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

The Baltimore Railway Plant

There is no task that gives a finer scope for engineering skill than the reconstruction and modernizing of an important plant in full operation. Any kind of mediocre talent enables a man to sit down with a bunch of manufacturers' catalogues and the blue prints of a few of their latest creations and lay out a station that will be gleefully described as "following standard practice." This bears the same relation to engineering that stencil-work does to art. To take a big system and keep it running while its power equipment is being turned inside out and to renovate

it without needless cost is a task of a very different order. This, however, is the kind of thing that has been accomplished in Baltimore with a high degree of success. To begin with, the task of reconstruction of the main station on Pratt Street was a formidable one. In the shake-up after the fire the widening of Pratt Street cut off about 50 ft. from the station front and crowded out the three 1800-kw d.c. units that were the mainstay of the distribution on the d.c. lines. These had to be removed to a new dynamo room at the rear of the Pratt Street property with the least possible disturbance to service. Then in the remaining space at the front the new and powerful a.c. equipment had to be located and a new front built. The result is a plant of very sensible but rather unusual character, with an a.c. generating equipment in a front operating room, a d.c. equipment in the rear and a boiler room, double-decked to save space, in the middle.

The rapid growth of Baltimore has called for extensive addition to the street railway lines and the area over which power must be distributed is correspondingly large. The generators, therefore, in the a.c. plant are for 13,200 volts, giving an economical distribution without resorting to raising transformers. At one point, however, Bay Shore Park, where the summer traffic is heavy, even this voltage looked uneconomical during the high copper prices, and it was determined to build an auxiliary d.c. station near the park to take care of the summer business. As this lasts only three or four months economy of construction to keep down the fixed charges was a prime necessity, and as a matter of fact that plant, of about 1500-kw capacity all told, was organized from the existing d.c. equipment displaced by the erection of new substations. The plant is large enough and good enough to give fairly economical service right where heavy output is needed. The rest of the Baltimore system is operated by the substations reinforced by the d.c. equipment at Pratt Street. The details of these plants are very well worked out, as one may see by reference to the plans, and in particular, ample space for increase of capacity is left and the wiring and switchboard outfit is arranged on a systematic plan that will, when merely carried along, allow for the control of several times the energy now allowed for. In the street railway business as nowhere else is the need of room for increase keenly felt. We could mention several stations that are notoriously and chronically behind their power demands all the time. It is most important in reorganizing a power system to leave things in such shape that increase of capacity can be very easily made. And the next step, which is far too often long delayed, is to make that increase before it is absolutely needed to carry on the daily business. Baltimore has been fortunate in getting the railway power system into such excellent shape, and particularly in having it so arranged that it can easily keep up with the growing demands of the territory.

Raising the Load Factor

Why should electric roads as now organized be able to undertake more work than is now usual along the line of general supply? In the early days of electric traction power circuits were not uncommon, but since the supply was from a grounded circuit the underwriters soon found it expedient to suppress this particular kind of service. At the present time the situation has radically changed as respects the nature of the distribution. Electric lines are supplied from long high-voltage feeders distributing power from large stations where the generating costs are low, in spite of load factors which are generally unsatisfactory. The lines reach districts in which the existing costs of generation for lighting and power are necessarily high. Why should not the railway plants much more often than now become wholesalers of current wherever there seems to be a profitable market? The grounded circuit situation is far less serious than under the old conditions, and since power for railways is usually distributed at 25 cycles, while most lighting and motor service is at 60, the interpolation of the requisite frequency changes would completely remove any chance of trouble from grounds on the railway side of the outfit, including even most of the chances of impairment of regulation.

There seems no good reason, in fact, why, wherever charter conditions permit, railways should not become important distributors of electricity in territory now served at high cost or not served at all. There are, of course, many plants at present doing such a general business, but the scheme has certainly not yet been worked for anything like what it is worth. The chief technical difficulty is that of proper regulation. Wherever frequency changers are used this difficulty practically vanishes. Even where the railway high-voltage distribution is at 60, automatic regulation by feeder regulators has reached a point where it must at least be taken seriously. A steady power load during the day helps out the irregular load factor of a railway plant wonderfully, and a night lighting load saves the load factor in the late evening. Of course, there is the outstanding difficulty of the peak, but the exigencies of railway service are such that there must be an allowance for peak generally large enough to carry any probable load. The stiffest loads on a railway system large enough to have a distribution system of the sort here considered are commonly not normal afternoon peaks which would lap the lighting peak, but come at special times in summer when lighting is at its lowest. A motor load in itself has no marked peak and does not make formidable demands on the general regulation. There are many small local plants now run under very uneconomical conditions which could well profit by the current available from railway feeders which could generally be sold at prices attractive from the standpoint of the small producer. The more effectively the country can be covered by networks supplied from big stations the better, and the big railway plants should be more of a factor in the situation than they now are. The present tendency is strong toward wholesaling power, and it is going to prove profitable. Such a plan should be welcomed, also, by small power users along the transmission line.

Power Plant Inspection Records

In the scientific study of equipment wear and tear the record system adopted plays an important part in the success of trouble reduction. The anticipation of defects tending to interrupt service is the natural outcome of the conscientious use of suitable records, and the extent to which the repair shop end of electric railway maintenance has benefited by inspection and repair record systems is evidenced by the experience of every company that has had a chance to give the matter a fair trial. In its particular field, power station inspection is quite as important as the regular inspection of rolling stock, and it is reasonable to assume that the more general use of simple records of power-house inspection would be productive of increased service reliability.

Doubtless in many plants it is planned to have the station log sheets take care of all records of happenings to the machinery, and this may be the principal reason why so little has been done in the way of recording apparatus inspections when the equipment appears to be in first class condition. As log sheets are filed, however, it becomes increasingly hard to pick out the history of any individual piece of machinery except the larger units, and as the average log sheet deals with breakdowns and repairs on the equipment side rather than with minor faults not necessitating the shutting down of apparatus, it is seldom of great value as a record of machinery inspection. In other words, a defect that an inspector considers important may not appear at all on the log sheet for the reason that it in no way changed the operating conditions as recorded by the hourly readings of instruments and the line of continuity of service for any given piece of machinery at work in the plant on the day covered. Rarely do station log sheets contain space for piping troubles or leaks in traps and valves, and unless an actual service interruption occurs on an important pipe line or valve, it is unlikely that any fault discovered on inspection and remedied with comparative ease will appear in such a record.

In most cases the inspection of power plant equipment is so closely associated with the regular station operation that it is supposed to be a continuous duty of the men in each shift to see that no condition liable to produce trouble escapes attention. In a very small plant, where three or four men handle the entire service of a single shift, it is no great task to keep a close watch of all the equipment in the building, but as the size of plants increases to the point where many hundred thousand dollars' worth of machinery are concentrated under a single roof, the variety of equipment is so great that only systematic methods can insure its being properly looked after. Inspection of such a plant may be the duty of the regular operating force, but whether it is done inside or outside the station staff, some simple record of the conditions as they occur day by day will be found worth far more than it costs to obtain, when it comes to the prevention of trouble and the accurate observation of equipment developed to satisfy varying specifications. By sketching out a simple sheet for the results of inspection with a space upon it for every individual piece of equipment examined, the varying frequency of inspection will cause no embarrassment, and the dated sheets

will show the complete history of all the apparatus from the chimney cap to the bottom of the sump, as regards its condition at each inspection. If a given piece of apparatus does not require inspection more than once a year, the record of its condition a year back is decidedly worth while for the purpose of a decision upon the scope of repairs and probable life that can be expected if the conditions continue. At the other extreme, any apparatus requiring daily inspection, even of an external and casual character, can be watched more skilfully and protected against failure more readily if the occurrence of the smallest abnormal condition is at once recorded. The signed inspection record is a most valuable means of fixing responsibility and encouraging the best work, and finally, it can be made of the broadest value at times when new equipment is being tried out in service.

It is a well known condition that the performance of new apparatus often develops facts which never see the light of day so far as the station log sheet is concerned. If, then, a good record system is in service in connection with the inspection of such machinery, the correction of operating troubles and the forestalling of shut-downs that might have been prevented ought to be much easier than if only the bare record of outputs, heavy repairs and failures at critical times is depended upon through the medium of the useful but not all-comprehensive log sheet.

The Opportunity to Investigate Special Problems

One of the most significant indications of returning business prosperity is the wide consideration now being given to the improvement of manufacturing facilities in industrial plants. There is a lesson for the electric railway manager in the course being pursued by not a few concerns engaged in the production of varied commodities. It is suggestive to note that one of the largest manufacturers of electric motors for machine tool and other industrial driving is at present busier in his engineering department than during the heaviest rush of business a year and a half ago, investigating new propositions, preparing quotations and special designs to meet conditions requiring other than standard treatment with the company's regular products, and answering a large number of inquiries as to the fitness of different sizes and types of motors for specific cases of group drive or direct power application. When business was at its maximum volume, it was often a fact that time could not be taken to consider a re-arrangement of equipment or a remodeling of production machinery, for the one problem above all others was how to turn out the orders in anything like the time promised. Now there is time to consider the equipment's needs in all the broader aspects, and to prepare for the next rush of business which is as certain to come as confidence becomes more and more widely established as that the crops being sown this spring will be carried to market by the railroads in the coming autumn.

There has been widespread interest in the problems of electric railway maintenance during the past few months, and the good results of the work that has been done in that direction will be manifested in the handling of summer traffic on many roads. There are many broader questions,

however, bearing more particularly upon probable future demands for accommodations and facilities for handling traffic, that need to be investigated on roads in different sections of the country. The wise manager is always trying to forecast the future conditions which he will have to face, and the company which is now carefully investigating such questions as the probable power requirements of the next two or three years or even longer, the demands of its latest tendencies in rolling stock upon the track and bridge construction in service, the probable shop facilities that will be needed in the next three or four years, the adequacy of its feeder system to supply power at a decent voltage in case the traffic expands from 30 to 40 per cent in the next two years, the condition of its rail bonds in connection with the economical return of heavier currents to the power stations, and the present quotations and deliveries possible upon repeat orders of standard apparatus, is putting itself in line to secure the most advantageous solution of its physical problems with the minimum delay as new facilities or enlarged means of handling business more economically become necessary.

In the case of one of the large city systems with which we are acquainted, which has for many years depended upon direct current power generation and distribution, the consulting engineers of the road are at work upon an exhaustive report of probable future power requirements, and are figuring carefully the relative advantages of current generation and distribution in the territory by direct or alternating methods. Whatever the future policy of the company may be as regards its technical methods of supplying power, it is wise to consider the problem with great care at this time, for when expansion of business demands greater capacity, the present thorough investigation of conditions with its allowance for the future's requirements will enable the company to proceed much more rapidly with the work in hand than as though the present excellent opportunity for analysis had been neglected. Another company which is in need of new shop facilities has decided to postpone the erection of any new structures of that sort for a year or so, whether wisely or not, is another question. Nevertheless, it is certainly the proper time in such a case to do all the preliminary planning, and if possible to get the working drawings and specifications into such shape that bids can be quickly secured when the company reaches the point where it is prepared to build. In still another case in mind a company has been trying for some years to get along with a direct current power system that is of doubtful economy under the existing loads and station location. It may be that the company does not feel inclined to take up this question with any firm of engineering experts at just this time. But if a broad recasting of the power situation on the road is a probability of the near future, it would be money well expended for the company to undertake at least a brief preliminary examination of the probable needs and feasible courses of the next few years. This can be done through its regular staff or, if preferred, through that of a reliable firm of engineers. In either case the plans can be reduced to paper, possible methods can be compared and the conclusion can then be filed for prompt use at the proper time.

THE RECONSTRUCTION OF THE POWER SYSTEM OF THE UNITED RAILWAYS & ELECTRIC COMPANY, OF BALTIMORE

During the spring and early summer of 1906 the service of the United Railways & Electric Company, of Baltimore, experienced a number of serious interruptions by reason of temporary failures of the power supply. Steady and rapid growth of the company's business had compelled large additions to the car equipment and the new cars added were materially larger and heavier than the old ones. For a year or two prior to the great fire work had been prosecuted along the lines of a general change in the system of power supply involving the construction of a large alternating current plant at the Pratt Street power house, distribution from this point by alternating current to substations located in various parts of the city and the gradual abandonment of a majority of the small and relatively uneconomical steam driven power plants which up to that time had supplied many of the lines of the company with power.

The great fire of Feb. 19, 1904, had seriously damaged the company's largest power plant at Pratt Street. Following the fire the city availed itself of the opportunity to widen Pratt Street, and this made it necessary for the company to cut off 60 ft. from the front of the site of the main power house facing Pratt Street, remove three 1800-kw engine-driven dynamos and a large amount of auxiliary machinery, relocate this apparatus within the reduced dimensions of the site and to construct a new power house at the Pratt Street end. In view of the unusual combination of circumstances existing it is not surprising that serious difficulties were experienced in maintaining the continuity of the power supply during the period of reconstruction following the fire and new construction necessitated by increasing business.

On Sept. 1, 1906, the railway company made a contract with L. B. Stillwell, of New York, under which he assumed entire charge of the motive power department, becoming responsible not only for constructive work, but also for operation of the company's plants and distributing system from coal pile to trolley. Mr. Stillwell opened an office in Baltimore and placed Horatio A. Foster in immediate

When plants already overloaded are reconstructed and extended under conditions of steadily increasing load new power units must be placed in service before old ones can

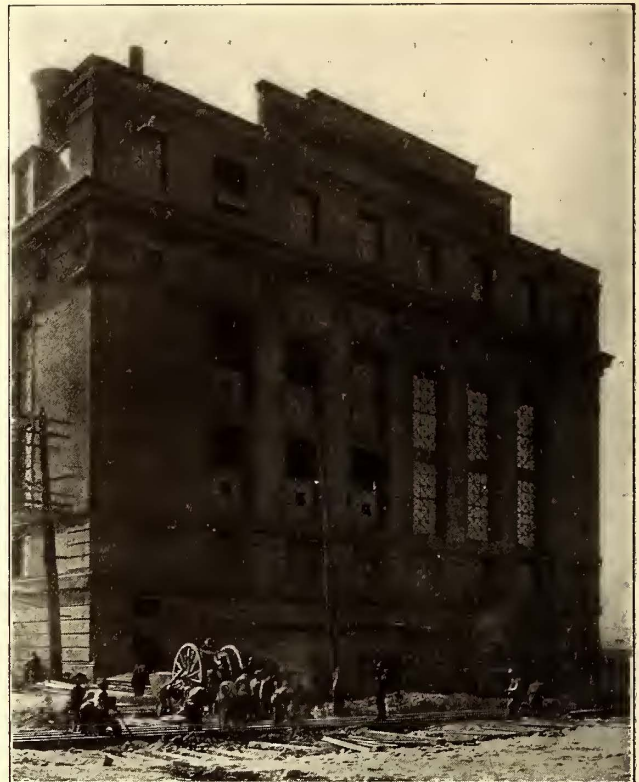


FIG. 2.—COMPLETED NORTH FRONT OF PRATT STREET STATION AFTER REMOVAL OF OLD ENGINE ROOM

be overhauled or moved to new locations, and work of this kind can never be pushed through to conclusion with the rapidity possible in the construction of a new power plant. The results which have been accomplished in 18 months, therefore, are striking evidence of the ability and energy of the force organized by Mr. Stillwell in Baltimore to carry out this work.

The present article will describe and illustrate in some detail the work of reconstruction and extension as thus far

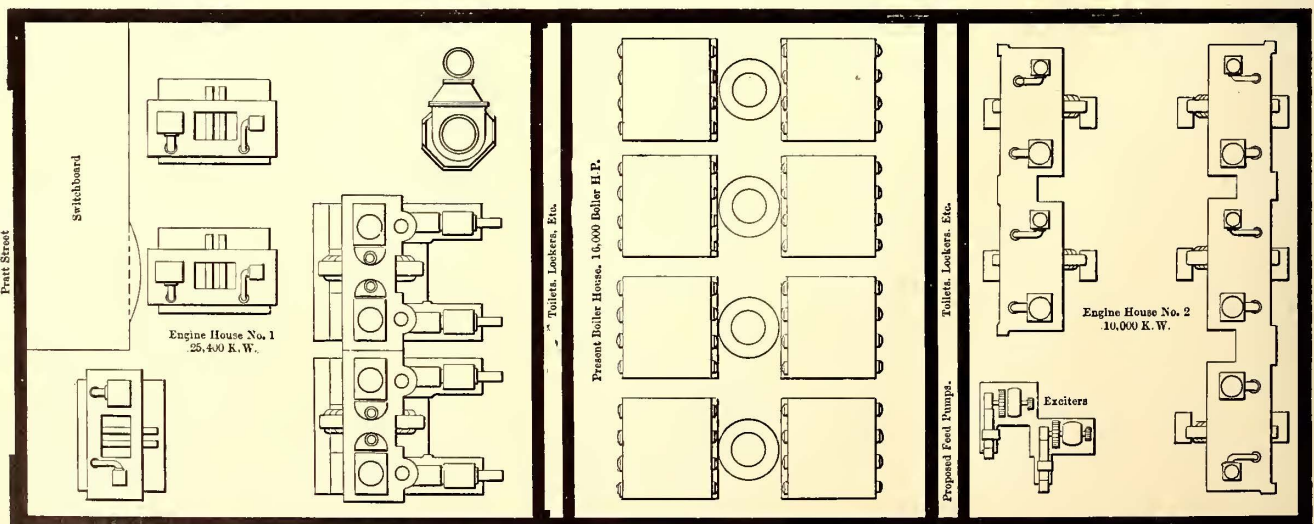


FIG. 1.—PLAN OF PRATT STREET STATION

charge of the work as resident engineer. C. F. Baker was appointed superintendent of the motive power department in immediate charge of operation and of the field work of construction.

completed. The results attained may be summarized as follows:

(1) At Pratt Street power house the reconstruction incident to the widening of the street has been accomplished.

(2) Switch galleries designed for the ultimate control from this central location of plants aggregating 120,000 hp have been completed and switch gear installed to the extent necessary to permit operation of the new substations.

(3) The 5000-kw Westinghouse dynamo driven by a McIntosh & Seymour engine ordered by the company prior to the date of Mr. Stillwell's contract has been erected and placed in service.

(4) A 5500-kw Curtis turbine unit has been installed and put to work.

(5) The boiler plant has been increased by the addition of eight B. & W. boilers of 450 hp each.

(6) A new substation has been built on Lombard Street near Penn Street.

(7) An addition to the Harford Road substation has been constructed.

(8) A new power station has been built for Bay Shore Park.

