09 6 " " '08	117,202 109,578 858,007 781,045	72,794 62,553 444,903 408,752	44,408 47,025 413,104 372,294	30,912 27,996 177,574 166,478	13,496 19,029 235,530 205,816	PENSACOLA, FLA. Pensacola Electric Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	20,410 18,795 246,664 209,183	11,726 10,832 141,338 144,871	8,684 7,963 105,327 64,312	4,597 4,281 52,631 51,161	4,087 3,681 52,695 13,151
CLEVELAND, O. Cleveland, Painesville & Eastern R.R. Lake Shore El. Ry.	1m., Jan. '10 1 " " '09	21,084 18,986	*11,495 *10,523	9,590 8,463	8,729 8,112	861 351	PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	8,001 7,962 130,786 122,266	6,852 5,650 92,949 88,440	1,149 2,311 37,837 33,825	1,809 2,153 21,668 26,755	‡600 158 16,169 7,070
DALLAS, TEX. Dallas Electric Corporation.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	119,766 106,830 1,320,122 1,171,958	75,105 65,940 821,491 782,645	44,661 40,890 498,631 389,313	27,675 27,720 337,811 348,026	16,986 13,170 160,820 41,287	PORTLAND, ORE. Portland Ry., Lt. & Pwr. Co.	1m., Jan. '10 1 " " '09	431,011 338,226	182,044 185,876	248,966 153,349	128,995 116,770	119,971 36,579
DAVENPORT, IA. Tri-City Ry. & Lt. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	204,859 178,259 2,038,728 1,819,077	110,659 96,652 1,148,141 1,069,317	94,200 81,607 890,587 749,760	..... ..... ..... .....	..... ..... ..... .....	POTTSVILLE, PA. Eastern Pennsylvania Ry. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	55,128 49,495 601,412 562,386	*31,760 *29,984 *372,412 *361,853	23,368 19,511 229,000 200,534	....................	....................
DETROIT, MICH. Detroit United Ry.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	708,864 613,104 8,192,388 7,179,716	427,941 *376,534 5,042,724 *4,559,123	280,923 236,570 3,149,664 2,620,593	*156,729 133,606 *1,880,129 1,618,665	124,194 102,964 1,269,535 1,001,928	ROCKFORD, ILL. Union Railway, Gas & Electric Co.	1m., Nov. '09 1 " " '08 11 " " '09 11 " " '08	251,350 226,808 2,534,338 2,326,110	134,711 117,156 1,301,649 1,202,442	116,639 109,652 1,232,689 1,123,668	65,027 64,835 708,344 696,184	51,612 44,817 524,345 427,484
EAST ST. LOUIS, ILL. East St. Louis & Suburban Co.	1 " Dec. '09 1 " " '08 12 " " '09 12 " " '08	185,225 172,276 2,035,790 2,009,514	96,186 102,146 1,097,236 1,062,310	89,039 70,130 938,554 947,205	..... ..... ..... .....	..... ..... ..... .....	ST. JOSEPH, MO. St. Joseph Ry., Lt., Ht. & Power Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	92,087 83,259 979,554 909,965	45,537 36,848 505,570 455,907	46,550 46,411 473,985 454,058	21,759 20,924 256,968 247,219	24,791 25,487 217,016 206,840
EL PASO, TEX. El Paso Elec. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	59,667 55,194 600,958 534,221	32,628 37,389 360,103 384,639	27,039 17,805 240,855 149,584	9,410 7,765 98,225 86,893	17,629 10,040 142,630 62,690	ST. LOUIS, MO. United Rys. Co. of St. Louis.	1m., Jan. '10 1 " " '09	885,782 829,036	*596,144 *544,752	289,638 284,284	233,787 235,568	55,851 48,716
FAIRMONT, W. VA. Fairmont & Clarksburg Trac. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	42,261 36,808 472,251 416,882	16,019 12,912 165,432 145,884	26,242 23,896 306,819 270,998	..... ..... ..... .....	..... ..... ..... .....	SAN FRANCISCO, CAL. United Railroads of San Francisco.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	645,847 603,403 7,455,965 6,866,303	380,203 343,071 4,242,648 4,242,750	265,644 260,332 3,213,317 2,623,553	....................	....................
