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JAMES H. MCGRAW, President.

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CURTIS E. WHITTLESEY, Secretary and Treasurer.

TELEPHONE CALL: 4700 BRYANT. CABLE ADDRESS: STRYJOURN, NEW YORK.

HENRY W. BLAKE, Editor.

L. E. GOULD, Western Editor.

Associate Editors:

RODNEY HITT, FREDERIC NICHOLAS, WALTER JACKSON.

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CHICAGO OFFICE.....1570 Old Colony Building

CLEVELAND OFFICE.....1015 Schofield Building

PHILADELPHIA OFFICE.....Real Estate Trust Building

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A Focus of Transportation Systems

The completion of the Hudson & Manhattan tube system to the junction of Thirty-third Street, Broadway and Sixth Avenue, New York, makes that point the most highly developed transportation intersection in the world. On the lowest tier is one of the two deep double-track tunnels of the Long Island and Pennsylvania railroads. On the next level above are the subway trains and present terminal station of the Hudson & Manhattan Railroad. Directly above this station, on the street surface, are the tracks of the Sixth Avenue and Broadway divisions of the Metropolitan Street Railway. These lines cross the Pennsylvania tunnels at Thirty-third Street and intersect at less than 50 ft. north of the corner. Finally the Sixth Avenue elevated tracks make the fourth level of tracks to cross this focus of electric railway systems. When the Hudson & Manhattan Railroad is extended to the Grand Central Station another and in some respects a more complicated situation will be presented, because, while the Pennsylvania tracks will be absent, the street pavement will cover the present subway, the Hudson & Manhattan and the Steinway tunnel, all at different levels.

Advanced Scientific Research

The annual report of President Schurman of Cornell, presented last week to the Board of Trustees of that university, contained an earnest plea for the extension of graduate school instruction and the establishment of a department of research. According to President Schurman, it is in this direction that the highest future of the American university lies, because it is through the scientific investigator that human knowledge is enlarged and progress in civilization made possible. Such extension of the work of a university should also act as a great intellectual stimulant upon the rest of the students and even of the faculty. Indeed, it might form the solution of the problem, recently considered in an address by President Lowell of Harvard, and also in the report of an alumni committee at Yale, of the best way of increasing the incentive to scholarship in the general undergraduate body. The influence upon industrial progress should also be enormous. To realize this one has only to think of what the effect would have been at the present time in the science of electrical engineering if for the past 20 or even 10 years a corps of trained investigators in a completely equipped laboratory had been engaged in adding to the world's knowledge upon such subjects as the action of electricity under different conditions, the laws of thermodynamics, the strength of materials and the chemistry of fuels. President Schurman thinks that it would take \$20,000,000 to endow such a school as he describes. The interest on this amount would be \$1,000,000 a year and the results, judged even from the single standpoint of national economy, should be far above that figure.

Short-Haul Suburban Business

A single-track, low-speed suburban line offers some traffic possibilities which may be lost by careless or inefficient attention to schedules. On lines of this character the transportation of city commuters from the suburban station to their homes is a desirable business. It is short in haul and is pretty regular in volume, except in time of storm, when it increases greatly. The largest amount of traffic possible can be realized from this source only by careful attention to details that are important because they concern the personal convenience of the passengers. First, if it is possible without unreasonable delay to others, the passengers who leave incoming trains should find cars waiting. Second, cars with passengers bound for the station should have a deserved reputation for "making trains." Third, cars with homeward-bound passengers should not be subject to regular delays because the meeting points of cars operating in opposite directions are badly placed or the meeting time is left to the haphazard choice of indifferent trainmen. These delays exhaust the patience of riders. Even if it is not possible to remove entirely these elements of friction, a reduction in the occurrences that vex the public will increase patronage.

The Proposed Boston Electrification

The long-awaited reports of the New York, New Haven & Hartford Railroad and the New York Central & Hudson River Railroad on the proposed electrification in the Boston Metropolitan District have been made public and are given in abstract in this issue. An idea of the extent of the project involved is shown in the total figures of cost, which, for the roads concerned, amount to a little over \$40,000,000, not including the credit which would be allowed for the steam equipment displaced. This for the New York Central & Hudson River Railroad amounts to about 15 per cent of the cost of the new equipment. It was not estimated by the New York, New Haven & Hartford Railroad for its own line or for the Boston & Maine Railroad, of which it is the lessee, because the company states that there is no direct opportunity for the utilization of so large an amount of equipment of this special type and its value to resell would be so doubtful that a valuation was not practicable. It is not surprising that the size of these estimates of cost is staggering to the railway companies. The New York Central & Hudson River Railroad explains that the receipts from its present suburban service in the district involved do not pay operating expenses and the company does not look with equanimity upon the addition of an annual expense for fixed charges of more than \$500,000, unless higher fares can be charged. The New York, New Haven & Hartford Railroad also complains of the expense and states that up to the present the electric train service on its New York electrical zone has not only failed to earn the interest on the capital invested, but has also increased the cost of operation. Part of this condition, it says, is due to the operation of freight trains by steam, but how great an improvement would result from complete electrical operation and whether there has been an increase in gross receipts since electric power was adopted the company does not say. Neither does it give the details of the higher operating expenses mentioned. The company is not entirely opposed to the change, but recommends its introduction, if at all, gradually, with subsequent extension as rapidly as may be consistent with the financial conditions and the public needs.

SIGNALS FOR INTERURBAN ROADS

Since the sequence of disastrous collisions between interurban cars which occurred less than two months ago a decided change has taken place in the attitude of interurban railway managers toward automatic block signals and other safety devices. Widespread interest is now being manifested in every kind of apparatus designed for safeguarding train operation, and several roads have made known to signal manufacturers their desire to purchase some form of signal apparatus which will effectually assist the dispatchers and the train crews in their work and prevent the recurrence of such accidents in the future. The Illinois Traction System has appropriated \$150,000 for signals to be installed immediately, and other interurban roads in the Central and Western States contemplate proportionately large expenditures. They have come to the conclusion that protection by signals of some sort is necessary from the economical as well as the humanitarian standpoint.

Few single-track electric interurban roads as yet have made a thorough study of automatic block signals as applied to their operating conditions. The problems involved may be divided into those which affect the movement of trains, such as location and spacing of signals, and those which relate to the details of the apparatus employed for giving the signal indications. To some extent both have been largely solved by the experience of the steam railroads and such electrically operated roads as the New York subway, the Hudson tunnels and the Long Island Railroad.

It may be of interest to summarize briefly the classes of signal apparatus which are available and are being studied by the interurban roads interested in safety devices of this kind. In the increasing order of degree of safety afforded they may be classified as follows:

(1) Centrally controlled dispatcher's signals, (2) automatic block signals operated by trolley contacts, (3) automatic block signals operated by track instruments, (4) automatic block signals with track-circuit control, (5) automatic block signals with track-circuit control and train stops, (6) the electrically interlocked staff system. None of these signal systems will fully supplant train dispatching on single-track roads, although the automatic block signals which have been installed on the single-track sections of many of the Western steam railroads have made possible the closing of a number of intermediate telegraph stations.

The question uppermost in the mind of every interurban railway manager who is considering block signals is: How much will they cost? The installation of automatic block signals with track-circuit control suitable for protecting a single-track interurban line with stub-end sidings about 2½ miles apart would cost between \$1,200 and \$1,500 a mile, according to the number and arrangement of signals at each siding. If a home and distant signal for each direction and a circuit controller on the switch were installed at each siding the cost would be nearer the higher figure. An electrically interlocked staff system would cost to install about \$250 to \$300 per mile. These figures, of course, are based on average requirements and the cost might be more or less according to the special arrangement of the signals on account of curves or other obstructions. They indicate, however, that the general impression regarding the high cost of adequate automatic block-signal protection is erroneous. This impression, no doubt, has been

gained because of the more complicated signal installations which are thought to be necessary by the steam railroads. The cost for maintaining automatic block signals with track-circuit control is less than \$50 per mile of road per year, when a signal maintainer is paid \$90 per month. The percentage of signal failures with an installation of this kind is infinitesimal. The steam railroads have made records of as high as one signal failure per 700,000 movements, and these failures are almost invariably false danger indications.

It has been the experience of the steam railroads in the Western States which are operating long stretches of single track with automatic block signals (the Harriman lines alone have equipped over 6000 miles of single track) that when the signals are first installed considerable opposition has been manifested by the enginemen. It has been found uniformly, however, that this opposition has disappeared entirely after two or three months, when the men have had an opportunity to become accustomed to the movement of trains in accordance with the signal indications. Many instances have been cited where committees of enginemen have called upon the managements of new lines and demanded that block-signal protection be given them. The enormous development of automatic block signaling on single-track roads in the West also has shown that when the signals are properly located the rate at which opposing trains can be dispatched over the road is not decreased, but is actually increased. It is obvious that as the distance between sidings is lessened the delays to opposing trains are decreased and the shorter the length of the blocks between sidings the faster is the movement of traffic in the same direction.

The electrically controlled staff system has been used on a number of steam roads where the greatest safety of train movement is desired, often at the sacrifice of running time. A staff system has been installed to protect trains operated over long single-track bridges and in tunnels, with an installation of electrically interlocked staff machines at the end of each block. The trainman may deposit a staff in the machine so as to clear the block which has just been passed through and procure a staff for the next block in advance in less than 10 seconds. Staff machines may be used with or without operators. The assistance of operators, however, reduces the time required for inserting and removing the staffs from the machines and hence increases considerably the average train speed. Provision is made in modern electric staff machines for operating trains in sections with permissive blocking for traffic moving in the same direction. This is done by using a sectionalized staff or tablet, one part of which is given to the crew of each section of a train at the entrance to the block. All of the parts must be assembled and inserted in the machine at the outgoing end of the block before an opposing train can remove a staff and proceed through the block.

Expert signal engineers who are now studying interurban conditions with a view to recommending adequate signal protection state that there is a strong possibility that a cheap but entirely safe staff system can be designed for high-speed interurban roads. Such a system would not unduly impede train movements and would not permit any trains to enter a block which was occupied by one or more opposing trains. The use of the staff system in connection with automatic block signals in the snow sheds of the Southern Pacific Railway is said to have increased the traffic capacity of the single track more than 100 per cent.

Safety is the chief aim when any system of signals is to be installed. It is far better to rely solely on present train dispatching methods than to install a signal system which is unreliable and may result in false indications or serious delays to traffic when any element fails. We believe that the requisites demanded by the steam railroad for automatic block signaling apply equally to the conditions of the average high-speed interurban road. If the interurban roads have reached the point where the necessity for block-signal protection is admitted, they can make no mistake in adhering to the standards which have been set by the steam railroads as the result of long experience. Any system of signals which falls below these standards is of doubtful value as a permanent investment.

THE READING POWER STATION.

The reconstruction of the power system of Reading, Pa., described in this issue, was brought about by the necessity of generating power more economically and the desirability of increasing the sale of energy for lighting and industrial purposes in a rapidly growing territory. The new station possesses quite a number of unusual features. The odd plan whereby the high-tension switches, control apparatus and local substation are housed in a longitudinal extension of the turbine room was determined by the shape of the available plot. This condition, however, did not prove a handicap to the proper control of the generating units, as the switchboard operator can overlook the turbine room from one end instead of from the side. A notable structural feature is the arched roof, which is more typical of foreign designs than of the customary American standards. This kind of roof is more graceful than the monitor and not more costly when built up of short spans, as in this installation. Special roof ventilators, of course, are required in this construction.

The steam piping is not only very simple, but it also embodies a recognition of the fact that the use of turbines demands different standards in pipe diameters. In a reciprocating-engine plant allowance must be made for the shocks due to the intermittent use of steam and the piping must be large enough to handle maximum amounts for short periods. These conditions do not apply to turbines because steam is delivered to them at a uniform rate of flow. If the Reading plant was operated with reciprocating engines using superheated steam, the pipe line would have had to be of approximately 25 per cent greater area, and if the reciprocating engines used non-superheated steam, it would have had to be of 40 per cent greater area. The present turbine units are all of the horizontal type, but the generating room is of ample height to permit vertical turbines in the future, should engineering and commercial factors make such a change desirable. Incidentally, this provision made it feasible to have a higher boiler room and greater coal storage.

The standardization of rotary converter equipments throughout the entire distributing system centering about Reading is most commendable from the standpoint of service continuity. Considered theoretically, some of the individual substations may not have the most economical size of unit, but it was considered more important to be able to interchange or substitute apparatus promptly and to keep down the number of supply parts. In such a scheme the portable substation holds an important place as a reinforcement at any point where the energy requirements are very irregular from day to day.

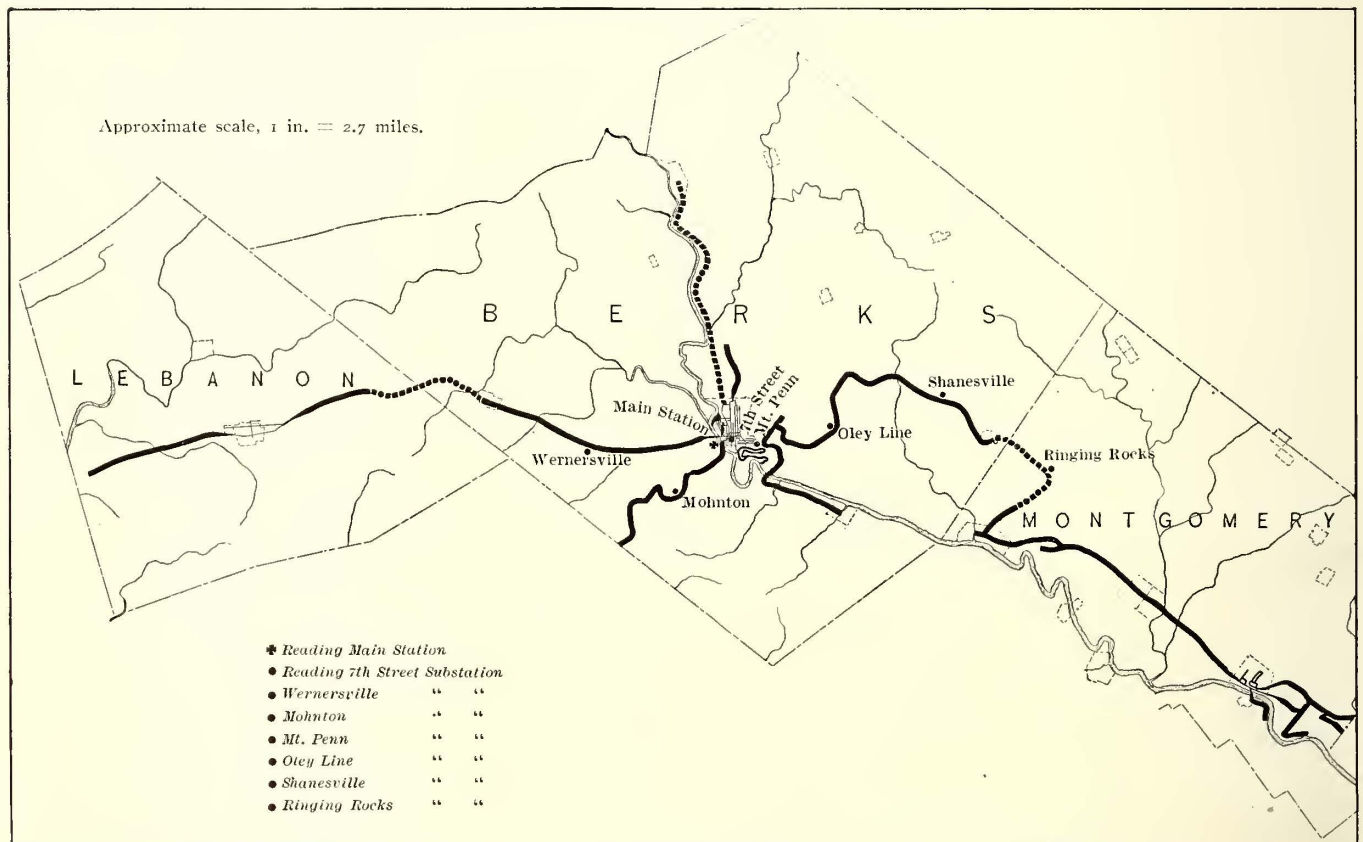
NEW POWER GENERATING AND DISTRIBUTING SYSTEM IN READING, PA.

The Interstate Railways Company is a corporation of the State of New Jersey, with headquarters in Philadelphia, under which are combined a large number of public service corporations in the States of Pennsylvania, New Jersey and Delaware. The most important group of these subsidiaries is formed by about a dozen railway and lighting companies in and about Reading, Pa., all of which are now leased to the Reading Transit Company. Among the underlying companies of the transit company is the Metropolitan Electric Company, of Reading, which acts as the sole generator and distributor of current to the following public utilities: Reading Traction Company, Reading Power Company, Reading Electric Light & Power Company, Reading & Southwestern Street Railway Company, Front & Fifth Street Railway Company, Birdsboro Street Railway Company, Oley Valley Railway Company, Adamstown & Mohntonville

by means of 25-cycle inverted rotaries which took current from the railway generators.

As shown on the map, the generating station at Reading serves practically all the territory included in Berks County. This is accomplished by means of high-tension feeders to the two substations already in operation at Shanesville and on the Oley line, and to four new ones located at Ringing Rocks, Wernersville, Mount Penn and Mohnton. A portable substation is provided also for emergency conditions. Each substation has one 500-kw rotary and air-blast transformer except Mount Penn, which has two units, and the main substation on Seventh Street, Reading, which has four 500-kw units. Under the old system the Shanesville and Oley line stations received current at 15,000 volts, 25 cycles, and consequently it was necessary to change their apparatus to suit the new conditions.

The light and power systems in Reading have been left undisturbed as far as possible, the only change being the withdrawal of all two-phase motors and the substitution of single-



Reading Power Improvements—Railway Lines in Three Pennsylvania Counties Supplied with Power from Reading

Electric Railway Company, Neversink Mountain Railway Company and Neversink Mountain Light & Power Company.

The foregoing corporations serve the entire County of Berks, and also parts of Lebanon and Montgomery Counties. The population served by the Reading Transit Company is about 150,000. The officers of this company are as follows: President, H. G. Louser; vice-president and general manager, W. A. Rigg; treasurer, H. H. Reigel; engineer, C. C. Long.

OLD AND NEW POWER CONDITIONS

The power system in use before the construction of the generating station described hereinafter consisted of a main generating plant on Seventh Street, Reading, composed of four brick buildings, which had been constructed from time to time as the needs of the system required. Three buildings were devoted to engines and generators and one was used for boiler rooms and miscellaneous purposes. The total capacity of this plant was about 7000 hp. Not only was this output insufficient for this rapidly growing territory, but the generating equipment itself had become antiquated. Outside of this plant were two rotary substations to which high-tension current was supplied

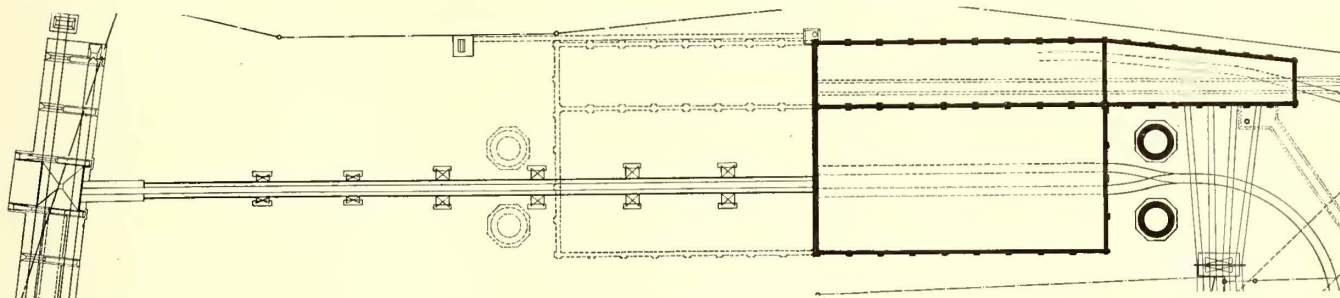
phase and three-phase motors. The Edison three-wire d.c. lighting system, serving the central portion of the city, was shifted from the generators in the old plant to the lighting rotaries in the new main substation at the same site. Future extensions of light and power service will be made from the three-phase a.c. lines wherever possible. The street-lighting system in Reading is composed of magnetite arc and tungsten incandescent series lamps. From 40 per cent to 50 per cent of the total power output is for railway service.

LOCATION OF THE NEW POWER HOUSE

The new power house is located in West Reading along the Schuylkill River, adjacent to the Pennsylvania and Philadelphia & Reading railroads. These railroad connections furnish excellent facilities for the delivery of building material, machinery and fuel. The shape of the plot made it necessary to lay out the different portions of the power station in a rather unusual manner. There was only room enough between the Pennsylvania Railroad's main line right-of-way and the property line opposite to permit the construction of the boiler and turbine rooms, which are 174 ft. x 88 ft. and 174 ft. x 38 ft. respectively.

A more favorable building cross-section could not be secured because the adjoining property was in litigation. To provide room for the rotaries, transformers and switch apparatus it was, therefore, necessary to build an annex running on to the narrow river end of the property. This annex is 113 ft. long, 38 ft. wide at the turbine room end and 26 ft. wide at the front. If the building had been located far enough back

To protect the auxiliaries from water at the maximum high-water level during the spring freshets, it was necessary to waterproof the turbine-room basement to an elevation of 8 ft. higher than the present basement floor. All the stairways and other openings were placed above the maximum high-water line except the opening in the end adjoining the switch house, where provision was made for a railway track to deliver



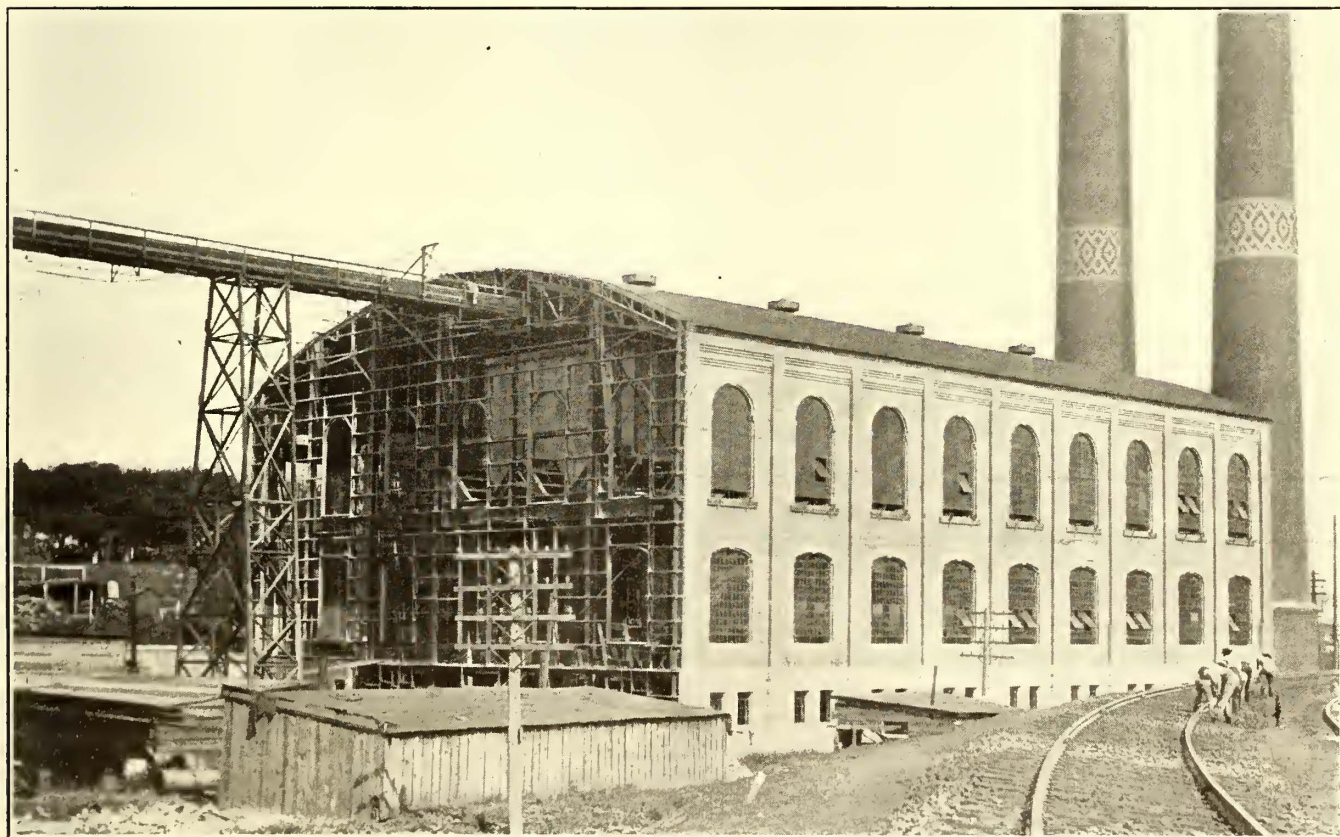
Reading Power Improvements—Present and Future Outlines of the Power Station, Coal Handling Facilities, Etc.

to allow sufficient width to place the switch gallery between the turbine and boiler rooms not enough room would have been left to allow extensions. Furthermore, the increased length of the condensing-water duct and the additional excavations required by the upward slope of the land would have added materially to the cost of the plant. The natural slope of the land at the river end was so slight that a comparatively level area was available for most of the space needed for the power house and only a relatively small amount of excavation was required to provide sufficient drainage area from the

machinery. At this track entrance there is installed a wooden gate which is always in place except on the rare occasions when it is necessary to bring machinery parts under the floor hatch in the turbine room.

CONSTRUCTION AND DESIGN OF THE POWER HOUSE

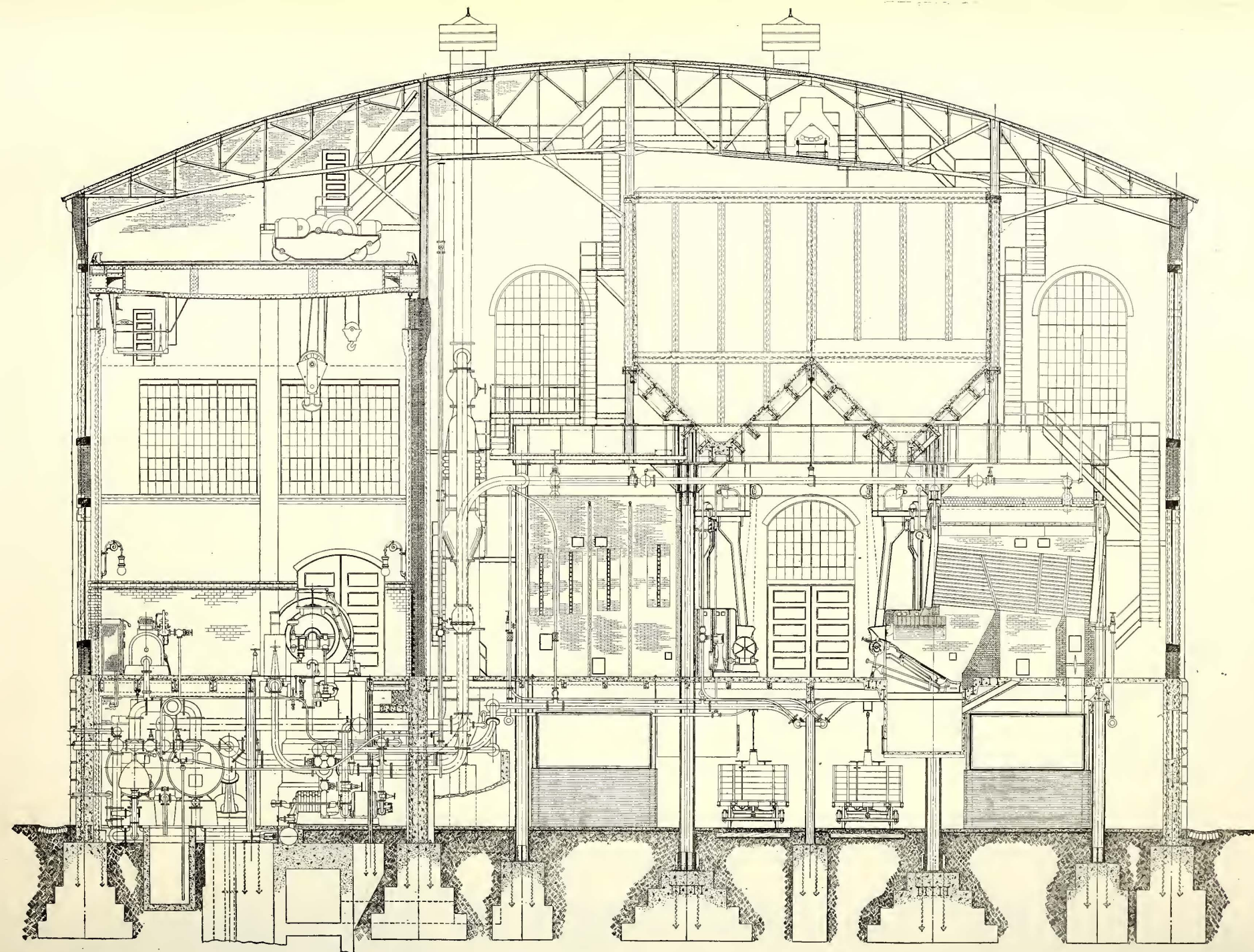
The power house is a steel-frame structure with brick walls resting on concrete basement walls which are carried up to the level of the first floor. The foundations are of rock, concrete-capped piling or solid ground, the differences being due to the extremely irregular geological formation at this place. As



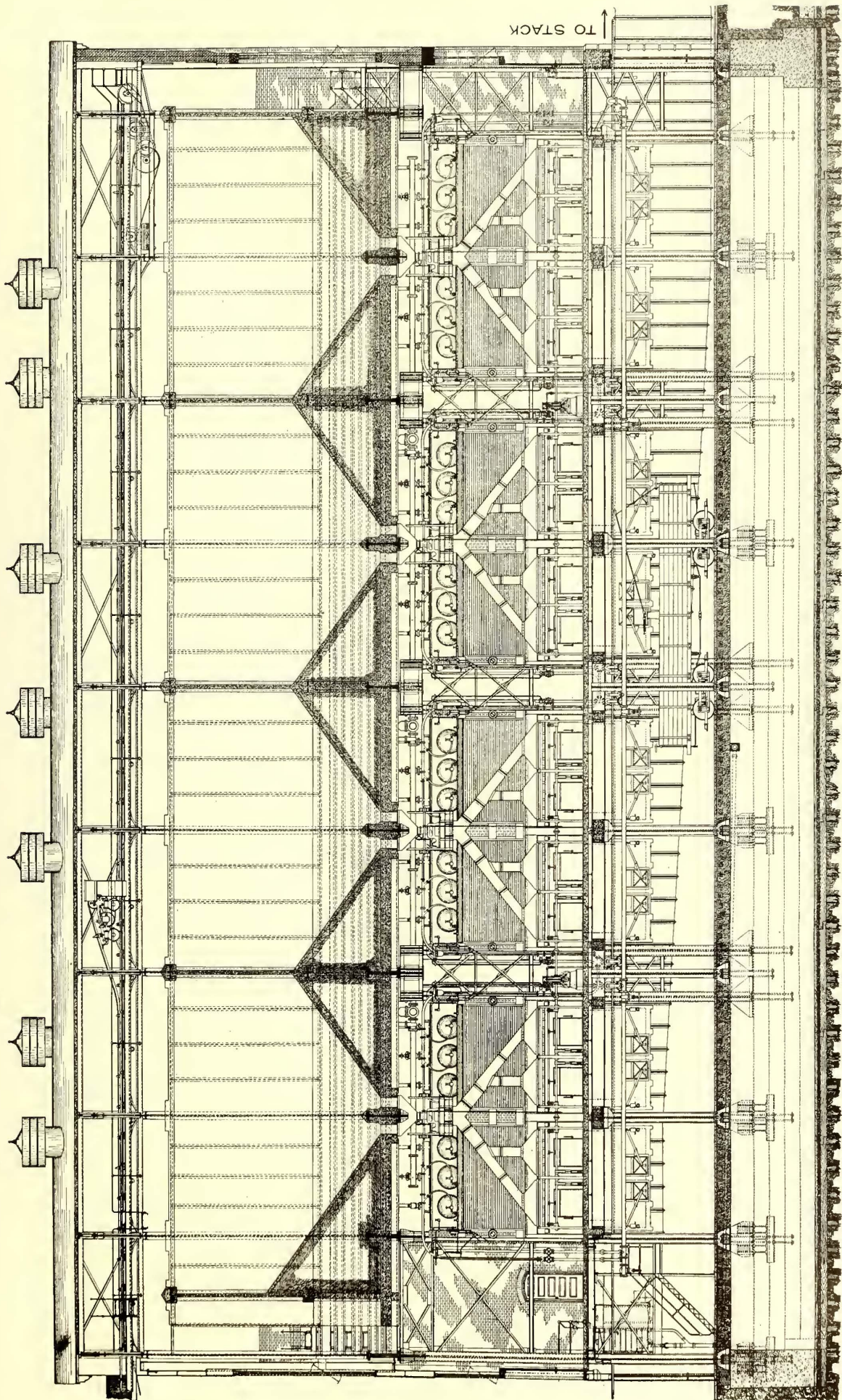
Reading Power Improvements—Rear of Main Station, Showing the Conveyor Run and Temporary End in Process of Erection

building under ordinary conditions. The basement floor grade of 87 was placed above ordinary floods, only slightly below bad ones and near enough to the highest recorded flood grade of 94.5 to permit complete protection for the turbine-room basement auxiliaries, while the lift for the circulating water pumps at the extreme low-water grade of 74.5 was within reasonable limits.

the low-water level of the river was 74.5 at grade, the bottom of the foundation was taken at grade 74 in order to make sure that the piling would always be moist. Concrete basement walls were chosen in preference to stone to give the finished building the proper architectural effect. The brick walls above the first floor are thick enough to take approximately half of the wind pressure on the sides of the building, leaving the steel framing



Reading Power Improvements—Cross-Section Through the Power Station, Showing the Principal Construction and Equipment Features of the Boiler and Turbine Rooms



Reading Power Improvements—Longitudinal Section Through Boiler Room

to take the other half. Allowance for wind pressure was an important factor in the construction, as Reading is located in a mountain valley subject to frequent storms.