PRATT STREET POWER HOUSE EXTENSION AND IMPROVEMENTS

The main power station on Pratt Street consists of two engine rooms between which is a double-decked boiler room (see Fig. 1). For convenience in designating, the engine rooms are numbered one and two, No. 1 being that nearest Pratt Street. The new building between the street and the boiler room

engine, which was already under order, has been erected, a 5500-kw Curtis steam-turbine unit has been installed, and

the three 1800-kw direct-current machines have been moved from the position now occupied by the street into the new

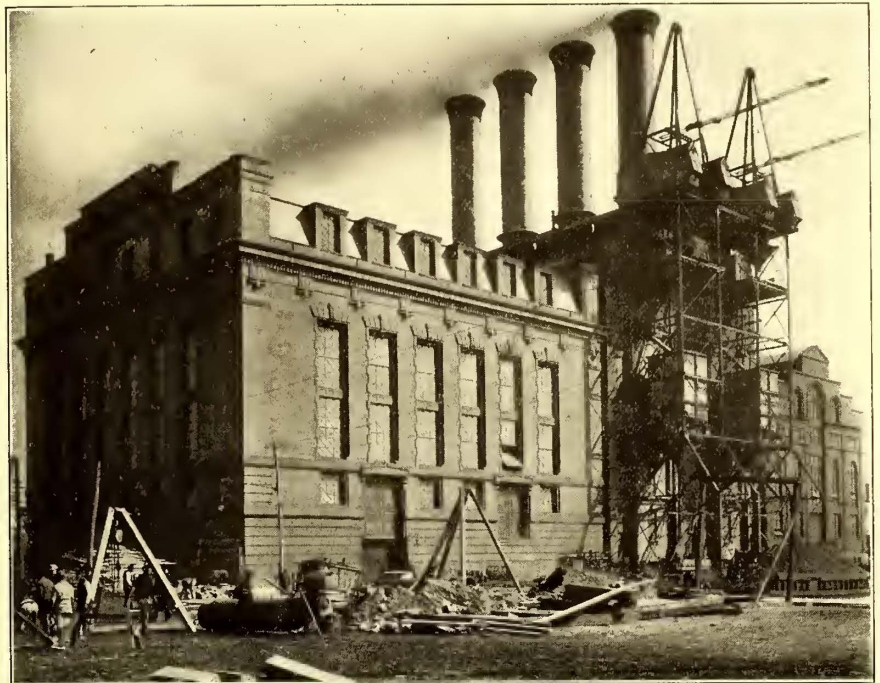


FIG. 3.—GENERAL VIEW OF PRATT STREET POWER STATION

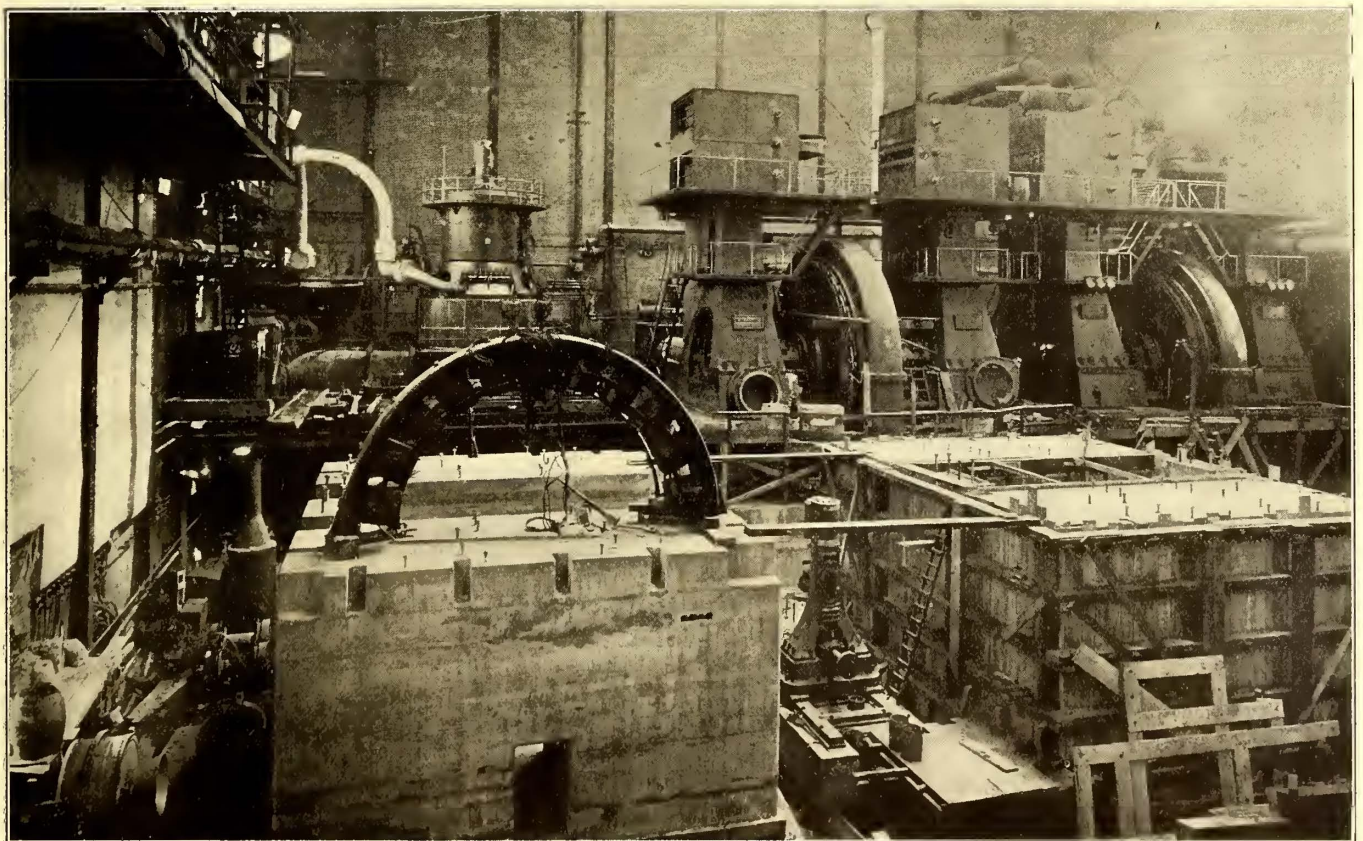


FIG. 4.—ENGINE ROOM OF PRATT STREET STATION—VIEW TAKEN DURING CONSTRUCTION

has been practically completed as to walls, and a new 5000-kw engine-driven unit had been installed when Mr. Stillwell took charge. Since that time a second 5000-kw en-

engine room. In addition, numerous changes in the piping and wiring have been made, a new direct-current switch gallery constructed, a new and comprehensive switching gal-

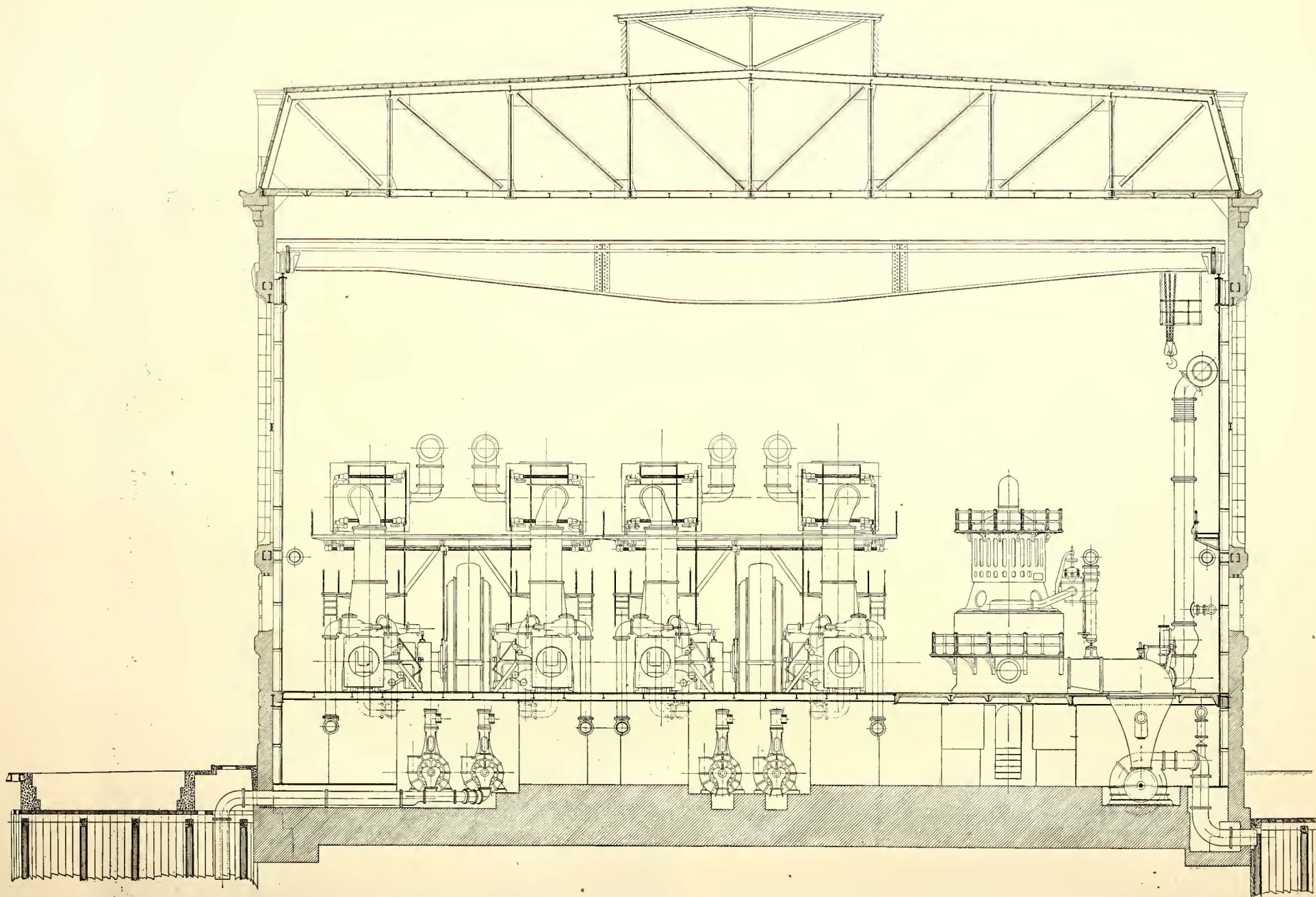


FIG. 5.—CROSS SECTION OF NO. 1 OPERATING ROOM, LOOKING NORTH, PRATT STREET POWER HOUSE

lery, designed to control the alternating and exciting current from all sources, was planned and is nearing completion.

The new building is a brick and steel structure of attractive appearance. The brick walls are built into a steel frame work which supports the floors and roof. Exterior walls are trimmed in terra cotta. The floors are of steel and concrete. The roof is provided with a monitor containing skylights and ventilators and the side walls contain numerous windows, all of which may be swung open for ventilation. Fig. 2 shows the front of the new station as completed and the old portion removed, and Fig. 3 shows a general view of the Pratt Street power station.

The rated capacity of all the machines in the new generator room is 20,400 kw and provisions have been made



FIG. 7.—BAY SHORE TRANSFORMER STATION

for the installation of an additional 5000-kw turbine. The three 5000-kw units are located in a row adjacent to the boiler room wall. On the opposite side of a passageway and in the center of the room are two of the 1800-kw units. The third 1800-kw unit is at present in the westerly corner near the north wall of the building, as shown in the diagram, Fig. 1, but on the extension of the switchboard galleries it will be moved in line with the other two.

THE 5000-KW RECIPROCATING UNITS

Each of these units consists of a McIntosh-Seymour horizontal-vertical double-compound engine and a 13,200-volt, three-phase, 25-cycle Westinghouse generator. Each engine has twin barometric condensers located against the boiler room wall. Independent 12-in. centrifugal pumps supply the condensing water. The pumps for one of the engines are at present driven by 500-volt direct-current motors, while the others are driven by vertical Buckeye engines.

THE 1800-KW UNITS

These consist of McIntosh-Seymour vertical cross-compound engines and General Electric direct-current generators. They are equipped with barometric condensers, supplied with water by centrifugal pumps driven by Buckeye vertical engines.

THE TURBO-UNIT

This unit consists of a Curtis turbine and a 5500-kw, 13,200-volt, three-phase, 25-cycle generator. Fig. 4, taken

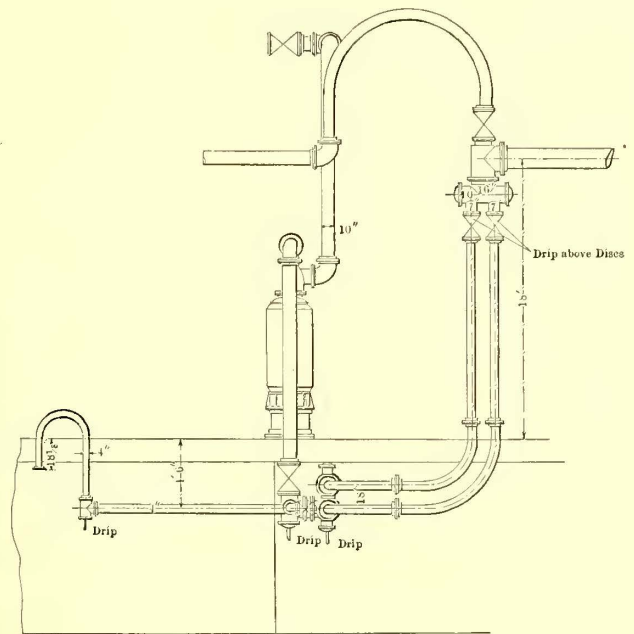


FIG. 6.—DETAIL OF PIPING

during construction, shows in a marked way the difference in size of the turbine and reciprocating units. The turbine exhausts into a Worthington jet condenser placed below the floor. An independent atmospheric exhaust extends from the condenser connections out through the roof of the engine room. Condenser water is furnished by a 26-in. centrifugal pump located in the basement and driven by a single Harrisburg horizontal engine. A 10 in. x 24 in. x 13 in. dry vacuum pump is installed on the main floor for use in connection with this condenser.

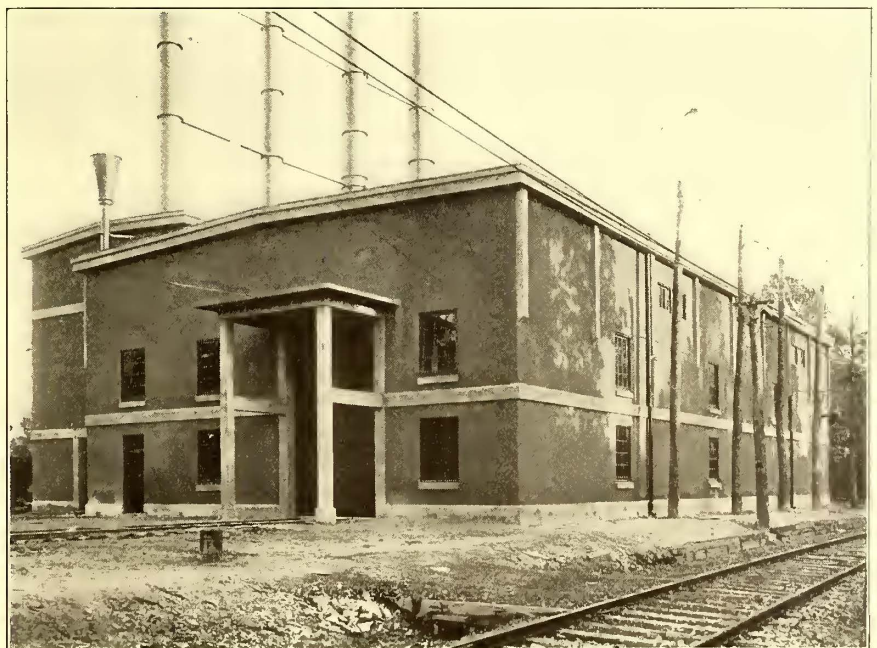


FIG. 8.—BAY SHORE POWER STATION

The oiling system for the turbine step bearing includes duplex oil pumps in duplicate, a receiver containing cooling coils and a Turner filter. No accumulator is at present em-

ployed. The pressure on the step bearing is maintained at about 700 lb. The steady bearings for the vertical shaft are supplied with oil from an entirely separate system of

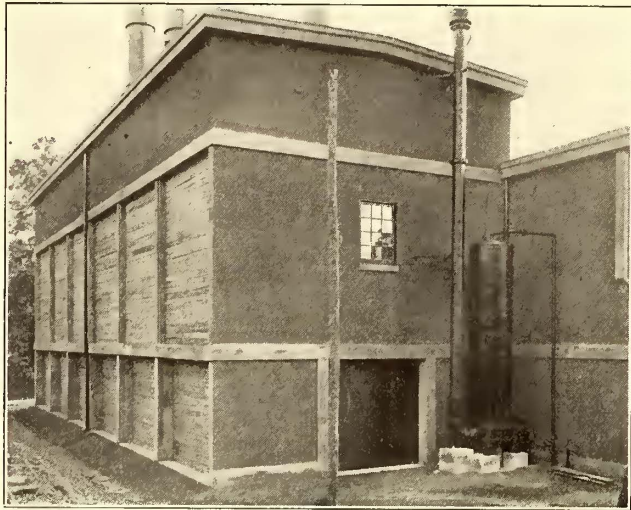


FIG. 9.—BOILER ROOM OF BAY SHORE POWER STATION. THE PLANKING IS REMOVED IN SUMMER FOR VENTILATION

pumps installed in duplicate; pressure is maintained at about 100 lb. at the pumps.

STEAM PIPING

The necessity of keeping the plant running has required considerable ingenuity in piping, in order that too great expense be not incurred in temporary work. The permanent plans provide for feeding the three large units direct from the main header on the north side of the boiler room. The 1800-kw units are fed from a ring system of piping with the main steam header forming a portion of

a rather novel manner. Where the pipes curve to pass below the floor, two 7-in. pipes were substituted for the single 10-in. pipe, by the use of manifolds. Fig. 6 shows this expansion curve in detail.

The Holly drip system is installed in connection with the steam piping, all drips draining to three pots located in the basement.

CONDENSER SUPPLY AND DISCHARGE

Condenser water is obtained from the slip on the west



FIG. 10.—FACADE OF CENTRAL SUBSTATION

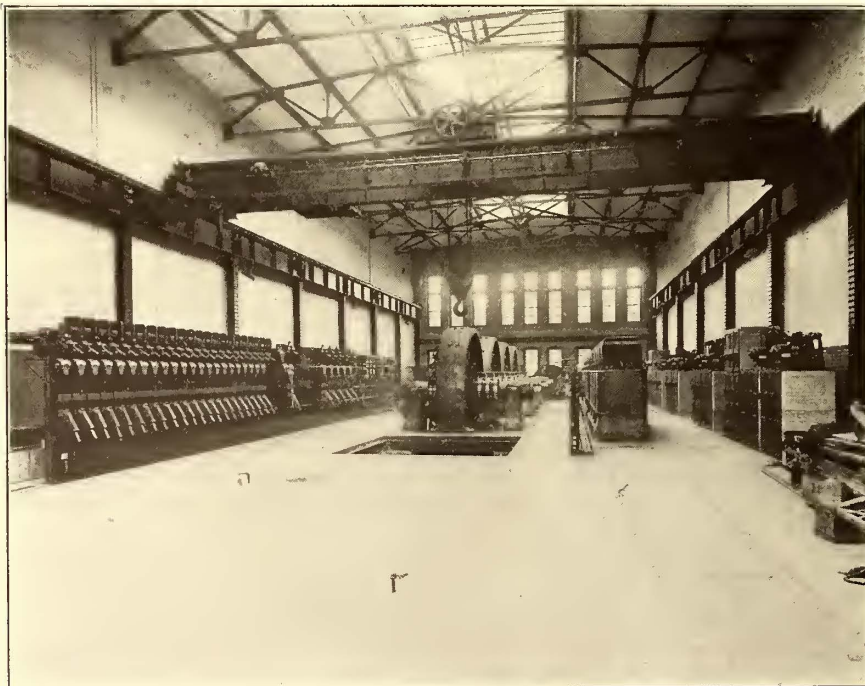


FIG. 11.—GENERAL VIEW OF CENTRAL SUBSTATION

the ring. The 10-in. mains connecting into the boiler room header at each end pass overhead along the side walls of the engine room to a point beyond the large units and then drop beneath the floor, meeting underneath to complete the ring. Provision for expansion has been made in

side of the building. Owing to the changes contemplated by the city in the dock system, the condensers are now provided with temporary supply and discharge pipes, but ultimate plans provide for three suction wells, one for the three 1800-kw units, one for the two 5000-kw engine units and one for the two turbines. The discharge from each set of units will be carried into an 8-ft. x 8-ft. duct to reduce the velocity of the flow into the slip on the east side of the station, thus preventing currents which would interfere with the handling of the fruit and produce boats and oyster smacks which land at these wharves. Fig. 5 shows an elevation in cross-section of the south side of the power house.

A. C. SWITCHBOARD AND WIRING

All alternating current apparatus in the entire station will ultimately be controlled from a gallery built against the north wall of the building. At the present time, however, the alternators in the old engine room are operated from the old switchboard in that room.

The plans provide for high-tension buses in both Nos. 1 and 2 engine houses, connected by heavy bus ties, in duplicate, with generators feeding to both buses, all con-

trolled from the bench-board in the No. 1 engine house. When the contemplated changes are made in the buses in engine house No. 2, the high-tension system of buses and switches will be capable of handling a generated capacity of 100,000 kilowatts, which, with changes in capacity of the small units, could safely be increased to 125,000 kilowatts.

The buses, switching apparatus, controlling switchboards and wiring have all been furnished and installed by the Westinghouse Electric & Manufacturing Company. This structure will be the subject of a separate article.