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	129,720 118,835 1,414,526 1,322,720	73,027 64,738 821,723 737,134	56,693 54,098 592,804 585,586	521,350 488,756	71,453 96,830	SAVANNAH, GA. Savannah Elec. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	50,288 54,001 603,814 595,819	32,683 33,736 392,351 388,830	17,605 20,266 211,463 206,989	17,590 17,077 209,693 206,615	6 3,189 1,770 375
FORT WORTH, TEX. Northern Texas Elec. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	108,483 97,448 1,259,551 1,080,577	61,033 54,326 692,735 1,080,577	47,450 43,122 566,816 450,525	17,076 15,185 204,139 189,541	30,374 27,938 362,677 260,984	SEATTLE, WASH. Seattle Elec. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	481,893 415,079 5,854,175 4,520,489	289,036 253,801 3,394,538 2,670,252	192,858 161,278 2,459,638 1,850,237	103,709 95,313 1,242,663 1,090,646	89,149 65,965 1,216,974 759,591
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	100,867 96,998 1,206,544 1,088,447	58,482 54,931 709,034 627,973	42,385 42,068 497,510 460,474	23,059 20,696 263,899 245,277	19,326 21,372 233,611 215,197	SYDNEY, N. S. Cape Breton Elec. Co., Ltd.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	24,308 21,766 240,709 247,546	12,570 12,514 142,502 142,509	11,738 9,252 98,207 105,036	5,060 4,959 60,440 59,462	6,679 4,293 37,767 45,575
GRAND RAPIDS, MICH. Grand Rapids Ry. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	90,143 81,854 1,029,011 940,645	45,185 42,718 492,855 470,985	44,958 39,136 536,156 469,660	18,381 20,972 227,056 226,949	26,577 18,164 309,100 242,711	TACOMA, WASH. Puget Sound Electric Ry.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	148,994 136,576 1,869,096 1,639,131	108,402 92,709 1,250,588 1,040,905	40,592 43,867 618,508 598,226	59,079 43,354 570,048 515,140	‡8,487 513 48,460 83,086
HARRISBURG, PA. Central Penn. Trac. Co.	1m., Jan. '10 1 " " '09	62,087 57,325	48,294 43,973	13,793 13,352	..... .....	..... .....	TAMPA, FLA. Tampa Elec. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	56,389 50,063 596,303 552,574	32,495 32,671 346,104 367,909	23,894 17,392 250,199 184,665	4,816 5,211 55,968 39,774	19,078 12,181 194,231 144,891
HOUGHTON, MICH. Houghton County Trac. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	26,083 24,833 319,966 265,576	14,234 13,299 172,551 148,245	11,849 11,534 147,415 117,331	7,106 5,805 73,326 59,632	4,743 5,729 74,090 57,699	TOLEDO, OHIO. Toledo Rys. & Lt. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	263,552 236,067 2,733,177 2,542,110	136,305 120,356 1,526,120 1,377,022	127,247 115,711 1,207,057 1,165,089	75,927 72,125 879,503 851,782	51,320 43,586 327,554 313,307
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., Dec. '09 1 " " '08 12 " " '09 12 " " '08	49,011 38,965 486,778 430,838	22,106 21,548 269,196 253,943	26,905 17,417 217,582 176,895	9,270 9,052 112,866 110,792	17,635 8,365 104,716 66,103	TORONTO, ONT. Toronto Ry.	1m., Dec. '09 1 " " '08 6 " " '09 6 " " '08	411,144 387,237 3,926,828 3,610,273	255,398 223,988 2,044,597 1,932,826	155,746 163,249 1,882,231 1,677,447	....................	....................
KANSAS CITY, KAN. Kansas City-Western Ry.	1m., Dec. '09 1 " " '08 6 " " '09 6 " " '08	27,509 28,439 191,369 182,927	20,263 18,389 118,921 110,258	7,246 10,050 72,448 72,669	6,875 6,871 41,250 41,200	x550 x3,225 x32,059 x31,640							