The top of the structure has an unbroken curved roof, which is quite a variation from the ordinary power-house construction. This type was adopted in order to avoid all gutters, to simplify possible extensions and to attain a more graceful appearance. The supporting truss, although apparently continuous, is made in five sections which are supported by the various column systems carried up to it. The clearance required for the coal conveyor was such that the bottom chord of the roof truss could be curved, with the dual object of improving the architectural appearance and bringing the depth of the unit trusses within the proper shipping height.

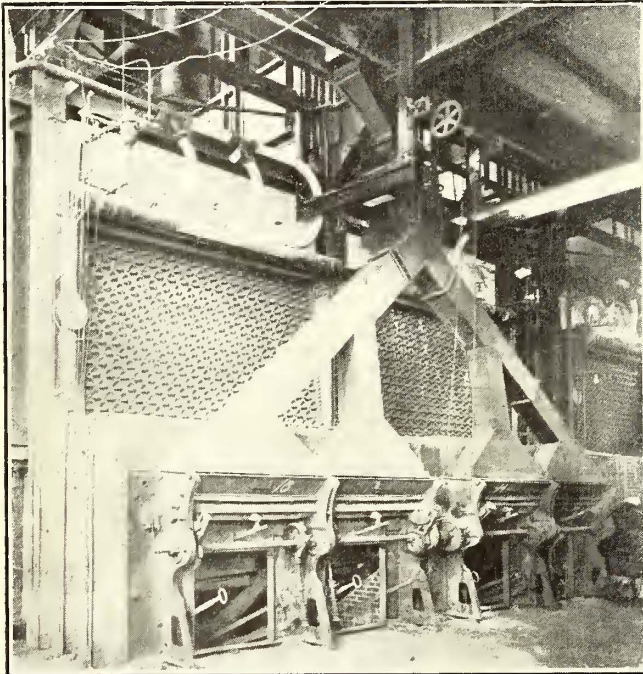
The roof framing carries 3-in. reinforced concrete Roebbling slabs covered with three-ply roofing felt. Owing to its curved form, the slope of the roof varies from flat at the center to about one-quarter pitch at the sides, which is considered within the limits of safe practice for asphalt roofs. The roof of the switchhouse annex has a slope of $\frac{3}{4}$ in. per foot and is supported by the usual shallow Pratt truss, with sloping top chord.

The switch house, as an annex to the main building, has different panel lengths to suit the electrical apparatus, and it

BOILER-ROOM CONSTRUCTION DETAILS

The boilers are hung from columns which form a part of the steel building framing, and the coal bunker rests upon girders supported by the front and rear columns of the boiler settings. The side columns of the coal bunker are carried from these girders up to the roof framing, which they help to support. The boiler columns, together with the wall columns, support the first floor and the ash bins and flues underneath.

The width of the coal bunker was determined by the proper relation of the space between the boiler fronts to the space required between the boiler fronts and the walls, as well as by the proper division of the roof into separate truss units. As a result, one side of the coal storage is placed on the center line of the building and the other side is symmetrical about the center of the firing floor, so that it is one-third of the width of the building. The coal storage capacity is about 3900 tons. The coal bunker is made of concrete slabs, supported by steel beams, and is divided into compartments by cross-girders and vertical beams. Each compartment is directly over two opposite batteries. The ash bins are hung from the first floor beams. They are constructed without the customary sloping bottom to secure the benefit of maximum capacity during the period of spring freshets.

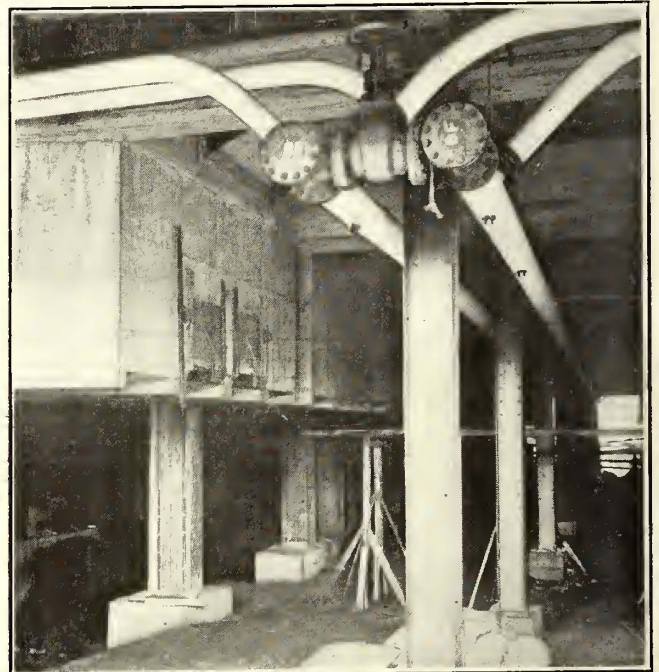


Reading Power Improvements—View of Boiler and Stoker Arrangements

therefore required different treatment. It was decided to build this portion with flat top lights and to use flat top parapets slightly lower than the main building instead of the curved roof of the latter.

The question of future extensions determined to a great extent the general design of this station. It is so arranged that extensions up to double the present capacity can be made, and the additional pair of chimneys required will be placed at the extended end in the same relation to the building as the present pair. The final boiler installation will be symmetrical about the present end bay.

According to the original plan the temporary wall at the extension end of the power house was to be of brick, laid in lime mortar to facilitate removal. The revival of business, however, created such an increased demand for power that it seemed likely that an addition to the present structure would be required very soon. Consequently, a partition of sheet metal supported on girts and columns and stamped to represent brick work was installed instead of a brick wall. This construction lends itself more readily to dismantling, as the bolted connections can be removed and re-erected as often as desired.



Reading Power Improvements—Ash Bins and Steam Piping in Basement

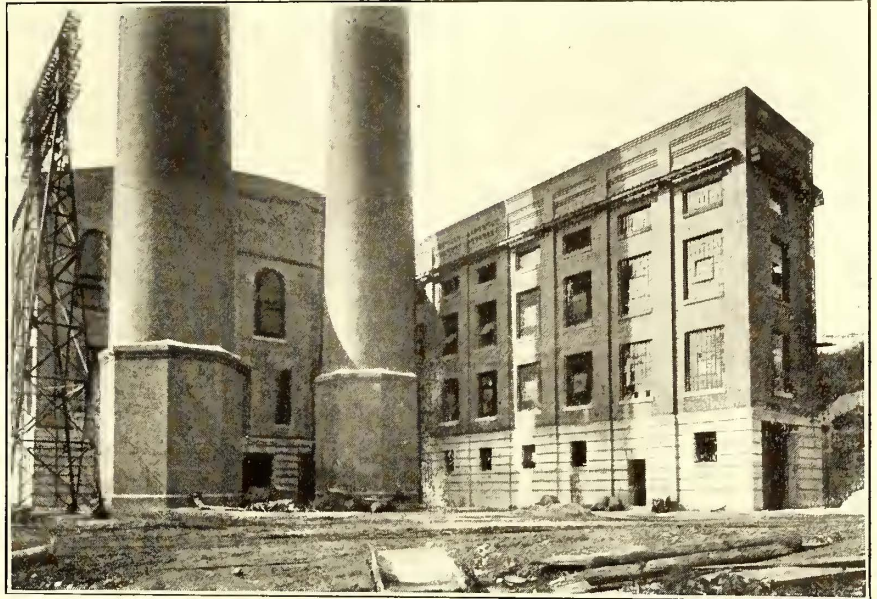
A complete system of walkways reachable by a stairway at each end of the boiler room was installed for operating the main steam valves. The walkways on each side are cross-connected. At each end of the building additional stairways of easy ascent run from these boiler walkways to the conveyor runways and machinery platform; an extension is carried through the middle wall and the turbine room, over to the switch-house roof, by which the main roof can be easily reached. A floor hatch is placed at the chimney end of the boiler room for convenience in transmitting parts for repairs to the machine shop in the switch-house basement. Parts can be lowered through this hatch by a chain hoist almost directly onto the trucks in the basement and hauled on the level to the machine shop.

At the extension end of the building a clear floor space of 15 ft. has been left between the boiler setting and the temporary wall. The first two columns in this wall are designed for future boiler columns, so that in the completed plant there will be a 15-ft. clear space crossing the firing floor at right angles. Underneath this space, separated by the ash-car tracks, which run through the aisles between the front boiler columns, there

are mezzanine floors with lavatories and lockers for the operators. These mezzanine floors are placed above high-water level and the space underneath them is available for future temporary extensions of the flues leading to the present chimneys. However, such extensions are to be used only until additional chimneys are installed, when the flues will end at the mezzanine floors as at present. The flues are placed directly under the boilers and are made up of steel plates, reinforced by angle ribs. They are 13 ft. wide with a level top and taper from a depth of 12 ft. 6 in. at the chimney end to half this depth at the mezzanine bay, which lesser depth is still large enough to permit the operation of an additional battery of boilers. The flues are supported directly from the floor girders and are anchored to the boiler columns at the chimney end.

Roof ventilation is attained by eight 48-in. Burt monitor ventilators. Three more ventilators of the same construction are installed on a line with four of these to receive the atmospheric exhaust pipes from the condensers. To obtain the best light and side ventilation for the building large windows were planned with relatively small window panes and large ventilator areas. The "Fenestra" sash, made by the Detroit Steel Products Company, proved adaptable to these requirements. In addition, the end walls were designed so that large-sized doors would come at each end of the firing floor, while the coal bin was stopped a few feet from each end of the building to permit good ventilation through the upper windows and the roof ventilators.

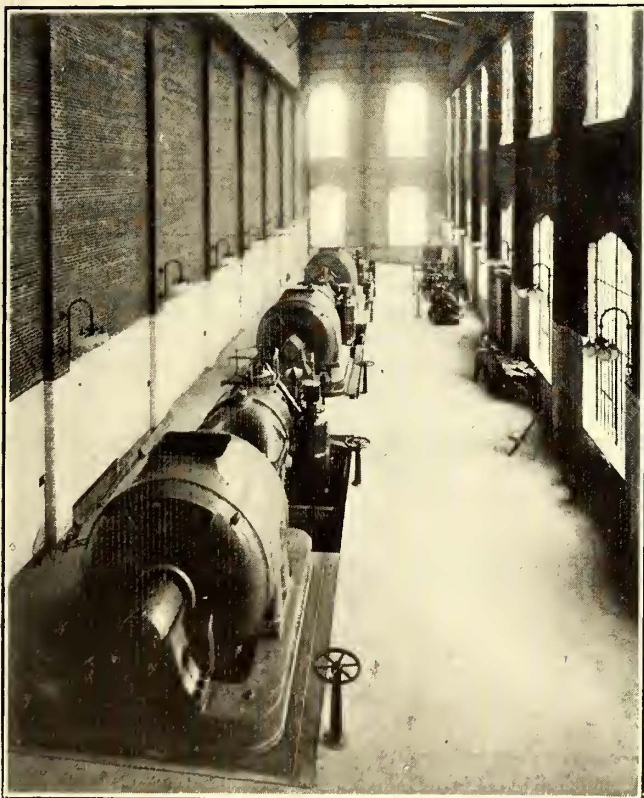
struction here is similar to the usual brick and steel office building, except that the narrowness as compared with the height made careful provision necessary to resist the side wind pressure. Hence all floor girders were knee-braced throughout. The end frame, since the walls were brought back to the



Reading Power Improvements—Front of Main Station, Showing Switch House Annex at Right and High-Tension Tower at Left

column centers, was sufficiently braced by the deep girders which carry the walls.

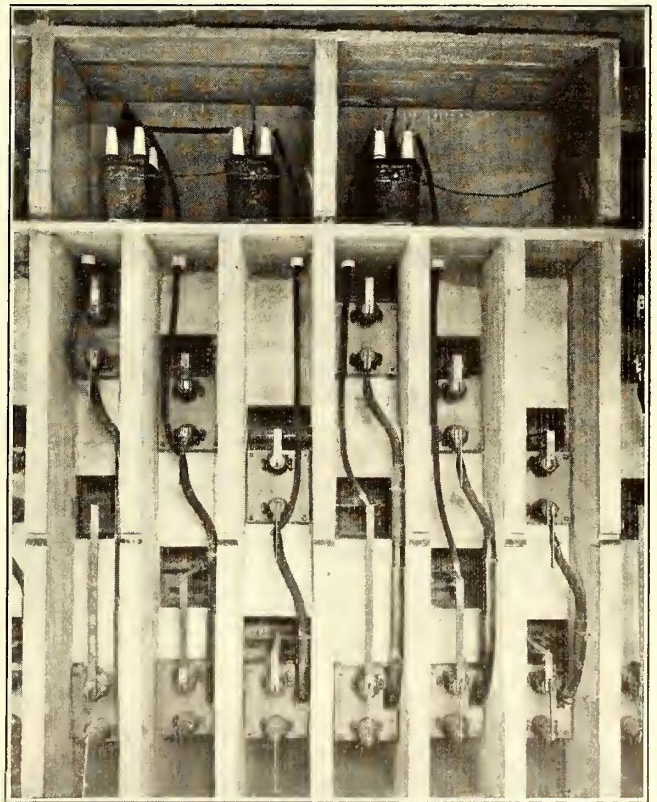
On account of the inclination of the property line at this



Reading Power Improvements—The Turbine Room

SWITCH HOUSE ANNEX

The switch house contains a machine shop in the basement, rotary converters, transformers and office on the first floor; the main switchboards and oil switches on the second floor, and lightning arresters on the third or top floor. The con-



Reading Power Improvements—High-Tension Cells

side of the building it was necessary to incline one side of the switch house, reducing the width from 38 ft. at the turbine-room end to 26 ft. at the outer end. In addition to this the railroad track in the turbine-room basement, in order to reach the main-line railroad on the river bank, was curved sufficiently

to necessitate offsetting the interior columns at the narrow end. The sloping sides make each roof truss different, while the offsetting of the interior columns in combination with the sloping sides, and the small crane run in the four bays at the inner end over the first-floor transformers, also make each column different from every other. The air duct necessary under the transformers was united with the cable gallery coming through the wall from the turbine-room basement. Reinforced concrete construction was adopted for this latter combination as the most satisfactory means of supporting the weights imposed and of furnishing enough working space to reach the transformer leads.

BOILER AND TURBINE EQUIPMENT

The principal equipment in the boiler room consists of 16 625-hp Edge-Moor horizontal water-tube boilers set two per battery. These boilers are equipped with Wetzel stokers driven from line shafts, each furnishing power for two batteries. The stokers are driven by a small vertical engine, but a complete spare stoker-engine unit is installed to provide for breakdowns. These stoker engines, the air compressor and the house service water pumps mentioned later are the only reciprocating mechanisms in the entire power house.

Each battery of boilers has a coal scale delivering to the two stokers through a Y-connection, so that for running boiler tests the coal consumed by any one boiler can be accurately determined; and in case of a test of a turbine unit the coal re-

stalled or dismantled can be moved with the crane to and from the hatchway without interfering with the machines in operation. The turbine room is served by an 80-ton Shaw crane.

As provision for further growth may require larger turbine units and as it was not considered best to confine the possibilities to a horizontal type, the turbine room was built high enough to admit the installation of the largest vertical turbine unit which might be required. Advantage was taken of this possibility to provide the large coal storage previously described by keeping the rest of the building up to the height of the engine room.

An interesting feature of the lighting of the turbine room is the use of four-light clusters of 75-watt tungsten lamps in single frosted globes. These give much steadier illumination than arc lamps and avoid considerable maintenance, such as trimming, globe cleaning, etc.

STEAM PIPING

As shown in the accompanying drawings, the piping layout between the boilers and the turbines is so arranged that it has the advantages both of a unit system and a duplicate main system, while being simpler than the latter. It is possible under all conditions to get enough boilers connected to furnish steam for any one turbine no matter what boilers are out of commission. The arrangement of the main steam pipes over the boilers is as follows: The boilers in each row are connected

to a line running lengthwise over each set of boilers and the steam for the turbines is taken by cross-connections between two sets of boilers in each row. By an arrangement of valves where these cross-connections are made any turbine unit can be tested with two or four boilers by the closing of three valves, still leaving the other boilers connected to operate other units. While a turbine is being tested it may be desirable to operate its auxiliary from another steam source. This can be done by closing one valve in the turbine-room basement.

Owing to the fact that the turbines operate with a constant flow of steam it was possible to use smaller piping than if it had been necessary to supply the more fluctuating demands of reciprocating

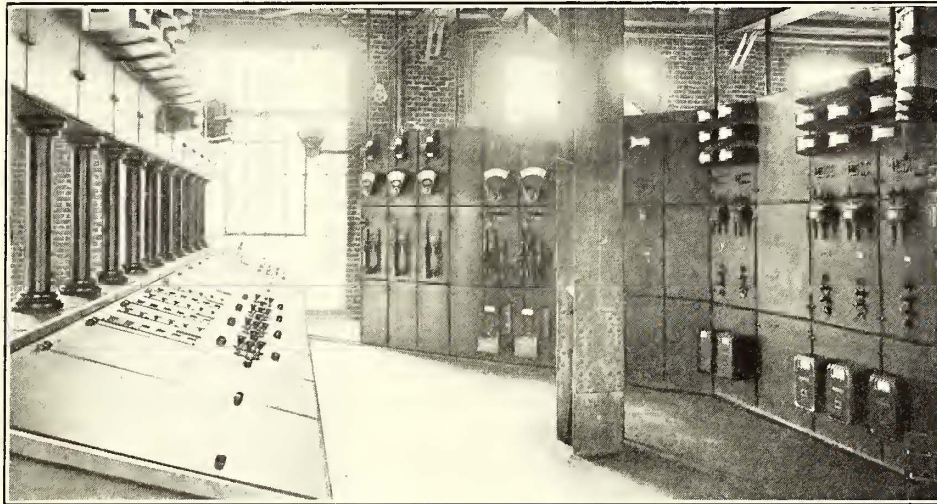
engines. The 6-in. steam connections from the boilers are joined to 8-in. mains. A 10-in. pipe is used to cross-connect the mains at the places where steam is taken for the turbines. The 12-in. pipe from each cross-connection leads to that point in the turbine basement where the connections to the auxiliaries are made, whence a 9-in. pipe leads to the turbine throttle. In laying out the piping diameters the requirement at the turbine end was taken as the starting point instead of planning from the boilers.

All piping to the turbine exciters is carried under the floor, so that none is visible in the turbine room except the risers through the floor to the machine. This gives the turbine room a remarkably light appearance and avoids all trouble from drips and escaping steam.

AUXILIARIES

In the turbine-room basement two Cochrane feed-water heaters and three Jeansville five-stage centrifugal boiler-feed pumps are placed at the end of the present building in such position that when additions are made to the plant the end turbine-room wall, which is of brick, may be taken down and a duplicate system of heaters and pumps installed symmetrically along the line of the temporary end wall, thus keeping this apparatus in the middle of the completed plant.

Provision is made in the basement of the turbine room for



Reading Power Improvements—Benchboard and Switchboard Looking Over the Turbine Room

quired for the number of boilers furnishing steam for that unit can also be determined.

Two radial brick chimneys of the Alphons Custodis type are now in service. Each chimney is 242 ft. high x 14 ft. inside diameter, and, as previously described, has a steel rectangular flue carried under the first floor connected to eight boilers. This arrangement gives one extra pass for the flue gases in the boiler settings. It was therefore decided to dispense with economizers as being of questionable value under the operating conditions presented.

The turbine room now contains three 4500-kw Allis-Chalmers horizontal turbo-generators delivering 13,200-volt, 60-cycle, three-phase current. These turbines take saturated steam at 200 lb. pressure. Their steam consumption guarantees per kw-hour are based on a pressure of 190 lb. at the throttle of the turbine and a vacuum of 28 in.: 2500 kw, 17.6 lb.; 4500 kw, 16.4 lb.; 5000 kw, 16.6 lb. These outputs are based on a power-factor of 80 per cent. Exciting current is furnished by two 100-kw GE horizontal turbine-driven units furnishing direct current at 125 volts.

By referring to the illustration on page 1021 of the turbine room it will be noted that the machines have been placed in a single line parallel to the longitudinal walls of the building. This arrangement leaves a clear space in which parts to be in-

the house service water by two steam-driven duplex pumps furnished by the Jeansville Iron Works. A single-cylinder steam-driven compressor furnishes the compressed air used for cleaning out the boiler tubes and for blowing dust out of the switch cells and machine frames. This compressor, by the way, is the only piece of apparatus transferred from the old plant to the new one.

The condensing equipment consists of the Allis-Chalmers Company's Tomlinson barometric jet condensers with two heads on each condenser. This arrangement was used to take advantage of the difference in diameter between these heads and what would be required if a single head were used. The combined guarantees for the turbines and condensers are sufficient to insure good results without air pumps. Each condenser has its own centrifugal steam turbine-driven circulating pump, but these pumps are connected with a main so that by means of cut-off valves one pump may be made to supply the needs of another condenser if necessary.

The circulating water is taken from the Schuylkill River in a rectangular duct 6 ft. square which runs into the building directly under the turbine foundations. On top of this duct there is a similar 6-ft. x 6-ft. return duct, into which the hot wells discharge through openings in the foundation wall. On account of the conditions at this site, the hot wells had to be constructed so that they would not be affected by floods. This necessitated the raising of the exhaust pipe connections over the condenser heads to the barometric distance above the possible flood level.

The boiler-feed supply is taken from a dam in Wyomissing Creek at a point nearly 1 mile distant. A large pipe was necessary on account of the low head between this dam and the feed-water heaters. This pipe line was constructed of discarded boiler shells, which were available for low-pressure purposes. The shells varied in diameter from 30 in. to 40 in. and were jointed by means of concrete envelopes. In this way it was found possible to get head enough to allow the feed water to run into the heaters by gravity, and from the heaters to the pumps with sufficient head to allow them properly to handle hot water. The boiler-feed system consists of three Jeansville five-stage centrifugal pumps driven by Kerr turbines. These pumps have a capacity of 700 gal. per minute at a pressure of 260 lb. The piping from these pumps consists of duplicate mains from the pumps down the length of the boiler-room basement. Each boiler has a front connection to one main and a rear connection to the other main, so that no possible breakdown of the piping short of a total disablement can prevent the feeding of any boiler. The feed water can be taken directly to the pumps in case the heaters are out of service. In emergencies and as a feature of the regular practice of this plant the circulating-water main is connected to the boiler-feed supply, so it is available in case of the failure of the supply line and can be periodically administered to the boilers as a purge for removing scale. The front feed connections to each boiler have a Vigilant feed-water regulator, furnished by the Chaplin-Fulton Company, which also supplied the pump governors for the boiler-feed and house-service pumps.

All of the auxiliaries exhaust at atmospheric pressure, the exhaust steam being used to heat the boiler feed water.

COAL AND ASH HANDLING

Coal is delivered over spurs from the Pennsylvania and the Philadelphia & Reading Railroads, which run side by side at different levels on the same set of reinforced-concrete piers, over the coal storage platform and a track hopper which dumps direct to the crusher, whence the coal goes direct to the power-house bunker via a 24-in. belt which has a capacity of 180 tons an hour.

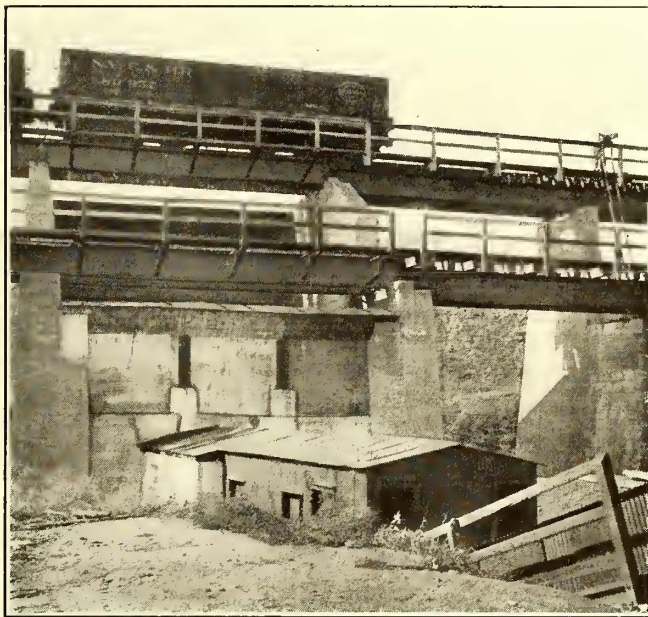
The surplus coal for outside storage is dumped between the concrete piers which support the dumping tracks. Directly under these piers there is a concrete structure which contains a tunnel with roof openings leading to a 36-in. belt conveyor. Ordinarily these openings are closed by cut-off gates. When stored coal is to be used the cut-off gates are opened from the floor of the conveyor tunnel by means of chains which enable

the operator to control the amount of coal for the reclaiming conveyor. A loading device in the tunnel regulates the flow of coal to the belt. This conveyor delivers coal to the crusher for transmission to the power house via the 24-in. belt previously mentioned. The latter belt attains the level of the lower chord of the power-station roof truss back far enough from the building to permit extending the structure in such a way that it would be necessary to disturb only the lower part of the conveyor support. This support consists of wooden bents on concrete piers. Coal to all divisions of the bunker or to any one of them is delivered by a traveling conveyor tripper. All of the coal-handling machinery was furnished by the Robins Conveying Belt Company, New York.

Ashes are dumped directly from the ash hoppers underneath the stokers into full-size ballast motor cars, which run through the basement. These ashes can be taken away for fills or dumped at any convenient point without rehandling.

HIGH-TENSION DISTRIBUTION AND UNDERGROUND CONDUIT SYSTEM

The main generator leads are carried in conduit along the basement wall into the switch-house basement and up the wall to the second floor to the switch cells. The underground feeders are taken in conduits directly down the wall and out through the



Reading Power Improvements—Tracks on Two Levels for Coal Delivery

foundation wall into a manhole, which is the entrance to the underground system hereinafter described. The conduits for the house-service feeders are also carried up the wall from the second floor to the third floor, which contains the lightning arresters. In general all the high-tension wiring in the building is run in fiber conduit covered with concrete. To keep the window openings clear all conduits between the first and second floors are grouped in the spaces between the windows, the concrete being made to give the effect of wide pilasters.

The outgoing high-tension lines are taken out through 16-in. circular openings in the walls, the wires being supported on insulators both inside and outside. The outside insulators and supports are designed for dead-end strains. Provision is made for taking eight three-phase high-tension circuits out of the switch house over the Pennsylvania main tracks in front of the building and from there distributing the circuits to the various substations. To accomplish this two extra heavy dead-end steel line towers were built to hold the maximum unbalanced load of 9000 lb. which the railroad company's standard specification required. The insulator clamps are designed to cover as far as possible the worst conditions of breakage and still to keep the wires in the proper position.

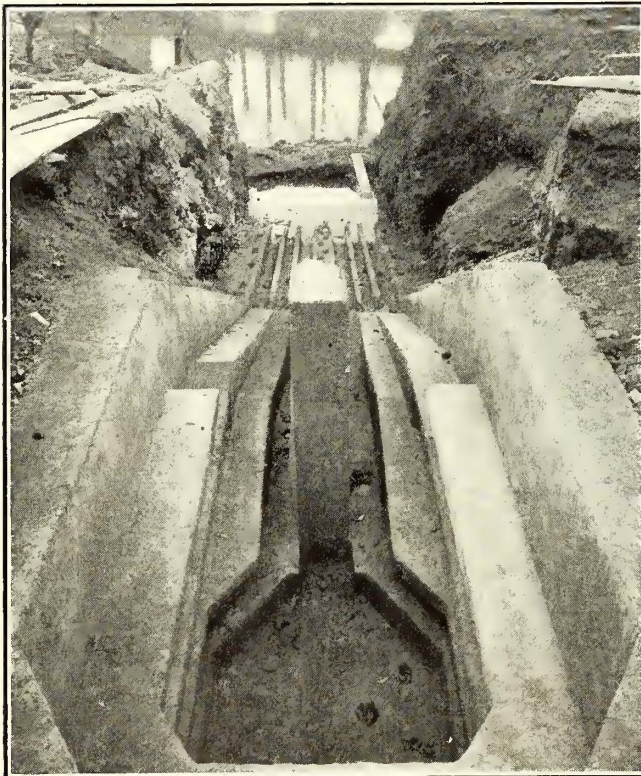
As the new station was built on the far side of the river at

a distance of about 1 mile from the old plant, which has been converted to a main distributing station, it was necessary to provide a conduit system for the six three-phase feeders to the main substation in question. These feeders are carried under the river and underground through the streets of Reading except where they cross the Schuylkill Canal. On reaching this canal the feeders are brought to the surface and carried across alongside the highway bridge on a special bridge built by the American Bridge Company. This bridge has a decking over the conduit envelope which can be used as a sidewalk.

The accompanying views show some interesting features in regard to the underground approaches at the river bank on the Reading side. One novel construction is that going out from the river up to the first manhole. The cables are brought up out of the slots on to the shelves at the sides of the manholes by a system of sloping shelves. In another construction (not illustrated) the submarine cables from the power plant to the river are placed in a single layer in slots in the floor of the tunnel and are covered with removable concrete slabs. From the tunnel these cables pass through fiber conduits embedded

as follows: Three present generator switches, three future generator switches, two spare switches, one auxiliary bus switch, one incoming water-power switch, four present underground switches, two future underground switches. The remaining switches are for outgoing overhead feeders. These switches and the bus compartments are arranged in the shape of a horse-shoe, one set being placed along the south wall and the other along the north wall. The switch cells face the outer walls with a 4-ft. aisle between the cells and walls. Instead of the usual brick and slab design these cells are made of concrete, except the floor slabs, which are of the customary slate. This construction weighs much less and consequently saved steel in the floor framing. On the rear side of the cells is the bus structure which contains the main and auxiliary bus. This bus structure, which is original with this plant, consists of separately molded concrete cells set into a space in the barriers, which are of concrete like the switch cells. The switch connections are laid in barriers on the floor in the walkways between the cells and the wall and are covered by a false floor of removable slabs.

As noted in the list of high-tension switches, there are two



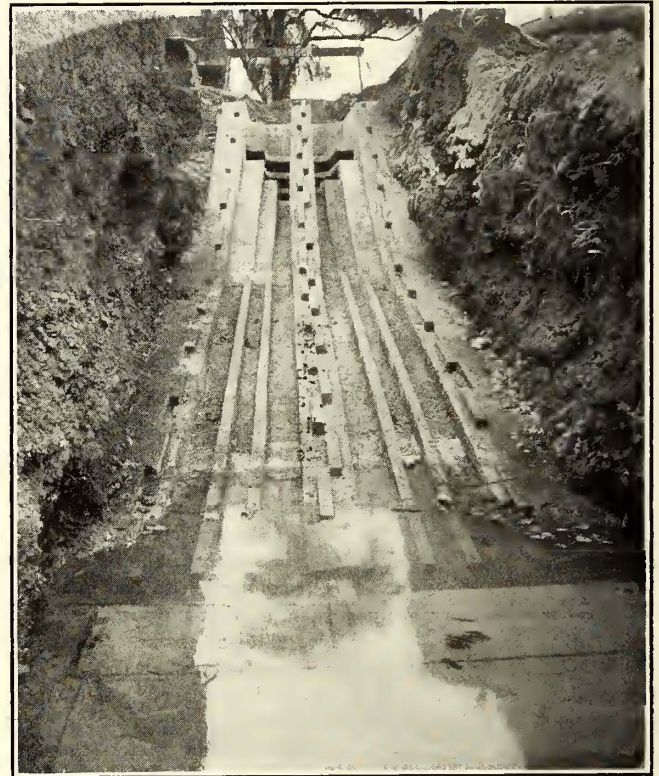
Reading Power Improvements—High-Tension Conduits, Looking Toward the River

in the concrete basement walls of the station up to the switches. The present installation comprises four three-conductor submarine cables, leaving available the remainder of the ducts for additional cables, either single conductor or otherwise. This underground line also has provision for a telephone cable connecting the power plant to the main substation and a metallic ground connection from the railway grounds in Reading to the power plant and the main substation.