DIRECT-CURRENT SWITCHBOARD

The three 1800-kw, 600-volt, direct-current generators in the No. 1 engine room are controlled from a switchboard supported on a steel and concrete gallery suspended from the east wall of the building, about 25 ft. above the engine-room floor. The generator and feeder cables from this board are carried up the face of the wall in vitrified tile ducts secured to its face.

GROUNDING NEUTRAL

The alternators are star-connected with grounded neutral, having an oil switch and resistance in series. If a ground occurs in the system, it is immediately indicated on the section of the benchboard controlling the neutral apparatus.

COMPRESSED-AIR CLEANING SYSTEM

A complete system of air piping is run throughout the switchboard structure and in the engine rooms, with outlets supplied with valves on each floor and at every generator, to which a hose-pipe may be connected for cleaning purposes. All piping is concealed. A 15-hp motor-driven

one 200-kw and one 150-kw engine-driven generators, located in engine house No. 2, as shown in Fig. 1. Provision

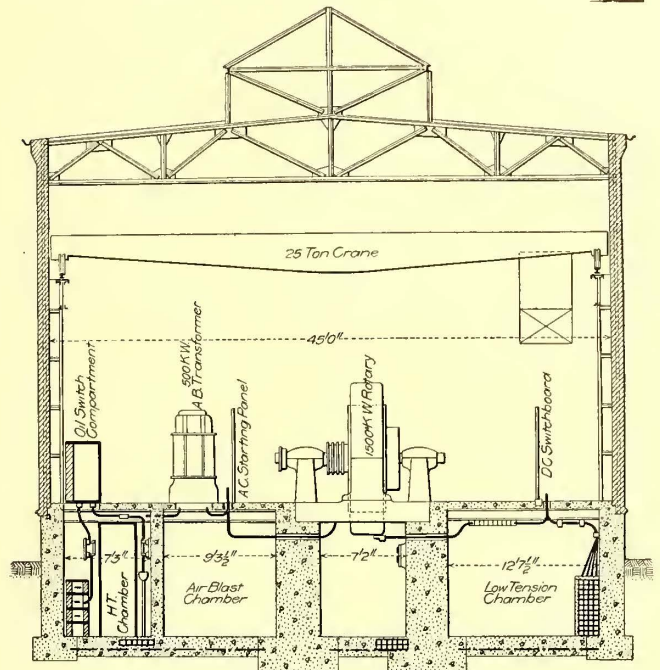


FIG. 13.—CROSS-SECTION OF CENTRAL SUBSTATION

has also been made for the future installation of two 500-kw engine-driven units in engine house No. 1.

LIGHTING

The lighting is at present accomplished by using five arc lamps in series in 550-volt circuits, but the plans provide that the general illumination in the boiler and engine rooms will be done by mercury-vapor lamps on two-wire, 110-volt, d. c. circuits, normally fed from the auxiliary bus, but which may be thrown on either the exciter or battery buses.

The electrical galleries, engines, boilers, etc., will be lighted by incandescent lamps, which will be fed normally by a 13,200 to 110-volt transformer, and may be thrown on the auxiliary bus or on the exciter or battery buses.

THE BAY SHORE PARK TRANSFORMER HOUSE

Bay Shore Park is lighted by current transmitted at 3300 volts from a substation nine miles away, or from the new Bay Shore power station a half mile distant. The 75-kw, 3300/110-volt transformers used for lighting were formerly installed in a frame building, but this has been replaced by an attractive structure of reinforced concrete. A view of the latter is given in Fig. 7.

Three transformers are connected in delta, and a fourth has been provided as a reserve. The primary and secondary leads are connected to a cable bus by means of solderless clamps in such manner that, if necessary, a defective transformer may be replaced with very little delay.

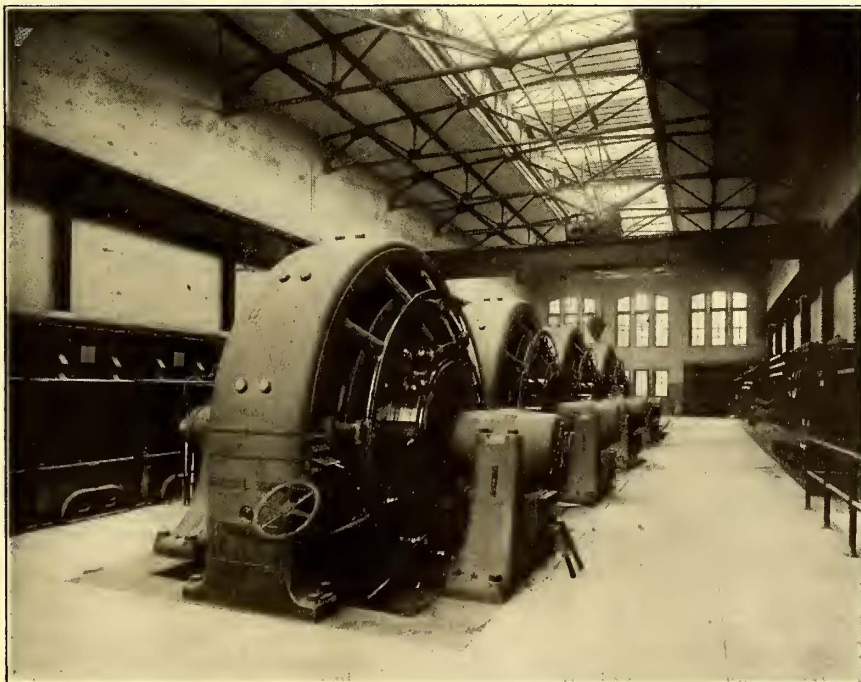


FIG. 12.—GENERAL VIEW OF CENTRAL SUBSTATION

air compressor and tank automatically supply this system with air at 80-lb. pressure.

EXCITERS

The alternators are excited by one 150-kw motor-driven,

THE BAY SHORE POWER STATION

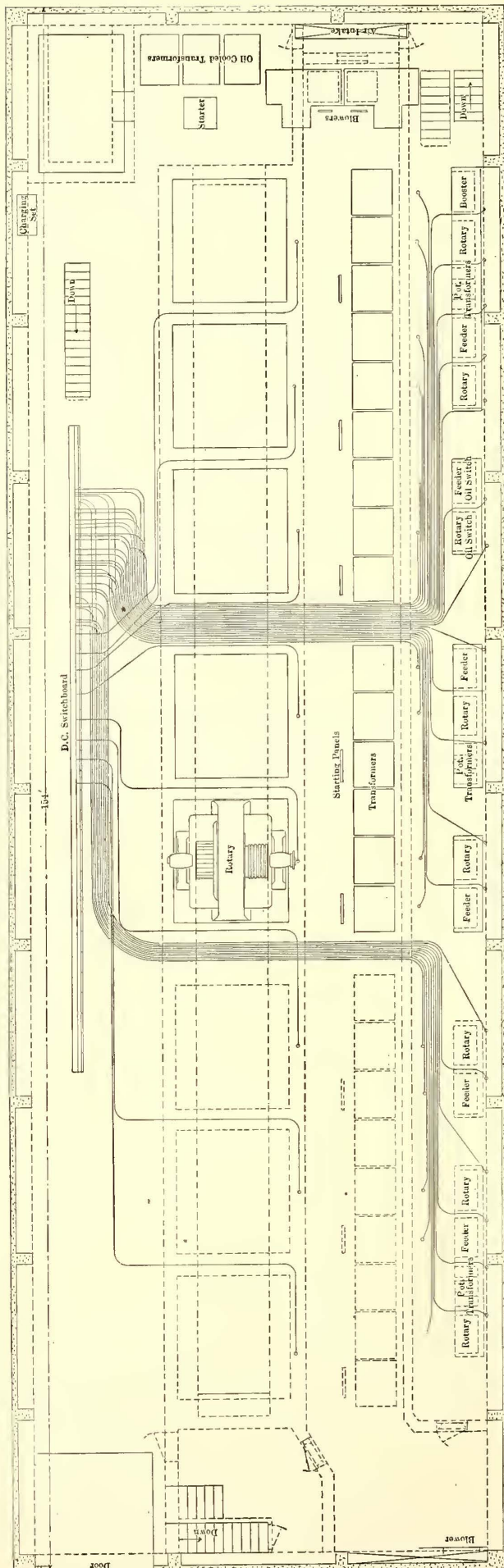


FIG. 14—PLAN OF CENTRAL SUBSTATION, SHOWING CONTROL WIRING

Bay Shore Park is located about 12 miles from the main station. The park and railway line, up to 1907, were supplied with direct current from rotary converters in the Eastern Avenue substation, which is 9 miles from the park. The positive necessity of providing some adequate service of power for this place caused the adoption of some methods which under other circumstances would have been given better consideration. For instance, at the price then quoted for copper, which was about 25 cents per pound, it was found to be more economical to build a new generating station near the park than to build a high-tension line and substation, or to run the extra copper for low-tension feeders from the existing substation. As the plant was to be operated only about one-third of the year, the fixed charges per kw-hour output on a station built with new and modern apparatus would have been excessive and would have been greater than the lessened cost due to the better economy of such a station. These conditions led to the construction of a plant made up almost entirely of machinery from several of the company's abandoned direct-current power stations, and practically everything in the station, including boilers, engines, generators, belts and piping, was taken from such plants, the only new apparatus being an alternating-current generator for the park lighting.

The building is a reinforced concrete structure with a "moostic" finish, as shown in Fig. 8, and was built by the Baltimore Ferro-Concrete Company. Kinnear rolling steel doors are provided at both ends of the boiler and engine rooms. The outer wall of the boiler room was left entirely open for ventilation, but is so fitted as to receive a plank bulkhead for the winter. (See Fig. 9.)

At one end of the engine room a track enters the building a sufficient distance to permit the unloading of cars by the overhead crane. As the roof span is too large for concrete construction, a double line of square concrete columns in the center of the building carries the beams for the runways and from cross-beams tying the columns together at the top vertical beams are extended to the roof. Two 20-ton hand-operated cranes, built by Maris Brothers, Philadelphia, are placed over the engine and generator bays.

The boiler equipment consists of two 600-hp and two 300-hp Morrin Climax boilers with independent smokestacks. Water is obtained from driven wells and is stored in two elevated tanks of 10,000 gal. capacity each. Closed feed-water heaters are located in a recess of the building at each end. Feed water is supplied to the boilers by two 7½-in. x 4½-in. x 10-in. Worthington feed pumps. Two Pohl 8-in. x 8-in. x 7-in. air lifts are used to elevate the water from the wells into the tanks.

The boilers feed into a ring system of steam mains, one line of which is in the boiler room and the other in the engine room. The pipes are supported on roller bearings and at their middle points a U-bend is provided to allow for expansion.

The power equipment consists of four 200-kw, 500-volt, four-pole, T.H. generators, belted to McIntosh & Seymour tandem-compound, non-condensing engines; a 250-kw, three-phase, 3300-volt, self-exciting General Electric generator, belted to an Armington & Sims engine; a 375-kw, 550-volt, direct-current generator, direct-connected to a Westinghouse kodak engine, and a 200-kw, 500-volt, direct-current generator of the same type and style, for supplying power for miscellaneous purposes at the park.

The direct-current switchboard consists of nine slate panels, fully equipped with instruments and other appli-

ances. A separate switchboard for the lighting unit is placed at one end of the building. Construction was started early in April, and, although the station was far from completion, current was turned on May 27, 1907.

THE CENTRAL SUBSTATION

The central substation at Lombard and Penn Streets, in a well built-up district, is the only newly located substation

ways were left on both sides of the building to lessen the transmission of vibration to the adjacent structures. Ample ventilation has been provided by numerous windows in the front and rear walls, and by louvre windows in the roof monitor. Light is admitted through the top of the monitor, which is of wired glass. A wide doorway with a 12-ft. recess behind it at the street level allows wagons to be backed into the building, so that they may be unloaded by

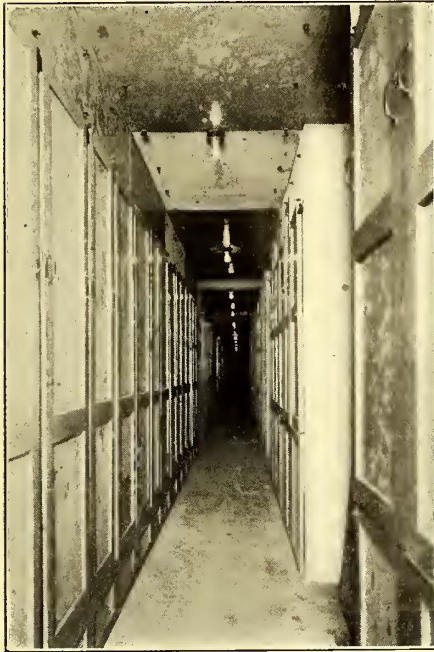


FIG. 15.—HIGH-TENSION CHAMBER

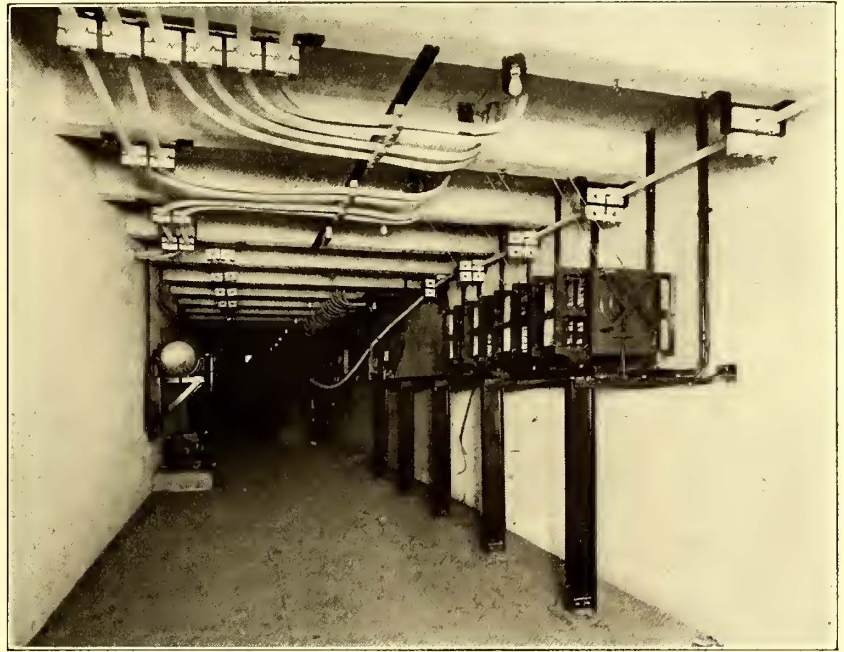


FIG. 18.—LOW-TENSION CHAMBER, SHOWING ROTARY FIELD RHEOSTATS AND CABLES FROM ROTARY TO D. C. SWITCHBOARD

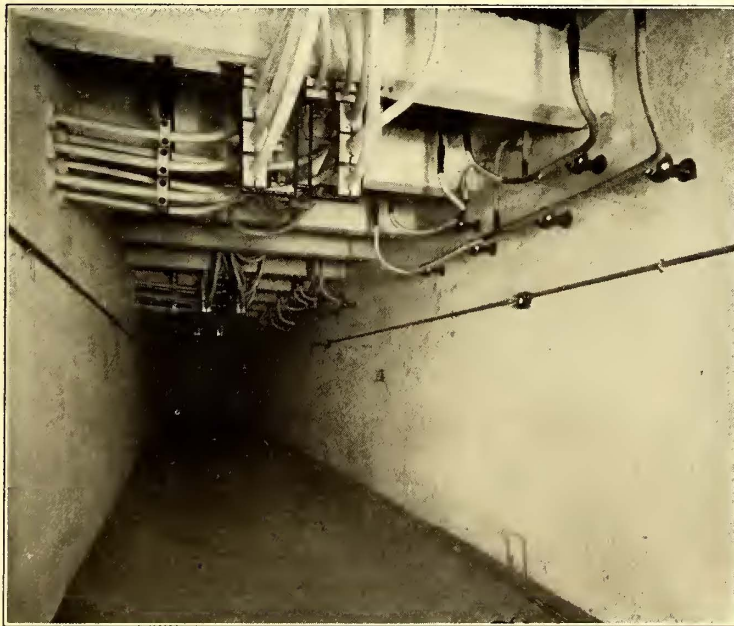


FIG. 16.—AIR BLAST CHAMBER SHOWING LIGHTING DELTAS ON RIGHT AND A. C. ROTARY CONNECTIONS ON LEFT



FIG. 17.—CHAMBER UNDER ROTARIES, SHOWING A. C. ROTARY LEADS ON LEFT AND D. C. LEADS ON RIGHT

erected since the reconstruction work was begun. The building, which is 154 ft. x 48 ft., is a fireproof brick and steel structure and is designed for the installation of eight 1500-kw rotary converters, five of which are now in place. The foundation, floors and roof are of concrete, and the walls are of brick trimmed in limestone. Window frames and sash are of metal, and the interior doors metal sheathed. A view of the Lombard Street end is shown in Fig. 10. Area-

the crane, which was furnished by Maris Brothers, Philadelphia, and is of 25 tons capacity. Figs. 11 and 12 give general views of the interior of this station.

The general arrangement may be observed in Figs. 13 and 14. All apparatus is on the main floor level. The underground high-tension feeders enter the building through the basement near the easterly wall and are carried up to the switches placed on the floor above. They then drop to high-

tension buses in the basement. Leads from these buses are carried through oil switches, and thence on the ceiling of the basement to the transformers, all high-tension leads being kept separate by concrete barriers. Fig. 15 gives a

building. From the d. c. switchboard, leads drop to the basement and are carried out to the street in conduits. This arrangement, it may be seen, confines all the high-tension apparatus to one side of the building and all low-tension apparatus to the other side. Fig. 16 shows, on the right, the arrangement of the high-tension deltas from the bus structure to the transformers, and, on the left, the low-tension six-phase connections to the six rings of the converters. Fig. 17 shows, at the left, the continuation of the low-tension wiring from the transformers to the rotary, and, on the right, the arrangement of the positive and negative from the commutator of the rotary. Fig. 18 shows the positive connections as carried through the wall to the direct-current switchboard. It also shows the field rheostats for the rotaries.



FIG. 19.—INTERIOR OF NEW PORTION OF NORTHERN SUBSTATION

The busbar and switch structures are built of light-colored shale brick and concrete slabs. Tests showed this brick to be well adapted for the purpose, as they withstand a comparatively high voltage test, are acid proof and do not absorb moisture. The busbar insulators are of such a design that the bars are free to move longitudinally, but are held rigid at disconnecting switches.