SWITCH-HOUSE EQUIPMENT

The first floor of the switch house or annex building is level with the turbine-room floor. At present it contains two 500-kw Westinghouse railway rotaries and the necessary air-blast step-down transformers with provision for one more rotary and transformer equipment. There are also two transformers for the house supply of lighting and power with space for a third installation. A hand crane of 6-ton capacity is to be provided for handling this apparatus. The engineer's offices are located at the outer or front end of this floor.

The second floor is laid out for high-tension oil switches



Reading Power Improvements—City Side Entrance from the River for Underground System

spare switches (one per row) and an auxiliary bus switch. In case of trouble the spare switch in each set takes the place of a regular switch by means of the auxiliary bus. Through the employment of the two spare switches and the auxiliary bus any overhead feeder can be independently operated from any one turbine.

The benchboard for the generator and field-control system is also on the second floor. It faces the window opening into the turbine room. This board has an open space over the bench and under the instrument board so that the operator can get a good view of the main floor. The main switchboard, which faces the benchboard, is curved as shown in one of the accompanying views. The control wiring for the switches is in iron conduit embedded in the concrete floor; that for the generator fields runs down the wall into the basement, where it follows the main generator leads.

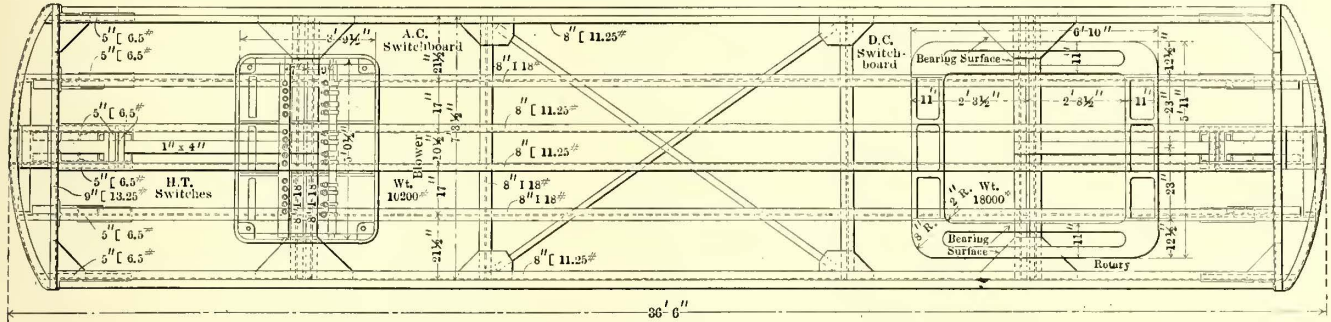
The third floor contains the GE electrolytic lightning arresters of all outgoing overhead lines and for the incoming water-power lines. All the switching apparatus and control

equipment for the main station and for all the substations were furnished and erected by the General Electric Company.

HOUSE POWER AND LIGHTING

All the lighting and power circuits in each room of the power station are controlled from conveniently located slate-lined steel-panel cabinets. The feeders for these cabinets are taken

for the wooden floors, columns and roof trusses. This building as reconstructed contains high-tension oil switches as follows: Six incoming feeders from the underground system, six 600-volt rotary converters, eight 250-volt lighting rotary converters, eight 2300-volt lighting and power transformers, two auxiliary switches, two bus section switches, one arc system switch.



Reading Power Improvements—Plan of Portable Substation

from the main house-service switchboard on the first floor of the switch house. Alternating current at 110 volts and 220 volts is supplied to these circuits from the house-service lighting transformer. The power requirements are as follows: One 40-hp motor in the roof structure to drive the 24-in. conveyor belt, one 75-hp motor in the coal pocket pit to drive the crusher and the 36-in. belt and two motors for driving the centrifugal fans for the air-blast transformers. Direct current at 500 volts is taken from one of the railway rotaries to operate the crane motors.

MAIN SUBSTATION

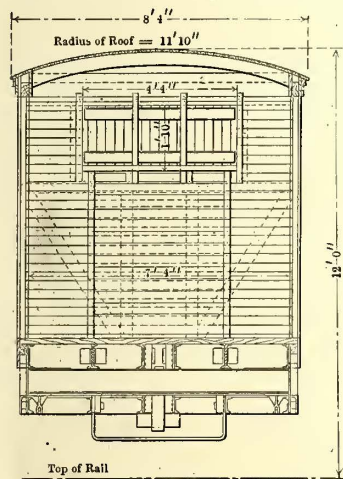
The old central power plant consisted of three buildings facing Seventh Street and a boiler house in the rear. The first of these buildings, a three-story brick structure with wooden floors and wooden columns, contained a line shaft on the first floor

On the second floor is the benchboard, the lighting rotary switchboard, the railway rotary switchboard, 2300-volt a.c. light and power switchboard and 26 pairs of interlocking 2300-volt oil switches distributed in pairs as follows: eight transformer switches, twelve lighting feeders, six power feeders. The lighting feeders are regulated by GE feeder regulators.

On the third floor are the lightning arresters for the 2300-volt lighting and power feeders and three static dischargers for the three sections of high-tension buses.

The remodeling of this first building was complicated by the necessity of keeping in operation all of the small generators on the second floor. It was also necessary to adopt a column spacing which would interfere as little as possible with the location of the new apparatus and the line shaft pulleys on the first floor. The new columns were pulled up into place through holes on the second and third floors and the connecting steel floorbeams were set in position a few at a time. To do this each machine on the second floor had to be raised and placed upon blocking equal to the thickness of the future concrete covering over the floorbeams and each machine belt had to be lengthened so that the operation of the plant was hindered in no case. These machines were relocated during the low-load periods of the day. Having installed all the steel structure in this manner, it was necessary only to leave openings in the concrete floor to accommodate the belts until such time as the machine should be entirely removed and the installation of the switches begun.

The old wooden floors were used as construction forms for

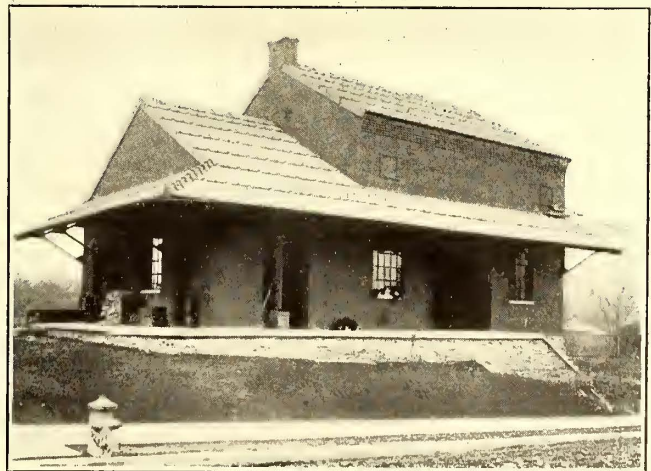


Section Through Portable Substation

belted to a large Corliss engine in the adjoining building. The same floor had seven small engines driving 28 bi-polar generators on the floor above. The second building was a brick wall, steel-frame structure with a traveling crane. It contained three vertical engines direct-connected to railway generators and a similar set for the Edison three-wire system; also the belted Corliss engine previously mentioned. The



Reading Power Improvements—Portable Substation



Reading Power Improvements—Stony Creek Substation

third building contained three large horizontal cross-compound direct-connected units and two small engines, each belted to a pair of generators.

To adapt these buildings for a main substation it was determined to reconstruct the first building, substituting steel

the concrete floor. As the steel floorbeams were placed 2 in. above the top of the old floor, it was an easy matter to build up the forms and to remove the wooden columns and floorbeams from below on completing the concrete structure. It is interesting to add that no steel contracting company cared to bid

upon the erection of this work under the conditions outlined, but it was successfully carried through by the company's men under the direct charge of C. C. Long, engineer of the Metropolitan Electric Company.

The second building, which contains the traveling crane, was adapted for railway and lighting transformers and rotaries and the street lighting incandescent and arc system. The present installation consists of four 500-kw railway rotaries and transformers with provision for two futures; five 500-kw lighting rotaries and transformers with provision for three futures; four 750-kw, 2300-volt transformers with provision for four futures; four 16-kw regulating transformers for series incandescent tungsten lighting and 12 75-light mercury arc rectifiers and transformers, with provision for eight future sets. This building was lengthened two bays, duplicating the original structure, by removing two batteries from the old boiler house.

The load of the old station would not allow the withdrawal of any of the generating apparatus, so it was necessary to install sufficient new machinery with connections to permit the removal of everything from the first building. However, this did not require a large capacity because the small bi-polar units in the first building took up a great deal of space for their output.

In the second building enough room was available to install one lighting transformer and rotary converter, which, through a temporary switchboard, replaced all bi-polar machinery in the first building. The arc machines were replaced by a lighting transformer temporarily located in the second building. This apparatus could thus be used as soon as the first generating unit in the new plant was ready to furnish current.

By this arrangement all the machinery was cleared out of the first building, allowing the construction of the switch cells, switchboards, etc., to go forward without any interruption. Then, having installed all of the high-tension switches in the first building, the various transformers and rotaries for the lighting and railway systems were gradually placed in the second building to take the place of the direct-connected units as fast as they were removed. The third building and the remainder of the boiler house have been rendered available for other purposes.

All the apparatus in this station was furnished by the General Electric Company with the exception of the 600-volt rotaries and transformers which were furnished by the Westinghouse Electric & Manufacturing Company.

OTHER SUBSTATIONS

All of the four small substations mentioned in the earlier part of this article are of the general construction typified by the view of the building at Stony Creek on page 1025. These structures are built of brick and steel with a roof and platform cover of Bonanza cement tile. All of these substations are furnished with waiting rooms and freight-handling facilities. The portable substation illustrated is a car 36 ft. 6 in. long over all and 8 ft. wide. The underframing is of steel, but the body is of wood. One side of the car has a double door 9 ft. wide, while the other is supplied with a 2-ft. 8-in. opening. The arrangement of the apparatus inside the car is shown on the plan.

CONSTRUCTION AND ENGINEERING

The foundation of the power station was constructed by Sims & Company, Philadelphia, Pa. The steel framing was fabricated and erected by the Phoenix Iron Company. The reinforced concrete floor and roof were constructed by the Roebing Construction Company and the brick walls by George W. Beard & Company, Reading, Pa.

The entire power rehabilitation, together with the electrical, mechanical, structural and architectural designs of all the buildings mentioned, was done by Walter J. Jones, consulting engineer, New York.

A large department store in St. Louis now operates a finely equipped 'bus to meet all interurban cars of the Illinois Traction System at that company's new terminal at Twelfth Street and Lucas Street. The 'bus carries passengers free to the store.

FEEDER CALCULATIONS FOR THE CHICAGO STREET RAILWAYS

The second annual report of the Board of Supervising Engineers, Chicago Traction, describes in detail the careful study made when calculating the power and return circuits for the recently rebuilt lines of the Chicago City Railway and the Chicago Railways.

The feeder calculations made for the Chicago Railways have been upon the basis of the 1200 cars provided in the traction ordinance, it being proposed to revise the figures as soon as estimates can be had of the probable car service requirements at the end of the rehabilitation period, which on this system will be the winter of 1910-1911.

The basis of all feeder calculations is given in Board Resolution No. 562, shown in the following:

"The subject of feeder requirements for the Chicago Railways Company was then taken up for consideration, and after discussion it was the sense of the board that the direct-current feeder copper for the Chicago Railways and the Chicago City Railway should be figured on a basis of 75 amp per car between the direct-current busbars of substations or power houses and the point of delivery at the car; it being understood that it is the intention of both roads to carry the voltage somewhat lower than 600 volts at the station busbars until such time as through the elimination of low-voltage motors and otherwise they are able to raise the voltage to 600 volts. After discussion the following resolution was unanimously adopted:

"RESOLVED, That the system of secondary or direct-current electrical conductors or feeders for the Chicago Railways and the Chicago City Railway shall be calculated and plans made therefor by the chief engineer of the work on the following basis.

"(1) That the direct-current busbar at power houses or substations will be operated at approximately 600 volts.

"(2) That an allowance of 40 kw in power-house and substation capacity for each standard double-truck car of the type approved by the Board of Supervising Engineers, weighing approximately 26 tons light, or its equivalent, will be provided at each direct-current busbar.

"(3) That in calculating the copper for current-carrying capacity an allowance of 75 amp for each standard double-truck car, as described above, or its equivalent, shall be allowed.

"(4) That an average* drop of 50 volts will be allowed between the direct-current busbars and the center of gravity of the trolley section, due provision being made for suitable tie lines to take care of emergency cases.

"(5) That the carrying capacity of insulated underground cables shall be calculated upon the following basis:

	Lead-Covered	Paper-Covered	Triple-Braided Waterproof
1,000,000 circ. mil cable, amp.	800	1,000	1,250
500,000 circ. mil cable, amp.	500	600	625
350,000 circ. mil cable, amp.	375	425	325
4/0 cable, amp. ....	...	...	325

In arriving at the kilowatts and amperes per car stated in the foregoing resolution a series of tests was made jointly by representatives of the Chicago City Railway, the Chicago Railways and the Division of Electrical Transmission and Distribution. Tests were first made upon a single car by equipping it with instruments and stationing observers upon it to record the results in actual operation on different kinds of service. Tests were also made upon groups of 18 to 76 cars operating on an isolated trolley section of 1 mile or more in length by stationing observers to note the cars entering and leaving the section and also to take readings on station switchboards of the current and voltage on the feeders to the sections at 15-second intervals.

TESTS UPON A SINGLE CAR

Car tested—Chicago City Railway pay-as-you-enter car No. 5446.

Scale weight—55,800 lb., or 27.9 tons.

Motor equipment—Four 40-hp GE-80 motors.

Motor control—K-28-E.

*This refers to the average maximum for the two-hour morning and evening rush periods. In a majority of cases the drop is less than 50 volts.

Gear ratio—69:17 or 4.06:1 with 33-in. wheels.
 Air brakes—With 16-ft. compressor set for range of 60 lb. to 85 lb.

Heaters—Electric, consisting of 14 truss-plank heaters, 4 panel heaters, 2 platform heaters.

Lighting—18 16-cp side lights, 3 32-cp center lights, 1 16-cp platform light, 1 32-cp headlight.

It was assumed that the average maximum condition for which feeders should be provided would be when a car was operating with motors, compressor, lights and two points on heaters. On this basis the individual and section tests compare as follows per car:

Individual car tests—	
Kilowatts at car.....	Average 43.81
Amperes at car.....	79.66
Section tests—	
Kilowatts at station.....	42.10
Amperes at station.....	73.00

The calculations for feeder requirements for the Chicago City Railway system are briefly outlined. This system is used because the calculations have been practically completed during the year.

(1) From the proposed operating schedules the total number of cars which were required during the "rush" hours was distributed and plotted upon a skeleton map of the system, which is called a "spot map." The afternoon maximum period is usually the heaviest service period, so that the car distribution for two hours of what is styled the "p. m. rush" was used on this map.

(2) The trolley sections were then drawn and the number of cars on each multiplied by 75, which gives the total average maximum load for each individual trolley section in amperes. This amount was placed in a small circle at the center of gravity of the trolley section (see Fig. 1).

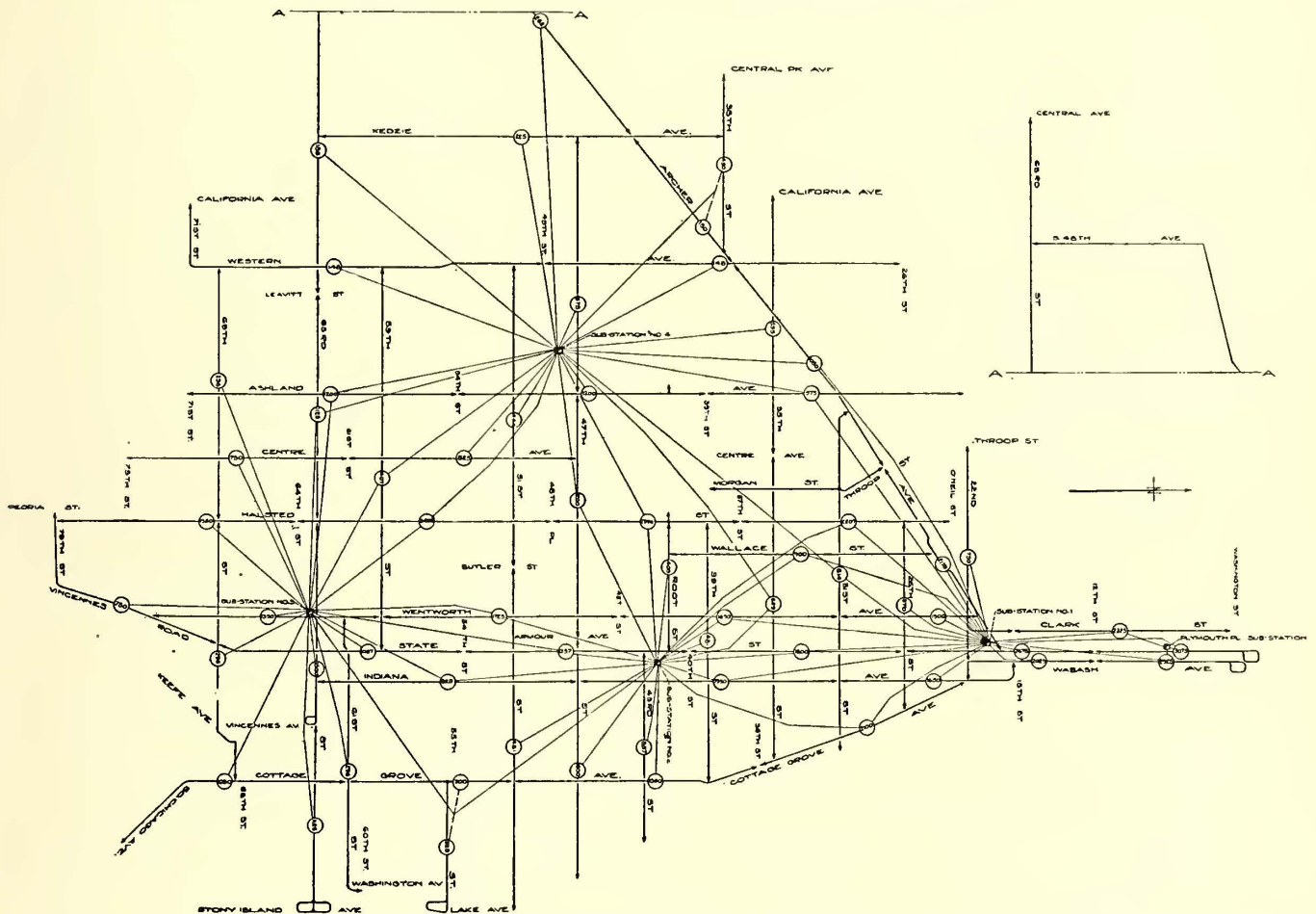


Fig. 1—Trolley Section Map and Spider Diagram

SUMMARY OF FIFTEEN TESTS ON SINGLE CAR MAY 28 TO JUNE 1, 1908	
Passengers, crew and observers.....	Average 30.4
Weight in tons, car and live load.....	30.03
Schedule speed in miles per hour.....	8.91
Volts at car.....	494.
Heater energy in kilowatts—	
First point (5 tests).....	2.87
Second point (5 tests).....	5.01
Third point (6 tests).....	7.74
Lighting energy in kilowatts (5 tests).....	1.61
Total energy in kilowatts at car—	
Motors and compressor.....	37.19
Motors, compressor and lights.....	38.80
Same with 1 point heat.....	41.61
Same with 2 points heat.....	43.81
Same with 3 points heat.....	46.54
Amperes at 550 volts at car motors, compressor, lights and 2 points heat.....	79.66

SUMMARY OF SECTION TESTS JUNE 11, 1908	
Two Hours' Maximum Service	
Number of cars on section.....	Average 62.7
Amperes to section at station.....	3430.00
Amperes per car at station.....	55.45
Adding 10 per cent for winter load.....	61.00
Adding 12 amperes for lights and 2 points heat.....	73.00
Kilowatts at station.....	32.5
Adding 10 per cent for winter load.....	35.8
Adding 6.62 for lights and 2 points heat.....	42.4

(3) A study was then made of the proper location of stations. The best probable locations were selected and a calculation of load centers was made by finding the combined center of gravity of the loads about a given station. If a given system was to be fed by a single power house, the system load center was also determined, which showed the most economical location so far as distribution of copper was concerned for the generating station. If the locations chosen were not the most economical for distribution of copper, studies were made of comparative costs for other locations where the company might have property or where real estate for substation purposes might be obtained to advantage.

(4) After the station locations were definitely settled and the sections to be fed from each station were decided upon, a "spider diagram" was added to the drawing, which then became a drawing of record, and showed at a glance what sections were fed from any given station and what average maximum load was to be expected upon that section.

(5) The most desirable routes for the cables were then de-

terminated, drawn upon a diagram and the distances measured from station busbar to the load center of each trolley section.

(6) The size of each feeder was then calculated in accordance with the requirements of Resolution No. 562 (already given in full). The known elements are:

- (A) Load in amperes.
- (B) Distance in feet.
- (C) Drop in potential, 50 volts, more or less.
- (D) Unit sizes of cables and carrying capacity of each.

From these the size of cables was calculated or read directly from the curves (Fig. 2) without calculation.

The curves shown in Fig. 2 may be used (1) to find the drop when the distance, current and circular mils are given; (2) to find the circular mils when the distance, current and drop are given, or (3) to find the distance when the current, drop and circular mils are given.

The following examples illustrate the use of the curves:

(a) Find the drop on a 500,000 circ.-mil cable, 5000 ft. long and carrying 450 amp. Follow the 5000-ft. ordinate up to the 500,000 circ. mil radial line, then horizontally until the 450-amp ordinate is crossed. This intersection at 47.5 gives the volts drop.

(b) Find the circular mils cross-section of a cable to carry 800 amp 8000 ft. with 30 volts drop. Follow the 800-amp ordinate up to the 30-volt line, then horizontally until the 8000-ft. ordinate is crossed. The location of this intersection gives the size as 2,250,000 circ. mils.

(c) Find the distance a 1,500,000 circ. mil cable will carry 600 amp with a 40-volt drop. Follow the 600-amp ordinate to the 40-volt curve, then horizontally to the 1,500,000 circ. mil line. The ordinate through this line gives the distance as 9350 ft.

The curves are plotted on the assumption that the resistance of 1000 ft. of a 98 per cent pure copper cable of 1,000,000 circ. mil cross-section is 0.01056 ohm.

(7) A certain number of the more important trolley sections are fed from two separate stations in such a way that in case of the shut-down of one station or of accident to one feeder the cars on the section could still be operated from the other station or by means of the other feeder. These are designated as "tie sections" and in addition to the above advantages are so proportioned and calculated that on the whole system in case of the shut-down of one or two stations a certain proportion of the cars can be carried on the remaining stations by interconnecting through these tie lines.

(8) Where the ordinances required feeders to be placed underground it was necessary to lay out underground conduit lines. A diagram is used for this, the number of cables over a given section being represented arbitrarily by the numerator of a fraction and the number of ducts by the denominator. Extra ducts are installed in all conduit lines where practicable to provide for future growth without tearing up pavements. The percentage of extra ducts will vary for different locations, depending upon the estimates of future requirements.

(9) The following comparative estimates of the positive

feeder system of the Chicago City Railway and the Chicago Railways are as of Feb. 1, 1909, and represent about the completed system under the ordinance rehabilitation of the South Side company, but the North and West Side system will probably be modified by the addition of two or more new substations.

Company.	Number of Cars Double Truck Equivalent*	Total Cost of Positive Feeders	Cost Per Double Truck Car
Chicago City Railway..	908	\$978,285.00	\$1,078.00
Chicago Railways.....	1,200	1,302,350.00	1,085.00
Both companies.....	2,108	2,280,635.00	1,082.00

* This includes some single-truck cars, which for convenience are reduced to a number of double-truck equivalents, based upon the comparative power consumption of single-truck and double-truck cars.

These figures include only the positive feeders from the station to the load center of each trolley section and are based upon the number of feet of 1,000,000 circ. mil equivalent for all underground feeders at \$1.25 per foot in place, and upon the number of feet of 500,000 circ. mil equivalent for all overhead feeders at 35 cents per foot in place.

NEGATIVE RETURNS

With the track construction adopted, which requires, as also do the ordinances, that the conductivity of the rail joints should be equivalent to the conductivity of the rail, a very liberal return circuit is provided for all rehabilitated car tracks. Four

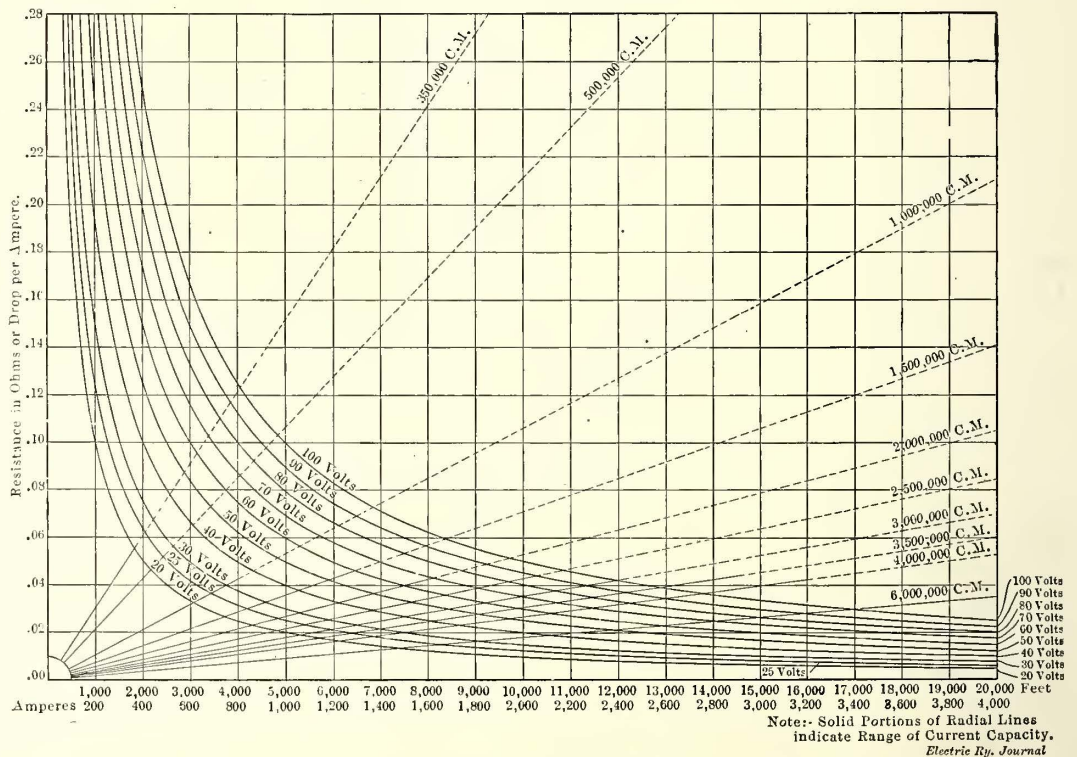


Fig. 2—Curves for Calculating Drop and Capacity of Feeders

electrically welded 129-lb. rails of the composition used are equal in conductivity to 6,000,000 circ. mil of copper. On a double-track line an auxiliary cable of 1,000,000 circ. mil. capacity is installed between the tracks and cross-bonded to each rail about three times in each 1000 ft. This makes a total of 7,000,000 circ. mil equivalent of copper in each double-track line. In the vicinity of stations it was found that a large amount of additional return cable was necessary.

Through the special work this full conductivity is assured by the following methods:

- (1) The installation of special work cables electrically welded to the stockrails at each end.
- (2) The installation of joint bonds at each joint in the special work.
- (3) The carrying capacity of heavy 12-bolt joint plates at each joint.

The calculation of the return system was much more complex than for the positive feeders, because the return system consists of a network with a multiplicity of return paths.

Briefly, a typical calculation was made as follows:

From a "spot map" a diagram was made up and the load in amperes determined for each side of any figure in the network. The elements given or assumed were then as follows:

(A) Load in amperes assumed to return to the station from which the corresponding positive feeders are taken.

(B) All tracks to be ultimately rebuilt in accordance with standards laid down by the board.

(C) Drop in volts per unit of distance or a maximum drop from any point on the return to the nearest station.

A preliminary estimate was first made of the probable amount of conductor required, keeping in mind the desirability of reduced potential gradients on all lines.

The resistance of each side of each mesh in the network was then determined and the distribution of the current in returning to the station calculated.

The drop in each section was then computed, or was read directly from curves, and the resultant drop around each mesh was determined, from which the preliminary estimates of amount of conductor required were corrected.

If from a careful study of these results it was found that there were any locations where further economy in copper could be secured additional calculations and corrections were made for these locations.

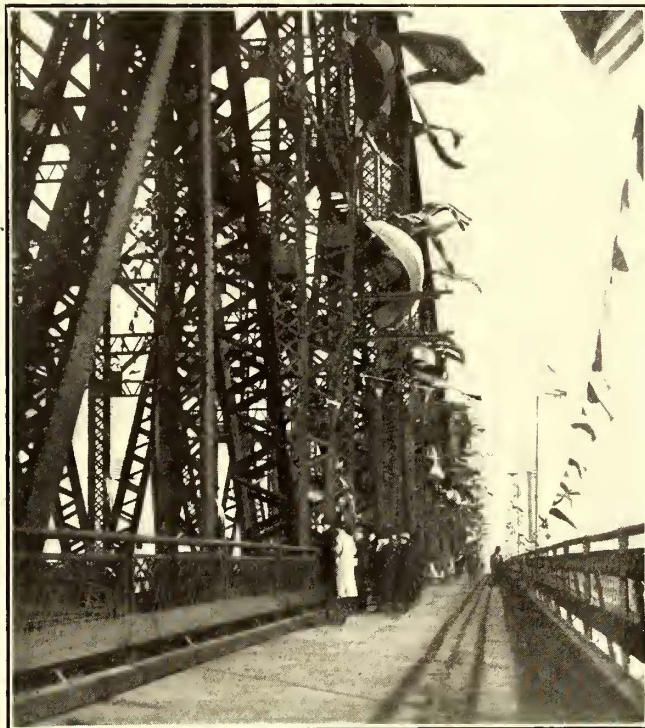
ELECTRIC RAILWAYS IN CONSTANTINOPLE

A group of German capitalists has recently purchased the Constantinople street railways from a Belgian syndicate and is now engaged in rehabilitating and electrifying the system. The railway company, known as the Société des Tramways, has had since 1906 the right to electrify the lines. One of the conditions imposed was that power must be purchased from the government. The company has made the following agreement with regard to profits from future operation:

From the net profits the shareholders will receive interest at the rate of 6 per cent. The surplus will be divided between the municipality and the company as follows: From 6 per cent to 9 per cent, one-tenth to the municipality, nine-tenths to the company; from 9 per cent to 12 per cent, two-tenths to the municipality, eight-tenths to the company; from 12 per cent to 15 per cent, three-tenths to the municipality, seven-tenths to the com-

FORMAL OPENING OF THE MCKINLEY BRIDGE OVER THE MISSISSIPPI RIVER

The McKinley Bridge, which spans the Mississippi River at St. Louis, named after Congressman W. B. McKinley, Champaign, Ill., president of the Illinois Traction System, was opened formally on Nov. 10, 1910, with appropriate ceremonies in which Gov. C. S. Deneen, of Illinois, and Gov. H. S. Hadley,



McKinley Bridge Opening—Decorations

of Missouri, participated. The massive structure was blessed by Archbishop John J. Glennon, of St. Louis. Miss Julia Mattis, Champaign, Ill., a niece of Mr. McKinley, was escorted to



McKinley Bridge Opening—The First View Shows Gov. Hadley (Under the Flag), Gov. Deneen and Mr. McKinley; the Second View Shows the Parade on the Bridge

pany; from 15 per cent to 18 per cent, four-tenths to the municipality, six-tenths to the company; surplus above 18 per cent will be divided equally. The company will complete the system by constructing various lines in and about the city. It will also proceed with other work necessary for the electrification of the lines.

the center of the bridge by the two Governors, and while the band rendered "The Star Spangled Banner," she drew the Stars and Stripes to the highest pinnacle of the bridge. The ceremonies on the bridge terminated with pronouncement of the benediction by Dean Carroll M. Davis, of Christ Church Cathedral.