The transformers are of the General Electric air-cooled type and of 550-kw capacity each. A pressure of $\frac{3}{4}$ oz. is maintained in the air-blast chamber by any two of the three motor-driven Buffalo Forge Company blowers. These blowers each have a capacity of 20,000 cu. ft. of air per minute. Entrance to the chamber is provided for through an air lock at one end, equipped with air-tight refrigerator doors. Air for the blowers may be obtained

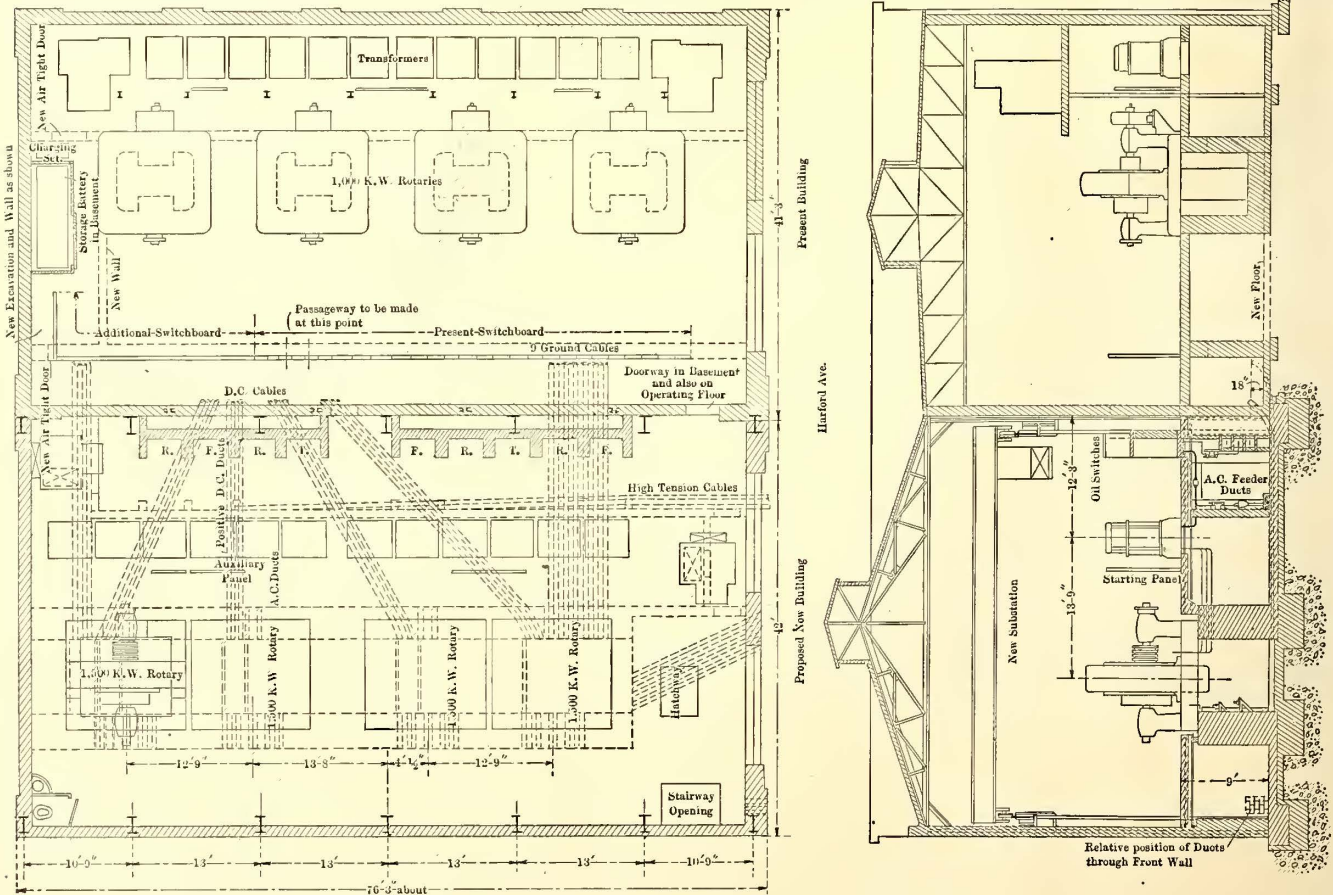


FIG. 20.—PLAN AND SECTION OF NORTHERN (NO. 2) SUBSTATION

view of the high-tension pit, showing the protecting doors of asbestos. The secondaries from the transformers are run across to the rotary converters, and the direct-current leads continue to the switchboard near the west wall of the

from outside the building through ducts provided for the purpose, or by opening dampers in the side of the ducts it may be taken from the station.

The rotary converters rest on parallel concrete walls

3 ft. 6 in. thick. The base frames of the machines are cast with square corners and with vertical sides, to provide for setting the top of the frame flush with the floor, as shown in the cross-section. The rotaries are provided with electrical oscillators, and are started from the alternating-current side by means of $1/3$ and $2/3$ voltage taps on the transformers. The two double-throw, triple-pole starting switches for each machine are installed on panels between the transformers and rotaries. In the northwest corner of the building is a 300-kw booster for raising voltage for an outlying line, for which the regular voltage of 575 volts is insufficient.

WIRING

All wires and cables are run in conduit, vitrified tile being used in the basement for alternating-current and direct-current feeders, and loricated conduits in the floor filling and walls for control and lighting wires.

The lead-sheathed high-tension cables entering the build-

converters, while the new one is intended for four 1500-kw machines, two of which are now in place, as shown in the view of the interior. (Fig. 19.)

The new apparatus is controlled from an addition to the switchboard in the old building. The arrangement of the apparatus in the new portion and the construction details correspond to those of the central substation, already described, and are shown in Fig. 20. In the old portion the high-tension bus and switch structures are located on a concrete gallery near the southerly wall and immediately over the transformers.

SUBSTATION LIGHTING

Both the Central and Northern substations are lighted by Cooper Hewitt mercury vapor lamps placed five in series on the 550-volt circuits. The incandescent lamp circuits are arranged so that the lamps may be normally fed from 430 to 110-volt transformers, or may be thrown on the control batteries. For emergencies, two arc lamps at Central and four tungsten lamps at the Northern substation are connected through a relay to the battery, so that when current fails on the mercury lamps the relay closes the battery circuit through the tungsten lamps, thus the station is never without light.

ENGINEERING

In addition to personal supervision on the part of Mr. Stillwell, the mechanical portion of the work has been under the care of John Van Vleck, and the electrical under that of H. S. Putnam, Mr. Stillwell's associates in New York.

The treatment of the entire matter of a sure power supply has necessarily been rather heroic, and the efforts of the engineers have been fully and promptly supported by President Wm. A. House, the entire board of directors, and the engineering staff of the United Railways & Electric Company.

EGYPT'S INCREASED DEMAND FOR APPARATUS

The Austrian Consul at Alexandria, in a recent report, points out the increased demand for electric apparatus and supplies in Egypt as a consequence of the enormous strides made in its development. France has imported to that country large quantities of copper for railways and electrical supplies and Germany has also shipped important consignments of wire, cables, generators and dynamos. It is further proposed to electrify several railway lines, and extensions of electric railway systems of Alexandria and Cairo are projected. The Alexandrian Railway Company will probably purchase its cars and supplies from Switzerland in the future.

It is planned to have a through passenger service between Toledo and Indianapolis by connecting the tracks of the Clover Leaf Railroad and the Indiana Union Traction Company at Marion. Between Indianapolis and Marion an electric car will be operated and at Marion it will be attached to a Clover Leaf passenger train for the remainder of the trip.



FIG. 21.—EXTERIOR OF NORTHERN SUBSTATION NOS. 1 AND 2

ing terminate in end bells, from which the leads are brought out to the terminals of the disconnecting switches, which are separated by concrete barriers. The middle switch is set higher than the two outside ones, so as to make the leads from the end bells the same length and thereby permit interchanging the connections without splicing.

THE SWITCHBOARD

The switchboard was furnished by the General Electric Company and is composed of direct-current machine and feeder panels, special alternating-current control panels and special battery panels.

The special feature of these alternating-current control panels is the arrangement of the operating switches for control of the oil circuit breakers, and a miniature bus.

The station is equipped with a compressed air cleaning system having outlets at all important points, and a complete grounding system, with outlets and flexible leads, has been installed.

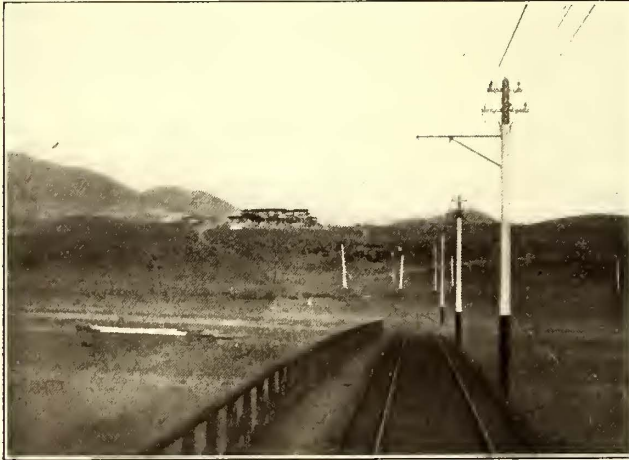
THE NORTHERN SUBSTATION

The addition to the Northern substation consists of a brick and steel building of practically the same dimensions as the original structure, a general view being shown in Fig. 21. The old building contains four 1000-kw rotary

THE WARREN-BISBEE RAILWAY OF ARIZONA

The system of the Warren-Bisbee Railway serves the thickly populated mining district around Warren, in the southern part of Arizona. It connects the towns of Warren, Bakersville, Upper Lowell and Bisbee, and its lines pass the shaft houses of most of the copper mines in the intervening territory. This is one of the largest copper-producing districts in the world, about 250,000,000 lb. of copper being mined annually. It supports a population of 25,000 persons, all of whom derive their living directly or indirectly from the mines. The mines are so situated that to reach them from the towns it is necessary to climb very steep grades for a distance of a mile or more and the

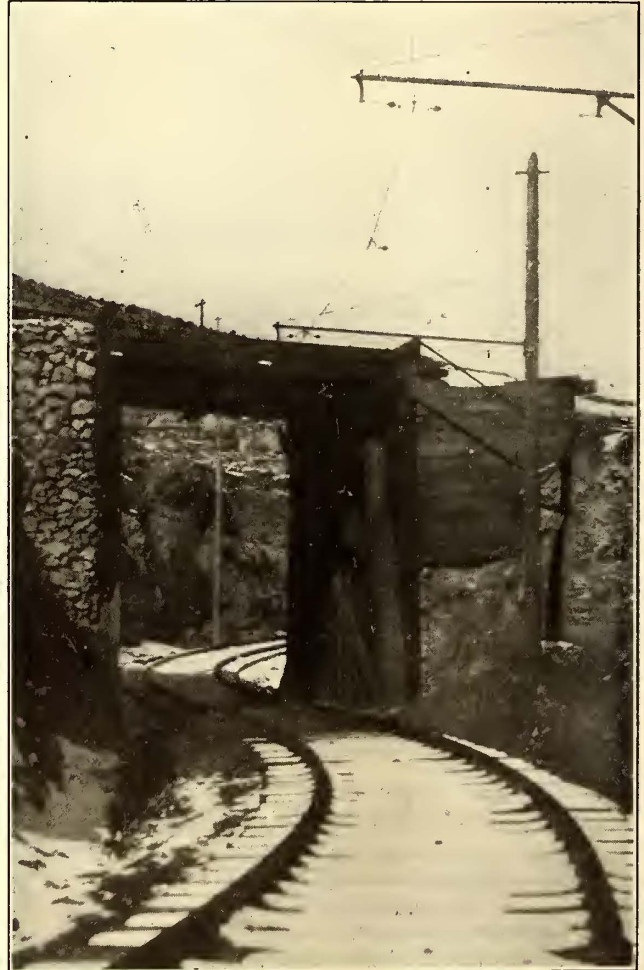
The "High Line" is equally crooked and steep. The mining district is honeycombed with the tracks of the El Paso & Southwestern Railway, which has built a spur to nearly every shaft for the purpose of collecting ore. In building the electric line grade crossings with the steam railway were entirely avoided, and this in itself required many short, steep grades and sharp curves. The total difference in elevation between Warren and the terminal at the upper end is 347 ft., which is reached in 4 miles. There are many heavy rock cuts and high fills. As the road was constructed with the primary idea of safety in operating cars, there is only one trestle on the entire line. This was necessary in order to cross a railway yard below, where there were several tracks. The cost of construction was



TRESTLE OVER RAILWAY YARD



JUNCTION OF BISBEE LINE AND "HIGH LINE" OUTSIDE OF WARREN



UNDER CROSSING OF THE WARREN-BISBEE LINE WITH A STEAM RAILROAD

electric railway thus handles a large workman's traffic in addition to the ordinary travel between towns. The lines also reach the Warren District Country Club and a race track and baseball park owned and operated by the company, which are situated $1\frac{1}{2}$ miles from Warren and about 7 miles from Bisbee.

The main line extends from Warren to Bisbee 8 miles and the "High Line" runs out of Warren to the mines 4.1 miles. The main line in general follows the wagon road, and on account of the mountainous country through which it passes, it is full of steep grades and sharp curves. Of the total length, 35 per cent is curved track; there are two 60-ft. radius curves on steep grades. The grades are long and steep, one grade of 7 per cent being 1500 ft. long. A difference of 377 ft. in elevation is attained in 5 miles.

probably as high as any road of its kind in the country, the average per mile being \$45,000.

The track is laid with 80-lb. A. S. C. E. section rails. A No. 000 grooved trolley wire is used, supported by pipe brackets on wood poles. The trolley is fed at frequent intervals from No. 0000 feeder cables strung on the trolley poles. There are 75,000 ft. of this cable in the distribution system.

The power plant is situated on the "High Line," at approximately the load center of the system. It contains two Westinghouse-Parsons alternating-current turbo-generators, one of 300-kw and one of 500-kw capacity. A 300-kw, 600-volt rotary converter is mounted in the engine-room of the power plant and a 300-kw, synchronous, motor-driven, 600-volt, d. c. generator is mounted in a substation,

three miles distant. In addition to carrying the railway load the power plant also furnishes current for lighting in Warren and small amounts of power to the mines in the vicinity.

The company now has six cars in service and operates a half-hourly schedule between Warren and Bisbee with a 15-minute schedule on the "High Line." Cars make the round trip between Bisbee and Warren, eight miles, in one hour, with a five-minute layover at each end. The round trip on the "High Line," a total of eight miles, is made in 30 minutes.

The cars were built by the McGuire-Cummings Manufacturing Company, Chicago, and were assembled and shipped complete, including wiring, motors and control apparatus. They have the following dimensions: Length over the end panels, 30 ft. 4 in.; length over all, 42 ft.; width over belt rail, 8 ft. 6 in., and height from the rail to the trolley board, 11 ft. 6 in.

The underframe consists of two 6-in. I-beam center sills; built-up side sills of steel plate, $\frac{5}{8}$ in. x 8 in., and yellow pine fillers, $4\frac{1}{2}$ in. x 8 in., and $1\frac{3}{4}$ in. x 6 in.; two intermediate sills of yellow pine, $2\frac{1}{2}$ in. x $1\frac{3}{4}$ in.; two I-beam needle beams and built-up wrought-iron bolsters. The platforms are 6 ft. long and are substantially framed and spliced to the body center sills. The body framing is of ash with steel angle roof carlines.

The platform vestibules are completely inclosed with three drop sashes in front and double folding doors on the sides so hinged that either half may be folded back. The vestibule floor is 10 in. below the car body floor and 31 in. above the top of the rail. A single step with a 10-in. tread $16\frac{1}{4}$ in. above the rail is provided. The end doors in the car are of the double sliding type with a total opening of 36 in. The side sashes are $33\frac{1}{4}$ in. wide, arranged



POWER HOUSE OF THE WARREN-BISBEE RAILWAY

in pairs with narrow art glass sashes above. They drop into pockets in the side sheathing. Particular attention was paid to preventing the sashes from rattling by the use of anti-rattling devices.

The cars are finished inside with selected quartered oak with bird's-eye maple ceiling and deck lining. Great care was taken in painting these cars on account of the extreme climatic conditions in Arizona. All metal trimmings are of polished bronze. There are six reversible cross

seats, 34 in. wide, in the center of the car with 23-in. aisle between and two longitudinal seats, 70 in. long, at each end. The seats are upholstered in rattan. Under the longitudinal seats are spaces for sand and tool boxes. The cars are heated with the Consolidated Car Heating Company's electric heaters and are equipped with four of the car builder's automatic sanders.

The trucks used under the cars are the McGuire-Cum-



INTERURBAN CAR ON THE WARREN-BISBEE RAILWAY

mings standard 10-A M. C. B. type. They are fitted with four GE-67, 40-hp motors and operated with the Type M multiple unit control. Westinghouse traction air-brake equipment is used, and in addition hand brakes operated by a vertical brake wheel in each vestibule are provided.

The line was built and equipped under the direction of Charles G. Adsit, consulting engineer. L. W. Powell is president and Cleve W. Van Dyke manager, both of Warren, Ariz.

NORTHERN TEXAS TRACTION'S IMPROVEMENTS

The Northern Texas Traction Company, of Fort Worth, last year carried out a number of very important improvements, the work done really anticipating the requirements of the service for some time to come. The substation near the city limits of Fort Worth on the interurban line which supplies power to all of the cars in Fort Worth and to part of the interurban, was enlarged by the installation of a new 400-kw rotary converter and the necessary transformers. A portable substation was erected and placed on the interurban line half-way between Fort Worth and Dallas. It consists of a box car with a 400-kw rotary converter and the necessary transformers, switches, switchboard, etc. It is being used continually at siding 18, half-way between Fort Worth and Dallas, for the purpose of furnishing additional power at that point. An additional exciter was placed in the power station. It is motor driven and permits of the shutting down of the steam-driven exciter except in cases of heavy load. During the year contracts were let for a new engine and generator, which will increase the capacity of the power house 50 per cent. This machinery will be installed some time during 1908. In both Dallas and Fort Worth considerable new track was laid. Overhead work was gone over carefully and thoroughly overhauled and 20 semi-convertible single-truck cars were placed in operation in Fort Worth.

It is said that 100,000,000 ties were used by steam and street railways in one year in the United States for construction of new track and renewals. Approximately three-quarters of these were hewed and one-quarter sawed. Oak furnished more than 44 per cent and Southern pine $1/6$ per cent.

ECONOMIC LOCATION OF ELECTRIC RAILWAYS

BY ROBERT H. BALDWIN,

Locating Engineer, Minneapolis, St. Paul, Rochester, Dubuque Electric Traction Company

Some of the evils of hasty, ill-considered location of electric railways are being realized by owners of those properties built some years ago, and better, more careful work is being done in the preliminary construction of new lines. Formerly no particular skill was considered necessary to locate an electric line. For purposes of economy or to cultivate public opinion a local country surveyor was employed whose one idea was to locate the road along the line of least resistance for the right-of-way agent, but not for the power house. He followed section lines, highways or the farmers' boundary lines and produced some remarkable profiles, which contributed in no small measure to the ultimate receivership of the roads or necessitated changes in right-of way later on and took many times the original expenditure required to have located the road properly in the first instance. The writer has frequently had to discard completely the results of such surveys on being called in to make the final location of a dormant project later revived. In one case the so-called location map was simply a graphic chronicle of the progress of the field party; not a highway shown, an ownership noted nor any attempt made to tie the proposed right of way to the plat of the country passed through. Only one bench mark was established on the 25-mile route and the grades laid down, often incorrectly, were assumed without any consideration of drainage or the load on the power house.

To locate successfully an electric railway an engineer must constantly compromise between the requirements of steam railway practice and the requirements of street railways. He must keep in his mind's eye the power house demand and the schedule to be operated, modifying the grade line and selecting a suitable topography accordingly. The organization of electric railways is smaller and the capitalization less than on steam railways and the engineer is expected to provide as good or better operating conditions for less construction expenditure.

The cost of a careful location survey is so small compared with the total cost of construction and possible savings in operation that engineering expense should not be questioned. The best is none too good. The old unscientific method of locating, as it were, by sheer perseverance and brute strength from behind a transit should be abandoned. The engineer should walk over the line from end to end in each direction and note the general possibilities of the country. An examination from a carriage while driving along the nearest highway will not produce the best results. This should be followed by a careful topographical survey of the land contiguous to the proposed route for a considerable distance on each side. From the map developed from these observations a line of the best grade and alignment can be laid out to be afterward surveyed and staked in the field without loss of time or money.

Entrances to cities and towns along the route are generally matters not under the control of the locating engineer. He must make the best of the situation and adapt the exterior portions of the line to the best advantage in connecting up with the city location. Whenever possible the main streets should be avoided on account of the restricted speed required because of other traffic. It is generally possible to locate an inexpensive cut-off or belt line around the outskirts of cities and towns for the use of

freight and limited trains. Even though such cut-offs are not built immediately, the cost of surveying them is small and the connections with the main line can be laid out so that if built in the future they will fit into the profile and alignment without making expensive or uneconomical changes.

Wherever possible steam road crossings should be located within the corporation limits of cities and towns where the trains are run under control. Country station stops should be placed on grade summits to assist in acceleration and braking. Turnouts between stations should be kept out of deep cuts where the cost of excavation is high. Their location will be governed largely by the train schedule which, however, is usually elastic enough to permit of the necessary variations to avoid unfavorable conditions.

In determining grade lines, momentum grades should be used when possible not only to save power, but to reduce wear and tear on the rolling stock. There is no economy in a long steady grade; it is a constant drag on the power house, heats up the motors in ascending and wears out the brake shoes in descending. The subgrade should never be less than 4 ft. above the surrounding ground level. Capillary attraction will make the bank soggy if of less height. Make the fills and cuts balance and avoid waste even at the expense of overhaul. It is cheaper to bring the grade up to the proper height in the first place with good soil than to fill in later with 3 ft. or 4 ft. of gravel ballast. Frequent waterways to carry off flood water are an absolute necessity. They may often save heavy repairs from washouts. If the roadbed is well drained and kept dry, particularly in damp cuts, the track will ride better and the ties and poles will last longer.

Where it is necessary to locate along a crooked highway, it is often cheaper in the end to make arrangements with the highway commissioners to divert or straighten the road instead of putting in frequent crossings and paying damages for injuries to drivers and pedestrians later on. Running in a highway in any event is poor economy. The railway becomes a tenant of the county, subject to regulation of speed and other conditions at the will of constantly changing local authorities. A fenced-in right of way is a great protection.

The writer recently completed the location survey of about 200 miles of interurban road in Southern Minnesota and Iowa through a heavy rolling country for part of the distance and in extremely rough broken country for the remainder. It was what would generally be considered 2 per cent country, but by making careful preliminary surveys and taking the topography with a hand level for 1000 ft. on each side of the preliminary line, a maximum grade of 1½ per cent was obtained. Some development was necessary to gain this low maximum; at one point about 6000 ft. of developed line was required in crossing a deep valley. The cost of the line was kept down to a reasonable figure and long tangents with easy curves and only occasional maximum gradient were developed in the unfavorable country covered. The methods employed were similar to the best steam railway location and the results compared favorably with the existing steam roads operating in that territory. Other projected electric roads would do well to adopt similar methods.

The Compania del Ferrocarril de Sarria, at Barcelona, Spain, has applied for a concession for an electric tramway in Barcelona.

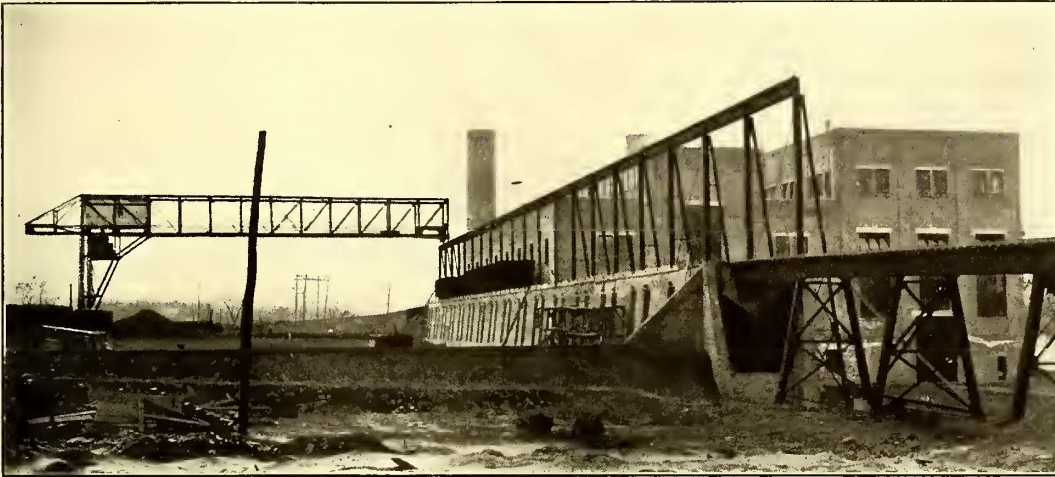
POWER STATION FOR DELAWARE & HUDSON COMPANY

A steam turbine power station embodying a number of interesting features has just been completed at Mechanicsville, N. Y., for the Delaware & Hudson Company. J. G. White & Company, of New York, designed the plant and carried out the construction under the general direction of

ators of 2000-kw capacity and two of 3000-kw capacity each. At present two 2000-kw units are installed.

The foundations for all the columns, turbines and the intake and discharge tunnels are placed on rock; all foundations and column footings are of concrete. The superstructure consists of a self-supporting steel skeleton frame, the walls of which are of brick, laid in lime and cement mortar. The two stacks are of the Custodis type, 100 ft. in height above their foundations by 9 ft. internal diameter.

The coal-handling and storage arrangements for this plant are unusually comprehensive and interesting. It is the intention of the Delaware & Hudson Company, during the early spring and summer months, when there is less demand for their coal-hauling equipment than at other seasons, to accumulate



VIEW OF MECHANICSVILLE POWER STATION, SHOWING ALSO THE COALING TRACK AND CRANE

Axel Ekstrom, consulting electrical engineer of the Delaware & Hudson Company. The plant is located on the west bank of the Hudson River, about 1 mile south of Mechanicsville, and 12 miles north of Troy. The energy developed will be used as reserve power for electric railway purposes by the Delaware & Hudson Company, supplementing the present sources of supply to the Hudson Valley Railway Company, United Traction Company, of Albany and Troy, and Schenectady Railway Company.

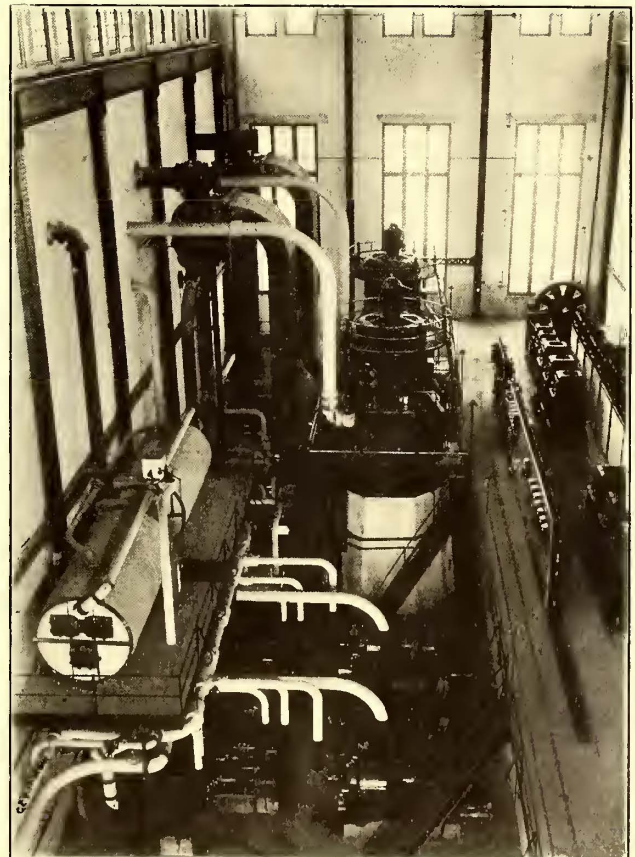
The present installation of machinery is 4000 kw rated capacity, but the building has sufficient space for a rated capacity of 10,000 kw and the condensing water tunnels, portions of the foundation and steel work, coal handling apparatus and coal storage are of ample capacity for 20,000-kw capacity.

The general arrangement of the interior of the building is novel in several respects, the principal object being to place all of the auxiliaries under view and supervision of the engineer in the turbine room, the only auxiliaries in the boiler room being the draft blowers and engines. Economy of space, as well as a suitable elevation for heaters, was secured by placing them on a platform in the turbine room parallel with the division wall.

The boiler room is 165 ft. long by 82 ft. 6 in. wide. The firing aisle parallels the turbine room and the boilers are arranged in two rows—on either side. The dimensions of the boiler room allow for an installation of 16 435-hp boilers, eight of which are installed at the present time. Below the boiler room is a basement 15 ft. 6 in. in height, the floor of which is about the level of the main turbine room floor. Besides the forced draft apparatus, the basement contains a storeroom, machine shop, oil room, locker and toilet rooms. This basement was made unusually high in order that the gondola cars of the Delaware & Hudson Company could be run directly under the ash hoppers, and the ashes removed and used for ballast without making use of the station ash handling apparatus.

The main generating room is 165 ft. long by 54 ft. wide, and is designed to accommodate two Curtis turbo-gener-

ators of 2000-kw capacity and two of 3000-kw capacity each. At present two 2000-kw units are installed. The coal-handling apparatus therefore has been designed with the idea of storing coal during these months in sufficient quantity to run the plant through the winter. The coal storage

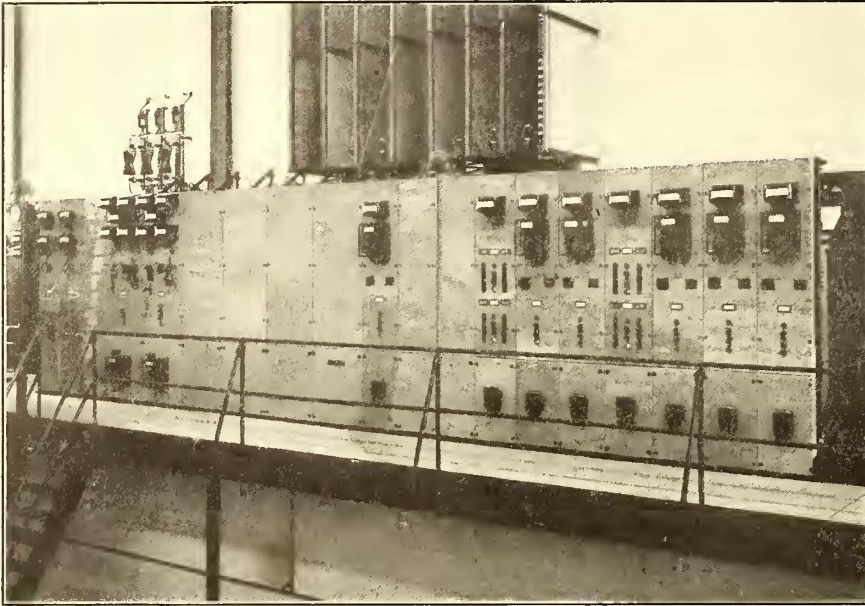


VIEW OF INTERIOR TAKEN FROM THE ROOF

yard is 319 ft. long by 117 ft. 6 in. wide, enclosed by retaining walls entirely spanned by a Mead-Morrison gantry crane, with a two-ton bucket having a capacity of over 50 tons per hour. The approximate coal storage is 30,000 long tons.

The railroad company's coal cars are run in on a siding and directly over reinforced concrete coal pockets, under which is an industrial railroad track on the same level as the boiler room floor. On this industrial track run charging cars, into which the coal from the concrete hoppers may be dumped and wheeled directly in front of the boilers. When the coal supply exceeds the requirements of the

main 10-in. steam header and this auxiliary steam main in turn is drained directly to the boiler feed pumps, this method of draining obviating the use of traps. All the steam piping is covered with two layers of 85 per cent magnesia covering, while the exhaust and feed-water piping is covered with a single thickness of similar material.



THE SWITCHBOARD GALLERY

power house the surplus will be permitted to flow from the pockets through gates provided on the side of each hopper into the storage yard and will be distributed by the gantry crane.

The boilers at present installed are of the Stirling type, build for a working pressure of 180 lb. per square inch and are provided with Stirling "U" type superheaters designed to give 100 deg. superheat. They are provided with flat grates, the front and rear section of which are dumping, the remaining portions being stationary. As it is the intention of the Delaware & Hudson Company to use a low grade of anthracite bird's-eye coal, the ratio of grate surface to heating surface in the boilers is unusually large; approximately 1 to 30.

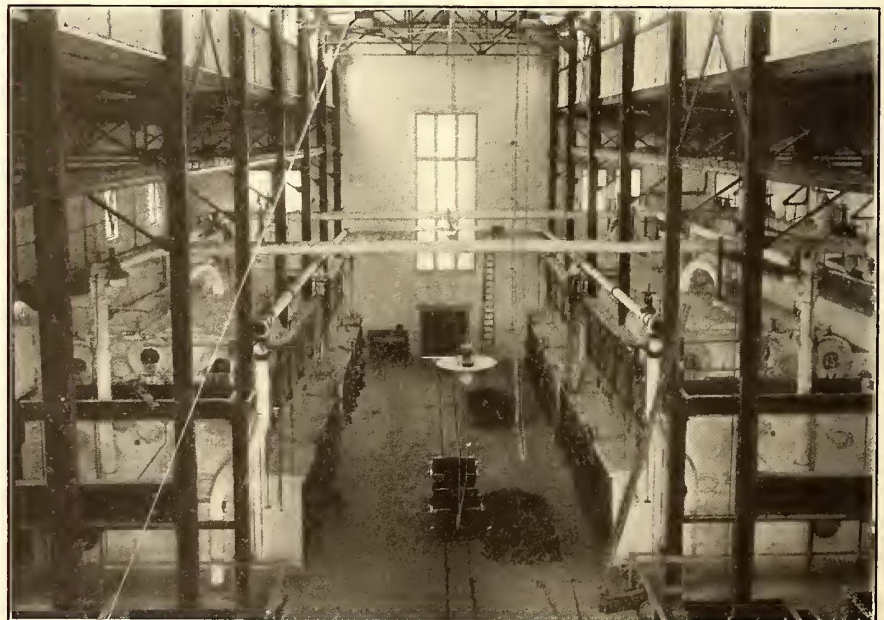
The boiler feed water is supplied by two horizontal duplex pumps, 14 in. x 9 in. x 12 in., so piped that either pump may supply water to any of the boilers after first passing through the feed-water heaters. The feed water is taken from the river through the tunnel, supplying water for the condensers by two 8-in. x 10 $\frac{1}{4}$ -in. x 10-in. duplex horizontal house pumps, either of which is of sufficient capacity amply to supply the ultimate needs of the station. The two heaters are of the Cochrane horizontal type, of 5000-hp capacity each.

The steam leads from the boiler are 6 in. in diameter and connected to the main header by a system of flexible connections. The main header is 10 in. nominal diameter and from it 8-in. branch leads are run to the turbines. The auxiliary steam piping is taken from the bottom of the

The turbine units manufactured by the General Electric Company are of the four-stage Curtis type, with six-pole generators, operating at 800 r.p.m., and deliver current at 2300 volts and 40 cycles.

The condensers are of the Worthington barometric type; the circulating water is furnished by 14-in. steam-driven centrifugal pumps; the dry vacuum pumps are of the rotative, single-stage type, also steam driven. The vacuum exhaust, taken from the turbine base, is carried in a rectangular steel duct, 2 ft. x 7 ft. 9 in., to the top of the condensing cone. By placing a relief valve on top of the condensing cone, the usual separate free exhaust line is obviated. The duplicate exciter units of 75-kw capacity are of the horizontal Curtis two-stage, non-condensing type, driving 125-volt, d.c. generators.

The main oil switches for controlling the electrical operation of the station are the General Electric Company's type H-3. Current at 2300 volts is delivered by the turbo-generators to the busbars and from thence to step-up transformers, which raise the voltage to 11,500 or 23,000 volts. The current capacity of all high-tension conductors is such as to allow full rated station capacity to be delivered at 11,500 volts, while the insulation and spacing are arranged for 23,000 volts. It is, therefore, possible, by means of duplicate sets of busbars and sectionalizing



GENERAL VIEW OF BOILER ROOM

switches provided, to supply simultaneously both the above voltages to outgoing feeders.

In addition to the foregoing alternating-current apparatus, there has been installed one 600-kw rotary converter for feeding directly to the trolley lines adjacent to Mechanics-

ville. Sufficient space has been provided for an additional rotary of similar capacity.

Directly behind and over the switchboard gallery are located high-tension lightning arresters, of the multiplex type, designed for 23,000 volts, with means of reducing the number of air-gap units for use on 11,500-volt service. The main busbars of the station are in the basement directly underneath the oil switches. Paralleling the busbar compartments is the air duct for supplying air to the various transformers which are located in a row, about the middle of the switchboard gallery, where they may be readily handled by the overhead traveling crane.

CORRESPONDENCE

INTERSTATE COMMERCE CLASSIFICATION

AMERICAN RAILWAYS COMPANY

PHILADELPHIA, April 30, 1908.

Editors STREET RAILWAY JOURNAL:

When I wrote my criticism on the Interstate Commerce Commission Accounting Series Circular No. 20 for your issue of March 21, I was under the impression that, and gave the commission credit for, having designed a classification of accounts which was applicable to steam road practice. I now find that this was an error which renders the position of the electric roads even stronger in their opposition to this classification. I find it stated in several places that anywhere from 85 per cent to 90 per cent of the entire operating expenses of steam roads are chargeable to about 20 per cent of the accounts provided in the classification, which would seem to indicate that the steam roads are suffering from the same over-refinement of accounting as is sought to be imposed upon the electric roads.

The annual report of the Pennsylvania Railroad illustrates this point. The report is for the calendar year, while the Commission's year ends June 30, so that the report for only one-half of the year is made up in accordance with the new classification of accounts. The report gives 146 accounts, six of which are double accounts—that is to say, show debits and credits—and only the net result is carried into the total. I also find that there is one account in which is charged over 10 per cent of the total operating expenses. There are 27 accounts each receiving a charge of less than 10 per cent and over 1 per cent; there are 69 accounts each receiving a charge of over 0.1 of 1 per cent and less than 1 per cent; 3 accounts receiving a credit within the same range. There are 30 accounts each receiving a charge of less than 0.1 of 1 per cent and greater than 0.01 of 1 per cent; 2 accounts receiving credits within the same range. There are 13 accounts receiving charges less than 0.001 of 1 per cent and 1 account receiving credit less than this percentage.

To turn this around and put it another way. One account represents a trifle over 10½ per cent of the total operating expenses; the aggregate of 27 other accounts represents over 64½ per cent; the aggregate of 72 other accounts represents about 23½ per cent; the aggregate of 32 other accounts represents 1.4 per cent and the 14 remaining accounts represent less than 0.5 of 1 per cent. It would seem to me that this speaks for itself.

The practical effect upon the railroad company of this kind of accounting is clearly expressed on page 10 of the annual report of President W. H. Truesdale, of the Delaware, Lackawanna & Western Railroad Company, who says:

The marked increase in the item of salaries of clerks and attendants under the head of general expenses was to some extent due to general increase in salaries paid beginning Jan. 1, 1907, but to a far greater extent it was caused by the larger forces in general offices which it was found necessary to employ in order to meet the requirements of the Interstate Commerce Commission and other United States authorities, as also those of the several States through which the lines of the company run, for additional reports and statistics covering in great detail the operations of the company and its leased and operated lines. The additional accounting thus required of the railways has resulted from the passage of National and State laws in recent years, and although frequently almost identically the same information is required by two or more different governmental bureaus, the railways must furnish same or become liable for penalties for not doing so. The public generally little appreciates how great and onerous this burden is steadily growing upon the railways.

	1907	Increase
Salaries of clerks and attendants....	\$238,414.67	\$56,024.07

Mr. Truesdale's statement shows that the new classification has imposed an increase of about 25 per cent in the cost of clerical service to his company, while his testimony and that of the Pennsylvania Railroad very clearly indicate that the burden is not warranted by the results obtained.

C. L. S. TINGLEY,
Second Vice-President.

REPORT OF ONTARIO RAILWAY EARNINGS

The following summary has been made from the annual report of the Ontario Railway & Municipal Board for the year ended Dec. 31, 1907:

	ELECTRIC RAILWAYS			Total net earnings.
	Mileage.	GROSS AND NET EARNINGS TO JUNE 30, 1907. Receipts from passenger traffic.	Total gross earnings.	
Berlin and Waterloo	3.14	\$31,127.07	\$33,285.24	\$8,217.84
Berlin and Bridgeport (leased line) ..	2.40	1,807.44	3,285.31	1,873.87
Brantford St.	7.00	26,191.16	31,294.10	6,743.97
Cornwall	6.50	16,815.75	25,813.92	5,211.65
*Galt, Preston and Hespeler	19.75	49,864.40	107,093.36	42,453.39
Grand Valley	20.50	38,195.75	41,004.27	9,307.75
Guelph Radial	6.00	25,906.43	8,509.65	8,340.62
Hamilton and Dundas	7.25	35,845.07	41,922.23	19,497.21
Hamilton, Grimsby & Beamsville ..	23.00	57,942.37	85,256.75	24,094.99
Hamilton Radial ..	24.75	66,452.32	106,364.94	38,916.25
Hamilton Street ..	22.00	281,073.96	281,830.96	63,271.29
International Transit Co.	3.30	43,441.68	43,743.74	10,439.55
Kingston, Portsmouth and Cataraqui	8.00	28,746.87	30,692.87	2,744.07
London St. Ry.	33.25	214,219.47	218,853.96	45,757.33
Niagara Falls Park & River ..	11.75	143,921.34	155,320.67	68,396.33
Ottawa St. Ry.	22.87	512,871.42	544,451.90	198,798.22
Peterborough Radial	6.00	32,587.18	33,597.46	5,934.26
Port Arthur St.	9.00	66,296.80	69,181.29	24,414.53
Port Dalhousie, St. Catharines and Thorold ..	8.17	19,602.70	19,602.70	6,561.11
Sandwich, Windsor & Amherstburg	34.63	126,372.38	135,517.39	67,565.77
Sarnia	8.00	26,669.65	36,919.54	5,739.88
Southwestern Traction Co.	18.25	28,462.06	29,189.01	642.30
St. Thomas St. Ry. ..	7.50	19,423.38	20,063.14	1,759.54
Toronto St. Ry.	51.05	3,254,853.70	3,271,192.97	1,576,166.23
Toronto and Suburban	9.81	33,263.72	36,257.03	8,407.14
Toronto and York Radial	50.44	209,647.82	241,385.77	80,412.92
Woodstock, Thames Valley and Ingersoll ..	11.50	25,025.03	26,766.43	12,376.38
Total	425.79	\$5,646,626.92	\$5,748,456.60	\$2,344,098.39

*Includes lease line, Preston and Berlin.