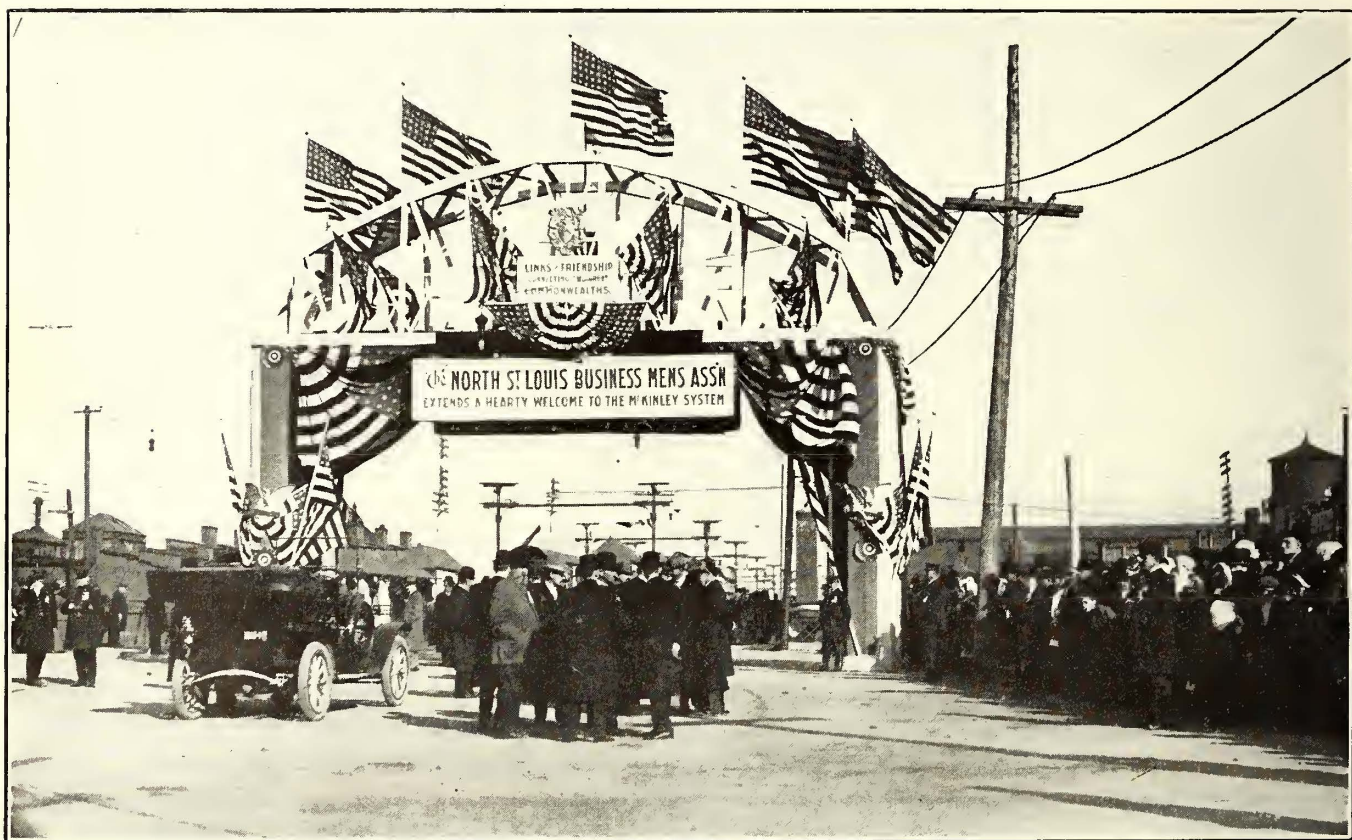
A banquet was tendered to about 700 guests of the Illinois Traction System at the Planters' Hotel, St. Louis, in the evening. David R. Francis was toastmaster. All the speeches were tributes to Mr. McKinley, his associates and the Illinois Traction System. Toasts were given by the Rev. Dr. Leon Harrison, of Temple Israel, St. Louis; Judge O'Neill Ryan, of St. Louis; Governor Deneen, of Illinois; Governor Hadley, of Missouri; Mayor F. H. Kreismann, of St. Louis, and L. Y. Sherman, former Lieutenant-Governor of Illinois. W. B. McKinley, of Champaign, Ill., president of the Illinois Traction System; T. B. Macaulay, of Montreal, Can., head of the Sun Life Assurance Company and one of the principal stockholders in the railway, and H. E. Chubbuck, vice-president of the system, responded. While the banquet was in progress a fireworks display was given on the bridge for the entertainment of many thousands of people.

The construction of the McKinley Bridge was begun in November, 1907. It was built at a cost of \$4,500,000, is the largest bridge ever attempted by an electric railway and has a greater carrying capacity per lineal foot than any other bridge

clearance above high water is 50 ft.; clearance above low water is 85 ft.

The four large river piers which support the structure are built of red granite and Bedford limestone, backed with concrete. The piers supporting the approach structure on either side are of concrete resting in reinforced concrete piles. The main piers are 150 ft. from bedrock to capstone, 26 ft. thick and 76 ft. wide at the bottom. The timber in the floors of the bridge and the roadway is creosoted. The design for the bridge was prepared by Ralph Modjeski, under whose supervision it was built. F. E. Washburn was resident engineer on the ground during the entire time the bridge was under way.

Under the west approach to the bridge there is a power plant which will have an ultimate capacity of 28,000 hp and will cost when completed about \$1,000,000. From the St. Louis side of the bridge the double tracks of the Illinois Traction System reach into the business heart of St. Louis, terminating at Twelfth Street and Lucas Street, half a block north of Washington Avenue. Immense terminal buildings are being constructed at this point, where the company owns over a block



McKinley Bridge Opening—Arch at Entrance

across the Mississippi. Its carrying capacity will be 12,000 lb. per lineal foot on the tracks as against 10,000 lb. for any other bridge. It will carry 3000 lb. per lineal foot on the driveways, of which there are two.

The steel structure includes three immense spans across the river, 521 ft., 523 ft. and 521 ft. in length, respectively; two shorter river spans, each 250 ft. in length, and three shorter shore spans of 150 ft. each. Structural steel elevated approaches form a connecting grade of 1.75 per cent at each end of the bridge. The approach on the Missouri side passes over 24 acres of freight yards owned by the Illinois Traction System. This approach is 2700 ft. in length and connects with the street grade. The length of the bridge and approaches is over 8000 ft.

The three main river spans are of the modified type of Pratt truss design, while the five spans over the shallow part of the river are of the deck truss construction. The main bridge carries two railroad tracks through a center space of 26½ ft.; two roadways, 14 ft. wide each, are carried on cantilever brackets. The total width of the bridge over all is 65 ft., and the

of land. A large passenger station and train sheds will be erected and the freight and express terminal is now nearing completion.

There will be no arbitrary charges over this bridge, and only the regular 2 cents a mile will be collected. The local street cars will run from the corner of Twelfth Street and Lucas Street to Granite City and Venice, a distance of 9 miles, for a 5-cent fare. At present every passenger entering St. Louis on a railroad over the old bridges must pay a toll of 25 cents; 5 cents extra is charged on the city cars. An arbitrary charge of 20 cents a ton is made for coal, with other freight in proportion.

W. Kelsey Schoepf, president of the Ohio Electric Railway, has announced that the old power house at Lindenwald will shortly be transformed into a club house for the use of the Ohio Electric Beneficial Association, which held its annual meeting at that place recently. The building will be overhauled and a gymnasium, baths, reading and pool rooms will be installed.

BOSTON ELECTRIFICATION PROBLEM

On Nov. 15 the special commission authorized at the last session of the Massachusetts Legislature to deal with the electrification of all of the steam railroads within the Metropolitan district of Boston made public the reports received from the New York, New Haven & Hartford Railroad and the New York Central & Hudson River Railroad as lessee of the Boston & Albany Railroad. The report of the New York, New Haven & Hartford Railroad consisted of a letter addressed by E. H. McHenry, vice-president of the company, to C. S. Mellen, president of the company. An abstract follows:

"The following report and estimates are submitted, which have been prepared in compliance with the terms of Chapter 134 of the Resolves of the Legislature of the State of Massachusetts, which provides that the railroad corporations operating within the Metropolitan District * * * be directed to prosecute studies with reference to the electrification of their passenger service in said districts, and to present the results of such studies on or before Nov. 1 to the Joint Board on Metropolitan Improvements.

"It was quite impossible to devote the proper degree of study and investigation to this subject within the very brief time set by the Legislature which the magnitude and complexity of the problem demand, but a special effort has been made to present at least the salient features of the proposed electrification of railroads within the Metropolitan District, together with an approximate estimate of the cost, in order to comply as fully as possible with the terms of the resolves of the last Legislature.

"The investigation of the traffic conditions of the New York, New Haven & Hartford and the Boston & Maine Railroads has been completed by A. B. Corthell, consulting engineer, to whom the task was assigned, which included a study of the train service upon some 20 through lines and branch lines, together with analyses of the number and direction of trains operated, train schedules, tonnage, speed and terminal conditions.

"To W. S. Murray, electrical engineer, was assigned the task of analyzing the traffic data and the preparation of estimates of the cost of the necessary power houses, overload equipment, tracks and of the electric engines and multiple-unit equipment required to replace the present steam engines and passenger cars.

"The results of these investigations are substantially comprised in various maps, diagrams and charts appended to this report, as follows:

"A map showing in heavy lines the portions of the railroads included within the proposed electric zone, also the number of tracks and the number of trains operated over same within 24 hours as compiled from the summer timetable for 1910.

"Diagram No. 1 shows the number of trains in and out of the North and South stations each half hour, and illustrates the relative amount of traffic in each direction at different hours of the day. As a matter of interest, the number of passengers in and out of the two stations, together with similar data for the Grand Central Station at New York for the past 10 years, is added. The curve of future growth may be approximated by extending the curves on this diagram.

"Diagram No. 2 shows curves of train weights, including motors, moving each period of 10 minutes throughout the day of 24 hours on the N. Y., N. H. & H. R. R. for each district and a curve of totals for all districts within the electric zone.

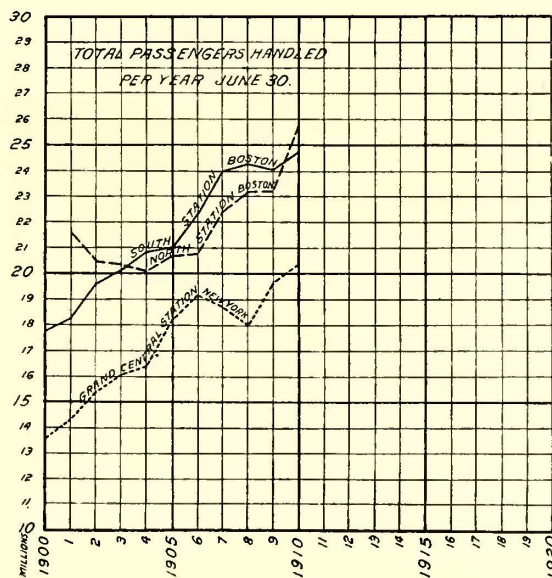
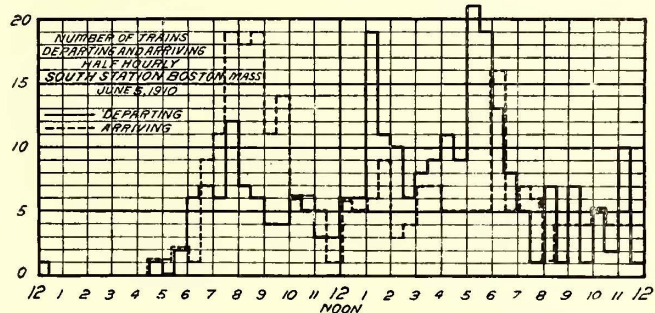
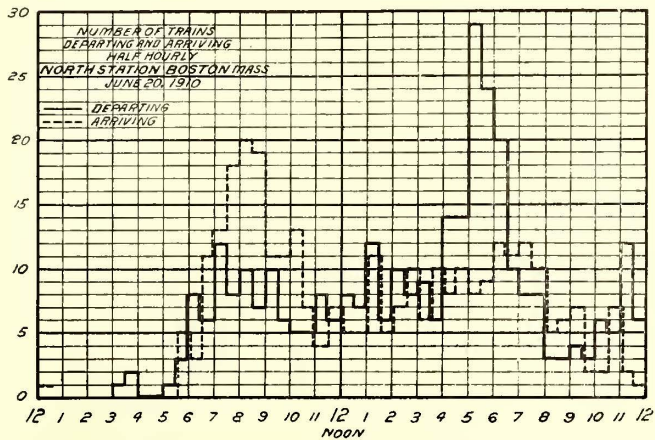
"Diagram No. 3 shows similar data for the B. & M. railroad for each division and totals for all divisions within the electric zone.

"Diagram No. 4 shows the combined totals for both the New York, New Haven & Hartford Railroad and the Boston & Maine Railroad, also the train weights upon which the estimated power house requirements are based.

"Equipment estimates showing the amount of electrical equipment necessary to cover the service between Boston and the suburban terminals. These estimates show both the number of electric engines required to perform all service, or, as an

alternative, the number of electric engines required for the operation of through trains only, and the number of motor and trailer cars operating in multiple-unit service required to replace the present trains terminating within the electric zone.

"A statement showing the number of steam and electric engines or equivalent multiple-unit cars at all suburban termini, for which it is necessary to provide electric or steam engine facilities, also the capacity of the facilities now in existence at each point, together with estimates of cost.



Boston Electrification—Number of Trains Departing and Arriving Daily at North Station and South Station and Total Number of Passengers per Year at These Two Stations

"A supplementary diagram showing the average daily runs and energy in kw-hours required for the motors in local and express service for both the New Haven and the Boston & Maine trains. This diagram is accompanied by a blueprint showing the proposed Boston electric zone, upon which are marked the general routes and track systems of both the New Haven and Boston & Maine Railroads; also showing location and distances of main line and yard tracks.

"Condensed estimates of construction cost within the Metropolitan District of Boston.

"It is not believed that the maps, charts and statements as above require an extended commentary, as they are practically self-explanatory. The estimates of construction cost are based upon the single-phase system of electric operation as adopted in service between Woodlawn and Stamford on the New York division of the New York, New Haven & Hartford Railroad. This system employs a generating voltage of 11,000 volts with a frequency of 25 cycles. An installation of this kind, as proposed for the lines in the vicinity of Boston, will differ, however, in some very important particulars, as the complications and increased cost due to the dual operation of both the single-phase system of the New Haven Company and of the direct current system of the New York Central Company will be avoided. No substations will be required within the zone of electrification, and as all current will be taken from an overhead contact no third rail for conducting current to engine shoes will be required. The elimination of the third rail is particularly desirable in this instance, as its introduction would create grave difficulties in working out plans for the equipment of the many and complicated track systems in terminal yards and at crossovers.

"The estimates for main lines, sidings and yards have been considered upon passenger basis only, and do not cover freight and switching service.

"The power requirements have been ascertained by applying

"The necessity of changing from steam to electricity and vice versa at the limits of the electric zone makes it necessary to provide proper transfer facilities, for which due provision has been made in the estimate. It will be noted that this is a very burdensome requirement in its effect both upon construction cost and operating expenses.

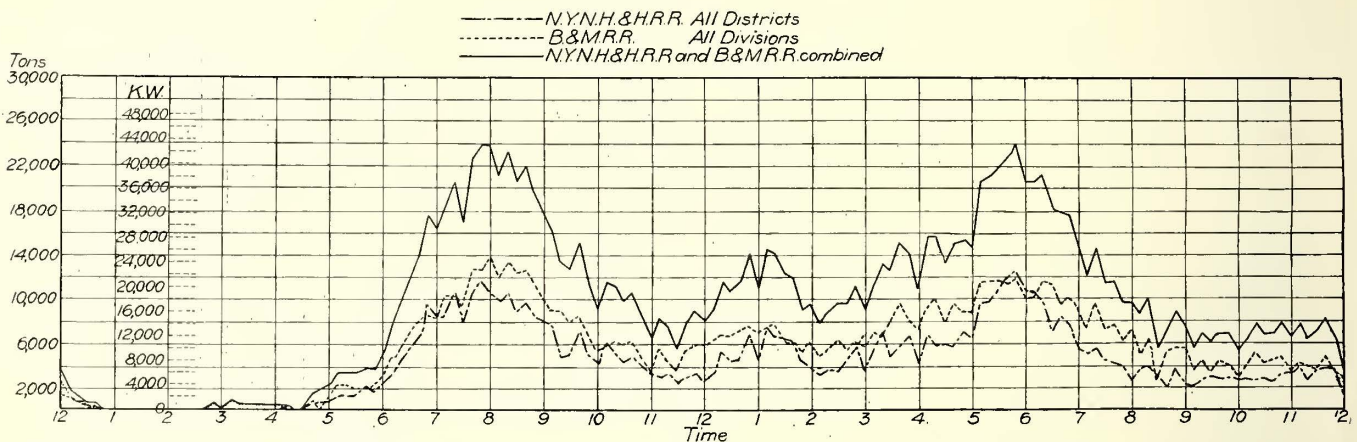
"The equipment estimates attached to this report indicate that equipment must be provided for the operation of 14,630 daily train miles, based upon the summer schedule of 1910. This is the theoretical or timetable mileage, as compared with the total actual mileage, including deadheading and helping, of 17,286 miles.

"The electric locomotives and multiple unit equipment required to replace the present equipment in this service as given in the estimate include additions of 15 per cent for shopping reserve and 50 per cent for holiday service and contingencies.

"The estimates for heavy repair shops and spare parts require no explanation.

"The estimates for the complete equipment of the New Haven and Boston & Maine Railroads as shown in greater detail in the attached summaries amount to \$13,862,750 and \$18,889,192 respectively, or \$32,751,942 total for both companies.

"It will be understood that these estimates are based upon a plan for electrification within the Metropolitan District of Boston in literal compliance with the request of the Legislature, which in nowise represents the scope and method of development which would naturally be favored by the railroad



Boston Electrification—Diagram Showing Curves of Moving Train Weights Each Ten Minutes and Amount of Power Required for Suburban Service of New Haven Railroad and Boston & Maine Railroad

to the computed ton mileage an average coefficient derived from the experience of the New Haven Company on its New York division from operation within its electric zone, which affords an estimate of the amount of energy required, expressed in terms of kw-hours. This result has been equated by adding 50 per cent for holiday conditions, 15 per cent to include heating and lighting of local trains by electricity and 25 per cent to cover transmission losses and power used for general auxiliaries, station and yard lighting, signaling, shop and other power requirements. The estimate so obtained has been reduced by applying the two-hour overload capacity of generators with the final result that a normal generating capacity of 60,000 kw is indicated as required.

"The estimates for transmission lines and the overhead contact system cover the equipment of single and multiple main track mileage and trackage in terminals, yards and sidings, as follows: 15.46 miles of four-track routes; 128.07 miles of double-track routes; 32.44 miles of single-track routes; 111.2 miles of yard tracks and sidings. The total mileage included in the above estimates is equivalent to 461.62 miles of single track.

"The construction types of the overhead structures and suspended system will be quite similar to those installed on the New York division of the New Haven Company, subject to certain modifications indicated by our experience.

companies in interest. The proposed restriction of the operation to the Metropolitan District establishes limits which are purely artificial and arbitrary, having but little relation to the flow and volume of traffic, and makes necessary the establishment of costly intermediate terminals at some 13 points on the district boundaries for accommodating both steam and electric motors.

"All trains passing through these transfer points will be subject to delays of three or four minutes in both directions, and, accordingly, the improved service within the Metropolitan zone will be gained only by sacrificing the commercial interests of many important secondary centers and outlying points, such as Marblehead, Salem, Lawrence, Lowell, South Framingham, Walpole, Brockton, Whitman and Greenbush, which communities will be less well served than at the present time.

"Similar conditions forced the extension of electric service on the New York division of the New Haven Company to Stamford, and on the New York Central lines to White Plains and Yonkers, although not required by the act of the Legislature, as such further extensions were necessary in order to avoid the cost and delays incident to engine transfers within suburban limits. These conditions lead to the conclusion that the subject requires a more complete and comprehensive study before fixing limits for the proposed electric service.

"The problem in its general nature is altogether different from the conditions at New York, as in the latter case the entire traffic of the New York, New Haven & Hartford Railroad and the New York Central Railroad companies within the city limits is concentrated upon a single four-track route between the Grand Central Terminal and Woodlawn, while, on the contrary, at Boston the suburban business is diffused over a great area, requiring the equipment for electric operation of not less than 20 through routes and branches, with a corresponding effect upon first cost and operating charges.

"Notwithstanding the more favorable conditions at New York incident to the greater density of traffic and the simpler track system in the region served by the New Haven and New York Central Railroads, the records of the New Haven Company demonstrate that under present conditions the electric train service not only fails to earn any interest upon the very large amount of capital invested, but that it has also increased the cost of operation, and with the less favorable conditions in the vicinity of Boston it is impossible to escape the conclusion that the deficit in fixed charges and operating expenses will be still greater.

"In explanation of this disappointing result, it may be stated that the experience of the New Haven Company in operating a mixed steam and electric service has proven very unsatisfactory. The annoyances and losses due to smoke, cinders, steam and noise are at best only alleviated without being eliminated, while at the same time so large a proportion of the expense of both methods of operation is retained as to prevent the realization of the fullest degree of economy of either system. This becomes more apparent when it is considered that the power stations, if provided for passenger requirements only, will have a large unused capacity between the hours of peak load, which otherwise could be utilized to very good advantage for the transportation of freight, and more particularly as the occupation of tracks by passenger trains during the hours of peak load acts automatically to limit the simultaneous operation of freight trains at such times. Thus little or no additional investment in power houses is required for freight operation, and similarly the overhead track equipment serves equally well for both passenger and freight traffic, which makes it practicable to extend electric operation to include all classes of service at the cost of only the additional engines and the equipment of yard trackage required for freight service.

"It therefore seems quite safe to conclude that no general substitution of electric for steam traction should be made unless the substitution is complete, including passenger and freight operation and yard switching in addition, and also that in making such substitution the operation should be extended to include the full length of run or engine district, in order to avoid the uneconomical subdivision of the present "trains run," together with the added expense and delays incident to intermediate engine transfer stations. The extension of the estimates to include the much larger expenditures required to cover the inclusion of freight service and yard switching, together with the probable enlargement of the limits of the electric zone, is not possible at this time, as the data for such estimates are not at present available, but it is certain that the revised and completed totals will be of the most imposing magnitude.

"The electrification of the Boston suburban district would release a large number of steam engines and passenger coaches, which should properly be credited to the construction estimate, but as there is no apparent opportunity for the utilization of so large an amount of equipment of this special type, and as its value for resale would be so doubtful, it is not practicable to assign values to this item.

"It should also be noted that no account has been taken of the profound changes affecting terminal conditions and methods of operation which would be introduced if the proposed connection between the North and South Stations at Boston is constructed, and if there is any reasonable probability of such construction being undertaken in the near future the installation of an elaborate and costly electric system at the present terminals could not be reasonably considered.

"In general it would seem altogether more practicable at first to restrict the substitution of electricity for steam to a few of the more important routes, subsequently extending the system as rapidly as consistent with the financial conditions and the public needs."

The figures given in the appendix follow:

SUMMATED COSTS OF BOSTON METROPOLITAN ELECTRIFICATION DISTRICT	
(1) Power house.....	\$6,000,000
(2) Transmission lines and overhead contact system.....	3,850,240
(3) Suburban terminal shops and inspection facilities.....	1,417,000
(4) Heavy repair shops.....	400,000
(5) Electric locomotives.....	6,725,000
(6) Spare parts for electric locomotives.....	336,250
(7) Multiple unit motor cars.....	6,960,000
(8) Multiple unit trail cars.....	5,014,100
(9) Spare parts for multiple unit cars.....	299,352
(10) Signaling.....	1,750,000
	\$32,751,942

SUMMATED COSTS OF BOSTON METROPOLITAN ELECTRIFICATION DISTRICT, N. Y., N. H. & H. R. R.	
(1) Power house (27,500 kw, based on average peak).....	\$2,750,000
(2) Transmission lines and overhead contact system—	
13.43 miles 4-track, at \$40,000 per mile....	\$536,000
52.58 miles 2-track, at 20,000 per mile....	1,051,600
17.71 miles 1-track, at 7,000 per mile....	123,970
61.14 miles yd. tr'k, at 4,000 per mile....	244,560
	1,956,130
(3) Suburban terminal shops and inspection facilities.....	435,000
(4) Heavy repair shops, based on percentage of equipment..	172,000
(5) Electric locomotives—	
Light passenger type; 48 at \$40,000 each....	\$1,920,000
Heavy passenger type; 21 at 45,000 each....	945,000
	2,865,000
(6) Spare parts for electric locomotives, based on 5 per cent of item 5.....	143,250
(7) Multiple unit motor cars, 100 at \$30,000 each.....	3,000,000
(8) Multiple unit trail cars, 116 at \$13,300 each.....	1,542,800
(9) Spare parts for M. U. cars, based on 2½ per cent items 7 and 8.....	113,570
(10) Signaling (automatic block).....	885,000
	\$13,862,750

SUMMATED COSTS OF BOSTON METROPOLITAN ELECTRIFICATION DISTRICT, R. & M. R. R.	
(1) Power house (32,500 kw, based on average peak).....	\$3,250,000
(2) Transmission lines and overhead contact system—	
2.03 miles 4-track, at \$40,000 per mile....	\$81,200
75.49 miles 2-track, at 20,000 per mile....	1,509,800
14.73 miles 1-track, at 7,000 per mile....	103,110
50.06 miles yd. tr'k, at 4,000 per mile....	200,000
	1,894,110
(3) Suburban terminal shops and inspection facilities.....	982,000
(4) Heavy repair shops (based on percentage of equipment)..	228,000
(5) Electric locomotives—	
Light passenger type; 65 at \$40,000 each \$2,600,000	
Heavy passenger type; 28 at 45,000 each 1,260,000	
	3,860,000
(6) Spare parts for electric locomotives (based on 5 per cent of item 5).....	193,000
(7) Multiple unit motor cars, 132 at \$30,000 each.....	3,960,000
(8) Multiple unit trail cars, 261 at \$13,300 each.....	3,471,300
(9) Spare parts for M. U. cars (based on 2½ per cent items 7 and 8).....	185,782
(10) Signaling (automatic block).....	865,000
	\$18,889,192

BOSTON & MAINE RAILROAD EQUIPMENT ESTIMATE

Statement showing the amount of electric equipment necessary to cover the service between Boston, Swampscott, Wakefield Junction, Wilmington, Lexington, Wayland and Waltham, and the number of steam locomotives which can be released; also the number of coaches by the use of multiple unit equipment.

<i>Passenger Service.</i>	
Number of locomotives required.....	98
Number of steam locomotives which can be released by substitution of electric locomotives.....	35
Number of electric locomotives required for switching service at passenger terminal.....	17
Switching engines released at passenger terminal by reason of electrification.....	17
Timetable engine mileage.....	7,853
Total engine mileage, including deadheading and helping.....	9,854
<i>Multiple Unit Equipment.</i>	
Number of electric engines required to run trains coming from and going to points beyond electric zone.....	54
Timetable engine mileage.....	4,792
Total mileage, including deadheading.....	5,370
Multiple unit equipment required to perform the service entirely within electric zone.....	227
Number of motors and trailers, assuming that one motor car will handle three trailers, seating capacity seventy-five each.	
Timetable mileage.....	2,715
Car miles made by motor cars.....	2,715
Car miles made by trailers.....	8,145
Number of steam engines which can be released under M. U. system.....	31
Number of coaches which can be released under M. U. system.....	227

N. Y., N. H. & H. R. R. EQUIPMENT ESTIMATE.

Statement showing the amount of electric equipment necessary to cover the service between Boston, Campello, Cohasset, South Braintree, Readville, Dedham, Mattapan and Needham Junction, and the number of steam locomotives which can be released; also the number of coaches, by the use of multiple unit equipment.

Number of electric engines required to perform all service.....	64
Timetable miles.....	6,777.63
Total mileage, including deadheading and helping.....	7,431.88

Number of electric engines required to run trains coming from and going to points beyond electric zone.....	40
Timetable miles	3,956.56
Total mileage, including deadheading.....	4,737.76
Multiple unit equipment required to perform balance of service—	
Motors	58
Trailers	67
Timetable miles	2,821.07
Car miles made by motors.....	3,978.00
Car miles made by trailers.....	6,430.00
Number of steam engines which can be released.....	53
Number of coaches released under this proposition.....	164

BOSTON & ALBANY RAILROAD

The report of the Boston & Albany Railroad was submitted by the New York Central & Hudson River Railroad, as lessee, and consisted of a letter dated Oct. 31 to the Joint Board on Metropolitan Improvements from A. H. Smith, vice-president and general manager of the company. It included a map of the district under consideration, a train and power station load diagram, and a diagram of the proposed electric schedule, with electric locomotives for the through and Worcester trains and multiple-unit cars for the Circuit and for the South Framingham trains. It also included a diagram showing the train and power station loads calculated for the present through and suburban service. The latter diagram is reproduced here-with.

The letter states that while the resolve did not impose any duty to make studies beyond the Metropolitan line, which crosses the railroad about 16.2 miles from the Boston Terminal, operating and financial conditions made it necessary to continue the studies to South Framingham. The track mileage involved in the above electrification is substantially as follows:

Boston to South Framingham, four tracks.....	83.60 miles
Highland circuit, two tracks.....	19.78 "
Yards and sidings.....	25.00 "
Total	128.38 "

The company also made no studies for the electrification of the South Terminal. In its calculations the company estimated on a power station located on the Charles River between Allston and Cambridge and containing three 7500-kw, 11,000-volt turbo-generators and three substations, one to be in Boston, one in Newton Lower Falls and one at Natick. Two of these would contain three 1500-kw rotary converters and the other three 750-kw rotary converters.

The company estimated on a third rail, using 1200-volt direct current, and electric locomotives and motor cars similar to those used by the New York Central & Hudson River Railroad in New York City. The present service would require 16 electric locomotives, 62 motor cars and 31 trail cars, and would retire 29 steam locomotives and 113 passenger coaches. A new alternating-current signal system would have to be installed to replace the present direct-current signal system at a cost of approximately \$700,000. In addition, improved drainage, at a cost of \$60,000, will have to be installed. The company estimates the initial cost of the entire installation and the annual expense resulting therefrom as follows:

	Cost	Annual Expense
Cost of construction.....	\$7,520,300	\$1,172,604
Credit	1,107,000	633,413
Increase, net.....	\$6,413,300	\$539,191

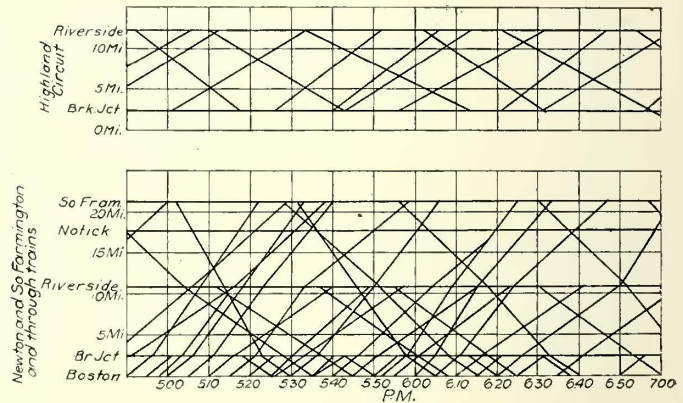
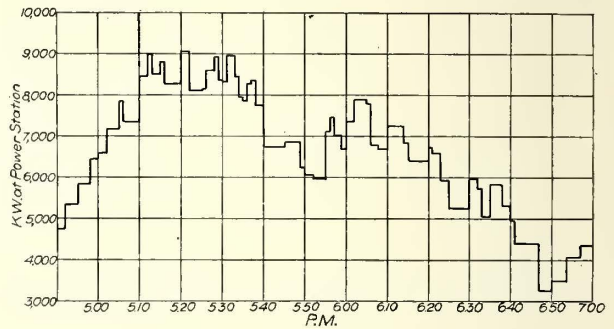
The report then says: "The gross revenue derived by the Boston & Albany Railroad in the district under consideration for electrification, including return tickets, single trip tickets, mileage proportion for traffic entering and leaving Boston for points west of South Framingham, is approximately \$1,300,000.

"The visible operating expense of affording this service under steam operation at the present time, without any interest whatever upon the large investment for right-of-way, tracks and structures, is slightly in excess of the gross receipts.

"If to this present deficit there be added the above additional annual expense as result of electrification, namely, \$539,191, the net revenue above operating expenses which accrues to the Boston & Albany Railroad as a whole from the business handled in and out of the City of Boston between all points on the road will be practically absorbed, thus leaving no net revenue from such service to meet existing obligations or those which would be created by this new investment.

"The solvency of a transportation company is of paramount importance to the public as well as to the railroad. Insolvency necessarily means inefficient service, and inefficient service means inconvenience and commercial and industrial calamity to the public.

"It would, therefore, seem imperative that any act providing for the electrification of steam railroads under such circumstances, empowering the proper board or boards to determine the manner in which such work should be prosecuted, should also empower the board or other properly constituted authorities to permit the railroad companies to assess all passengers and traffic using the facilities with a terminal charge sufficient to bear the financial burdens imposed, with some additional profit to the operating company for performing the service and assuming the additional responsibilities and liabilities necessarily introduced. This would seem more consistent and equitable than to impose it upon other cities, villages or rural



Boston Electrification—Load Diagram for the Present Through and Suburban Service on the Boston & Albany Railroad

communities in local fares or other forms of transportation which receive no real estate or other benefits from the new form of transportation employed.

"The Boston & Albany Railroad has no material source of income except the receipts from transportation afforded the public. If the public elects through legislative mandate to have that service provided through the use of more costly appliances and methods than formerly, the conclusion is inevitable that the public must ultimately pay the cost and should therefore have full information on the subject in advance. The case is analogous to the elimination of grade crossings, where the public participates in the immediate costs and assumes in transportation expenses the carrying charges on the remainder."

Prof. Dugald C. Jackson, of the Massachusetts Institute of Technology, contributed an article on the report of the Chamber of Commerce of Boston in regard to rapid transit in that city to the Boston American of Oct. 30, 1910.

MEETING OF THE EXECUTIVE COMMITTEE OF THE ENGINEERING ASSOCIATION

The executive committee of the American Electric Railway Engineering Association held a meeting at the offices of the American Association in New York on Nov. 15. The following members of the committee were in attendance: W. J. Harvie, Utica & Mohawk Valley Railway, president; Norman Litchfield, Interborough Rapid Transit Company, secretary; Martin Schreiber, Public Service Railway; E. O. Ackerman, Columbus (Ohio) Railway & Light Company; G. H. Kelsay, Indiana Union Traction Company; C. B. Voynow, Philadelphia Rapid Transit Company; E. J. Burdick, Detroit United Railway; H. H. Adams, Metropolitan Street Railway, New York.

The secretary read the minutes of the meeting of the executive committee, held at Atlantic City, Oct. 10, 1910. The minutes were approved as read.

METHOD OF PREPARING COMMITTEE REPORTS

The first general subject considered was the method of preparing committee reports for the coming year. The secretary read the standing instructions to the chairmen of the committees, outlining the method of treatment of the subjects assigned to the standing committees by the executive committee. Mr. Voynow asked that the secretary be instructed to furnish a copy of these instructions to every member of the standing committees to be appointed this year.

Mr. Schreiber moved that the membership of all standing committees, except the committee on standards, be increased from six members to nine members. In support of this motion he stated that the American Railway Engineering & Maintenance of Way Association has about 400 members, of whom over 300 are members of one or more standing committees of the association. Some of the standing committees of this association had as many as 17 members and at least one committee of the American Society for Testing Materials had as many as 40 members. He believed that increasing the membership of the committees would result in the presentation of more representative opinions in the committee reports, and that no better way could be found to increase the interest in association affairs among the members than to have a larger proportion of the members engaged in committee work. In his opinion the time would come when the standing committees would be composed of not less than 20 members. After a brief discussion the motion of Mr. Schreiber to increase the committees to nine members was carried.

Mr. Schreiber then moved that in addition to the appointment of a chairman for each standing committee the president should also appoint a vice-chairman of each committee. The vice-chairman would be in a position to carry on the committee work without delay in the event that the chairman was unable to serve. The motion was carried. Mr. Kelsay suggested that each committee appoint a secretary to have general charge of the correspondence among the members and to prepare the reports of the meetings. It was agreed that this suggestion would be made to the standing committees.

Mr. Litchfield called attention to the fact that it was very difficult for the secretary of the association at the present time to keep in touch with the work to be done by the association committees, and he suggested that the standing instructions to the committees be amended so as to make it mandatory upon the committees to keep the secretary of the association informed at all times of the progress of their work.

After some discussion Mr. Adams moved that, in order to keep the executive committee in touch with the work of the standing committees, the chairman of each standing committee should be instructed to submit reports of progress to the executive committee on Feb. 1, April 1, June 1, July 1, July 15 and Aug. 1, and that the chairman of each committee should also transmit to the secretary of the association copies of all important letters relating to committee work. The secretary is also to be advised in advance as to the date and place of all committee meetings, and after any committee meeting is held the chairman is to transmit to the secretary of the association

a brief outline of the work done at the meeting. The secretary is to forward copies of these progress reports to each member of the executive committee. This motion was carried.

Mr. Voynow raised the question of the best method of keeping the associate members acquainted with the progress and scope of the committee work. On motion it was decided to send to all associate members copies of all data sheets and other circular matter relating to committee work, the same as is now being done in the case of member companies.

In order to facilitate the printing of the reports of the committees prior to the convention the secretary was instructed to communicate with the chairman of each standing committee and make suggestions for improving the quality of the engravings included in the reports and reducing the labor and expense of preparing the copy for the printer.

Mr. Ackerman moved that the secretary be instructed to prepare a circular letter to be sent to all associate members advising them of the membership of the standing committees and the subjects selected for consideration this year, and inviting all associate members to co-operate with the committees in contributing information on the subjects under discussion. The motion was carried.

Mr. Adams moved that the date on which committee reports should be in the hands of the secretary of the association be advanced from Aug. 1 to July 15. The motion was carried, as was also a motion to the effect that advance copies of all committee reports should be issued to members 30 days prior to the convention.

In order to bring about a closer knowledge of the work which is being done by the Master Car Builders' Association the secretary was instructed to apply for membership in that association, the expense to be borne by the Engineering Association.

The secretary then read a letter from W. H. Evans, Indiana Union Traction Company, suggesting closer co-operation between the standardization committee of the Central Electric Railway Association and the committees of the Engineering Association. A motion was made that the secretary of the Engineering Association send a copy of the circular letter which is to be prepared for the information of the associate members to the secretaries of all the local electric railway associations, with an invitation to each of these associations to offer any suggestions concerning the scope of the work of the Engineering Association. The motion was carried.

The committee then took up seriatim the different standing and special committees and drew up a series of topics for these committees to discuss during the coming year. Under the rules of the association these topics are suggested only and the committees have authority to omit the discussion of any of them if, for any reason, they should find that it could not properly or fully be considered during the year.

COMMITTEE ON BUILDINGS AND STRUCTURES

The following topics were selected for the consideration of the committee on buildings and structures. The first was recommended for treatment this year in the report of the committee last year; the second was assigned last year and not treated in the report, and the third is a new topic:

Proper facilities for employees, especially in car terminals.

Economical maintenance of car houses and other structures, including their painting, inspection, etc.

Fire protection of car houses and terminals, including open yards. This assignment will include a discussion of the proper method of installing fire protection systems and the best way of maintaining them.

COMMITTEE ON EQUIPMENT

Four topics were selected for the committee on equipment. The first was taken up at the suggestion of a member company in New England. The second was proposed by Mr. Adams. The third was suggested by Secretary Donecker in accordance with a request from Secretary Neercamer, of the Central Electric Railway Association, and the fourth by Mr. Kelsay, who said that the interurban railway companies of the Central West were very anxious to have that matter settled, in connection

with the subject of standard couplers considered in the third topic. The assignments follow:

Methods of heating cars.

Design of car body and trucks with a view of reducing their weight without sacrificing their strength, the reduction in weight of motors and equipment by changes in design, and a unit basis for the comparison of weights of rolling stock.

The report of the Central Electric Railway Association on standard car couplers recently adopted. (See *ELECTRIC RAILWAY JOURNAL* for Sept. 10, 1910, page 403.)

Standard air, signal and control connections for interurban cars.

COMMITTEE ON POWER GENERATION

Four subjects were assigned for consideration this year by the committee on power generation as follows:

Purchase of bituminous and anthracite coal on the b.t.u. basis. The secretary was asked to instruct the chairman of the committee to secure the co-operation of purchasing agents affiliated with the Engineering Association in the discussion of this subject.

Investigation of the economical increase of boiler capacity for service and peak conditions.

Boiler settings.

Direct-current turbo-generators of greater capacity than 500 kw.

COMMITTEE ON POWER DISTRIBUTION

Four subjects were referred to the committee on power distribution, as follows:

Specifications for high-tension, three-conductor cables and for low-tension, single-conductor cables. This subject was considered by the committee last year and a set of specifications was presented in its report, but the specifications were not recommended for adoption as standard. At the request of the committee this subject was referred back to it.

Other sizes of grooved trolley wire than No. 0000. In previous reports the committee on power distribution has considered grooved trolley wire of the No. 0000 size.

The protection of crossings of overhead electric transmission lines with other classes of aerial conductors and of crossings of overhead electric transmission lines with steam railroads.

Concrete poles.

COMMITTEE ON WAY MATTERS

Four subjects were referred to the committee on way matters, as follows:

Further investigation of girder-rail sections, with a view to recommending standards.

Rail joints. This subject was continued from last year.

Economical maintenance, in connection with (1) proper shop facilities for the way department and (2) standard rules for the government of employees in the way department.

Clearances between street surface and the rolling equipment.

COMMITTEE ON STANDARDS

The work of the committee on standards was next considered. The secretary was instructed to prepare a memorandum of the subjects referred to the committee on standards by the standing committees reporting at the last convention. Mr. Litchfield called attention to the indiscriminate use of the terms standards and standard practice in the recommendations of several of the committees. He also called special attention to the apparent conflict in the recommendations contained in the report of the committee on standards this year regarding the adoption of the T-rail and girder-rail sections as standard or recommended practice. Mr. Ackerman called attention to the fact that the committee on way matters had recommended that the T-rail sections be adopted as standard, and that the girder-rail sections proposed two years ago be adopted as recommended practice. The committee on standards had recommended that the sections for both T-rail and girder-rail be adopted as recommended practice. He raised the question as to the authority of the committee on standards to change the recommendations of the standing committees in such a manner. He also explained that the committee on way matters this year

decided to withdraw its recommendations regarding the adoption of girder-rail sections as recommended practice. On motion, the secretary was instructed to incorporate in the letter ballot the recommendations for the adoption of the T-rail sections as recommended practice and to omit from the letter ballot all reference to the girder-rail sections.

A long discussion then took place as to the powers which should be conferred on the committee on standards, and the methods which should be employed by the association in the adoption of any standards or recommended practices. As the executive committee was unable to agree on some of the plans proposed the president was authorized to appoint a committee of three members to formulate rules for the guidance of the standardization committee similar to the instructions which have been formulated for the guidance of the standing committees.

COMMITTEE ON HEAVY ELECTRIC TRACTION

It was decided to retain the committee on heavy electric traction to consist of five members, but the committee will be advanced this year from a special committee to a standing committee of the association. The committee will be instructed to consider the subject of general maintenance of heavy electric equipment which was assigned to it last year, but not reported on, and it was left to the discretion of the committee to take up any other subjects which it considered would be of value and interest.

JOINT COMMITTEE ON ACCOUNTING

The secretary read a letter from W. H. Forse, Jr., president of the Accountants' Association, recommending the continuance of the joint committee on shop accounting. Mr. Forse also recommended that each association increase its committee membership from three to five, and that P. S. Young be retained as chairman. The suggestion of Mr. Forse that the committee membership be increased to five members from each association, and that Mr. Young be continued as chairman, was approved. The selection of the subjects for consideration during the coming year was left to the discretion of the committee, with a recommendation that the committee give special attention to the points brought out in the discussion of this year's report, and that the subject of subdivision of operating and expense accounts of the "way and structures department" also be considered. On motion it was decided to suggest to the Accountants' Association that the name of this committee be changed to "Joint Committee on Subdivision of Operating Expense Accounts," so as to include all branches of engineering work. The president was instructed to keep in mind in appointing the members of this committee that it was desirable to have the membership represent all branches of the engineering department.

MISCELLANEOUS BUSINESS

The secretary read a letter from Edgar Marburg, secretary of the American Society for Testing Materials, extending a cordial invitation to the Engineering Association to appoint a conference committee which would take up with the executive committee of the Society for Testing Materials any questions of common interest. There was some discussion on the representation which the Engineering Association should have on the committees of the American Society for Testing Materials, and the president was instructed to appoint a conference committee of five members, including the president and secretary of the Engineering Association. This committee will canvass the entire situation with the executive committee of the American Society for Testing Materials and make recommendations for representation in that society at a later meeting.

It was moved and seconded that the American Association be requested to appropriate the sum of \$2,700 for the expense of the committees and salary of the secretary of the Engineering Association for 1911. The motion was carried.

The advisability of continuing the "Question Box" was raised, and the secretary was instructed to send out a circular letter to all associate members requesting their opinions as to the value of the "Question Box," and making it clear that if at any time a member desires information on any engineering subject the

secretary of the Engineering Association will be glad to institute a search for the information desired and if necessary send out a data sheet to all members of the association.

The secretary read a letter from W. H. Evans, Indiana Union Traction Company, referring to the resolution proposed by him, and adopted at the Denver convention, authorizing the appointment of a committee to consider the subject of electric railway apprenticeship instruction. The president was authorized to appoint a special committee of three members to consider this subject during the coming year.

The secretary then read a letter from the electrical committee of the National Fire Underwriters' Association stating that a meeting of this committee would be held in New York some time during March, at which time the present code of rules for electrical wiring would be brought up for revision. The secretary was instructed to make an announcement of this meeting to all associate members through a circular letter requesting them to co-operate by sending in any suggestions with regard to advisable changes in the electrical code. The president was authorized to appoint a committee of three members to represent the Engineering Association at the meeting in March.

President Harvie explained at length the proposed plan of reorganization of the committee on associate membership. He was empowered to appoint a committee to represent the Engineering Association which will work in connection with the main committee of the American Association. The meeting then adjourned.

HEARING ON BROOKLYN RAPID TRANSIT TRANSFER SYSTEM

The New York Public Service Commission for the First District resumed on Nov. 3 the hearing of the complaint against the amended transfer regulations adopted by the Brooklyn Rapid Transit System. Commissioner McCarroll presided.

Various residents of Brooklyn were introduced to testify as to the increased fares for certain rides affected by the new regulations. John J. A. Rogers, the complainant, asked the witnesses questions regarding the character and apparent occupation of passengers affected. Commissioner McCarroll held that the millionaire and the workingman were not unequally concerned, and that the rules of the company ought to give a square deal to everybody. He also held that the judgment of passengers in a certain locality that a transfer system was unjust, without a statement of the grounds upon which they formed that opinion, added nothing to the information of the commission. The commission, in order to determine the question presented, sought information as to the unreasonableness, the inconvenience and the unlawfulness of the arrangement.

C. D. Meneely, secretary and treasurer of the companies in the system, was recalled for further examination. He testified that some changes were to be made in tickets, mostly in the correction of errors. The two principles embodied in the new transfer system are: (1) The restriction of the transfer between lines of separately operated companies to a transfer only for a cash fare at existing transfer points, and (2) between the lines of the same company (excluding the 10-cent routes to Flushing and North Beach), the retention of the previous plan of three rides for a single fare, including additional privileges to and from feeder lines, except that the route taken shall be in the same general direction. In the adoption of these principles there were necessarily a few errors and some omissions. In addition the arbitrary application of these principles had caused greater hardships in some localities than in others. Without surrendering principles the company had stood ready from the start to do everything it could to make the system as convenient as possible for the public.

Reciprocal arrangements had been made between various companies of the system under which the first company retained the fare in cases where transfers were exchanged between the two properties.

The transfer system was based upon the construction of the words "general direction" and "reverse direction" in the Kelly case. A reference to this case was published in the *ELECTRIC RAILWAY JOURNAL* of Sept. 24, 1910, page 483.

In answer to an inquiry Mr. Meneely said that the adoption of a general system of transfers had the effect of increasing largely the traffic on paper. He did not know what the receipts would have been if no transfer system had existed. The transfer system was of large benefit to the people in the suburbs and throughout the city at the expense of the companies.

The hearing was adjourned to Nov. 10, when a further adjournment was taken until Nov. 15.

VIEWS OF NEWLY ELECTED GOVERNORS ON PUBLIC SERVICE COMMISSIONS

A report was published immediately after the election in New York State on Nov. 8, 1910, that the Democrats would take advantage of their victory at the polls to amend the public service commissions law so as to take away from the Governor his jurisdiction over the work of the Public Service Commission of the First District, which includes all of Greater New York, and vest the power to make appointments to the commission in the Mayor of New York. On Nov. 12, 1910, Governor-elect Dix, in an interview published in the *New York Times*, discredited the report regarding the plan to change the law. He is quoted as follows:

"I do not see that any good can be attained, but, on the other hand, I do believe that harm might be worked by any such step. Supervision and regulation of public-service corporations has been adopted as a State policy, and the regulation should remain with the State. If New York City had a commission appointed by the Mayor Buffalo might come forward with a similar request and so on ad infinitum. The Public Service Commission Law is a fixture. I think the commissioners have performed a useful service as between the people and the public-service corporations. I believe they have a definite and distinct mission to perform. If nothing else, they have acted as a safety valve. I do not believe even the heads of the public-service corporations would like to see them abolished. What I have objected to, what I do object to still, is the appointment of inexperienced men on these important commissions. Just think of one having no practical experience on railroads telling men who have been trained from early manhood in the transportation business how to run a railroad. It is ridiculous, and I do not believe that regulation should be carried to the extent of telling companies what colors to paint their cars."

Mayor Gaynor, of New York, subsequently announced that he would not favor a bill proposing to change the appointing power of the Public Service Commissioners for the First District from the Governor to the Mayor of New York City. Mayor Gaynor said:

"My attitude as to the proposed new charter has not been affected by the Democratic victory, and I will not take advantage of victory. I do not intend to revise the charter for partisan purposes or along partisan lines."

John K. Tener, who was elected Governor of Pennsylvania on the Republican ticket at the election in that State on Nov. 8, 1910, expressed himself as follows at Norristown on Nov. 4, 1910, in regard to enlarging the powers of the Railroad Commission of Pennsylvania:

"I believe in a reorganization of our Railroad Commission, not so much in the reorganization of the commission as in the passage of legislation that would enlarge the powers of that commission, whether it be called a railway commission or a public-service commission, so that that commission might be clothed with enlarged powers for the purpose of taking over the control and direction of some of our public-service companies, that the public might enjoy to the full all the conveniences which those public-service companies should provide and which it was intended they should provide when their charters were granted."

TOLEDO TRACTION SITUATION

Brand Whitlock, Mayor of Toledo, Ohio, notified the Toledo Railways & Light Company on Nov. 9, 1910, that 18 franchises on streets reaching the business section of the city had expired on that date. In this letter the Mayor said:

"I have to notify you that the rights heretofore vested in or acquired by your company under ordinances of this city to use the streets hereinafter named for the operation thereon of street cars expire to-day, and that from and after this date the use of the streets by your company for the operation of street cars will be a trespass."

The Mayor said that the letter was addressed to the company to protect the rights of the city if the matter ever came before the courts. The operation of cars on the streets could not be suspended. The public right is paramount to all other rights, and the administration will permit the company to operate until a tentative arrangement has been made for the use of the streets.

Albion E. Lang, president of the Toledo Railways & Light Company, made the following statement on Nov. 11, 1910, regarding the letter from Mr. Whitlock:

"I do not consider the letter of the Mayor as an act of hostility at all. Mayor Whitlock, as well as the city solicitor and Chairman Merrell, of the committee on railroads and telegraph, are dealing with the franchise matter with tact and wisdom and on the broad plane of sound business policy.

"I well remember the conditions in this city 25 years ago last Wednesday when the City Council passed the ordinance covered by the streets mentioned in the Mayor's letter. By that act the city conferred a great benefit upon all of the patrons of the street cars as well as promoting the welfare of Toledo, for the subject of transportation is one in which every citizen is vitally interested.

"By that franchise ordinance passed 25 years ago the length of the ride on the street cars for a 5-cent fare was increased from 3 miles to approximately 10 miles by transfer. While the patrons of the street cars were thus enabled to ride over three times as far as formerly, they were not compelled to pay any increased fare.

"By extensions since made to the original lines passengers are now enabled to enjoy by transfer a 12-mile ride at the same rate of fare as formerly charged. Since the days 25 years ago passengers are enabled to ride in cars which in comparison with the old-style street cars are models for comfort and are equipped to carry the passengers much more comfortably and much more quickly than 25 years ago.

"Has not all this contributed very materially to the city's welfare, for whatever assists the individual in his enjoyment of privileges certainly enhances the prosperity of the community as a whole?"

"During all the period of the franchise passed a quarter of a century ago the company has sold tickets at a rate of fare less than that which it had a right to charge under the terms of the ordinance. Can it be said, therefore, that corporations have no souls?"

John B. Merrill, chairman of the railways committee of the Council, has stated that nothing had been done to fix the value of the physical properties of the company, but that it would not be a difficult matter to fix a fair value on the whole plant.

In the *ELECTRIC RAILWAY JOURNAL* of Nov. 12, 1910, page 990, the letter was published which Ford, Bacon & Davis addressed to Albion E. Lang, president of the company, with their inventory of the property of the company. The inventory includes the following general particulars regarding the property:

Single, double and non-revenue producing track owned and operated by the company within the city limits aggregates 598,816 ft., or about 113.41 miles. Of this, 8402 ft. is devoted to loop and storage or non-revenue producing purposes. In the car houses and yards at Central Avenue, Dorr Street, Starr Avenue, Superior Street and the interurban station are 21,122 ft. of track. A new interurban station is shown on the maps of the engineers, indicating that the company is not satisfied with the one now in use.

In order to reproduce existing tracks in the paved streets the report shows that 291,046 ft., or 127,792 sq. yd., of pavement would have to be torn out and replaced.

Four plants produce current and heat. The Water Street plant is 350 ft. x 243 ft. ground dimensions, has a boiler capacity of 14,720 hp and a generator capacity of 18,840 kw. The Detroit Avenue plant is 200 ft. x 425 ft. in dimensions and has a capacity of 5000 kw. Two smaller plants are located on Floyd Street and Twenty-second Street.

The underground conduit system occupies 56,538 ft. of streets and carries 625,662 duct-ft. There are 266 manholes leading to the system.

The company has 176 cars in use on the system, of which 140 are of the double-truck, single-end type and the remainder double-truck, double-end cars. The schedule includes 40 vehicles and 33 horses. About 30 pieces of real estate are owned by the company, some of it being accumulations from the days when horse cars were operated. Some of the old horse barns have been rebuilt as flat buildings.

STRIKING PUBLICITY IN CHICAGO

On Nov. 16 the Chicago City Railway published as an advertisement in the Chicago papers a page announcement entitled "The Three-Legged Stool of Local Transportation: A Study in Street Railway Operation." The company took as its text the happy simile used by the Pennsylvania State Railroad Commission in a recent report when it likened electric railway congestion problems to a three-legged stool. In this problem three factors are necessary for success—the company, the public and the municipality. Each must do its duty or any attempt at reform will fail.

The company states in its announcement that it has as a business partner the City of Chicago, and therefore the Chicago public, so that it solicits the co-operation of both without apology, that it proposes to discuss partnership business and addresses business partners.

The announcement continues that Leg No. 1 of the three-legged stool in Chicago is the company, whose duty it is to co-ordinate the various lines under its control, and to regulate the traffic so as to accommodate the greatest number of people without violating contractual obligations running to communities in sparsely settled territory. A sketch is then given of some of the situations which the company must meet, especially in regard to the evening rush-hour business. In this connection the notice says: "Adequate street car service in Chicago cannot be obtained and maintained without the aid of a highly organized system. This system, moreover, must be constructed along scientific lines and must be controlled by general as against local needs of the city considered as a whole. Traction troubles in the past have been due to lack of system and co-ordination rather than to the failure of it. The more delicate the machinery of transportation becomes and the more highly organized the system of car distribution the more serious become obstructions to traffic. A pebble will soon do as much damage as was done by a boulder a few years ago." A sketch is also given of the improvements made in the rolling stock of the company, and some of the duties which the company has to fulfil to the public and municipality.

The public is referred to as Leg. No. 2 of the triangular support. Some of the duties of the public are given as follows: "Prompt compliance with the reasonable rules of the railway company and with city ordinances as they relate to personal conduct and the regulation of traffic is an indispensable requisite to efficient railroading. Patrons who assist the company in enforcing the anti-spitting ordinance perform a valuable public service. Overcrowding of cars results not only in traffic delays, but in increased liability to accidents. Overcrowding is made a misdemeanor in some cities and is particularly unwarranted when done by persons who can conveniently take the next car. In the interest of good service, the public can greatly facilitate the movement of traffic by not attempting to board overcrowded cars.

"It is the duty of drivers of all vehicles to give street cars the right of way at all times. Vehicle obstruction is one of the chief causes of irregular service and broken schedules. These obstructions are cumulative in their effect and a momentary delay caused by each of 50 vehicles results in a large aggregate loss of time and makes regular service impossible."

The third leg is the municipality, which in its legislative and executive capacity exerts a powerful influence upon street railway transportation. The announcement says that: "As representatives of all the people it becomes the duty of city officials to consider street railway problems as affecting, first, the entire city, and, second, particular territories whence come demands for changes in transportation which may involve the whole system. Manifestly it is the duty of the constituted municipal authorities to consider all special interests in connection with the general welfare and to enact such legislation as may be necessary to simplify routes and to expedite the operation of cars.

"In the regulation of street traffic the municipality is rendering invaluable aid to street railway service through the activities of the mounted police squad and crossing officers in the downtown district. The police are in constant communication with trainmen, and their influence upon traffic is incalculable.

"Through its various departments and bureaus the municipality's dealings with the street railway company cover every phase of its activity. Without its co-operation progressive railroading would be either extremely difficult or impossible."

In conclusion the company expresses its acknowledgment of the assistance of the public and the municipality in the past and bespeaks even greater awards as the result of still greater intelligent co-operation in the future.

ADDITIONAL SIGNALS ON ILLINOIS TRACTION SYSTEM

The Illinois Traction System at present is receiving bids for 100 track-circuit control, automatic block signals similar to those used by steam trunk lines, and also has just closed a contract with the Baird Electric Company, Chicago, for dispatchers' signals to cover 100 miles of track. The devices of the Baird Electric Company have been described in these columns. The Illinois Traction System installation of these dispatchers' signals will include 51 sidings on single-track lines connecting Peoria, Mackinaw Junction and Bloomington, and Mackinaw Junction, Lincoln and Springfield. The dispatchers' signal indications will be given by semaphore blades in the day time and lamps at night. The system provides an answer-back and record in the dispatcher's office for the movement of each signal.

With the Baird system the dispatcher can at one time set or clear one or as many of the semaphores as he desires. The control for the dispatchers' signals will be superimposed on one of the telephone circuits, and the operation of the signals will not interfere with the use of the telephone. No additional line wires will be required. Duplicate control boards will be provided in the dispatcher's office at Mackinaw Junction. Special care has been taken in the design of this layout to provide against false indications either from mechanical reasons or from stray currents. It is interesting to note that with the addition of selectors for setting dispatchers' signals over the telephone wire the telephone service itself is said to be improved, and also the operation of the signals and the attachment of the selectors will not interfere in any way with the use of the telephone between those parts of the road which are equipped with signals and other parts not so equipped.

The Pacific Electric Railway, the Indianapolis, Columbus & Southern Traction Company and the Louisville Railway also are said to be considering the purchase of block signals.

H. C. Eddy, secretary of the District Electric Railway Commission, Washington, D. C., has reported to the commission the result of the study which he made of the exhibits at the recent convention of the American Street & Interurban Railway Association at Atlantic City.

RIGHT OF CITY COUNCIL TO ORDER EXTENSIONS

A decision has been rendered by the Railroad Commission of Wisconsin on a case in which an order was sought to require the Merrill Railway & Light Company to extend a street railway line. The commission held that it was without jurisdiction and it dismissed the petition.

It was shown in the hearing that the Common Council had requested by ordinance that the company extend its lines as desired. The decision of the commission says in part:

"The relation existing between the company and the municipality is contractual, and while the terms and the conditions of the franchise may not be beyond the power of amendment or repeal vested in the Legislature, they are, nevertheless, binding upon the parties until altered by express legislative provision. It is incontrovertible that the authority granted to the company to extend its lines or to construct additional lines is permissive merely, if its duty in the premises is to be determined by the language of the ordinances mentioned. The only imperative obligation resting on the company, by virtue of the franchise, as to lines upon which service shall be rendered, seems to be that of maintaining and operating the existing lines and any extension thereof or additions thereto that may hereafter be voluntarily constructed by the company. Nor is there anything in the act under which the company was organized, or in its articles of incorporation, requiring it to extend its line to subserve the public convenience. In this respect it stands in the same position as steam railroads chartered under the general railroad act.

"It seems to be established by the weight of authority that in the absence of any statutory or charter provision requiring a railroad company to construct and operate its line or any portion thereof, such a duty cannot be implied from the common-law obligations resting upon the company in respect to its public service. It is only when the property has been brought into being and operations commenced that the right of the public in the use of the property attaches and may be enforced, and as long as the property is devoted to a public service such right continues, and in certain instances its withdrawal from the service without the consent of the public is denied by statute.

"Unless there is some provision in the Railroad Commission act altering the situation, a railroad company cannot be compelled to extend its lines in order to serve a new territory in the absence of any contractual obligation to make such extension. The material inquiry then relates to the purposes and scope of such act. The contention is urged by counsel for petitioner that section 1797-3, which provides that every railroad shall 'furnish reasonably adequate service and facilities,' in effect imposes upon the railroad the duty of extending its lines whenever public convenience and necessity require it. Railroad facilities are the means by which the road renders its service. However, the duty of furnishing reasonably adequate facilities has not been left by the statute in every instance to the general terms employed in section 1797-3, which is merely declaratory of the common law.

"Furthermore, the act was designed to regulate railroads operating within the State in the same general manner that the Interstate Commerce Act regulates interstate carriers and traffic, and much of the phraseology of the former was taken from the latter. The general purpose of the two acts, as far as they are identical in subject matter, is the same. They were both enacted to remedy certain evils which were common in both interstate and intrastate transportation. It is very clear from the authorities that the Federal act created no such obligation as is here asserted.

"It may be that the authority contended for by the petitioner should exist in case of street railways, which in cities of the size of Merrill have a natural monopoly. More than one street railway system in such a city is impossible. Therefore the necessities of such a community as a whole should be taken into consideration in developing the street railway system. If public convenience and necessity demand the extension of a line or lines of street railway to serve a section

of the city whose population is sufficient to warrant the required investment, the company should meet the exigencies. The Public Utilities Law has vested in common councils the power to compel extensions and additions to public utility plants when necessary to serve the public requirements. The common council is the proper body to which such authority should be given, if possible, over all public utilities, including street railways. It has control of the streets and is best situated, in the first instance, to determine what extensions and additions are required and where they should be made. Such authority, however, has not yet been conferred by the Legislature upon common councils or this commission in respect to street railways, and hence we are without jurisdiction of the subject matter of the petition."

REORGANIZATION OF THE THIRD AVENUE ROAD

The rehearing on the reorganization plan of the Third Avenue Railroad System, New York, has been closed formally by the New York Public Service Commission, First District. Several hearings have been held and various points have been raised, presumably with the idea that the entire case will be taken into the courts.

Herbert J. Bickford, of counsel, made a formal request for a reconsideration by the commission of all the facts and conclusions and that the commission abrogate, modify or change the order so as to grant the relief requested by the petition of the committee of bondholders and the Third Avenue Railway.

No announcement has been made as to the date when the commission will render its final decision.

JOINT AND SPECIAL WORK GRINDING IN SYRACUSE

The accompanying illustration shows a grinding outfit which is being used with good results by the Syracuse Rapid Transit Company to smooth down joints and manganese special work. The machine itself is the standard electric grinder of the Stow Manufacturing Company, Binghamton, N. Y., but the arrangement of the flexible shaft is novel. According to E. P. Roundey, engineer maintenance of way for the Syracuse company, the original installation had a 1¼-in. shaft coming straight out from a universal joint at the grinder. The men had to carry a wooden trough to lay the shaft in while grinding to keep it from getting kinked; also the arrangement of the original shaft at the grinding wheel was so rigid that the wheel



Grinding Machine in Service

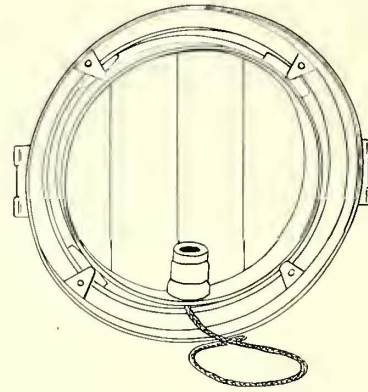
when grinding chattered to such an extent that a man could only grind for a short time without resting.