The Cleveland, Painesville & Eastern Railroad Company recently offered a prize of \$25 for the best trademark for its use. The awards, which have not been announced, will be made by a committee of newspaper men.

THE INTERSTATE COMMERCE CLASSIFICATION

The Public Service Commission of the First District of New York State recently notified the street railway companies in New York that it was considering the adoption of the tentative classification of operating expenses for electric railways proposed by the Interstate Commerce Commission, and requested any criticisms or suggestions in regard to it which the companies in this district might care to offer. A joint reply has just been submitted by Howard Abel, comptroller of the Brooklyn Rapid Transit Company; E. F. J. Gaynor, auditor of the Interborough Rapid Transit Company; H. W. Brown, auditor of the New York City Railway Company, and A. B. Bierck, auditor of the Long Island Railroad Company. A copy of this reply has also been forwarded to Prof. Adams, as the report of the companies to the inquiries contained in Circular No. 20. An abstract follows:

I. MAINTENANCE OF WAY AND STRUCTURES.

A. MAINTENANCE OF WAY.

Acct. 1.—Ballast.

The expense incurred in connection with the operation of gravel pit or quarry should be divided as follows:

A.—Estimated depreciation due to removal of gravel or otherwise, and all items of a preparatory nature, which would be apportionable to the cubic contents of the quarry.

B.—Operating expense, apportionable to the output of the quarry.

Combining the two classes of expenditure, as provided in the Tentative Classification of Operating Expenses, and computing the average cost of production by dividing the cubic contents of the quarry into both classes of expense gives an erroneous unit of cost. The operating expense is divisible only by the output. The depreciation and preparatory expenses are divisible by the entire cubic contents of the quarry. [The reply contains a table, based on the formula prescribed in the classification and applied to a quarry containing 1,000,000 cu. yd., from which 50,000 cu. yd. are taken out each month. The preliminary expenses are assumed at \$15,000 and the monthly operating cost at \$50,000 a month. On this basis the quarry would be exhausted in 20 months. The price per cubic yard, estimated according to the rules of the Commission, has been figured for each month up to the 20th. The table shows that the price so determined would vary between \$0.068421 per cubic yard for the first month to \$3.563530 per cubic yard for the nineteenth month, when it returns to \$1 per cubic yard for the twentieth month.]

Acct. 7.—Paving.

Classification provides: "Paving: Cost of material used and labor expended in paving streets used as roadway or assessments covering paving expenditures." Should read "Cost of material used and labor expended in repairing or renewing paving in streets used as roadways and assessments covering expenditures for repairing or renewing paving."

Acct. 10.—Bridges, Trestles and Culverts.

The title of this account is not suggestive or descriptive of an elevated structure. Recommend two additional accounts: "Elevated structure repairs" and "Elevated structure foundation repairs."

B. MAINTENANCE OF ELECTRIC LINE.

Accts. 17.—High-Tension Transmission Lines.
18.—Overhead Feeders.
19.—Underground Feeders.
21.—Overhead Trolley Lines.
23.—Underground Conductor Rails.

As poles, subways and conduits are in many instances used in common for high and low-tension feeders and conductors, would suggest that maintenance of poles, subways, conduits and appurtenances used in common be apportioned equally to the accounts affected.

Acct. 24.—Miscellaneous Electric Line Expenses.

Suggest that the item of tools and supplies used in connection with Miscellaneous Electric Line maintenance be charged to this account instead of to account No. 43.

C. MAINTENANCE OF BUILDINGS AND STRUCTURES.

Acct. 30.—Stations, Waiting Rooms and Other Buildings.

See note under this account and compare with Note A under account No. 31.

Acct. 31.—Docks and Wharves.

The instructions are contradictory as the terms "repairs" and "maintenance" are synonymous.

Acct. 32.—Miscellaneous Buildings and Structures Expenses.

Suggestion as to tools, etc., account No. 24, applies to this account as well.

D. MAINTENANCE OF SERVICE EQUIPMENT.

Suggest that the "Maintenance of Service Equipment" be carried under II. Maintenance of Equipment, as the maintenance of all cars and car equipment comes under the jurisdiction of the mechanical department.

If, however, the service equipment is to be classed under I. Maintenance of Way and Structures rather than under maintenance of equipment, the latter account should not be burdened with any expense due to the maintenance of service equipment, and we would suggest the following additional primary accounts:

37a Injuries to Persons.

37b Insurance.

37c Other Maintenance of Service Equipment Expenses

Superintendence and Engineering Dept. Salaries and Expenses

Stationery and Printing

Other Expenses

to provide for such proportion of the mechanical department expenses as is applicable to the maintenance of service equipment. Is it the intention of the Commission not to segregate the charges under account 63, "Other Equipment Expenditures," as between revenue equipment and service equipment, or is Note A under account 63 (item of "Superintendence") to be construed as meaning that administrative expenses applicable to service equipment are to be classed as "other work not chargeable to 'Maintenance of Equipment,'" and are accordingly to be charged to accounts 34 to 37 inclusive? This is not the apparent meaning of the foot-note, but if that is the intention, why is there no similar provision made for Injuries to Persons, Insurance, etc.?

If the "Maintenance of Service Equipment" may be included under the general account Maintenance of Equipment as recommended, all expenses of superintendence, etc., will, of course, be included with similar expenses relating to Revenue Equipment, under account No. 63.

E. AVAILABILITY MAINTENANCE EXPENSES.

Acct. 43.—Other Miscellaneous Expenses.

(See criticisms under accounts Nos. 24 and 32.)

II. MAINTENANCE OF EQUIPMENT.

G. MAINTENANCE OF REVENUE EQUIPMENT.

Accts. 47.—Passenger Cars—Repairs.

48.—Combination Cars—Repairs.

49.—Express Cars—Repairs.

50.—Mail Cars—Repairs.

51.—Freight Cars—Repairs.

Suggest that where, by reason of the character of the work, an absolute division of labor and materials cannot be made between the various types of cars, the carrier be permitted to apportion such items of expense pro rata on the basis of car-mileage.

H. MAINTENANCE OF ELECTRIC EQUIPMENT OF REVENUE EQUIPMENT.

Accts. 53.—Electric Equipment of Passenger Cars—Repairs.

54.—Electric Equipment of Combination Cars—Repairs.

55.—Electric Equipment of Express Cars—Repairs.

56.—Electric Equipment of Mail Cars—Repairs.

57.—Electric Equipment of Freight Cars—Repairs.

Suggestion under preceding accounts applies to these as well.

J. MAINTENANCE OF POWER APPARATUS.

Suggest additional primary account (61a) entitled "Cable Power Plant Equipment." (Not provided for.)

Suggest the addition of the following primary accounts:

61b Injuries to Persons

61c Insurance

61d Other Maintenance of Power Apparatus Expenses

Superintendence and Engineering Dept. Salaries and Expenses

Stationery and Printing

Other Expenses

in order to segregate such expenses applicable to Power Station

Maintenance from similar expenses applicable to Car and Car Equipment Maintenance. (See account No. 63). In cases where these two branches of the work are under the jurisdiction of different departments there is no apparent reason why their administrative expenses, damages, etc., should be charged to the same account, as prescribed in the classification.

NOTE—In the "Maintenance of Way and Structures" group the sub-general accounts (except D: Maintenance of Service Equipment, see Criticism) are provided with primary accounts to take care of Superintendence, etc., and this method should be followed in other groups as well.

L. ADJUSTMENT ACCOUNTS—MAINTENANCE OF EQUIPMENT.

Acct. 68.—Equipment Borrowed—Dr.

Why should this account be assessed for proportion of wear and tear on borrowed cars when such cars may be returned to the owning company each night or sent to a repair shop operated in common by several companies where the expenses are apportioned on a car-mile basis? This account seems to be peculiarly applicable to steam railroads, and such condition as referred to above does not seem to have been contemplated.

Acct. 69.—Equipment Loaned—Cr.

The last sentence in the note under this account should read: "This credit should invariably equal the debit to the clearing account Hire of Equipment," to correspond with note under account No. 68, Equipment Borrowed—Dr., and instructions on page 9.

III. TRAFFIC EXPENSES.

M. TRAFFIC EXPENSES.

Acct. 72.—Traffic Supplies and Expenses.

See note under item "Stationery and Printing" referring to items chargeable to "Superintendence." This should read "should be charged to Account 70, Soliciting and Administering." No account entitled "Superintendence" appears under the general account Traffic Expenses.

The above account provides (under item "Insurance") for "insuring persons against injury when such injury would otherwise be chargeable to Traffic Expenses," but no sub-primary account "Injuries to Persons" is included under Traffic Expenses. Injuries of what nature are to come under the above heading?

IV. TRANSPORTATION EXPENSES (POWER).

N. POWER MANUFACTURED.

Suggest an additional account (78a) entitled "Engineering Dept. Salaries and Expenses" in order to segregate the expense of consulting and civil engineering from that of engineers and others employed in the stations.

O. POWER PURCHASED.

Acct. 79.—Purchased Power.

This account excludes "joint operation." Would the following arrangement be so defined?

- A owns transmission lines and power stations;
- B " substations only;
- C " substations, feeders and transmission lines;
- D " power stations, substations, feeders and transmission lines;
- E " feeders and transmission lines only;
- F " power stations and substations only.

A, B, C, D and E pool their plants and transmission lines with F, and agree to purchase power from F on the basis of cost plus 5 per cent, including in the cost the insurance, taxes and 6 per cent interest on the plant owned by F, also an agreed rental for the plants of A, B, C and D. There is no actual rental paid, the agreed rental being used only in computing the power cost, so as to equalize for lack of plant contributed by E, and disproportion of plant furnished respectively by A, B, C and D. A and B, having existing trackage arrangements with G, agree to account to F for all power purchased and sold by them, such amounts being taken into account in computing the cost before dividing between A, B, C, D and E.

If the above is defined as joint operation, why exclude? And if excluded from account No. 79, are A, B, C, D and E to apportion the cost of purchased power to the several operating and maintaining accounts affected, and to income account, according to the "elements" contained in the charge? If this is done, those companies which do not own plants will show operating expenses inconsistent with the actual conditions. It seems clear that companies which do not own (or lease) power plants cannot reflect in their accounts the expense of operating and maintaining such plants, and must therefore charge the cost of power bought by them to "Purchased Power."

If, on the other hand, the above arrangement is not considered joint operation within the meaning of the text of account No. 79, and the proposed method of accounting is followed, we have the following inconsistency:

A has a large investment in transmissions agencies used in common by all affiliated companies pooling their respective plants, and having ample power plant for its own uses it therefore needs no additional capital outlay, but since by the arrangement indicated it buys power from F at \$0.12 per kw-hour (estimated cost), and of this \$0.004 per kw-hour represents insurance, taxes, interest and profit, \$0.008 per kw-hour would be the amount chargeable to Purchased Power, the balance being chargeable to Income Account. The object of the pooling arrangement is to insure greater constancy of service and obtain lower cost of power, but if A's cost of producing power with its own plant is \$0.012 per kw-hour, the same price as charged by F, to divide the cost of power furnished by F into separate elements and show but two-thirds under cost of power, would produce a misleading result; and if it be conceded that two-thirds of the charge made by F is A's true purchased power cost, this is only obtained at the expense of a fictitious income (or fixed) charge—the value of which result is questionable.

The above inconsistency would, of course, occur as well if the true purchased power cost were apportioned among the various power plant operating and maintaining accounts, instead of to Purchased Power Account.

The text of Account 79 does not state whether the seller's profit shall be included in the element of Capital or in the element of Manufacturing Cost, or to a part in each element. If the Purchased Power Account is intended to reflect the actual cost of manufacture, the profit must necessarily be included in the capital element—and this suggests the following question:

How are the various elements entering into the price to be determined if power is sold at a loss, due to the fact that the price was agreed upon at a time when the production cost was lower than at present, and the contract protects the buyer against an increase in price? Shall the values originally agreed upon be used by the buyer for his charges, and by the seller for his credits? This would be correct from an accounting standpoint, as the seller's loss would then be charged to his Profit and Loss Account, but the Purchased Power Account on the buyer's books, while showing actual cost to the buyer, would not reflect the true manufacturing cost of the power bought, and the object of the analysis would be attained. On the other hand, if the buyer should charge his Purchased Power Account with the true manufacturing cost (say \$1,500) and his Income Account with the capital elements, including the agreed profit (say \$500), the difference between the total charge (\$2,000) and the amount agreed to be paid (say \$1,600—that is, \$400) would be a credit to Income Account, and the buyer's books would then disclose an inflated income to offset a corresponding inflation in his operating expenses.

P. ADJUSTMENT ACCOUNT—POWER.

Acct. 80.—Power Transferred—Cr.

To what account should power sold for lighting, heating and operating cars be credited? No provision seems to have been made for power sold for such purposes.

IV. TRANSPORTATION EXPENSES (OPERATION OF CARS).

Q. WAGES OF CAR OPERATORS.

Suggest additional account (87a) entitled "Student Motormen" in order to segregate the wages paid motormen while on probation prior to their being placed in charge of the operation of cars from motormen regularly in service.

R. OPERATION OF CARS.

To what account should be charged the wages of Fare Collectors on Trains? These men are equivalent to traveling ticket agents and are assigned to trains on those portions of the route where it is impracticable to place stations and employ ticket agents.

Account 93.—Station Employees includes "collectors and ticket collectors at stations (but not ticket exchangers or collectors on trains)," but no specific provision is made for such "collectors on trains." Their wages are not properly chargeable to account No. 83, "Passenger Conductors," nor to account No. 84, "Passenger Trainmen," as these two accounts are grouped under "Q: Wages of Car Operators." The "collectors on trains" are additional to and distinct from conductors, and have no part in the operation of cars, their duties being simply to

collect the passengers' fares. On the other hand, the wages of these men should be charged to a more specific account than "Other Expenses" under Primary Account No. 99, "Other Transportation Expenses."

V. GENERAL EXPENSES.

U. GENERAL EXPENSES.

Acct. 106.—General Office Supplies and Expenses.

Suggest that "rent" be eliminated from this account and carried separately as Account 108a, "Rent."

Acct. 109.—Law Expenses.

This account to include "Cost of law books, printing briefs, legal forms, testimony, reports, etc."

(Subdivision)—a. Law Expenses in connection with Damages.

b. Other Law Expenses.

Acct. 113.—Stationery and Printing.

This account to include "Cost of all stationery and printing of the Law Department, except cost of printing briefs, legal forms, testimony, reports, etc."

In each case the "etc." should be itemized so as to avoid confusion in regard to items chargeable and not chargeable to account No. 109. Why not charge all stationery and printing of the Law Department to the expenses of that department and subdivide account No. 109 as above?

CLEARING ACCOUNT—STORE EXPENSES.

This provides for one account "Store Expenses," subdivided as between "Storehouse Expense" and "Purchasing Department Expense," the "Storehouse Expense" apportionable according to value of material issued, and the "Purchasing Department Expense" apportionable according to value of material purchased by that department. Where a large amount of construction material is being purchased the operating and maintenance accounts would receive undue credit. What would constitute a purchase by the purchasing agent? Supposing the general manager negotiates for the purchase of \$1,000,000 worth of equipment and a formal order is given by the purchasing agent, and such material does not pass through the storeroom, would such purchase be considered in apportioning the purchasing agent's office expenses? The proposed basis of absorbing this expense seems undesirable and unjust. Suggest that the expense of storekeeper and purchasing department be divided on the basis of material issued from the storeroom, excluding material not passing through storeroom, as in that manner the account chargeable would bear more nearly its relative proportion of the actual cost of purchasing and handling.

CLEARING ACCOUNT—STABLE EXPENSES.

The instructions under this account provide that the expense of operating stables—including cost of horses—shall be apportioned among the accounts benefited, on the basis of service rendered by the horses. Although not so stated, it is understood that this account is to be cleared monthly. This method may be followed in so far as actual operating expenses are concerned, but it would be incorrect to include the cost of horses, which should be considered as part of the stable equipment. Such cost should be distributed over a period covering the estimated life (i. e., usefulness) of the animals, and monthly operating charges should include a fraction of the total cost of horses based on the number of months in the estimated period of their efficiency.

As a matter of fact, Capital Account No. 52, Miscellaneous Service Equipment (Page 80), provides for the cost of new or additional horses purchased, and Maintenance Account No. 37, Miscellaneous Service Equipment (Page 34), covers the expense of horses purchased to replace others displaced or lost in service. If horses are to be charged to these two accounts (as is correct), why should the clearing account provide for a similar expense?

Regarding the monthly apportionment of Stable Expenses, it would seem fairer to fix a rate per horse hour and charge the proper accounts accordingly—on the basis of service rendered. The balance, if any, remaining in the account after the proper charges have been made should be charged to an account entitled "Operation of Stables" (not provided for in the tentative classification), and the same account should receive credit if the charges exceed the actual cost for the month, the theory being that the expense of operating stables is, to a large extent, not contingent upon the work performed by the horses. Otherwise—if the proposed method were adopted—the apportioned charges would fluctuate unjustifiably.

Suppose, for example, that the conditions in a given month were such as to require the use of only six horses (from a stable containing sixteen) at an average use of three days each, or a total of eighteen horse days—equivalent, on an eight-hour-day basis, to 144 horse hours. Assuming that these six horses performed work at 12 locations, 12 horse hours being spent at each "job," it would then be correct to charge each job with one-twelfth of the operating expense of the horses, drivers, supplies, etc., incidental to the service rendered, including a fair share of the general stable expenses, but it would be unreasonable to include in that apportionment the entire stable expenses for the month, the greater portion of which may have been incidental to the ten horses which performed no service, and to the other six when not in use, which expense was of no benefit to the jobs referred to. In other words, the accounts for which service is performed should be charged on the basis of such service, but should not share in the expense of "idle" horses from which they receive no service. If the instructions prescribed by the Commission were followed the result would be that the expense to each job would increase proportionately as fewer horses were put into service, and decrease proportionately as more horses were put into service, and the error of this method is therefore apparent.

The fixed rate, or tariff, per horse hour should be determined with a view to absorbing the entire stable expenses from month to month, based on an estimated annual expense and an estimated monthly average number of hours during which horses are engaged in actual service. Such tariff should not be changed unless a marked increase or decrease in expenses were occasioned, which would make the charge incommensurate with the actual expense of service rendered.

The suggested account, "Operation of Stables," should be classed under Group V—General Expenses.

How are the expenses of so-called "Emergency Crews" to be treated? These crews, comprising horses, drivers, wagons and all necessary equipment, are held in readiness for immediate action in case of a breakdown requiring their assistance (much as a crew at fire quarters), and are not assigned to other duties. Should not the entire expense of maintaining such crews, even while held in reserve at the stables, be apportioned among those accounts benefiting by the service, it being considered that they are in active service at all times?

Where several emergency crew stables are maintained exclusively for one department's use, why not charge such stable with actual expense, since these costs are determinable, and exclude same from the clearing account?

CLEARING ACCOUNT—WORK EQUIPMENT OPERATION.

Why should the expense of operating sand cars, snow plows, sweepers, etc., used exclusively in the Transportation Department, be charged to the Clearing Account instead of directly to the accounts affected in the first instance?

Why should the cost of repairing work cars be charged to account No. 35, Work Cars, when said cars are engaged in construction work? Is not such an item of expense chargeable to the work in hand? Is it the intention to charge all items of expense in connection with equipment operation to the Clearing Account instead of to the account directly affected, where such specific division of expense is in the first instance possible?