The present shaft is ¾ in. instead of 1¼ in. and as can be seen from the illustration falls in an easy curve from an arm attached to the motor. The troublesome universal joint at the motor is eliminated, and the connection of the shaft to the grinding wheel is made flexible. Hence, as there is no more

trouble from wheel chattering, a man can grind a long time without resting. The present ¾-in. shaft costs about one-half as much as the original 1¼-in. shaft. The grinding wheel is of Carborundum Aloxite, 8 in. in diameter, 1½ in. thick and with a 1-in. arbor hole. The wheel is driven at 1700 r.p.m.

ASSEMBLING GLASS IN HEADLIGHT DOORS

When the door of the headlight is bent or out of shape, it is quite difficult to adjust the several pieces of glass into place. The glass is sent from the factory cut circular in four pieces.



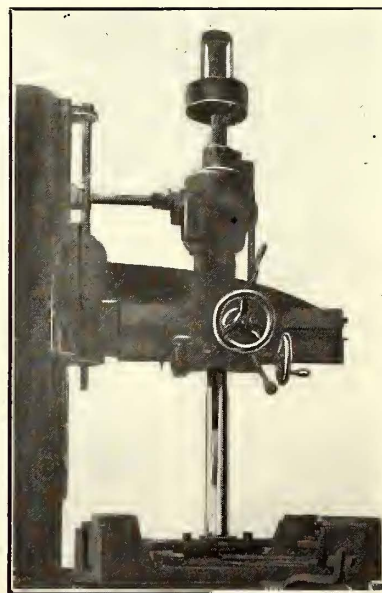
Assembling Headlight Door Glass

It is a long and tedious job to put the gasket around the glass and place it into the frame straight. To avoid this, cut a pasteboard templet the exact shape of the frame which is to receive the glass. Lay the pasteboard templet under the glass and cut around it with a glass cutter. Tap the glass where the marks have been made with the end of the glass cutter. Break the glass away to leave a piece the same shape as the templet. Divide the glass into four equal parts and cut straight parallel lines, by the aid of a straight-edge. When this has been done, take a rubber gasket and place it around the edge of the glass, first having put a little shellac on the ends of the gasket, to hold it together. Put the glass into the frame of the headlight door and fasten securely with the four little clamps, as shown in the cut. Tap the glass where the four parallel lines have been cut, so the glass will break at these places, thus allowing room for expansion when the glass becomes hot.

USING A DRILL FOR A BORING MILL

There are many small electric railway shops which find it necessary to adapt one tool for several uses as there is not enough to warrant the purchase of special devices. An interesting

example of this kind is afforded by the accompanying illustration showing a W. E. Gang radial drill which is used by the Charleston (S. C.) Consolidated Railway, Gas & Electric Company, and is frequently employed as a boring mill. The regular drill slot suffices for holding the 1½-in. borer used for this company's ferryboat repair work, but the full length of the spindle is required for the wheel borer. No change is required in the bed of the machine in either case. The wheel



Radial Drill Used as Borer

borer was made out of an old car axle and the tool set in with a wedge. From 15 to 20 minutes is required to bore a wheel to remove ¼ in. of metal. The illustration and particulars were furnished by F. H. Harris, master mechanic, Charleston (S. C.) Consolidated Railway & Lighting Company.

News of Electric Railways

Program of Central Electric Railway Association

The following program has been announced for the meeting of the Central Electric Railway Association which is to be held at the Phillips House, Dayton, Ohio, on Dec. 1, 1910:

MORNING SESSION, 9:30 A. M.

Business session and reports of special committees.

Last reading of and final action on "Revised Constitution and By-laws."

Paper, "Recent Developments in Car Heating," by H. S. Williams, of the Peter Smith Heater Company, Detroit, Mich.

* Discussion.

† Paper, "Traffic," by W. O. Woodard, traffic manager of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind.

Discussion.

Adjournment for lunch.

AFTERNOON SESSION

Paper, "Gears and Pinions," by T. W. Williams, of the General Electric Company, Schenectady, N. Y.

Discussion.

Paper, "Wood Preservation," by A. L. Kuehn, general superintendent of the American Creosoting Company, Chicago, Ill.

Discussion.

The executive committee of the association will meet at 7:30 p. m. on Nov. 30, 1910.

Quarterly Meeting of New York State Association

The twelfth quarterly meeting of the Street Railway Association of the State of New York will be held at the Hotel Onondaga at Syracuse, N. Y., on the evening of Dec. 6 and on Dec. 7, 1910. The session on the evening of Dec. 6, 1910, will be opened with an informal dinner at 8 o'clock at the Hotel Onondaga, after which the remainder of the evening will be given to a general discussion of one of the subjects on the program. There will be morning and afternoon sessions on Dec. 7, 1910, at the Hotel Onondaga, at which the following program will be carried out:

PROGRAM OF MEETING

Committee appointed to confer with the Public Service Commission relative to the meaning of the word "center-bearing" as it appears in the Railroad Law—W. H. Collins, chairman; M. J. French, B. E. Tilton.

Committee on Traffic and Tariff—J. M. Campbell, chairman; H. C. Allen, C. H. Armatage, R. M. Colt, C. R. Gowen, John W. Nugent, B. E. Wilson.

Committee on Standard Franchises—C. Loomis Allen, chairman; Edgar S. Fassett, E. F. Peck.

Committee on New Schedule of Annual Dues—H. M. Beardsley.

The next order of business will be a discussion of the results secured at the annual meeting of the American Electric Railway Association, held at Atlantic City last October, as follows:

"Shop Accounting and a System for Handling Scrap Materials." Discussion to be opened by J. C. Collins, secretary and auditor of the New York State Railways, followed by J. M. Joel, auditor of the Utica & Mohawk Valley Railroad, and F. E. Belleville, auditor of the Schenectady Railway.

Paper, "Training of Transportation Employees," by W. H. Collins, general manager of the Fonda, Johnstown & Gloversville Railroad. Discussion led by J. E. Duffy, superintendent of transportation of the Syracuse Rapid Transit Railway, and R. H. Smith, general manager of the Albany & Southern Railroad.

Paper, "Maintenance of Way and Equipment," by H. A. Benedict, mechanical engineer of the United Traction Company. Discussion led by Martin Schreiber, engineer of maintenance of way of the Public Service Railway, Newark, N. J.; M. J. French, engineer of maintenance of way of the Utica & Mohawk Valley Railway, and W. J. Harvie, chief engineer of the Utica & Mohawk Valley Railway.

Arrangements have been made with the Hotel Onondaga for accommodations for those who apply directly to the hotel management prior to the date of the meeting.

A cordial invitation is extended to all to attend and participate in the open discussions on the papers and questions presented.

Subway Grants in Cleveland

At the election in Cleveland on Nov. 8, 1910, franchises were approved which grant to the Cleveland Underground Rapid Transit Railroad permission to proceed with the construction of high and low-level subways in Cleveland. The franchises were originally passed under the Johnson administration. They were opposed by many because they contained few of the safeguards which are contained in the grant made to the Cleveland Railway.

Ordinance No. 1647a, known as the high-level grant, provides for subways from the Public Square to the city limits under Superior, Euclid and Woodland Avenues on the East Side and under Detroit and Lorain Avenues and West Twenty-fifth Street on the West Side, with certain cross-town lines and connections. Another short line is provided for in the grant to reach the flats along the Cuyahoga Valley.

The low-level subways are intended to care for the interurban and suburban business of the steam railroads and the electric railways. One line will extend from the Public Square under Superior Avenue to East Ninth Street and under the latter to the private right-of-way of the Nickel Plate Railroad at the Broadway depot. Another line will leave Euclid Avenue at Fourth Street, pass under the Central Market grounds and continue in a southerly direction to a connection with the tracks on the right-of-way of the New York, Chicago & St. Louis Railroad, near Twenty-second Street. Another line will begin at the south side of Canal Road, opposite East Ninth Street, as an elevated structure and extend to a subway on East Ninth Street, and continue northerly to the railroad right-of-way north of Summit Avenue N. E. Still another line will begin at East Ninth Street and Summit Avenue and continue under Summit Avenue to East Third Street and south under East Third Street to Superior Avenue N. E., also from East Ninth Street under Roekwell Avenue to the Public Square.

In asking for these grants it was urged that the low-level subways would take care of the interurban and suburban traffic by providing an entrance for the interurban cars to the city over the Nickel Plate tracks and the subway to the Public Square, while the high-level routes would care for traffic within the city.

The franchises for the low-level routes require that the company must begin construction before December, 1912, and must have at least one line, or lines, from the Cuyahoga Valley to the Public Square in operation before December, 1914. All low-level lines must be completed before December, 1917. The franchise for the high-level routes provides that the company must begin construction before June, 1912, and that one line must be in operation from the Public Square to the city limits before December, 1914. At least 5 miles more of double track must be completed before December, 1917, and five additional miles must be completed every two years until all the lines are in operation.

The grant is for 75 years, with the privilege of purchase sooner by the city at a price fixed by the franchise. At the end of 75 years the upper subways will pass to the city without cost.

The first grant made to the company was submitted to the voters a year ago, but the result is still in doubt, as the election board was restrained from counting the blank ballots, which the representatives of the company insisted were votes. New franchises were passed by the Council and signed by Vice-Mayor Lapp. After the grants had been advertised once the city was restrained from proceeding further. W. R. Hopkins, for the company, claimed that in the case of a special ordinance advertisements were not necessary and that the contract between the company and

the city had been closed, as the company had accepted the ordinances. Under the new administration the City Council passed a repealing ordinance, but it was claimed the repeal was not legal. The referendum petitions were then circulated. David Evans then brought suit to restrain the board of elections from placing the question of approving the ordinances on the ballot. This case was carried to the Supreme Court, but was not decided. The board therefore had the right to submit the grants to a vote.

Transit Affairs in New York

On Nov. 14, 1910, the Public Service Commission received from Alfred Craven, its chief engineer, the report on the examination of the bids on the Broadway-Lexington Avenue, the Canal Street crosstown, and the Broadway-Lafayette Avenue (Williamsburg) subway, which Mr. Craven made to detect any unbalancing of the bids. Chairman Willcox of the commission would not say when the commission would send the bids to the Board of Estimate. The members of the Board of Estimate are said to be divided in regard to the tri-borough plan. Unless the members who have made public their preferences change their attitude it is possible that Borough President McAneny, whose attitude is unknown, will cast the deciding vote. Mr. McAneny is quoted as saying: "I have taken no position in the subway situation either for or against the tri-borough route. Until the Board of Estimate has given its hearings and heard the argument and until time has been taken for careful consideration of every question involved, financial as well as tactical, I prefer to reserve my own judgment."

The agreement between the Interborough Rapid Transit Company and the Public Service Commission regarding the operation of the Steinway Tunnel was placed before the Board of Estimate and Apportionment of New York on Nov. 11, 1910, but owing to the fact that the commission had not submitted a complete proposition or terms regarding the third tracking of the elevated system, which is a part of the plan of the Interborough Rapid Transit Company, the matter was referred to the transit committee of the board.

The Public Service Commission has adopted a final order directing the Coney Island & Brooklyn Railroad to relay or repair within two years its tracks in Franklin Avenue, Wythe Avenue, Malbone Street, Parkside Avenue and Ocean Avenue, from Park Circle to the termini at South Eighth Street and at the Broadway ferries. The company has 30 days in which to file with the commission a statement of what portions of its tracks it will rebuild within two years.

The Public Service Commission has ordered a hearing to be held Nov. 21, 1910, to determine whether the Brooklyn Union Elevated Railroad, the Nassau Electric Railroad, the Sea Beach Railway and the South Brooklyn Railway shall be ordered to change the ventilating arrangements on some of their cars. The cars used on the Culver, Fifth Avenue, Bay Ridge, Sea Beach and West End lines have "Empire" roofs with small ventilators in the top of the car instead of a monitor with side ventilators.

Expiration of Trial Period in Cleveland

The trial period for the operation of the Cleveland (Ohio) Railway provided in the Tayler franchise ends on Dec. 1, 1910. So far the present fare of 3 cents and 1 cent for a transfer has taken care of the interest on the investment and provided some money for the extension of the service. The idea seems to prevail that no material extensions should be asked by the Council and that re-routing should be left for future consideration. Under this plan the company will be limited to a certain and almost definite sum per year in making repairs and rebuilding track. The company is operating with about the same number of cars that it had when the settlement was reached. Some of these have been rebuilt, however, and provided with pay-within or pay-as-you-enter equipment. On the other hand, J. J. Stanley, president of the Cleveland Railway, states that the coming winter will bring a crisis in the 3-cent fare proposition. He does not believe that the people will remain satisfied with the service which they are getting under the present fare. G. M. Dahl, street railway commissioner, would not con-

firm the report that the City Council had settled the question of fare as outlined above.

The allowance for repairs and maintenance goes from 6 cents to 4 cents per car mile during the winter months, but the increased cost of operation will probably more than offset this. The cost of heating the cars is about \$150 a day.

It is said that the system has been operated on the most limited margin since the settlement was reached. No extensions are being made and no improvements are contemplated. Since March 1, 1910, \$850,000 has been borrowed and stock amounting to \$376,000 has been sold. This money has gone to care for necessities. No permanent improvements can be made unless a better demand for the stock develops.

The people of Collinwood complain that the cars which reach that section are filled with passengers who do not ride beyond the fare limits and that the people who pay a 5-cent fare are compelled to stand up after waiting sometimes half an hour for a car. It has been suggested that signs should be placed on the Collinwood cars stating that the fare is 5 cents and asking people who ride only within the 3-cent fare limits to take other cars. The trouble occurs mostly during the rush hours in the evening.

Both Mr. Stanley and Mr. Dahl object to the plan to build a line through the flats along the Cuyahoga River. They say that the company has no funds for construction and that the line would not pay. Mr. Stanley has suggested that the connection of the Harvard and Dennison Avenue lines over the new Harvard-Dennison bridge would pay and that such an improvement is needed. The cost of the three miles of track required would be about \$150,000, but even this extension cannot be undertaken now on account of lack of funds.

The city health authorities believe that the prepayment cars, which are closed by doors at both ends, are not sufficiently ventilated. Mr. Stanley states that a new ventilating apparatus is being tested and may be adopted.

Meeting of Alabama Light & Traction Association.—The meeting of the Alabama Light & Traction Association, which was originally arranged to be held at Anniston, Ala., on Nov. 21, 22 and 23, 1910, has been postponed until Nov. 28, 29 and 30, 1910, at Anniston. The program for the meeting is now being arranged.

Special Committee to Consider Municipal Ownership in Worcester.—The Aldermen of Worcester, Mass., have passed a resolution to appoint a special committee to consider the advisability of conducting negotiations with the Worcester Consolidated Street Railway for the purchase of the property of the company.

Mill Tax Taken to Supreme Court.—An appeal has been granted in the United States Circuit Court at St. Louis by Judge David P. Dyer on motion of the attorneys for the United Railways, St. Louis, Mo., and the St. Louis Transit Company, which will take the mill tax of the electric railways to the Supreme Court for a second time. An ordinance passed in 1903 levied a tax of one mill on every 5-cent cash fare received by the company. The amount now due the City of St. Louis under the provisions of this tax is said to be nearly \$1,500,000.

Meeting of Massachusetts Street Railway Association.—The regular monthly meeting of the Massachusetts Street Railway Association was held at Young's Hotel, Boston, Mass., on the evening of Nov. 9, 1910. President R. S. Goff presided. The dinner was attended by a large number of street railway officials from various properties in Eastern Massachusetts. After the dinner Commodore J. W. Miller, vice-president of the Cape Cod Construction Company, described the construction of the Cape Cod Canal, illustrating his remarks with the stereopticon.

Public Conference to Consider Legislation in Indiana.—The officers of the interurban railways in Indiana are to be asked to confer with Governor Marshall of Indiana and the members of the Railroad Commission of Indiana to consider suggestions regarding recommendations about electric railways which it is proposed to incorporate in the Governor's message to the Legislature. The conference will be public. The special report made by the commission to the Governor on the recent fatal interurban wrecks at Kingsland and Tipton will be considered at the conference.

Financial and Corporate

New York Stock and Money Market

Nov. 16, 1910.

The Wall Street market has practically recovered from the selling epidemic which succeeded the election. Many of those who bought stocks about the first of the month at low figures sold while the high prices prevailed before the election. Others tried to gather their profits the day after the election. As a result there was a sharp break in prices. This flurry over, the market has settled down strong in tone but dull in trading.

The bond market has improved very little, but the money market continues to be sufficiently easy to continue trading. Quotations to-day were: Call, 3@3½ per cent; 90 days, 4½@4¾ per cent.

Other Markets

While transactions in Rapid Transit and Union Traction have been quite liberal—especially in the former—on the Philadelphia Exchange during the past week there have been no material changes in the prices.

In the Chicago market there is less interest in tractions. Small lots of Railways certificates series 2 have been traded in, but the price has remained stationary in the neighborhood of 20. Other tractions have been neglected.

Massachusetts Electric shares are again quite active in the Boston market, stimulated by the excellent earnings reports that have recently been made public. Prices are strong, but have not advanced materially. Boston Elevated is less prominent in the market.

In Baltimore there has been no trading in traction stocks during the past week. The bonds of the United Railways continue to sell actively at unchanged prices.

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

	Nov. 7.	Nov. 15.
American Railways Company.....	a43	43
Aurora, Elgin & Chicago Railroad (common).....	a45	a45
Aurora, Elgin & Chicago Railroad (preferred).....	a90	a80½
Boston Elevated Railway.....	a128	a128½
Boston & Suburban Electric Companies.....	*14¼	16½
Boston & Suburban Electric Companies (preferred)....	*72	72
Boston & Worcester Electric Companies (common)....	*10½	*10½
Boston & Worcester Electric Companies (preferred)....	*43	*43
Brooklyn Rapid Transit Company.....	77¾	77¾
Brooklyn Rapid Transit Company, 1st pref. conv. 4s.	83¼	83¼
Capital Traction Company, Washington.....	a128½	a128½
Chicago City Railway.....	*170	*170
Chicago & Oak Park Elevated Railroad (common)....	*3¼	*3¼
Chicago & Oak Park Elevated Railroad (preferred)....	*7¼	*7¼
Chicago Railways, ptcptg., ctf. 1.....	a77	a76
Chicago Railways, ptcptg., ctf. 2.....	a21	a20½
Chicago Railways, ptcptg., 3.....	a11	a11
Chicago Railways, ptcptg., ctf. 4.....	a5½	a5½
Consolidated Traction of New Jersey.....	a73½	a74
Cleveland Railway.....	*91½	*91½
Consolidated Traction of N. J., 5 per cent bonds....	a104	a104
Detroit United Railways.....	a58	a57
General Electric Company.....	154½	153
Georgia Railway & Electric Company (common).....	a121¾	a120
Georgia Railway & Electric Company (preferred)....	*89	a89
Interborough-Metropolitan Company (common).....	22¼	21
Interborough-Metropolitan Company (preferred)....	58¾	57½
Interborough-Metropolitan Company (4½s).....	81½	80¾
Kansas City Railway & Light Company (common)....	a23½	a23
Kansas City Railway & Light Company (preferred)....	a75	a75
Manhattan Railway.....	a142½	a142
Massachusetts Electric Company (common).....	a21	a20½
Massachusetts Electric Companies (preferred).....	a86	a87¾
Metropolitan West Side, Chicago (common).....	*21	*21
Metropolitan West Side, Chicago (preferred).....	*64	*64
Metropolitan Street Railway.....	*22	*22
Milwaukee Electric Railway & Light (preferred)....	*110	*110
North American Company.....	*67½	65½
Northwestern Elevated Railroad (common).....	a23	a20
Northwestern Elevated Railroad (preferred).....	a60	a60
Philadelphia Company, Pittsburg (common).....	a45¼	a45¼
Philadelphia Company, Pittsburg (preferred).....	a42	a41½
Philadelphia Rapid Transit Company.....	a15¾	a16¼
Philadelphia Traction Company.....	*82	*82
Public Service Corporation, 5 per cent col. notes....	a95	a95
Public Service Corporation, ctf. 5.....	a101	a101
Seattle Electric Company (common).....	*109	a107½
Seattle Electric Company (preferred).....	*98½	a102½
South Side Elevated Railroad (Chicago).....	65	*65
Third Avenue Railroad, New York.....	13½	*12¾
Toledo Railways & Light Company.....	a8	a10
Twin City Rapid Transit, Minneapolis (common)....	a111	a110½
Union Traction Company, Philadelphia.....	a39½	a39¾
United Rys. & Electric Company, Baltimore.....	*15¾	*15¾
United Rys. Inv. Co. (common).....	14¾	*14¾
United Rys. Inv. Co. (preferred).....	*60	*60
Washington Ry. & Electric Company (common)....	a35¾	a36½
Washington Ry. & Electric Company (preferred)....	a90	a90
West End Street Railway, Boston (common).....	a87	87½
West End Street Railway, Boston (preferred).....	*100¾	*100¾
Westinghouse Elec. & Mfg. Company.....	73¾	71
Westinghouse Elec. & Mfg. Company (1st pref.)....	*124	124

a Asked. * Last sale.

Railway Assessments in Wisconsin

A preliminary assessed valuation of \$42,788,000 has been placed on the street railway, light, heat and power utility companies of Wisconsin by the State Tax Commission. This is an increase of \$2,318,000 over the preliminary valuations of the past year. The largest increase was made with the Milwaukee Electric Railway & Light Company, from \$23,500,000 in 1910 to \$24,400,000, an increase of \$900,000. The assessments of the various electric railway companies follow:

Milwaukee Electric Railway & Light Company.....	\$24,400,000
Milwaukee Light, Heat & Traction Company.....	6,950,000
Milwaukee Northern Railway.....	1,650,000
Wisconsin Traction, Light, Heat & Power Company.....	1,150,000
Chippewa Valley Railway, Light & Power Company.....	1,000,000
Duluth Street Railway.....	875,000
Sheboygan Light, Heat & Traction Company.....	865,000
Southern Wisconsin Railway.....	850,000
Eastern Wisconsin Railway & Light Company.....	775,000
Green Bay Traction.....	705,000
Wisconsin Electric Railway.....	650,000
Wausau Street Railroad.....	500,000
La Crosse City Railway.....	460,000
Rockford & Interurban Railway.....	310,000
Kenosha Street Railway.....	275,000
Nemominee & Marinette Light & Traction Company.....	240,000
Ashland Light, Power & Street Railway Company.....	285,000
Chicago & Milwaukee Electric.....	180,000
Merrill Railway & Lighting Company.....	120,000
Manitowoc & Northern Traction Company.....	120,000
Grand Rapids Railway.....	110,000
Beloit Traction Company.....	110,000
Waupaca Electric Light & Railway.....	86,000
Janesville Street Railway.....	37,000
Bay Shore Street Railway.....	20,000
La Crosse & Onalaska Street Railway.....	20,000

These preliminary valuations are subject to review and correction after hearing, which will be held before the State Tax Commission.

Annual Report of the New Orleans Railway & Light Company

Earnings of the New Orleans Railway & Light Company for the year ended Dec. 31, 1909, compare with the previous year as follows:

	YEAR ENDED DEC. 31	
	1909	1908
Operating revenue:		
Railroad department.....	\$4,101,545	\$4,033,780
Electric department.....	1,027,898	1,046,776
Gas department.....	904,881	887,933
Total.....	\$6,034,324	\$5,968,498
Operating expenses:		
Railroad department.....	\$2,403,076	\$2,468,366
Electric department.....	525,806	487,517
Gas department.....	400,019	409,101
Total.....	\$3,328,901	\$3,364,984
Net operating revenue.....	\$2,705,423	\$2,603,514
Deduct: Operating taxes.....	481,750	476,727
Operating income.....	\$2,223,673	\$2,126,787
Miscellaneous income.....	8,569	10,497
Gross income.....	\$2,232,242	\$2,137,284
Total deductions.....	\$1,571,760	\$1,566,790
Interest on funded debt.....	\$1,498,888	\$1,451,272
Other interest charges.....	13,966	68,188
Dividends on New Orleans City R. R. stock, proportion payable to minority holders.....	4,745	4,746
Amortization of commission on loans.....	47,222	26,389
Uncollectible accounts and unadjusted claims charged to income.....	5,448	14,695
Other deductions.....	1,500	1,500
Total deductions.....	\$1,571,760	\$1,566,790
Net income.....	\$660,473	\$570,494

Hugh McCloskey, the president, says in part in his statement to shareholders:

"The percentage of passengers using transfers during the year 1909 was 22.6 per cent, and our average fare per passenger was 4.10 cents against 4.19 cents in 1908.

"During the past year the various companies expended in construction, improvements and betterments and for acquisition of new property the sum of \$681,382.

"On Nov. 1 the company sold to Bertron, Griscom & Jenks \$2,581,000 par value of its 5 per cent 40-year refunding and general lien gold mortgage bonds, the proceeds to be used for improvements and betterments to the properties of the company at 75 per cent of the cost thereof. This discount on these bonds and on the 4½ per cent bonds sold during the year as shown in the balance sheet will be

written off in the customary manner during the period covered by the life of the securities.

"It is gratifying to be able to assure you that the physical property and equipment of the company in every department and branch have been maintained in a good state of repair and efficiency, the generally satisfactory showing for the year not having been made at the expense of the property."

The certificate of Marwick, Mitchell & Co., who examined the accounts, certifies that "subject to proper provision for depreciation of properties and plant" the balance sheet is correctly prepared from the books of the company, and its subsidiaries, and is in their opinion "properly drawn up so as to show the true financial condition of the company as at Dec. 31, 1909."

Traffic statistics in the report compare as follows:

	1909	1908
Revenue passengers carried.....	78,643,680	77,459,499
Transfers redeemed.....	17,816,746	15,492,363
Revenue mileage.....	18,718,605	18,671,256
Eighteen-hour cars.....	117,072	115,605

Chicago (Ill.) Consolidated Traction Company.—The Harris Trust & Savings Bank, Chicago, Ill., is receiving deposits of the underlying bonds of the Chicago Consolidated Traction Company. The time for the deposit of these securities expires on Nov. 19, 1910, and the properties are to be sold under the decree of the Federal Court on Nov. 30, 1910.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis.—The Wisconsin Railroad Commission has approved a further issue of \$100,000 of first mortgage 5 per cent bonds of 1907 by the Chippewa Valley Railway, Light & Power Company. The proceeds are to be used to complete a concrete dam and power house at Cedar Falls; to acquire additional riparian rights; to pay for additions, including the transmission line from Eau Claire to Chippewa Falls, and to pay the floating debt incurred for additions.

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 further postponed by Judge Lacombe of the United States Circuit Court to Jan. 17, 1910, on motion of the Union Trust Company, New York.

Interstate Railways, Philadelphia, Pa.—The directors of the Interstate Railways have decided to call a special meeting of stockholders of the company at Camden, N. J., for Nov. 25, 1910, to vote on a plan to issue \$1,000,000 of preferred stock at par. The proceeds of the sale of the stock will be used to liquidate the company's floating indebtedness and to pay overdue interest and the coupons due on the bonds in February.

Los Angeles (Cal.) Railway Corporation.—The Los Angeles Railway Corporation, which succeeded the Los Angeles Railway, and, as noted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 12, 1910, page 1007, has taken over local lines of the Pacific Electric Railway in Los Angeles and will operate them as a part of its system, has secured title to the lines of the Los Angeles Traction Company, including the West Adams, West Jefferson, Boyle Heights and Santa Fe depot lines, which operate downtown via Third Street, the Temple Street line in the northwestern part of the city, the Belt Line, which is made up of the Angeleno Heights and the Crown Hill lines, the Arcade depot and the Brooklyn Heights line on the East Side and the West Sixth Street line beyond Figuera.

Manhattan Elevated Railway, New York, N. Y.—Paul Morton has been elected a director of the Manhattan Elevated Railway to succeed the late Dumont Clark.

Metropolitan Street Railway, New York, N. Y.—The sale of the property of the Metropolitan Street Railway under foreclosure has been postponed until Jan. 5, 1910, on which date the property pledged under the \$12,500,000 first mortgage will be sold at noon and the property pledged under the \$16,604,000 refunding mortgage will be sold at 2:30 p. m.

Philadelphia (Pa.) Rapid Transit Company.—The committee of directors of the Union Traction Company, consisting of Robert A. Balfour and George W. Elkins, which has been considering the plan for financing the Philadelphia

Rapid Transit Company proposed by E. T. Stotesbury, reported to the directors of the Union Traction Company on Nov. 14, 1910, and was instructed to continue its investigation. No official statement was issued in regard to what transpired at the meeting, but the Philadelphia *Public Ledger* quoted J. J. Sullivan, an ex-officio member of the committee, as follows: "The committee's report was accepted. That is all I am at liberty to say at this time." The same paper also quoted J. H. Chestnut, a director of the Union Traction Company, as follows: "The committee is getting along nicely, although it has been delayed somewhat by Mr. Elkins' unavoidable absence from the city of two weeks. The plan as being worked out will undoubtedly find favor when the committee's work is completed." T. E. Mitten, president of the Chicago (Ill.) City Railway, it is reported will shortly be elected a director of the Philadelphia Rapid Transit Company. It is understood that Mr. Mitten will accept this duty in addition to his present work and that he will be elected a director of the Philadelphia Rapid Transit Company so that his services may be used in an advisory capacity during rehabilitation work. City Councils have postponed action on the resolution which provides for the election of a successor to George H. Earle, Jr., as one of the three representatives of the city on the board of directors of the company, George McCurdy, president of Common Council, having declared that he could not accept the appointment on account of other business.

Portland Railway, Light & Power Company, Portland, Ore.—A special meeting of the stockholders of the Portland Railway, Light & Power Company has been called for Nov. 28, 1910, at Portland, Ore., to act on a plan to redeem \$5,000,000 of the preferred stock of the company now outstanding at 105, by increasing the capital stock of the company to \$25,000,000 by issuing an additional \$10,000,000 in common stock. For each share of the present full-paid common stock, accompanied by \$62.50 in cash, 2½ shares of new stock will be issued, 65 per cent paid, the remaining 35 per cent being subject to call, the calls to be limited to not more than 5 per cent in any calendar year. The circular to stockholders says that the result of this plan will be that instead of having \$15,000,000 of capital stock, divided into \$5,000,000 of preferred and \$10,000,000 of common, the capital stock will be \$25,000,000, of which 65 per cent, or \$16,250,000, will have been paid in. As a further result the company will receive \$1,000,000 in cash.

Trenton (N. J.) Street Railway.—The Trenton Street Railway has asked the Board of Public Utility Commissioners for the State of New Jersey to ratify the lease of the property of the company to the Trenton & Mercer County Traction Corporation.

Washington, Baltimore & Annapolis Electric Railway, Washington, D. C.—Plans which are said to have been prepared by the committee representing the bondholders of the Washington, Baltimore & Annapolis Electric Railway provide for the organization of a new company to take over the property of the Washington, Baltimore & Annapolis Electric Railway after foreclosure, the new company to have total authorized capital liabilities of \$13,000,000, of which \$7,500,000 is to be first mortgage bonds, \$2,500,000 6 per cent non-cumulative preferred stock and \$3,000,000 common stock. At present \$5,000,000 of bonds would be issued, \$1,460,000 of preferred stock and the entire amount of common stock. Of the bonds to be issued, \$217,000 are to be placed in the treasury and the remainder to be delivered only for additions, extensions, etc.

West Penn Traction Company, Pittsburgh, Pa.—The directors of the West Penn Traction Company have authorized an initial semi-annual dividend of 1 per cent on the common stock of the company, payable on Dec. 15, 1910, to holders of record of Dec. 7, 1910.

◆◆◆◆◆
Dividends Declared

Northern Texas Electric Company, Fort Worth, Tex., quarterly, 1¼ per cent, common.

Pacific Gas & Electric Company, San Francisco, Cal., quarterly, 1½ per cent, preferred.

West Penn Traction Company, Pittsburgh, Pa., 1 per cent, common.

Traffic and Transportation

Boston Elevated Continues Educational Campaign

Reference was made in the *ELECTRIC RAILWAY JOURNAL* of Oct. 15, 1910, page 856, to the rapid transit educational campaign which the Boston Elevated Railway is conducting in the daily press of Boston to convey to the public comprehensively the improvements effected in recent years and planned for the immediate future. Nine advertisements have been printed in this campaign up to Oct. 26, 1910, each accompanied with a large map of the entire system and showing the effect of each new elevated or subway line upon the transit facilities of the metropolitan district. In the *ELECTRIC RAILWAY JOURNAL* of Oct. 15, 1910, the features of the first two maps were mentioned. In the third insertion the East Boston tunnel was shown. This is the first structure ever built under tidewater for street car service. The tunnel serves a district inhabited by 80,000 persons which is peculiarly located.

The fourth advertisement discussed the benefits to the community of the Washington Street tunnel, which permitted the restoration of the Tremont Street subway to its original surface car use. The new tunnel made it possible to use six, seven or eight-car trains, and the capacity of the

In the ninth advertisement the company describes the elevated extension to Malden from Sullivan Square, which will mean the completion of 11 continuous miles of double track elevated road from north to south through Boston. This extension will be about three miles in length and its estimated cost is \$3,500,000, without equipment. The running time from Malden Square to Sullivan Square will be reduced from 16 minutes to 6 minutes by this improvement. The extension will also serve the people of Everett.

On Oct. 31 the company published a map showing the additions which it has made to the surface lines of its system in the past 12 years and pointed out that in 16 States of the Union and numerous important cities, such as Louisville, Indianapolis, Omaha, Rochester and Columbus, there are fewer miles of street railway than the Boston Elevated Railway has added to its surface lines since 1898.

Accidents on Interstate Electric Railways

The Interstate Commerce Commission has issued Accident Bulletin No. 36, which contains a summary of railroad accidents in the United States during April, May and June, 1910, and the year ended June 30, 1910. The report deals only with employees on duty and passengers. It contains the accompanying tables, which show the accidents on

ACCIDENTS ON ELECTRIC RAILWAYS—CASUALTIES TO PERSONS—APRIL, MAY AND JUNE, 1910.

	Passengers (a and b), killed.	Passengers (a and b), injured.	Persons carried under agreement or contract (bb), killed.	Persons carried under agreement or contract (bb), injured.	Total (a, b and bb), killed.	Total (a, b and bb), injured.	Trainmen, killed.	Trainmen, injured.	Trainmen in yards, killed.	Trainmen in yards, injured.	Yard trainmen (switching crews), killed.	Yard trainmen (switching crews), injured.	Other employees, killed.	Other employees, injured.	Total employees, killed.	Total employees, injured.	Total persons reported killed.	Total persons reported injured.
Collisions	2	259	1	..	3	259	5	13	..	..	1	..	..	..	..	..	8	274
Derailments	..	50	..	..	..	51	..	..	..	..	..	..	..	..	..	..	..	59
Miscellaneous train accidents	..	2	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	2
Total train accidents	2	311	1	1	3	312	5	19	..	1	..	..	..	3	5	23	8	335
Causes.																		
Coupling or uncoupling	..	..	..	..	..	..	2	..	1	..	4	..	1	..	8	..	8	..
While doing other work about trains or while attending switches	..	..	..	..	..	..	14	..	..	..	2	1	6	1	22	1	22	..
Coming in contact with overhead bridges, structures at side of track, etc.	..	9	..	..	9	1	3	..	..	..	2	..	1	1	6	1	15	..
Falling from vehicles or while getting on or off	4	275	..	..	4	276	1	11	..	..	3	..	3	1	17	5	293	..
Other causes	..	52	..	..	..	52	2	..	..	..	..	..	2	28	4	30	4	82
Total (other than train accidents)	4	336	..	1	4	337	4	32	..	1	..	11	3	39	7	83	11	420
Total, all classes	6	347	1	2	7	649	9	51	..	2	..	11	3	42	12	106	19	755

(a) Ordinary passengers; (b) passengers traveling on freight trains; (bb) postal clerks, express messengers, newsboys and others carried under special arrangements.

entire elevated system was thereby increased 70 per cent. These advantages were obtained only at the enormous cost of \$10,000,000, or about \$2,000 per running foot.

The fifth insertion showed the Forest Hills elevated extension. The company emphasized the fact that eight years ago the residents of West Roxbury paid two fares to reach the downtown district. In 1903 the Boston Elevated Railway leased the West Roxbury lines and reduced the fare to 5 cents, at once expending \$400,000 in double tracking and similar improvements. The elevated extension cost \$3,000,000 more and was opened for business in November, 1909.

The sixth advertisement took up the East Cambridge elevated extension, which will provide a fast route over the Charles River dam from Lechmere Square, East Cambridge, to the North Station and Tremont Street subway entrance and reduce the running time by two-thirds.

In the seventh instalment the company discussed the Cambridge subway and Beacon Hill tunnel which are under construction. The entire taxable value of Cambridge, with its population of 105,000, is only \$108,000,000, or nine times the cost of this subway.

The eighth publication discussed the improvement to be effected by the Riverbank subway, which will provide additional terminal facilities at Park Street, relieve the congestion on Boylston Street, and save 10 minutes in running time to nearly all residents of Brighton, Allston and Brookline, and to a part of the population of Newton, Waltham and Watertown. This subway will be 1.75 miles long and its estimated cost without equipment is \$3,000,000.

electric railways on which interstate commerce is carried and which are subject to the federal accident law.

ACCIDENTS ON ELECTRIC RAILWAYS—COLLISIONS AND DERAILMENTS—APRIL, MAY AND JUNE, 1910

	Number	Loss	Killed	Injured
Collisions, rear	15	\$5,839	1	62
Collisions, butting	11	47,502	7	202
Collisions, train separating	..	..	..	..
Collisions, miscellaneous	7	846	..	10
Total	33	\$54,187	8	274
Derailments due to defects of roadway, etc.	2	..	..	5
Derailments due to defects of equipment	..	..	..	..
Derailments due to negligence of trainmen, signalmen, etc.	2	..	..	15
Derailments due to unforeseen obstruction of track, etc.	1	1,500	..	1
Derailments due to malicious obstruction of track, etc.	..	..	..	..
Derailments due to miscellaneous causes	11	3,860	..	38
Total	16	\$5,360	..	59
Total collisions and derailments	49	59,547	8	333

Operation of Hudson & Manhattan Railroad Extended to Thirty-third Street, New York

The new station of the Hudson & Manhattan Railroad, which operates under the Hudson River between New York and New Jersey, at Thirty-third Street and Sixth Avenue, was opened at 3 a. m. on Nov. 10, 1910. The work on the extension to Grand Central Station by way of Sixth Avenue and Forty-second Street has not yet been begun. A special train was run on Nov. 9, 1910, from the Cortlandt

Street terminal by way of the Pennsylvania Railroad and the Erie Railroad Stations in Jersey City back to Manhattan and up Sixth Avenue to Thirty-third Street. The train carried a party of railroad officials and business men, who were entertained at luncheon at the Hotel Martinique. Among those who were present at the luncheon were William G. McAdoo, Wilbur Fisk, O. T. Bird, J. B. Davies, E. P. Munger, William Everdell and K. B. Conger, of the Hudson & Manhattan Railroad; Isidor Saks, B. J. Greenhut, Isaac Stern, Percy Straus, A. J. Hemphill, W. H. Browning, Chairman Willcox and Commissioner Eustis, of the Public Service Commission; W. G. Oakman, president of the Hudson Companies; Pliny Fisk, William M. Barnum, Waldo H. Marshall, president of the American Locomotive Company, and Frederick D. Underwood, president of the Erie Railroad.

In anticipation of the opening of the station the Hudson & Manhattan Railroad carried in the daily newspapers in New York an advertisement 11 in. by 13 in. containing a drawing of a train pulling into the station at Thirty-third Street and Broadway, under which appeared in bold type the following:

"At 3:00 a. m. on Thursday, Nov. 10, 1910, the magnificent concourse station at Broadway and Thirty-third Street and the station at Twenty-eighth Street and Sixth Avenue will be opened for traffic.

"Tube trains will run to and from Thirty-third Street and the Pennsylvania, Lehigh Valley, Erie and Lackawanna Railroad stations in Jersey City and Hoboken, saving passengers from 20 to 45 minutes in each direction.

"At the Thirty-third Street station will be ticket offices of the Lehigh Valley, Erie and Susquehanna Railroads; a parcel check room, public telephones and telegraph offices, taxicabs and baggage delivery facilities.

"This wonderful station at Broadway, Sixth Avenue, Thirty-second and Thirty-third Streets enables passengers to get to or from the very heart of the shopping, theatre, hotel and up-town business district quickly, conveniently and comfortably by the Hudson & Manhattan Railroad."

It was announced on Nov. 13, 1910, that the joint service of the Hudson & Manhattan Railroad and the Pennsylvania Railroad between Newark and the new station at Thirty-third Street, New York, will begin next summer. Trains will be operated over the Hudson & Manhattan Railroad as far as Bergen Hill, N. J., and thence over the Pennsylvania Railroad to Newark at frequent intervals. The rates charged will be the same as the Pennsylvania Railroad now charges passengers to its station in Jersey City or at its ferry stations at Cortlandt Street and Twenty-third Street, New York. If Newark passengers wish to travel by the Pennsylvania tunnels to the Seventh Avenue and Thirty-third Street station, they will be required to pay the 10 cents extra which the Pennsylvania Railroad has placed on fares to its new station. It also has been arranged to transfer passengers of the Pennsylvania Railroad who wish to land downtown to the trains of the Hudson & Manhattan Railroad at Harrison, N. J., in the near future, instead of bringing them into the Jersey City terminal of the Pennsylvania Railroad as at present.

Decision Regarding Fares in Lenox, Mass.

The Railroad Commission of Massachusetts has rendered the following decision in regard to the petition of the Selectmen of Lenox to require the Berkshire Street Railway to establish a 5-cent fare between all points in the municipality and to institute a half-hourly service over its lines:

"The primary inquiry in this case is directed to the reasonableness of rates on the Berkshire Street Railway within the township of Lenox. A careful study of the finances of the company warrants no recommendation by the board that would result in a reduction of the fare for a through ride originating in the village of Lenox to points outside the township. The receipts and expenses on the Lenox branch, so called, are conclusive upon this issue. We believe, however, that residents of the township should be afforded communication between its villages for a 5-cent fare, and recommend the establishment of a 5-cent fare from Lenox proper to a point substantially in the center of the village in the northern part of the town. This fare in operation will secure the same rate between Lenox and New

Lenox as is now enjoyed between Lenox and Lenoxdale.

"The remaining question is with respect to service. The board suggests that prior to the opening of the next summer season attention be given to a schedule that will provide more frequent trips from Lenox to the station, and in the event of the failure of the Selectmen and the management of the company to agree, the board will, upon the application of either party, reopen this branch of the case."

A summary of the testimony presented before the commission in this case was published in the ELECTRIC RAILWAY JOURNAL of Sept. 24, 1910, page 484.

Accidents in Indiana During Quarter Ended Sept. 30, 1910

The Railroad Commission of Indiana has issued Accident Bulletin No. 13, which contains a summary of the accidents on the steam railroads and the electric railways operated in Indiana for the three months ended September, 1910. On the electric railways during this period 71 persons were killed and 89 were injured, whereas for the same period of 1909 20 persons were killed and 63 injured. The comparative record of casualties on the interurban electric railways for the quarter ended Sept. 30, 1910, and the same period of 1909, as contained in the bulletin of the commission, follows:

PASSENGERS.			
WHERE—		1909.	1910.
On passenger trains.....		42	100
On station grounds.....		1	9
CAUSES—			
Collisions.....	21	96	
Deraillments.....	8	0	
Getting on and off moving trains.....	7	4	
Getting on and off trains after stops are made.....	2	0	
Miscellaneous.....	7	9	
RESULTS—			
Deaths.....	3	50	
Fractures or dislocations.....	4	4	
Sprains.....	10	6	
Cuts and bruises.....	22	47	
Miscellaneous.....	6	2	
TRAVELERS ON HIGHWAYS.			
WHERE—			
Travelers on highways in vehicles.....	11	14	
On foot.....	2	2	
CAUSES—			
Struck on crossings.....	13	16	
Teams frightened.....	0	0	
Miscellaneous.....	0	0	
RESULTS—			
Deaths.....	6	5	
Sprains.....	1	1	
Cuts and bruises.....	6	9	
Miscellaneous.....	0	0	
Loss of limb.....	0	1	
EMPLOYEES.			
EMPLOYMENT—			
Conductors.....	6	4	
Motormen.....	4	9	
Laborers.....	2	3	
CAUSES—			
Collisions.....	2	13	
Miscellaneous.....	10	5	
RESULTS—			
Deaths.....	2	4	
Fractures or dislocations.....	0	0	
Sprains.....	4	5	
Cuts and bruises.....	5	9	
Miscellaneous.....	1	0	
TRESPASSERS.			
WHERE—			
Trespassers on tracks.....	10	17	
Miscellaneous.....	3	0	
RESULTS—			
Deaths.....	9	12	
Fractures or dislocations and cuts and bruises.....	4	5	
Collisions, 2. Damage, \$750.00.			

In commenting on the figures contained in the report the commissioners say:

"This quarter was the most disastrous to passengers in the history of interurban railroads in this State. This quarter 1909, 42 passengers were injured on these lines; this quarter 1910, 100, an increase of 100 per cent. In 1909, this quarter, three passengers were killed; this quarter 1910, 50 were killed, the per cent of increase being too great for comparison. Nearly all of these fatalities resulted from head-on collisions; and collisions are preventable accidents and will occur most rarely, and not in groups, where fit, careful men are employed, and where the railroad is equipped with safety devices. The comparatively small revenues of the interurbans, their freight business being very little compared with the steam railroads, make a most difficult problem as to how these railroads may be able to do what is necessary to secure the proper factor of safety. This commission has had this subject under consideration and has made a report to the Governor and recommendations to the companies on this subject."

Report on Pay-Within Cars in Washington, D. C.

H. C. Eddy, executive officer and secretary of the District Electric Railway Commission, has recently submitted to the commission an interesting report on the new pay-within cars of the Capital Traction Company, Washington, D. C., which are equipped with folding doors and steps, as described in the *ELECTRIC RAILWAY JOURNAL* of Nov. 12, 1910, page 1002. Mr. Eddy in his report says, in part:

"I have the honor to report that on Oct. 31, 1910, the Capital Traction Company placed in operation on its Fourteenth Street line a number of new cars, these being a part of the first delivery of an order for 150 cars recently placed by the Capital Traction Company with the Jewett Car Company, Newark, Ohio. This first delivery is to consist of 20 cars which are practically of the same type as car No. 131, which has been in operation on the Fourteenth Street line since June 28, 1910.

"The new cars are of the pay-within type. The doors are of the folding type, but are slightly different from and an improvement on the doors on experimental car No. 131, above referred to. The doors are manually operated, the front or exit doors folding inwardly and at the same time forming a protection for the passengers from danger of being injured by the brake handle, and the rear or entrance door folding outward and in such a manner as to form a barrier which will tend to prevent a person from being thrown off the platform if by any chance the car should start before the door is closed. The door-operating mechanism is so designed that it can be operated very quickly and with very little effort. The steps are provided with a safety tread designed to prevent persons from slipping thereon.

"This type of car has several advantages over the strictly open car, chief among which may be mentioned the element of safety and the possibility of quickly and effectually closing the car in the case of a sudden storm. The car also answers every purpose for winter service and can be readily and effectually heated, as has been demonstrated in the case of the Chevy Chase cars."

After referring to the seating arrangement, which utilizes all the seating space, and to other details of the equipment, Mr. Eddy concludes his report as follows:

"The cars are provided with the latest approved mechanical and electrical devices and apparatus, including some improved and more efficient fender and wheel guard trips. The writer has made a thorough inspection of these cars at the company's shops and finds that the cars comply in all respects with the rules and regulations of the Interstate Commerce Commission.

"It will be remembered that Mr. Hamilton, president of the Capital Traction Company, in his letter of July 15, 1910, to the Interstate Commerce Commission stated that if these 20 cars proved satisfactory the remaining 130 would be ordered to be the same type. It will also be observed that these cars have been placed in operation one month earlier than was promised by Mr. Hamilton, thereby making it possible for the company to continue the one-minute schedule ordered by the commission on the Fourteenth Street line last spring, the season for open motor cars now being closed and the company not having previously had a sufficient number of cars to operate this schedule."

Near Crossing Stops in Indianapolis.—The Board of Public Safety of Indianapolis has requested the Indianapolis Traction & Terminal Company to stop its cars on the near side of the street in downtown Indianapolis.

Increase in Age Limit of School Tickets Requested.—The companies operating street railways in Los Angeles, Cal., have been petitioned to increase from 18 to 21 years the age limit at which half-fare school tickets are sold.

Accident in Michigan.—Several persons were killed and more than a score were injured on Nov. 12, 1910, in a collision in Kalamazoo, Mich., between a car of the Michigan United Railway and a train of the Michigan Central Railroad.

To Use New Fenders.—In an ordinance signed by Mayor Simon, of Portland, Ore., the Portland Railway, Light & Power Company will be required to place Nelson fenders on all its cars by July 1, 1911, to take the place of those that are now in use, and felt to be inadequate.

More Pay-as-You-Enter Cars in Los Angeles.—Pay-as-you-enter cars have been placed in operation on the West Eleventh Street line of the Los Angeles (Cal.) Railway Corporation, making three lines on which cars of this type are now in use in Los Angeles.

Smoking on Cars Prohibited in Kansas City.—The Metropolitan Street Railway, Kansas City, Mo., has issued an order, signed by John M. Egan, president of the company, to prohibit smoking on its cars. Placards placed in the cars read: "Smoking positively prohibited on this car. Conductors are required to enforce this rule. Please observe."

Traffic Over the McKinley Electric Bridge.—The local service which the Illinois Traction System recently started between St. Louis, Mo., and Alton, Venice and Grant City, Ill., using the new terminal tracks and the McKinley Bridge, handled 152,000 passengers during the first 10 days of operation, exclusive of passengers carried on interurban cars.

Decision in Tacoma Fare Case.—The Supreme Court of Washington has decided that the residents of Fern Hill, which is now part of Tacoma, are entitled to be transported by the Tacoma Railway & Power Company to and from all parts of Tacoma for a 5-cent fare. The city limits of Tacoma were some time ago extended to include Fern Hill, and the company contended that the settlement ordinance which was passed in 1901 should not be interpreted as providing for a 5-cent fare to territory not included within the city limits as prescribed when the franchise ordinance was originally passed. The company has announced that it will apply for a rehearing of the case.

Rehearing Denied in West Chester Fare Case.—The application of the West Chester Improvement Association for a rehearing of the complaint which it brought against the Philadelphia & West Chester Traction Company, Philadelphia, Pa., for establishing six 5-cent fare zones between Sixty-third Street and Market Street, Philadelphia, and West Chester, instead of five, has been denied by the Railroad Commission of Pennsylvania. The hearing before the commission on the original complaint was held on April 24, 1910, and was reported in the *ELECTRIC RAILWAY JOURNAL* of April 30, 1910, page 787. On June 24, 1910, the commission dismissed the complaint. A summary of the decision of the commission dismissing the complaint was published in the *ELECTRIC RAILWAY JOURNAL* of July 2, 1910, page 55.

Inquiry Into Trolley Guards in Indiana.—The Railroad Commission of Indiana has addressed the following circular to all the interurban electric railways operated in Indiana: "The Railroad Commission is conducting an inquiry with respect to the installation of trolley guards at crossings of electric and steam lines. To assist it in its investigation it solicits your answers to the following questions: 1. Give number of crossings upon your line now protected by trolley guards, and give brief description of guard or guards so used, with name of manufacturer. 2. Give approximate number of crossings upon your line not so protected. 3. What is your opinion concerning the practical efficiency of trolley guards? 4. What kind of guard do you consider the best? 5. What is the approximate cost of installing a serviceable trolley guard? 6. Do you propose installing guards upon your line in the near future? If so, to what extent? Prompt replies to the above are requested."

Department in Oklahoma.—J. E. Love, chairman of the Corporation Commission of Oklahoma, has addressed a communication to the steam railroads and the electric railways in Oklahoma regarding the department of their employees, in part as follows: "You are hereby notified that on Nov. 16, 1910, the commission will hear any objections which may be urged against the following proposed order, rule, regulation and requirement: 'All employees of steam and electric railways or railroads, the Pullman Company and all persons, firms or associations regularly engaged in the transportation of persons or property for hire employed in the operation of any car, train or other vehicle of conveyance in the State of Oklahoma, as conductor, train auditor, brakeman, motorman, porter, or otherwise, shall at all times extend to the public and to each individual passenger or patron every possible courtesy and perform every duty devolved upon him by his position, to provide comfort and convenience to the public and to all passengers and patrons.'"

Personal Mention

Mr. R. C. Taylor, master mechanic of the Illinois Traction System in charge of the shops of that company at Granite City, Ill., has been appointed engineer of maintenance of equipment of the company attached to the office of the general superintendent at Springfield, Ill.

Mr. W. T. Durfee, Decatur, Ill., has been appointed traveling auditor of the local properties of the Illinois Traction System, Champaign, Ill., to succeed Mr. L. L. Campbell, who has been appointed auditor of disbursement to succeed the late Mr. A. A. Price.

Mr. G. H. Dodge has resigned as acting superintendent of the Syracuse & South Bay Electric Railroad, Syracuse, N. Y., which is controlled by the Beebe interests. No successor to Mr. Dodge will be appointed, as it is proposed to have the operating force of the Syracuse, Lake Shore & Northern Railroad, which is also controlled by the Beebe syndicate, conduct the Syracuse & South Bay Electric Railroad.

Mr. E. W. Olds, superintendent of rolling stock of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., is now on the trip to the Pacific Coast for the benefit of his health which he was noted in the *ELECTRIC RAILWAY JOURNAL* of Aug. 13, 1910, as contemplating taking. Mr. Howard A. Mullet, who has been assistant superintendent of the Kinnikinnic shops of the company for several years, will act as superintendent of rolling stock during Mr. Olds' absence.

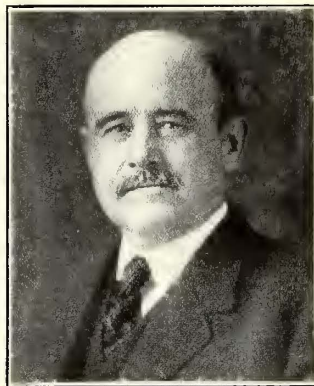
Mr. L. E. Fischer, formerly general manager of the Illinois Traction System, Peoria, Ill., has been elected vice-president and general manager of the Choctaw Railway & Lighting Company, McAlester, Okla. Mr. Fischer was born in O'Fallon, Ill., in 1876, and was graduated from the Manual Training School at St. Louis in 1893. In 1898 he was graduated from the School of Municipal and Sanitary Engineering of the University of Illinois and was immediately appointed assistant city engineer at Kendallville, Ill. In 1899 and 1900 he acted as assistant city engineer at Paris, Ill. Mr. Fischer's connection with the Illinois Traction System began in 1901, when he was made superintendent of the power house of the company at Danville, Ill. In 1902 he was appointed manager of the property of the company at Danville, and in 1905 was appointed general manager of the entire system. He retired from the company in 1908.

Mr. D. H. Brown has been appointed engineer of maintenance of way of the Salt Lake & Ogden Railway, Salt Lake City, Utah. Mr. Brown began his railway work with the New York Central & Hudson River Railroad and served in the engineering department of that company and the Central Railroad of New Jersey from 1899 to 1902. From July, 1902, to April, 1903, he acted as transitman for Ford, Bacon & Davis, New York, N. Y., on work which they were then doing for the Metropolitan Street Railway, Kansas City, Mo. Mr. Brown then became connected with the Gulf & Ship Island Railroad, Gulfport, Miss., as a construction engineer. In October, 1905, he accepted the position of assistant engineer of the Public Service Railway, Newark, N. J., but resigned from that company in June, 1907, to become engineer of maintenance of way of the Lehigh Valley Transit Company, Allentown, Pa. Since September, 1909, Mr. Brown has been chief engineer of the Diamond Water Company, Hazleton, Pa.

Mr. F. A. Belden, whose appointment as superintendent of the Dover, Somersworth & Rochester, or northern division of the New Hampshire Electric Railways, with an office at Dover, N. H., was announced recently in the *ELECTRIC RAILWAY JOURNAL*, entered electric railway work in June, 1900, in the car house of the Aurora (Ill.) Street Railway when he was 19 years old. In the fall of 1901 Mr. Belden resigned from the Aurora Street Railway to attend the University of Wisconsin. In August, 1902, he entered the shops of the Georgia Railway & Electric Company, Atlanta, Ga. Later he served in the track department of this company and as inspector of car service. In 1905 he was appointed engineer of work being done by the Aurora, De Kalb & Rockford Electric Traction Company, Aurora,

Ill. In 1906 Mr. Belden entered the woolen business, but in 1909 he accepted an appointment as superintendent of construction of the Haverhill, Merrimac & Amesbury Street Railway for the New Hampshire Electric Railways. When this work was completed Mr. Belden became general foreman of the Chicago (Ill.) Railways and continued with the company during the period of rehabilitation of the property and until his recent appointment to the New Hampshire Electric Railways.

Mr. W. B. McKinley, president of the Illinois Traction System, Peoria, Ill., who conceived and caused to be built the bridge across the Mississippi River which was formally opened on Nov. 10, 1910, was born in Petersburg, Ill., on



W. B. McKinley

Sept. 5, 1856, and was educated in the common schools of Champaign and the University of Illinois. After he left school Mr. McKinley became associated with his uncle, Mr. J. B. McKinley, in the farm loan business in Champaign. In 1884 he began to interest himself in public utility enterprises. He had formed financial relations with capitalists in the East, and in 1884 he built the water works at Champaign. Shortly after this Mr. McKinley constructed an electric lighting plant in Champaign. He then bought the horse railway between Champaign and Urbana and equipped it with electricity. In 1890 Mr. McKinley bought the gas and electric plants in Defiance, Ohio, and built a street railway in that city. In 1892 he bought the horse railway in Springfield, Ohio, and electrified it and did the same thing at Bay City, Mich. At the time of the panic of 1893 Mr. McKinley had considerable money invested in farm mortgages in Kansas and disposed of most of the utilities which he had bought. In 1896 he re-entered the public utility field by building an 11-mile electric railway at Joliet. Mr. McKinley intended to continue this line to Chicago, but he afterward disposed of the property. In 1898 he bought and modernized the street railway lines to Quincy. He did the same with the lines at Galesburg and constructed an interurban railway to Knoxville. With the purchase of the car lines at Danville in 1900 the foundation was laid for the present Illinois Traction System. Mr. McKinley interested a group of capitalists in Montreal, Can., in his plans and bought up rights and franchises for lines in various places which the original promoters were unable to finance and build. In nine years the line at Danville has grown until it has become the Illinois Traction System, operating 500 miles of track, the bridge across the Mississippi at St. Louis and the terminal which enables the cars of the Illinois Traction System to run into the heart of St. Louis. The public utilities operated by the McKinley syndicate are embraced in two holding companies, of which Mr. McKinley is the president. These are the Illinois Traction System and the Western Railways & Light Company. The first comprises the interurban lines connecting St. Louis, Springfield, Lincoln, Peoria, Bloomington, Decatur, Champaign, Urbana and Danville; the street car lines at Danville, Urbana, Champaign, Decatur, Bloomington, Peoria, Normal, Jacksonville, Granite City, Venice and Madison; the electric light, gas and heat systems at Urbana, Champaign, Danville and Decatur; the light and heat plants at Bloomington and Normal, and the light and gas at Jacksonville. It also includes the electric lighting plant at Edwardsville, Madison, Venice and Granite City. The latest additions to the holding of the Illinois Traction System were the electric lighting plant at Des Moines, Ia., and the street railways at Topeka and Atchison, Kan. The Western Railways & Light Company controls the interurban lines in the northern part of the State between Princetown, La Salle and Seneca and the local lines in Quincy, Ill., and Wichita, Kan.; the street car, electric and gas concerns at Cairo, La Salle and Peru, and the gas, electric light, street car system and heat plants at Galesburg.

Construction News

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

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

RECENT INCORPORATIONS

***Mesaba Electric Railway, Duluth, Minn.**—Application for a charter has been made in Minnesota by this company to build electric railways in St. Louis, Itasca and adjoining counties. Capital stock, \$50,000. Officers: Oscar Mitchell, president; W. D. Bailey, vice-president, and F. M. Emanuelson, secretary and treasurer.

St. Louis, St. Charles & Northern Traction Company, Mexico, Mo.—Chartered in Missouri to build a 77-mile electric railway to extend through St. Charles, Lincoln, Pike, Montgomery and Audrain counties. Capital stock, \$900,000. Headquarters, Mexico, Mo. Incorporators: R. E. Race, Mexico; R. M. Hendershott and C. Pearson, Middletown. [E. R. J., Aug. 27, '10.]

***Defiance (Ohio) Interurban Railway.**—Incorporated in Ohio to build an electric railway to connect Defiance, Fort Wayne, Ashwood, Emmett, Cecil, Paulding, Antwerp and New Haven. Capital stock, \$50,000. Officers: K. V. Haymaker, Defiance, president; Charles E. Bennett, Wausen, vice-president; T. C. Jacks, Defiance, secretary and general manager, and Robert C. Holgate, Defiance, treasurer.

***Glassport & Elizabeth Railway, Elizabeth, Pa.**—Incorporated in Pennsylvania to build a 3-mile electric railway to connect Glassport and Elizabeth. Capital stock, \$18,000. Incorporators: Jacob Ulrich, McKeesport; W. T. Fuether, D. J. Altman, H. G. Altman and C. A. McGrew, Glassport.

***Pennsylvania Southern Railway, Harrisburg, Pa.**—Incorporated in Pennsylvania to build a one-mile railway in Clarion County. Capital stock, \$20,000.

FRANCHISES

New Britain, Conn.—The Connecticut Company, New Haven, has received a franchise from the Council to build an extension to its north end line, from Allen Street to Francis Street, New Britain.

Waterbury, Conn.—The Connecticut Company has applied to the Council for a franchise to build several extensions to its line in Waterbury.

Collinsville, Ill.—The St. Louis & Eastern Traction Company has received a franchise from the City Council to build its tracks on Clay street, Collinsville. This proposed railway will connect Granite City and Greenville via Collinsville, Troy, St. Jacob, Highland, Pierson and Pochontas. A. W. Crawford, Hillsboro, is interested. [E. R. J., Oct. 22, '10.]

Waukegan, Ill.—The Waukegan, Rockford & Elgin Traction Company has applied to the Council for a franchise to build its tracks over certain streets in Waukegan.

Waterloo, Ia.—The Waterloo, Cedar Falls & Northern Railway will ask the City Council for a franchise to build extensions to its tracks in Waterloo.

Hagerstown, Md.—It is reported that L. N. Downs, New York; H. L. Kirby, Virginia, and associates have received a franchise to build a railway in Hagerstown. This is part of a plan to build a 27-mile electric railway to connect Hagerstown, Clear Springs, Md., and Mercersburg, Pa. [E. R. J., Nov. 5, '10.]

***Duluth, Minn.**—The Mesaba Electric Railway has received a franchise from the County Commissioners to build a 36-mile electric railway from Hibbing to Gilbert, via Chisholm, Buhl, Virginia and Ebelethe. Oscar Mitchell, president.

Fulton, Mo.—The Mexico, Santa Fe & Perry Traction Company has received a one-year extension to its franchise in which to begin construction of its railway connecting Perry, Mexico City, Santa Fe, Hereford, Columbia, Fulton and Mokane.

Mexico, Mo.—The Mexico, Santa Fé & Perry Traction Company has received an extension to its franchise of one year's time in which to begin the construction of its line through Boone, Andrain and Collaway Counties.

St. Joseph, Mo.—The St. Joseph Railway, Light, Heat & Power Company will apply to the City Council for a franchise to build an extension to its track on Third Street, from Francis Street to Edmond Street, in St. Joseph.

South Amboy, N. J.—The Public Service Railway, Newark, has applied to the Council for a franchise to extend its tracks to connect with those of the Jersey Central Traction Company at Main Street and Broadway, South Amboy.

Binghamton, N. Y.—The Binghamton Railway has received an extension of time to build its line between Union and Vestal. The franchise is extended for two years until Nov. 1, 1912.

Lebanon, Ore.—The Albany Interurban Railway, Albany, has applied to the City Council for a franchise to build an electric railway through Lebanon. This proposed railway will connect Albany, Sweet Home, Lebanon, Brownsville and Holley. P. A. Young is interested. [E. R. J., Sept. 10, '10.]

Port Arthur, Tex.—The Beaumont-Port Arthur Interurban Electric Railway has asked the Council for a franchise to build a proposed electric railway in Port Arthur. I. D. Polk is interested. [E. R. J., May 7, '10.]

TRACK AND ROADWAY

***Penticton, B. C.**—J. M. Robinson, Summerland, is said to be interested in a plan to build an electric railway to connect the towns which are located on the east shore of Okanagan Lake between Naramata and Vernon, B. C.

Fresno, Cal.—S. N. Griffith, Fresno, has awarded the contract to the Colorado Fuel & Iron Company, Pueblo, for material for building the proposed 10-mile electric railway to connect Fresno and Clovis. [E. R. J., Nov. 5, '10.]

Los Angeles (Cal.) Railway.—This company has begun the construction of an extension on its suburban system from Hollywood to Lankershire via Cahuenga Pass.

Los Angeles-Western Railway, Los Angeles, Cal.—This company is making preliminary arrangements for the building of its proposed electric railway to connect Hermosa Beach and Culler. A. W. Taylor is interested. [E. R. J., Nov. 5, '10.]

Gough Street Railroad, San Francisco, Cal.—This company has begun the construction of its proposed one-mile street railway to extend south along Gough Street connecting Valencia Street and Fillmore Street via McAllister Street to Haight Street, there to connect with existing lines in San Francisco. Albert J. Pon is interested. [E. R. J., Oct. 22, '10.]