CLEARING ACCOUNT—INJURIES TO PERSONS.

The accounts referred to in the Clearing Account do not coincide with those indicated in the classification, and there is no provision made for "Injuries to Persons" under the heading General Expense, although referred to in the Clearing Account. (See attached table).

Suggest that the accounts referred to in the Clearing Account be made to harmonize with the specific titles given said accounts throughout the classification.

The directions as to charging expenses in connection with injuries to persons are ambiguous. Is it the intention to charge expenses on account of injuries to persons as well as payments on account of injuries to the specific account directly affected, wherever possible, and to the Clearing Account only such items as cannot be specifically charged to one division of expense or another? Or is it the intention to charge all expenses to the Clearing Account and then apportion? The classification as now prepared is objectionable, inasmuch as the account Injuries to Persons is buried in the Other Maintenance of Way Expenses, in the Miscellaneous Electric Line Expenses, in the Miscellaneous Buildings and Structures Expenses and in Other Equipment Expenditures, and therefore only those items of

expense included in the Transportation Expenses (Account 103), and Availability Maintenance Expenses (Account 42), would appear in a report containing only the 116 primary accounts provided for in the Tentative Classification.

Suggest that "Injuries to Persons" be made a primary account in each one of the divisions so that the aggregate amount paid on account of injuries to persons may be readily ascertained.

To what account are expenses incurred on account of injuries to persons chargeable, when the cause of the accident is not ascertainable and where payments are made in no liability cases from "policy" standpoint? In liability cases, what shall be the rule in apportioning such expenses? Would the proximate cause be assessable or the agency causing the actual injury?

Queries:

- Where charge Injuries to Persons account of Maintenance of Service Equipment?
- Where charge Injuries to Persons account of Operation of Power Plants?
- Where charge Injuries to Persons account of Maintenance and Operation of General Office Building?
- Where charge Damage to Property, due to other causes than operation of cars, classed under "Transportation?" (See account No. 102).

ARRANGEMENT OF "INJURIES TO PERSONS" ACCOUNTS.

AS PROVIDED FOR IN CLASSIFICATION. AS PROVIDED FOR IN CLEARING ACCOUNT.

- I. Maintenance of Way and Structures:
 - A. Maintenance of Way:
 - 15. Other Maintenance of Way Expense. } A: Maintenance of Way.
 - Injuries to Persons. (Sub-primary account).
- I. Maintenance of Way and Structures:
 - B. Maintenance of Electric Line:
 - 24. Miscellaneous Electric Line Expenses. } B: Maintenance of Electric Line.
 - Injuries to Persons. (Sub-primary account).
- I. Maintenance of Way and Structures:
 - C. Maintenance of Buildings and Structures:
 - 32. Miscellaneous Buildings and Structures Expenses. } C: Maintenance of Buildings and Structures.
 - Injuries to Persons. (Sub-primary account).
- I. Maintenance of Way and Structures:
 - E. Availability Maintenance Expenses:
 - 42. Injuries to Persons. } (Not provided for).
- II. Maintenance of Equipment:
 - K. Miscellaneous Maintenance Equipment Expenses:
 - 63. Other Equipment Expenditures. } K: Miscellaneous Maintenance of Equipment Expenses.
 - Injuries to Persons. (Sub-primary account).
- IV. Transportation Expenses (Group 2—Oper. of Cars).
 - S. Injuries and Damages:
 - 103. Injuries to Persons. } IV: Transportation Expenses.
 - (Not provided for). V: General Expenses.

*No provision made for Injuries to Persons due to operation of power stations and substations, Group 1.

CLEARING ACCOUNT—HIRE OF EQUIPMENT.

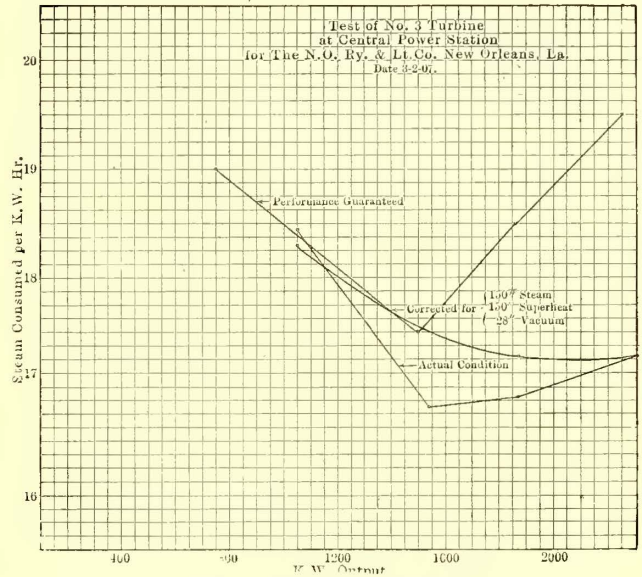
Why is this account omitted from the classification, although referred to on page 9 and again in the note under account No. 68, "Equipment Borrowed?"

Suggest that wherever the words "Supplies and Expenses" appear in the caption of an account, the same be changed to read "Expenses and Supplies."

The report concludes with a proposed classification of operating expenses based on that of the Commission, but with various modifications and additions which, it is suggested, would tend to make the classification more adaptable to the requirements of surface, elevated and underground electric railways. These changes embody the points mentioned in the discussion published.

TEST OF A 1500-KW CURTIS TURBINE

In the STREET RAILWAY JOURNAL of Dec. 7, 1907, there appeared a description of the reconstructed power system of the New Orleans Railway & Light Company in which reference was made to the installation of three 1500-kw General Electric three-phase, 60-cycle, 2300-volt Curtis tur-



TEST OF A 1500-KW TURBINE

bines. The results of an efficiency test upon one of these units after a year's operation are given in the accompanying curves, which were obtained by Sanderson & Porter, consulting engineers of the company.

Throughout the entire range of operation the turbine economy exceeded the guarantees, with the exception of the full-load point, which was practically the same as the guarantee. Corrected for 150 lb. steam pressure, 150 deg. superheat and 28 in. vacuum, the steam consumption was 18.13 lb. per kw-hour at three-quarters load, 17.51 lb. at full load and 17.25 lb. at 50 per cent overload. These figures do not include the auxiliaries. Reference to the curves shows that at the 25 and 50 per cent overload points the steam consumption of the unit was 1.25 and 2.25 lb. per kw-hour lower than the guarantees. The curve of actual test conditions was not, of course, suitable for a comparison with the stated guarantees of the manufacturers.

RESOLUTION ON DEPRECIATION AND PUBLICITY

At the concluding meeting of the Iowa Street & Interurban Association, held in Des Moines on April 23, the following resolutions were offered by the committee to whom the question had been referred and were passed by the members present:

Resolved, That the Iowa Street & Interurban Railway Association recognizes the correctness of the principle of providing out of earnings an adequate annual appropriation for a depreciation reserve; said depreciation reserve account to be separate and distinct from any maintenance account. The funds so appropriated to be used solely for the purpose of paying for renewals of equipment worn out in service or superseded by advances in the art.

Your committee deems it wise that all member companies shall make public their financial statements at least once a year for the following reasons:

First—To correct the erroneous idea on the part of the public that the business is productive of excessive profits.

Second—A true exposition of the net returns to security

holders will to a large extent still the clamor for short-term franchises and reductions in fares and rates.

Third—The public is disposed to be fair-minded and if they have access to our reports and realize the close margin of profit in the electric railway business much of the effectiveness of the doctrines of the demagogues will be lost.

ELECTRIC RAILWAY BRIDGE OVER THE CLACKAMAS RIVER NEAR PORTLAND, ORE.

Last March a bridge over the Clackamas River was completed for the Oregon City line of the Portland Railway, Light & Power Company, of Portland, Ore. This bridge is a 260-ft. span steel structure of ten 26-ft. panels with Warren riveted trusses. It replaced a combination bridge of the same span erected in 1892 which had become unequal to the increased loads of the rolling stock passing over it. The lower chord, made of bolted timbers, was overstrained and in 1906 it was decided to relieve this by driving piles in groups of four at each panel point to form a trestle which would support a part of the loads until the bridge could be replaced by a steel structure.

The first plan for the new bridge called for two 130-ft. spans with a pier at the center of the river supported on piles. Preliminary plans were drawn, but when borings were made at the center of the river it was found that there was a gravel formation as far as the boring proceeded or at least 75 ft. It was then decided to leave out the pier in the center of the river and make the bridge a single span of 260 ft.

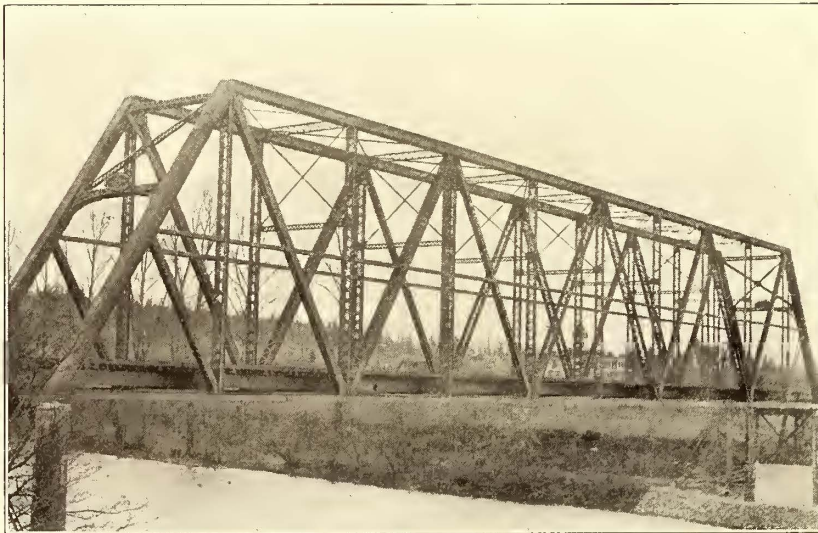
The bridge does not accommodate highway traffic or pedestrians, being used exclusively by the Portland Railway, Light & Power Company for electric traffic, including both freight and passenger cars. The carloads having greatly increased in the past few years, it was decided to design the new bridge for a moving load of 4000 lb. per foot of

The bridge is very near the mouth of the Clackamas River, where it joins the Willamette River and consequently it gets the full effects of such sudden freshets. However, when the river reaches its highest point, which is about 30 ft. above low water, there is little or no current, as the water is backed up from the Willamette River. After the pile trestle was put in a period of high water carried out two bents of piles, but did no other damage.

The contract for the new bridge was signed Oct. 9, 1907, and in the latter part of the same month preparations for erection were made by driving three more piles in each bent, one on the downstream side and two on the upstream side, and diagonal bracing was put in. The combination span was taken down with the exception of the bottom chord, which was left to make a runway for the traveler.

The original piers for the combination span were 3-ft. 10-in. diameter steel tubes which ran down into hard gravel. These were thought to be sufficiently strong for the new bridge and the increased loads, but as an additional precaution new steel bracing was put in and the tubes surrounded by concrete in a rectangular form for a height of 6 ft. from the bottom of the tubes and a width of 9 ft. and a length of about 26 ft., which completely surrounds the tubes; above this the concrete is extended for 9 ft. with each tube surrounded by concrete in the form of an octagon, and the octagons, whose widths across are 9 ft., are connected by a web 2 ft. thick in which old rails were put diagonally to make reinforced concrete bracing.

The bridge was swung Jan. 9 with a drop of $\frac{3}{4}$ in. from the camber of $5\frac{1}{2}$ in. when the falsework was in, to a camber of $4\frac{3}{4}$ in. when the bridge was swung. The erection took place during a bad time of the year, as the winter rains had commenced and everything was so wet the erection did not go on as rapidly as was expected; each riveting crew of four men arranged about 175 rivets a day. The members were very accurately laid out in the shop, every-



ELECTRIC RAILWAY BRIDGE OVER THE CLACKAMAS RIVER, NEAR PORTLAND, ORE.

bridge with an additional excess load of 30,000 lb. for one panel. This loading is as heavy as that of many steam railroad bridges and should satisfy the electric traffic for many years to come.

The location of the bridge on the Clackamas River made the erection difficult, as this stream is subject to very sudden rises of from 10 ft. to 12 ft. During such a rise the current is very rapid and the drift of logs, timber and trees quite considerable.

thing fitted with great precision and the holes matched so that almost no reaming was done in the field.

The unusual points about the bridge are the length of span for a riveted connection bridge of heavy loading and the fact that it is entirely a Western product, as the bridge was designed by J. B. C. Lockwood, of Portland, Ore., and fabricated in Portland by the Northwest Bridge Works, formerly J. R. Bowles. The erection was done by Robert W. Wakefield without any interruption of traffic.

ECONOMICAL LIMIT OF WHEEL FLANGE WEAR

Wheels are often removed for turning before flange wear has progressed very far, and again they are allowed to remain in service until the flanges are so thin that an excessive amount of metal must be removed from the tread in order to restore the flange to its normal thickness and contour. On the Northwestern Elevated Railway, of Chicago, the economical limit of flange wear has been calculated exactly and is closely followed. All wheels are inspected with the flange gage patented by J. E. Osmer, master mechanic, which was illustrated in the STREET RAILWAY JOURNAL, Dec. 8, 1906.

This gage shows at a glance the depth of cut required on the tread to restore the flange to normal M. C. B. dimensions. The following table was used in calibrating these gages and shows reduction in diameter of the wheel as well as the depth of cut required for various degrees of flange wear:

MEASUREMENTS FOR STEEL M. C. B. TIRE.

Thickness of wheel flange.	Depth of cut at wheel lathe.	Reduction in diameter of wheel.
3/4 in.	20/32 in.	1 1/4 in.
13/16 in.	18/32 in.	1 1/8 in.
7/8 in.	16/32 in.	1 in.
15/16 in.	14/32 in.	7/8 in.
1 in.	12/32 in.	3/4 in.
1 1/16 in.	10/32 in.	5/8 in.
1 1/8 in.	8/32 in.	1/2 in.
1 3/16 in.	6/32 in.	3/8 in.
1 1/4 in.	4/32 in.	1/4 in.
1 5/16 in.	2/32 in.	1/8 in.
1 3/8 in.	...	...

NOTE.—Measurements to be taken through flange, 17/64 inch above tread.

The cost of removing, turning and replacing a pair of wheels may be taken as constant for any degree of flange wear, inasmuch as the actual difference in cost of making a cut 1/4 in. deep and one 1/2 in. deep is very small, in comparison with the total cost. Each fraction of an inch of thickness of the tire has a proportionate value to the total cost of the tire. The economical limit of flange wear, therefore, is that point where the cost of removing, turning and replacing the wheels just equals the value of the metal in the tires which is removed in turning to restore the tire to normal dimensions. For example, if the cost of turning a pair of tires is \$4 and each 1/4 in. of diameter of each tire, calculated on the cost of a new tire, is worth \$1, the economical limit of flange wear is the equivalent to 1/2 in. reduction in diameter of the tires, which from the table is 1 1/8 in. Turning tires before this limit of thickness is reached wastes shop expense; turning them after the limit is passed causes a loss of valuable metal in the tread.

The Rio de Janeiro Tramway, Light & Power Company, Ltd., has concluded arrangements with some leading banking houses in Paris and Brussels for placing £1,750,000 (one-half) of the issue of new 5 per cent debentures. £400,000 of these debentures having been paid in full. A public issue of £900,000 will be made simultaneously in Paris and Brussels on May 12 and the balance, £850,000 of the above amount reserved for Paris and Brussels, will be offered in the autumn.

The Electric Club and the Civil Engineers' Club in Cleveland have been amalgamated, and the combined organizations will hereafter be known under the latter name, with headquarters in the Caxton Building.

ADVERTISING LOST ARTICLES IN BOSTON

A carefully worked-out system enables the Boston Elevated Railway Company to return to the owners a large proportion of the articles lost in stations or waiting rooms or left in cars and trains by its patrons. Steam roads have frequently made good use of a similar system, but the Elevated company made a new departure recently in following the procedure familiar to the public through the following advertisement inserted in a double-column square in the daily newspapers:

Boston Elevated Railway Co. Concerning Lost Articles

Between March 1, 1907, and March 1, 1908, about 35,000 articles were lost or left on the cars or premises of this company. Approximately one-half of these articles were restored to their owners.

For the purpose of facilitating the work and increasing the efficiency of the lost articles organization, persons who desire to report lost articles are requested to observe the following directions:

1. State name of article lost.
2. Give date, time and place as exactly as possible.
3. Description of article.
4. Where did you board car or train?
5. Where did you leave car or train?
6. Name.
7. Address.

Write to or call upon the Lost Articles Clerk, office of Superintendent of Transportation, Room 701, 101 Milk Street, or telephone Main 5700. Hours 8.30 A. M. to 5.30 P. M.

Boston Elevated Railway Company

THE TROLLEY CAR AS A MOVING VAN

The express cars of the Conestoga Traction Company, of Lancaster, Pa., which are run on the company's lines on a regular schedule, are frequently used for moving household effects. The crews, being accustomed to handling express matter, are very proficient in moving furniture. Most of the moving is done at night. The car is loaded



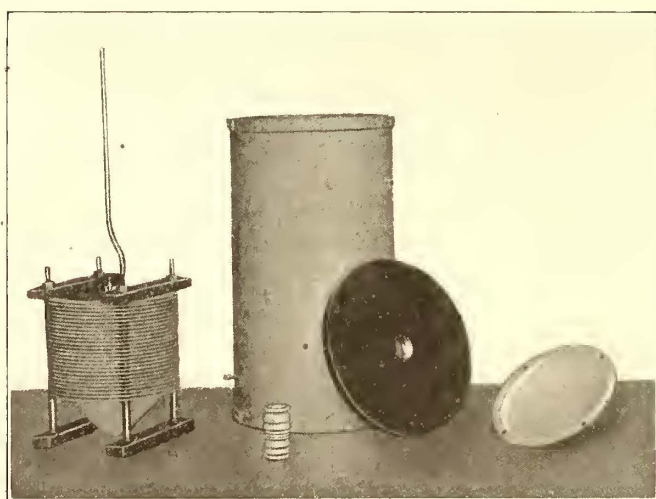
PLACARD FOR ADVERTISING TROLLEY EXPRESS IN CONESTOGA

after midnight, taken to its destination and unloaded by the time the cars start to run in the morning. When a moving job is handled in the day time the cars are loaded between schedules. If the party is going to the city the car is unloaded after midnight, but if going to the country the car is unloaded between the schedules. Articles are not moved from one point in the city to another, all moving being either from the city to the country or from a point in the country to another point in the country. The charge for the cars is 30 times the round trip fare between points, with a minimum rate of \$10.

ALUMINUM CELL LIGHTNING ARRESTER

The General Electric Company has just placed on the market a form of electrolytic lightning arrester known as the aluminum cell arrester for operation on alternating-current circuits. It consists essentially of a series of concentric inverted cones placed one above the other with a vertical spacing of about $\frac{3}{16}$ in. The cones are insulated from each other except for the electrolyte which partially fills them. Each cell then consists of two aluminum cones and the intervening electrolyte.

A sufficient number of cells placed in series form a complete arrester, the electrical characteristics of which are the same as a single cell. The cones complete with the electrolyte are immersed in a tank of oil which affords the necessary insulation and great heat-absorbing capacity. These tanks are made of welded steel and are equipped with wooden covers and suitable porcelain bushings.



ALUMINUM CELL LIGHTNING ARRESTER

The efficacy of the cones as a lightning arrester depends upon a thin film which is formed upon the surface of the aluminum by a special process of manufacture. This film may be compared with the safety valve of a steam boiler which opens at a definite pressure and allows the steam to escape.

Each cell, that is, two adjacent cones with intervening electrolyte, is designed to operate normally at 300 volts. If the potential rises to any value greater than 300 volts and less than 420 volts, the film allows the discharge to take place, but a thicker film is immediately formed and the current is again decreased to a small value. When the line potential becomes normal this extra thickness of film gradually dissolves, leaving the film in its normal condition.

At 420 volts (about 40 per cent above normal voltage) the film opens and allows a free and heavy discharge to take place. This voltage represents the maximum critical film value per cell. The plate area of the cells is sufficient to allow a discharge of more than 1000 amp at double normal potential, or 600 volts per cell. This represents a quantity of electricity many times greater than that usually liberated by an ordinary induced lightning stroke. Consequently it is not possible to get an excessive potential across the terminals of the arrester by such discharges.