San Joaquin Valley Electric Railway, Stockton, Cal.—This company has completed the grading of its roadbed to Ripon and is now advertising for bids for the construction of a reinforced concrete bridge over the Stanislaus River south of Ripon. The structure will be 200 ft. in length and the two main spans will be 80 ft. each. Morris L. Brackett is interested. [E. R. J., April 30, '10.]

***Brooklyn, Conn.**—Plans are being considered for building an electric railway to connect Brooklyn, Danielson, Willimantic, Attawaugan and Ballouville. William Clewley, Brooklyn, is interested.

Shore Line Electric Railway, New Haven, Conn.—This company, it is reported, expects to extend its railway next year into New Haven.

Fox & Illinois Railway, Aurora, Ill.—This company, recently incorporated to build an electric railway to connect Yorkville and Morris with connecting lines at Dwight and Sandwich, has organized by electing the following officers: Henry H. Evans, president; John Meredith, vice-president; Ralph C. Putnam, secretary, and Frank M. Zimmerman, treasurer. [E. R. J., Nov. 12, '10.]

***Gary, Ind.**—C. H. Geist is said to be interested in a plan to build an interurban railway to connect Gary, Chesterton and Whiting.

Kalamazoo, Elkhart & South Bend Traction Company, South Bend, Ind.—This company is said to have amended its charter so as to provide for the construction of its line from South Bend to Kalamazoo, Mich., via Mishawaka, Elkhart, Bristol, Constantine, Nottville, Three Rivers, Parksville, Vicksburg and Austin. A. D. Harris, South Bend, president. [E. R. J., Nov. 7, '09.]

Tri-City Railway, Davenport, Ia.—This company has begun work on the extension of its Twenty-seventh Street line in Davenport. The grading is being done by the McCarthy Improvement Company.

Louisville (Ky.) Railway.—This company has placed a contract with the Carnegie Steel Company, Pittsburgh, Pa., for 500 tons of rails.

Northampton Street Railway Company, Northampton, Mass.—This company advises that it will relay three miles of track with 70-lb rails, which will be ordered before Jan. 1.

Butte (Mont.) Electric Railway.—This company expects to build an extension and double-track a portion of its line in Meadville.

***Halfmoon, N. Y.**—It is stated that plans are being considered to build a 15-mile electric railway to connect Waterford, Halfmoon, Crescent, Vischers Ferry and Rexford flats. This proposed line would follow practically the course of the Mohawk River along its northern shore. Surveys have been made. Among those who are interested are: D. B. Hawley, W. F. Hickey, Halfmoon; C. V. Gould, Dunsbach Ferry; Frederick W. Kavanaugh and W. K. Mansfield, Waterford.

Hudson River & Eastern Traction, Ossining, N. Y.—This company has applied to the New York Public Service Commission, Second District, for permission to issue bonds for an amount sufficient to extend its railway from the present terminus in Ossining southeast through Briarcliff Manor, Pleasantville and Sherman Park to White Plains, a distance of about 18 miles.

Asheville & Carolina Railway, Asheville, N. C.—This company is reported to be making plans to build a 2-mile extension of its West Asheville line. It is expected to have this extension ready about the time the new bridge across the French Broad River is completed. The rails for the line are to be laid in the center of the bridge.

Isothermal Traction Company, Rutherfordton, N. C.—It is said that this company is now making surveys between Rutherfordton and Asheville through the Hickory Nut Gap. This proposed railway will connect Rutherfordton and Gastonia via Carolien, Shelby, Cherryville, Waco, Stubbs, Shelby, Cliffside, Henrietta, Caroleen and Boiling Springs. J. F. Flack, Rutherfordton, secretary. [E. R. J., June 25, '10.]

Wheeling, Cadiz & Tuscarawas Traction Company, Cadiz, Ohio.—This company advises that it has let contracts and construction will begin this month on its proposed 60-mile electric railway to connect Wheeling, Bridgeport, Martin's Ferry, Florence, Colerain, Harrisville, New Athens, Cadiz, Franklin, Philadelphia Roads, Dennison, Adena, Uhrichsville and Georgetown. Capital stock, issued, to be increased from \$10,000 to \$1,200,000. Bonds, issued, to be increased to \$1,200,000. The company will operate nine cars. Its power station and repair shops will be located at a point half way between terminals. It will also furnish power for lighting purposes. A. Evans Townsend, Doylestown, general manager. [E. R. J., Oct. 15, '10.]

Toledo, Columbus, Springfield & Cincinnati Railway, Toledo, Ohio.—This company reports that preliminary arrangements have not yet been completed for building its proposed 28-mile electric railway to connect Toledo, Napoleon, Lima, Bellefontaine, Columbus and Cincinnati. Capital stock, \$100,000. Bonds authorized, \$100,000. Officers: M. Seyfang, Toledo, Ohio, president; Dr. S. S. Thorn, Toledo, vice-president, and William P. Heston, 2901 Collingwood Avenue, Toledo, secretary and treasurer. [E. R. J., Sept. 18, '09.]

Muskogee (Okla.) Electric Traction Company.—This company has begun work on two new extensions of its lines, one to the north end of Muskogee to the city limits in Reeves addition and the other an extension to the Midland shops.

Ottawa, Rideau Valley & Brockville Railway, Ottawa, Ont.—This company announces that it will begin work at once on its proposed 60-mile electric railway to connect Ottawa and Brockville. Andrew Haydon, president. [E. R. J., Oct. 1, '10.]

Portland Railway, Light & Power Company, Portland, Ore.—This company has awarded the contract to Watson,

Flagg & Strandifer for the construction of the 3½-mile extension of its Cazadero line to the new power house on the headwaters of the Clackamas River in Portland.

***Hazleton, Pa.**—It is said that plans are being considered to build an electric railway to connect Berwick, Nescopeck, Wapwollopen, Beech Haven and Hobbie. At Hobbie it will connect with the Wilkes-Barre & Hazleton Railway, Hazleton.

Lewisburg, Milton & Watsonville Passenger Railway, Milton, Pa.—This company will soon extend its line to Mifflinburg. The Simplex Surface Contact Company has the contract for electrifying the Lewisburg & Tyrone Railroad between Montandon and Mifflinburg, a distance of 10 miles. Work will soon begin. Power will be furnished by the new power plant at Milton.

West Penn Railways, Pittsburg, Pa.—This company has awarded the contract for grading and has begun work on the extension of its line from Juniata to Bitner.

***Woodlawn (Pa.) Southern Railway.**—This company is being organized by the Jones & Laughlin Company to build a seven-mile electric railway passing along Franklin Avenue, Woodlawn, to the borough line in the direction of New Sheffield, over the Woodlawn-Aliquippa Road to Woodlawn and above the Pittsburgh & Lake Erie Railroad from the present station to the south end of the borough. It is proposed eventually to extend the line to South Heights and New Sheffield.

***York, Pa.**—It is said that New York and Pittsburgh capitalists are planning the construction of a proposed electric railway to connect York, New Freedom, Paradise, Logansville and Glen Rock.

Quebec Railway, Light & Power Company, Quebec, Ltd., Quebec, Que.—This company will apply to the Dominion Parliament for a bill amending its charter. It is understood that the company plans to extend its line from St. Joachim down the north shore of the St. Lawrence to Murray Bay.

Chicago, Burlington & Quincy Railway, Deadwood, S. D.—This company has placed in operation its double-track line between Galesburg and Bushnell.

Trinity Valley Traction Company, Dallas, Tex.—This company expects to finish the surveys of its 100-mile railway to connect Dallas and Palistinevia Waxahachie, Ennis, Corsicana by Dec. 1. [E. R. J., June 11, '10.]

***Bonita Valley Rapid Transit Railway, Jourdanton, Tex.**—C. S. Young, San Antonio, is reported to be promoting an electric railway to be known as the Bonita Valley Rapid Transit Railway to connect Jourdanton and Pleasanton.

***Taylor, Tex.**—L. E. Walker is said to be interested in a plan to build an electric belt railway to connect the different industrial plants and steam railroads of Taylor.

Elkins (W. Va.) Electric Railway.—This company is laying 8 miles of new track in Elkins and expects to have it completed by the first of the year. All material has been purchased.

***Burlington, Wis.**—H. B. Kamschulte, Milwaukee, is said to have obtained a certificate of necessity from the Railroad Commission to build a proposed electric railway from Lake Geneva to Burlington via Lyons.

POWER HOUSES AND SUBSTATIONS

Connecticut Company, New Haven, Conn.—This company has purchased the following apparatus from the General Electric Company: One 400-kw, 600-volt, 60-cycle rotary converter with transformer and switchboard for station A at New Haven; one 1000-kw, 600-volt, 25-cycle rotary converter with transformers and switchboard for the Hartford station; two 300-kw, 600-volt, 25-cycle rotary converters with transformers and switchboard for the Buckland station; two 400-kw, 600-volt, 25-cycle rotary converters with transformers and switchboard for Rockville station.

Shore Line Electric Railway, New Haven, Conn.—This company, it is said, will install a new rotary with a capacity of 300-kw at its power house at Waterford. The New London & East Lyme Street Railway expects to purchase its power from this company.

Capital Traction Company, Washington, D. C.—This company will build a power house on Thirty-sixth Street and M

Street in Washington. The building will be a 1-story structure of brick and concrete construction.

Beech Grove Traction Company, Indianapolis, Ind.—It is reported that this company will build a substation on Twenty-fifth Street and Churchman Avenue in Beech Grove. The structure will be 26 ft. x 34 ft. The motor generators will be furnished by Fairbanks, Morse & Company. This company has made arrangements to obtain power from the Indianapolis Light & Heat Company.

Lexington & Interurban Railways, Lexington, Ky.—This company will spend \$300,000 installing new equipment at its power house in Lexington. Exact details have not yet been given out.

New York Central & Hudson River Railroad, New York, N. Y.—This company has placed an order with the General Electric Company for four 2000-kw, 600-volt, 25-cycle, direct-current rotary converters, with four air-blast transformers. Three of these rotary converters will be placed in the substation at Irvington and one at Glenwood. Delivery will be made next summer.

Cincinnati (Ohio) Traction Company.—Press reports state that this company will build an addition to its Pendleton power house in the East End of Cincinnati. The structure will be 40 ft. x 60 ft. of steel and concrete construction. It will be equipped with two additional boilers of 525 hp each. When completed this plant will have a capacity of 7250 hp. The estimated cost of improvements is about \$50,000.

Cleveland, Ohio.—The Cleveland, Barberton, Cashocton & Zanesville Railway has applied to the County Commissioners for a franchise to build its tracks over certain streets in Cleveland. The proposed railway will connect Cleveland and Zanesville via Elyria, Barberton, Oresville, Millersburg and Coshocton. J. J. Breiting, president. [E. R. J., Oct. 29, '10.]

Rhode Island Company, Providence, R. I.—This company has ordered the following apparatus from the General Electric Company: One 15,000-kw, 25-cycle, 11,000-volt, three-phase Curtis turbine; three 2000-kw, 600-volt, 25-cycle rotary converters; also three 2250 three-phase air blast transformers and switchboard.

Elkins (W. Va.) Electric Railway.—This company states that it will soon build a new power house at Elkins. It will not let any contracts for the work. P. B. Bloomfield, general manager.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company is building a substation on Clinton Street in Milwaukee. The structure will be 47 ft. x 145 ft. and 34 ft. high, of brick and steel construction. The cost is estimated to be about \$25,000.

SHOPS AND BUILDINGS

Central California Traction Company, San Francisco, Cal.—This company has taken possession of its new offices on Weber Avenue and El Dorado Street in Stockton.

Chicago (Ill.) City Railway.—It is reported that this company has purchased property on West Seventy-ninth Street in Chicago on which it will build new car houses.

Iowa City (Ia.) Electric Railway.—This company will erect a car house containing an office and a repair shop at College Street and Gilbert Street in Iowa City.

Tri-City Railway & Light Company, Davenport, Ia.—It is said that this company will remodel the Smith Building in Davenport to be used as a station and office building. The structure is 43 ft. x 150 ft. and four stories high.

Boston & Worcester Street Railway, Boston, Mass.—This company has just built a new station on Bacon Street, Boston.

Missoula (Mo.) Street Railway.—This company is reported to be building a new car house and machine house in Missoula.

Janesville Traction Company, Madison, Wis.—This company has let the contract to Shearer, Ford & Boos for the construction of its car house to be located on Eastern Avenue in Janesville. The structure will be a 1-story brick building, with an ordinary roof construction divided by a firewall into two bays. One bay will contain two tracks for storage of cars. The other bay, which will contain one track with a pit for the inspection of cars, will be floored with concrete.

Manufactures & Supplies

ROLLING STOCK

Kankakee (Ill.) Electric Railway is considering the purchase of three new cars.

East Shore & Suburban Railway, Richmond, Cal., contemplates the purchase of three motor cars.

Dayton, Covington & Piqua Traction Company, West Milton, Ohio, expects to purchase six dump cars for hauling crushed stone.

Greenville Railway & Light Company, Greenville, Tex., which has under construction a 7-mile street railway in Greenville, will purchase seven cars.

Boston (Mass.) Elevated Railway, noted in the ELECTRIC RAILWAY JOURNAL of Oct. 15, 1910, as asking for bids for 100 new cars, has ordered 50 semi-convertible cars from the Lancia Car Company.

Metropolitan Street Railway, Kansas City, Mo., has nearly completed the first double-truck car of a lot of 88 cars which are to be built by splicing together two single-truck car bodies.

Woodstock & Sycamore Traction Company, Sycamore, Ill., has ordered a gasoline motor car from the McKeen Motor Car Company for use on its extension between Genoa and Woodstock, which is nearing completion. This is the second car of this type ordered by this road.

Atlanta-Northern Railway, Atlanta, Ga., has received from The J. G. Brill Company two closed 44-passenger trail cars. The car bodies are 30 ft. 8 in. long and the length over vestibules is 38 ft. 8 in. The equipment includes Brill 2' trucks, Van Dorn couplers, Brill gongs, Ohmer registers and Brill Winner seats.

Alton, Jacksonville & Peoria Railway, Jerseyville, Ill., noted in the ELECTRIC RAILWAY JOURNAL of April 9, 1910, as considering the purchase of four cars, is asking bids for six 55-ft., 42-passenger, double-truck cars. Plans and specifications were prepared by H. A. Strass, vice-president and chief engineer, Falkenau Electrical Construction Company, Chicago. The new cars will be equipped with four Westinghouse 306 interpole motors, double-end electro-pneumatic control and automatic air brakes.

Chicago & Joliet Electric Railway, Joliet, Ill., has received two combined passenger and smoking cars from The J. G. Brill Company. Mention of the placing of this order was made in the ELECTRIC RAILWAY JOURNAL of April 23, 1910. The specifications for these cars include the following details:

Seating capacity.....	50	Curtain fixtures.....	National
Length of body.....	36 ft.	Curtain material.....	Pantasote
Over vestibule.....	46 ft.	Gongs.....	Brill Dedenda
Width over sills..	8 ft. 9¼ in.	Heaters	Consolidated
Over posts at belt,		Roofs.....	plain arch
	8 ft. 9¼ in.	Sanders.....	Brill Dumpit
Body	wood	Seats, style.....	Wheeler
Interior trim.....	cherry	Seating material.....	rattan
Underframe	steel	Step treads.....	Mason
Bumpers	Brill	Trolley retrievers....	Wilson
Couplers	Tomlinson	Trucks.....	Brill 27 MCB-I

TRADE NOTES

Ackley Brake Company, New York, N. Y., has been awarded the silver medal for brakes at the International Exposition in Brussels.

Buffalo Brake Beam Company, New York, N. Y., has removed its St. Louis offices from the Lincoln Trust Building to suite 1443, Syndicate Trust Building.

Burton W. Mudge & Company, Chicago, Ill., manufacturers of the Garland car ventilation devices, have appointed J. L. Phillips manager of their electric railway department.

Rossiter, MacGovern & Company, New York, N. Y., have moved their offices from the West Street Building, New York, to Claremont and Mallory Avenues, Jersey City, N. J.

Couch & Seeley Company, Boston, Mass., announces that on Nov. 15, or shortly after, it will be established in its new factory and office building at 162-172 Columbus Avenue, Boston.

Charles K. Mohler, Chicago, Ill., consulting engineer, announces that he has opened a new office at 1839 McCor-

mick Building. Mr. Mohler has made a specialty of reports on traffic and transportation and valuations of steam and electric railways.

Cooper Hewitt Electric Company, New York, N. Y., has removed its general offices from 220 West Twenty-ninth Street, New York, to Eighth Street and Grand Street, Hoboken, N. J. The company also announces that the equipment of its new works is completed.

McKeen Motor Car Company, Omaha, Neb., has received an order from the Denver, Laramie & Northwestern Railroad for two of its 70-ft. gasoline motor cars, which are to be delivered in January, 1911. These cars will be operated between Denver and Greeley, Col.

F. B. McCurdy Company, Halifax, N. S., are proposing to organize a company with this name under the Nova Scotia Companies Act, its authorized capital stock to be \$2,625,000, in shares of \$100 each, to take over the property and business of the Silliker Car Company, of Halifax, and assume its indebtedness, including the debt to the city of Halifax.

Nickelized Casting Company, Pittsburgh, Pa., reports the use of its Nickelized chilled car wheels on four railroads. They have now been in use for 18 months, making a mileage of 45,000, and are still running under 100,000-lb. coal cars on heavy grades. They show the same endurance as steel wheels in freight train service at less than one-half the cost per 1000 miles run.

Union Switch & Signal Company, Pittsburgh, Pa., will have a meeting of shareholders on Dec. 14, at which a vote will be taken on increasing the capital stock from \$2,500,000 to \$5,000,000, or to an amount not exceeding \$5,000,000. The additional stock may be issued from time to time in payment of dividends or for subscription upon such terms as the directors shall deem proper.

American Rolling Mill Company, Middletown, Ohio, has just completed a splendidly equipped research laboratory costing approximately \$40,000. The company has made arrangements whereby it has secured the services of Dr. Allerton S. Cushman, late of the office of good roads, Department of Agriculture, Washington, D. C., who will give the work of the research laboratory personal supervision and direction.

Pawling & Harnischfeger Company, Milwaukee, Wis., owing to the increase in its business on the Pacific Coast, has opened a branch office in the Washington Building, Portland, Ore., in charge of R. K. Morse, who for some years past has been a member of the company's engineering staff at the home office in Milwaukee. Mr. Morse will also be sales representative and will handle a complete line of cranes, hoists and lumber-handling apparatus, etc.

Wonham, Sanger & Bates, New York, N. Y., sales agents of the American Automatic Switch Company, report the recent sale to the Brooklyn Rapid Transit Company of 26 electric track switches, as well as an interlocking outfit consisting of three curb controls and nine switch-throwing machines with indicators. Wonham, Sanger & Bates have also received an order from the Sao Paulo Tramway, Light & Power Company, Brazil, for 125 sets of H-B Universal wheel guards.

American Brake Shoe & Foundry Company, New York, N. Y., announces that J. S. Coffin, vice-president, will on Dec. 31 next retire from active service with the company in order to devote himself more closely to the affairs of the Franklin Railway Supply Company, of which he is president, and the American Arch Company, of which he is chairman, as well as the Locomotive Superheater Company and other allied interests. Mr. Coffin will, however, retain his financial interest in the American Brake Shoe & Foundry Company and also his membership on the board of directors.

Canton Culvert Company, Canton, Ohio, has recently sold a large order of Acme corrugated metal culverts in Brazil. Although the shipment, consisting of several carloads of 4-ft., 5-ft. and 6-ft. diameter culverts, left New York by boat Oct. 15, it is not expected that it will reach its destination until some time next spring. The representative of the railway project in connection with which these

culverts are to be used said that the Canton culverts were decided upon because it is a serious proposition to transport bridge work or anything that cannot be shipped in small and light sections. By using Acme culverts they can be hauled to their destination section by section, if necessary.

Western Electric Company, New York, N. Y., reports that its gross earnings for October, 1910, were 40 per cent larger than last October, and the 12 months ending with this month will show gross sales of more than \$61,000,000. The Western Electric Company has now disposed of the greater part of its Chicago surplus real estate, which consisted of its Polk Street and Clinton Street property. Nearly \$4,000,000 which was received for the property will be added to its already large working capital and will render financing unnecessary in 1911. Recently the company appropriated \$1,000,000 for new buildings at Hawthorne, and doubtless before the present lease expires on the 500,000 sq. ft. of the Clinton Street property which the company still occupies it will be necessary to erect further new buildings at Hawthorne to carry out the policy of concentration which is now in effect.

United States Electric Signal Company, West Newton, Mass., is building a large reinforced concrete two-story addition to its plant. The first floor will be used for testing purposes and shipping, and the second floor will be devoted to assembling and stock room. The main plant will be equipped with new machines and tools for the further extension of the manufacturing facilities of the company. The working force has been doubled. Among recent orders for signals received by the company are 120 blocks for Public Service Railway, Newark, N. J., and 30 blocks for the Rio de Janeiro Tramway, Light & Power Company, Rio de Janeiro, Brazil. The company has secured the services of J. Warren Putnam as sales engineer. Mr. Putnam was formerly electrical engineer of the signal department of the Boston & Albany Railroad. He has had several years of experience in high-tension transmission work and was connected for nine years with the Metropolitan Street Railway, New York, as superintendent of the feeder line department.

ADVERTISING LITERATURE

Allis-Chalmers Company, Milwaukee, Wis., has issued Bulletin No. 4025, which briefly describes Allis-Chalmers motor-driven air compressors and calls attention to a few of the many applications to which this type of apparatus is adapted.

Recording Register & Fare Box Company, New Haven, Conn., has printed a booklet describing and illustrating several types of its fare boxes and fare registers. It also contains illustrations of register fittings accompanied by a complete price list.

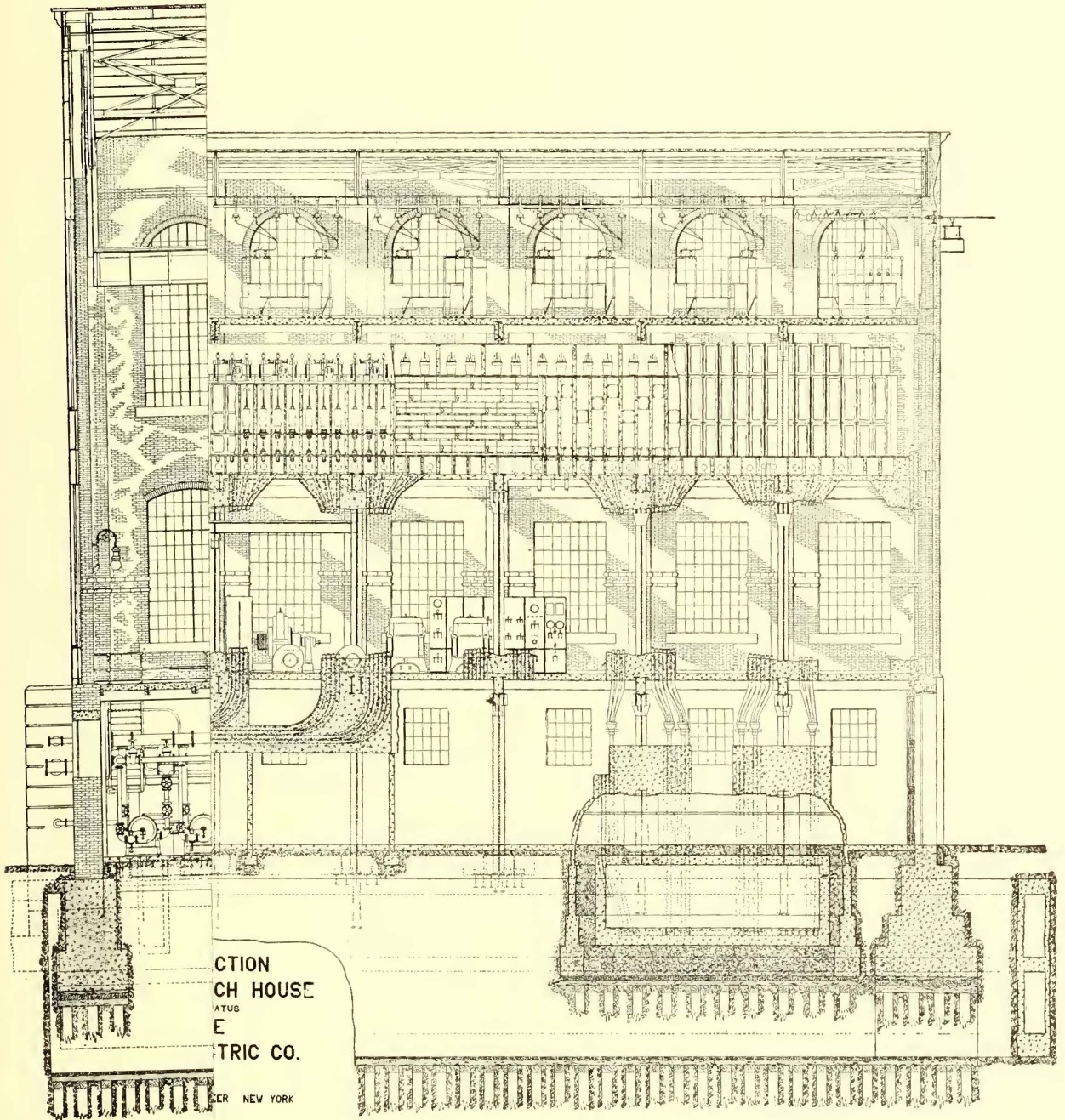
Hess-Bright Manufacturing Company, Philadelphia, Pa., has issued several catalog sheets on ball bearings and their correct use. Sheet No. 18 A is devoted to mounting directions, sheet No. 60 to positive lock nuts for ball bearings and sheet No. 61 to bearing mountings without shoulders on shaft.

National Metal Molding Company, Pittsburgh, Pa., has issued a 32-page booklet listing and illustrating its various forms of metal molding and molding fittings. Particular attention is directed to several new National molding fittings, Nos. 350, 370, 375 and 376, with particular reference to the last two named.

NEW PUBLICATIONS

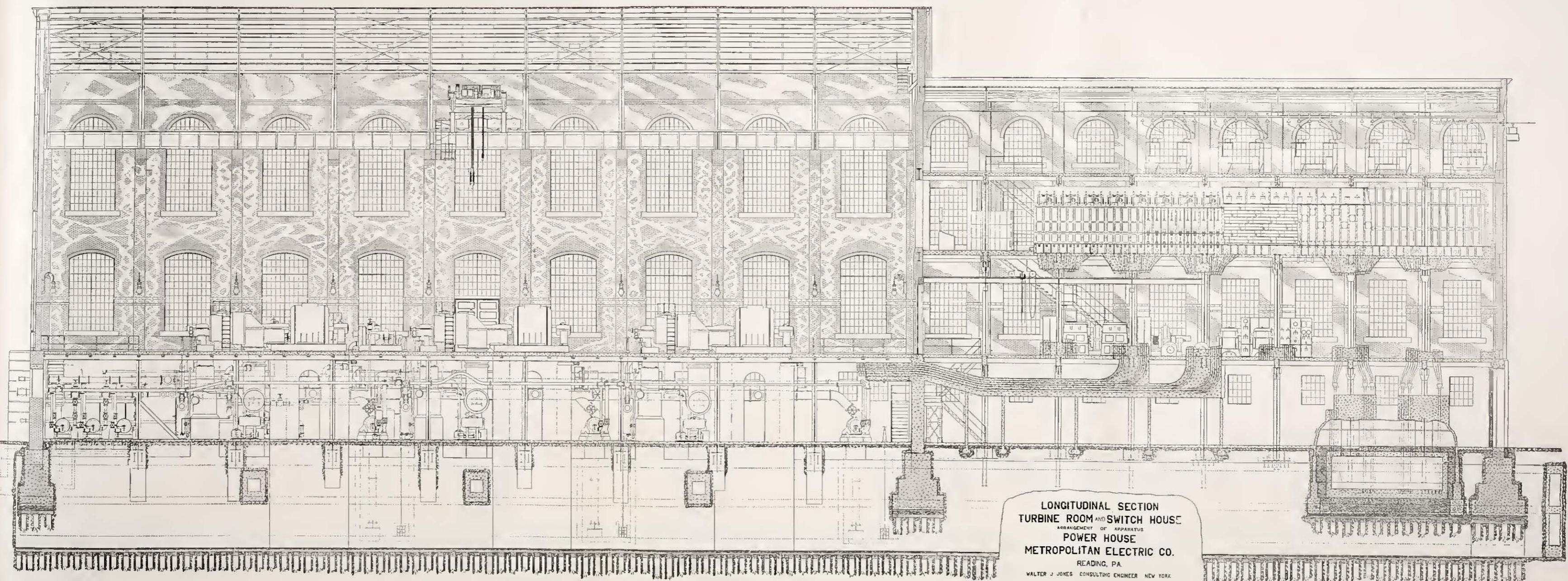
Report of the Twenty-eighth Annual Meeting of the Street Railway Association of the State of New York. Published by the secretary at Kingston; 158 pages.

The Cooperstown convention of the Street Railway Association of the State of New York, held June 28 and 29, has been reported in these columns, but the official proceedings give the complete discussion and papers, as well as the banquet speeches. The Cooperstown convention, like all of the meetings of the Street Railway Association of the State of New York, was an excellent one and the proceedings will well repay a careful perusal, whether the reader was in attendance at the meeting or not.

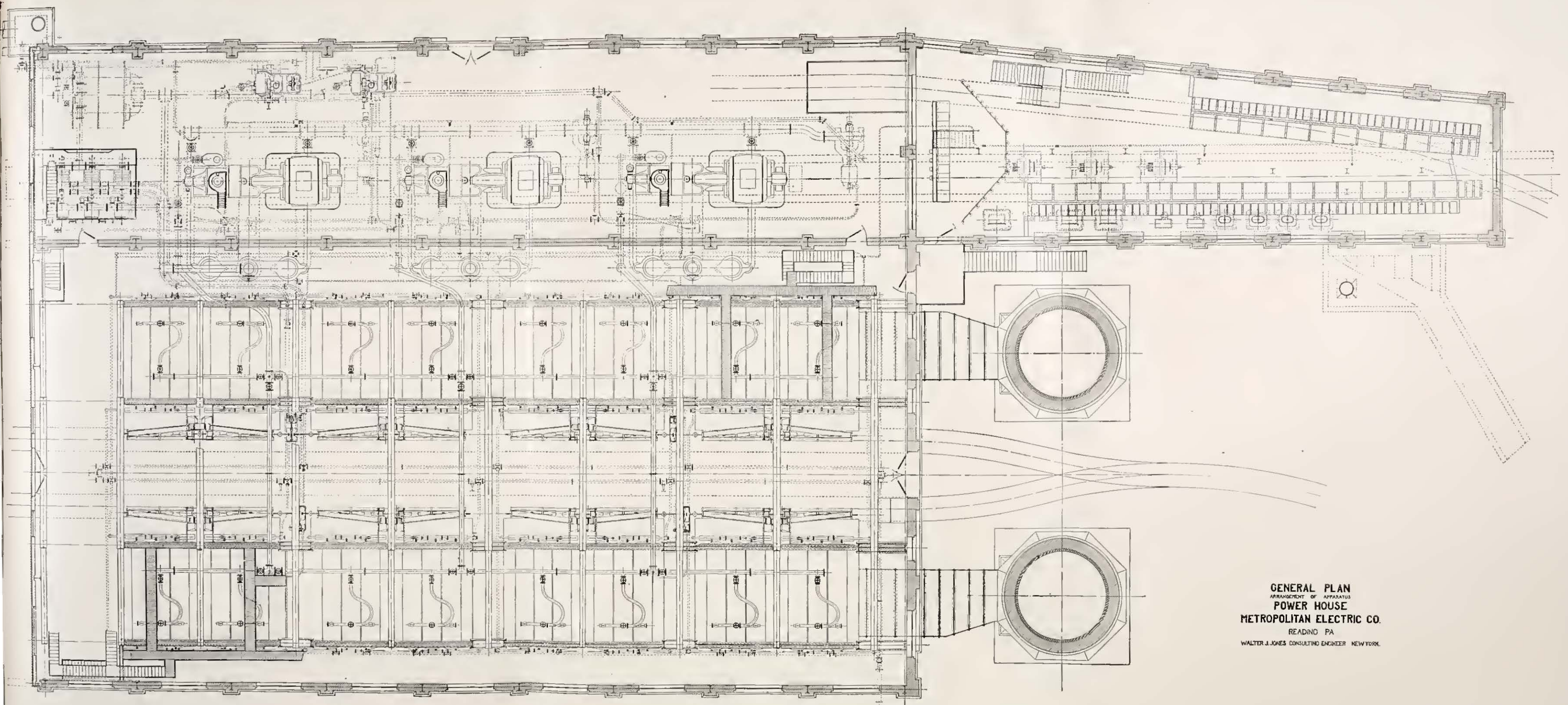


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