The aluminum cell arrester is designed to be connected to the line through adjustable horn gaps. These gaps may be set so that the voltage will break across at any desired rise above the normal operating voltage. When the con-

ditions warrant the gaps can be set so as to allow the arrester to discharge when the line voltage rises only about 25 per cent. The horn gaps perform three important functions: First, they act as spark gaps, as explained; second, they may be used as disconnecting switches, and, third, for subjecting the arrester to normal voltage. It is recommended that current be sent through the arrester every day or two so as to assure proper formation of the film on the aluminum cones. The horn gaps are so constructed that they can be easily short circuited momentarily for accomplishing their purposes.

The use of steel for the containing tank prevents liability of breakage during transportation, installation or operation. Another important feature in the mechanical construction of these arresters is that the aluminum cones are supported by their rim at four points, thus making a sturdy construction and eliminating any liability of the adjacent cones short circuiting against each other.

The cone shape or pointed construction of the aluminum has a very decided advantage in preventing explosive or corrosive action of the arrester and prevents local heating and short life. Some of the advantages of this type of arrester from a protective standpoint of view are as follows:

(1) It is designed to discharge at a comparatively small rise of voltage.

(2) The arrester will discharge the heaviest induced stroke without allowing an abnormal rise of voltage in the system.

(3) The large amount of oil used for heat absorbing and radiating capacity enables the arrester to discharge continuously for one-half hour. This is particularly desirable in case of a grounded phase, since the cause of the ground can often be located in a half-hour's time, or necessary switching done so as to transfer to another set of buses.

(4) An inherent feature of arresters with a properly formed film is that no dynamic current will flow as a result of the discharge.

CONVENTION COMMITTEE VISITS DENVER

A joint committee of the American Street & Interurban Railway Association and of the American Street & Interurban Railway Manufacturers' Association visited Denver this week at the invitation of the Denver City Tramway Company to decide whether Denver should be selected as the convention city next October. Those composing the committee were President Calvin G. Goodrich and Secretary B. V. Swenson, of the railway association, and President J. R. Ellicott, Chas. C. Peirce and Arthur S. Partridge of the latter association. The committee expected to be in Denver on May 3 to 5, and will report its findings to the full committee on conventions of the American Street & Interurban Railway Association, consisting of James F. Shaw, chairman; Arthur W. Brady, Frank R. Henry, B. V. Swenson and President Goodrich, ex-officio. By a resolution passed by the executive committee of the American Street & Interurban Railway Association, this committee has power to decide upon a meeting place for the association next October.

After the meeting at Denver, Secretary Swenson expects to go to El Paso, Tex., and attend the meeting of the Southwestern Electrical & Gas Association, May 7 to 9, and afterward visit a number of the street and interurban railway companies on the Pacific Coast.

NEW TYPE OF PAY-AS-YOU-ENTER CAR

The Jewett Car Company has designed and is now putting on the market a new type of "pay-as-you-enter" car, a full-sized model of which has recently been on exhibition in

swings against the bulkhead, thus closing the rear end of the car completely. This partition is swung to a position at an angle to the center line of the car, and in this position forms the exit at the rear end.

Fig. 1 illustrates the arrangements of the partitions when

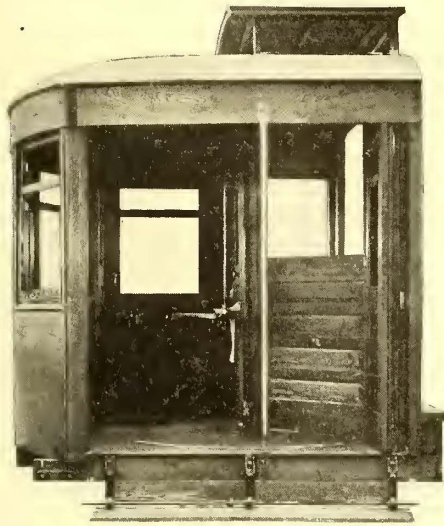


FIG. 1.—REAR PLATFORM



FIG. 2.—FRONT PLATFORM

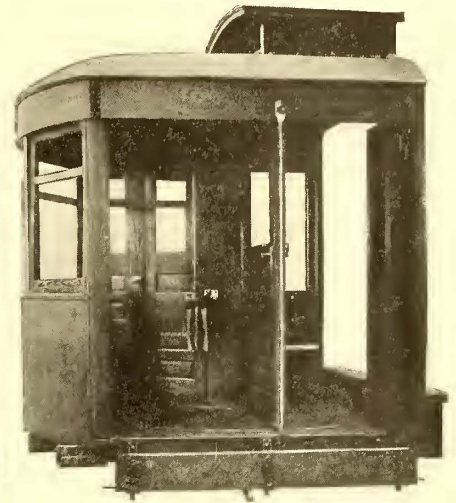


FIG. 3.—VIEW DURING CHANGE

New York. The design provides for wide folding doors on opposite corners of each platform. These doors are closed on the front platform and open on the rear end, the opening at the rear end being used for exit and entrance ways for passengers. At the opposite sides of the platforms from the folding doors are small sliding doors. The small door at the rear end of the car is kept closed and locked as it is on the side of the platform farthest away from the sidewalk,

the platform is used as the rear platform of the car and Fig. 2 shows their arrangement on the front platform. These same positions are shown by the solid lines in Fig. 5. At the end of the run the folding seats on the front platform are shut up and the hinged folding door enclosing the open side of the platform is thrown back. The hinged partitions are then swung around, as shown in Figs. 3 and 4 and by the dotted lines in Fig. 5.

An interesting feature of the car is an automatic folding turnstile, which is placed on the partition at the jam of the swinging entrance door. This turnstile is connected to the car register, and registers each passenger entering through the entrance door. It is automatically folded by the move-

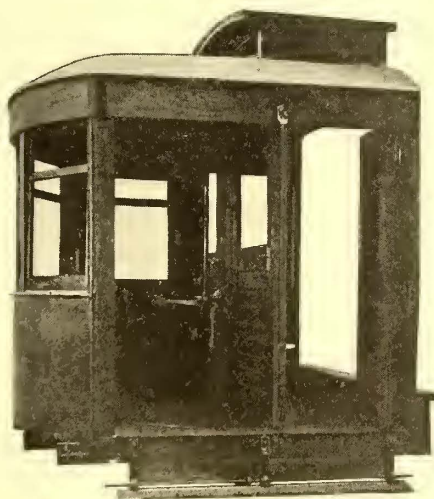
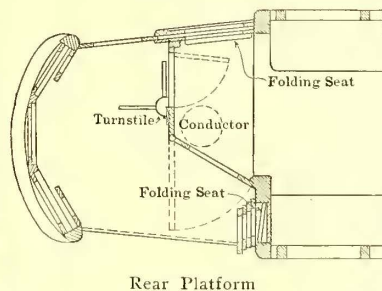
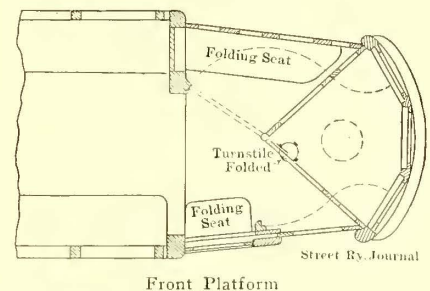


FIG. 4.—VIEW DURING CHANGE



Rear Platform



Front Platform

FIG. 5.—PLAN OF CAR—FULL LINES SHOW FRONT PLATFORM AT RIGHT AND REAR PLATFORM AT LEFT—DOTTED LINES SHOW DIRECTIONS IN WHICH PARTITIONS ARE SWUNG

but the forward sliding door may be used for the exit of passengers.

The particularly interesting feature of the Jewett design consists in the novel arrangement of the folding partitions which are hinged about an upright pipe placed on the car platform. These partitions are identical at either end of the car and on the front platform are swung into a V-shaped position forming an enclosed cab for the motorman. On the rear platform one of these partitions is locked at right angles to the center line of the car. This partition carries within itself a swinging door which forms the entrance way for passengers. The other partition on the rear platform

ment of the partition, to which it is fastened when this partition is moved to form the motorman's cab. The movement of the swinging partition also automatically folds up the steps at the doors which are not in use on the side of the car away from the sidewalk.

The principal claim made for the Jewett design is that the maximum seating capacity is obtained inside the car body, no corner seats being cut out for doorways. By means of the folding seats, which are arranged to be let down on the front platform as described, room is provided for six passengers in addition to those in the interior of the car body.

FINANCIAL INTELLIGENCE

WALL STREET, May 5, 1908.

The Stock and Money Markets

The most striking feature of the general financial situation at present, as it has been for the past week or more, is the continued extreme case in money, which may be had both on call and on time, in superabundance and at unusually low rates for this particular season of the year. The taking of a considerable amount of gold for export to Europe, approximately \$11,500,000, and the large borrowings by corporations, have had no effect whatever upon the money market, neither has the action of the Secretary of the Treasury in ordering the withdrawal of \$45,000,000 of government deposits from the National Banks, all of which will be taken from them during the current month. In the face of these developments, the surplus reserves of the New York Clearing House banks keep on piling up and are now at the unusually high point of over \$62,000,000, which compares with something like \$6,000,000 at this time last year. Currency from all parts of the United States is now flowing this way in very heavy volume and it is owing to this, rather than to anything else, that the local financial institutions are enabled to enlarge their reserves despite the drains that they have been and are being subjected to through the channels referred to.

In consequence of this immense plethora of money, the stock market during the past week, while at intervals irregular and uncertain, has displayed an advancing tendency, with a number of stocks selling at the highest prices of the year, and this, too, in the presence of a number of ordinarily depressing elements, such as a slowing down in the copper and steel industries, with expectations of a reduction in prices for finished steel; the cutting of the Pennsylvania Railroad's dividend from a 7 per cent to a 6 per cent annual basis; reports that the number of idle cars on the railroads is now greater than ever before, and more or less conflicting advices concerning the crops. Besides, the returns of railroad earnings coming to hand continue to show substantial decreases in gross, but the influence of this has been minimized by the fact that in all cases operating expenses have been greatly curtailed, so that net revenues present fairly favorable comparisons with corresponding periods last year.

But apart from the confidence which has been inspired by reason of the present enormous supply of money and the ability of the railroads of the country to reduce operating costs without impairing their efficiency, the general stock market has derived much of its strength from the overwhelming success that has attended the flotations of the immense bond issue that have been put out by several large corporations, among which may be specifically mentioned the Pennsylvania Railroads and the Interborough Rapid Transit Company. The Public Service Corporation of New Jersey and the North American Company also have disposed or have arranged to dispose of new securities, to say nothing of the latest sales of about \$35,000,000 revenue bonds by the city of New York. The eagerness with which all these securities have been taken up testifies to the present temper of investors of both large and small means and constitutes one of, if not the strongest, backlogs to the current speculative and investment situation. In addition to the foregoing, the Union Pacific has now authorized an issue of \$100,000,000 bonds, only part of which, however, will be put out for the present. Thus it is that factors which under ordinary circumstances would be calculated to hold the market in check have failed of any influence whatever in that direction, as it is recognized that so long as money virtually remains a drug in the market, there is not much danger of any material setback to values, as sooner or later all these idle funds must of necessity find employment. Even though many stocks are now receiving smaller dividends than six months or a year ago, the investment yields in most cases are still very tempting, and all things being equal, it is only reasonable to

expect a continuance of the current demand for securities of merit, at least for some time to come.

The event of the week has been the opening of the Brooklyn Subway, which has done much to enhance the earnings of the Interborough Company. While the first effect of this has been to cut into the revenues of the Brooklyn Rapid Transit, close students of local traction affairs are confident that eventually the latter company will benefit materially by the greater influx of people to the territory served by its lines. With the opening of bids for the new Fourth Avenue Subway in Brooklyn, the situation becomes still more interesting, and with the advent of spring weather all the companies under this head have record-breaking earnings ahead of them. That the securities of local traction companies are constantly finding increased favor among investors is demonstrated by the readiness with which the \$25,000,000 Interborough 6 per cent bonds, recently offered by a prominent banking house, were taken. There is no doubt that the success of this offering was in large measure due to the excellent standing of the firm tendering them. Nevertheless, it testifies in no uncertain manner to the increasing popularity of this class of investment.

Philadelphia

Trading in the local tractions, while upon a comparatively small scale, have been accompanied by decided strength, prices for some issues scoring substantial advances during the past week. Philadelphia Company's issues have ruled particularly strong, the common advancing to 41, while the preferred moved up to 41½ on rather light purchases. Philadelphia Rapid Transit moved between 17¾ and 18½, while Philadelphia Traction touched 89. Union Traction was irregular, the price declining from 55½ to 54¾, but later recovering to 55. In the higher-priced investment issues, sales of Frankfort & Southwark Passenger were recorded at 399; Second and Third Streets at 275 and United Companies of New Jersey at 241½. American Railways showed strength during the early part of the week at 44¾, but near the close there was a fractional reaction to 44⅜.

Baltimore

The market for tractions at Baltimore continued extremely quiet throughout the week, and while prices moved irregularly, the undertone was firm. United Railway issues were the features in point of activity, the 4 per cent bonds fluctuating between 85½ @ 85, and the incomes from 52⅜ to 50⅞. The refunding 5s, however, held firm at 76½, and the stock brought 11 @ 10¾. North Baltimore 5s sold at 111 and Washington City and Suburban 5s at 98⅝ @ 99.

Other Traction Securities

Price movements in the Boston market were decidedly irregular, and the final quotations for practically all of the leading issues were about the lowest of the week. Boston Elevated, after selling at 138, dropped to 135, and West End common and preferred declined from 85¼ and 105 to 84½ and 104 respectively. Massachusetts Electric sold at 9⅞ @ 10 and the preferred at from 46¾ to 44. The Chicago market, although not very active, was broader, more issues being traded in than for some time past. Union Traction receipts advanced from 1¾ to 2¼, and the preferred receipts brought 6. North Chicago receipts sold at 40. Metropolitan Elevated sold at 15, the preferred at 48 and Northwest Elevated at 53.

Security Quotations

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

	Apr. 29.	May 5.
American Railways.....	44¾	44¾
Boston Elevated.....	137½	136
Brooklyn Rapid Transit.....	46⅞	—
Chicago City.....	156	160
Cleveland Electric.....	—	—
Consolidated Traction of New Jersey.....	64½	65
Detroit United.....	32	33
Interborough-Metropolitan.....	9⅞	9⅞
Interborough-Metropolitan (preferred).....	27½	27½
International Traction (common).....	—	—

International Traction (preferred).....	—	—
Manhattan Railway.....	132½	134
Massachusetts Elec. Co. (common).....	10	9¾
Massachusetts Elec. Co. (preferred).....	46½	44½
Metropolitan Elevated, Chicago (common).....	a17	a17
Metropolitan Elevated, Chicago (preferred).....	a49	48
Metropolitan Street.....	25	25
North American.....	55	57
Philadelphia Company (common).....	40¼	40¾
Philadelphia Rapid Transit.....	17¾	18
Philadelphia Traction.....	88¾	89
Public Service Corporation, certificates.....	—	—
Public Service Corporation, 5 per cent notes.....	90	—
Public Service Corporation, 5 per cent notes.....	—	—
Twin City, Minneapolis (common).....	86¾	86½
Union Traction (Philadelphia).....	55½	54¾

a Asked.

Metals

The iron and steel trades continue quiet, without indication of improvement. Copper metal is extremely quiet, and consumers show a better disposition to enter the market, even at the present low level of prices. Lake is quoted at 12¾¢. @ 12¾¢e., Electrolytic at 12½¢. @ 12½¢e. and castings at 12¼¢. @ 12¾¢e.

B. R. T.'S CONEY ISLAND BUSINESS UNPROFITABLE

At the hearing last week before the Public Service Commission on the Coney Island fare case, the Brooklyn Rapid Transit Company submitted figures showing that the Coney Island business of its lines during the year ended Dec. 31, 1907, caused it a net loss of \$463,443. This loss was on the basis of the 10-cent fare now charged, and not on the basis of a 5-cent fare, as is proposed. The gross earnings for the year on the Coney Island business was given as \$2,688,554, and the expenses as \$3,151,997, with a resulting loss of \$463,443. The expenses are figured on the car mileage basis, and include charges, taxes and special appropriations.

For the various subsidiaries the earnings and expenses were given as follows:

Company.	Earnings.	Expenses.	Net loss.
Brooklyn Heights Railroad Co.....	\$82,596	\$104,717	\$22,120
Nassau Elec. Railroad Co. (surface)..	522,082	532,752	10,669
Nassau Elec. Railroad Co. (elevated)	259,382	359,009	99,627
Brooklyn, Queens Co. & Sub. R.R..	176,551	199,411	22,860
Brooklyn Union Elevated R. R.:			
Franklin Ave. to Coney Island...	*388,264	518,264	130,001
Bklyn. Bridge to Franklin Ave..	*129,421	172,755	43,334
West End Route:			
Bklyn. B. to 5th Ave. & 36th St.	*259,382	305,362	45,979
Sea Beach Route:			
Bklyn. B. to 5th Ave. & 36th St.	*277,843	250,954	†26,889
South Brooklyn Railway Co.....	315,189	448,417	†133,228
Sea Beach Railway Co.....	277,843	260,356	†17,486
	\$2,688,554	\$3,151,997	\$463,443

*Estimated where actual figures not obtainable. †Increase.

The following additional explanation was made by Comptroller Abel of the company:

"While these figures for the West End Route and the Sea Beach Route may exclude some of the local traffic carried by through Coney Island cars, no credit should be given the Coney Island service therefor, as whatever local passengers are carried on Coney Island trains are amply provided for by local service."

In order to show the character of the Coney Island business, namely, a mostly one-way business, and what it would be providing the travel was in both directions, the company submitted a statement of possible profits under different conditions. This statement showed that if the company's cars had carried at all times 50 passengers each and if the rate of fare and the method of collecting it had remained the same as now, the net profits last year from Coney Island business of the six operating companies in the system would have been as follows:

Brooklyn Heights	\$16,309
Nassau Electric	813,749
Brooklyn, Queens County & Suburban.....	69,719
Brooklyn Union Elevated.....	340,801
South Brooklyn	428,453
Sea Beach	238,193
Total	\$1,907,224

Profits such as are shown above are impossible because of the existing conditions, even with a 10-cent fare. Counsel for the company stated that the figures were put in evidence only to show that even under the most favorable circumstances the company's earnings from Coney Island business would not be large.

MASSACHUSETTS ELECTRIC COMPANY EARNINGS

The Massachusetts Electric Company's statement for the quarter and six months ended March 31, 1908, compares as follows:

Jan. 1 to March 31:	1908.	1907.
Gross receipts.....	\$1,552,771	\$1,526,523
Operating expenses.....	1,127,720	1,207,782
Net earnings.....	\$425,051	\$318,741
Charges and taxes.....	464,316	436,152
Deficit	\$39,265	\$117,411
October 1 to March 31:		
Gross receipts.....	\$3,332,246	\$3,241,142
Operating expenses.....	2,447,783	2,436,589
Net earnings.....	\$884,463	\$804,553
Charges and taxes.....	900,752	846,443
Deficit	\$16,289	\$41,890

REPORT OF UNITED TRACTION OF ALBANY

The United Traction Company (Albany-Troy) has filed its report at Albany for the quarter ended March 31, 1908, as follows:

	1908.	1907.
Gross receipts.....	\$453,777	\$456,644
Operating expenses.....	323,799	292,621
Net earnings.....	\$129,978	\$164,023
Other income.....	30,977	37,641
Total income.....	\$160,955	\$201,664
Fixed charges.....	89,612	87,481
Surplus	\$71,343	\$114,183

The general balance sheet of the United Traction Company of Albany-Troy as of March 31, 1908, compares with that of June 30, 1907, as follows:

	Mar. 31, '08.	June 30, '07.
Cost of road and equipment.....	\$10,320,650	\$10,176,114
Stocks and bonds.....	7,755,666	7,755,666
Supplies on hand.....	187,045	181,820
Jas. McCredie, treas., trustee.....	400	400
Open accounts.....	237,220	214,610
Cash on hand.....	25,440	57,905
Expenses app. to fut. period.....	34,474	20,062
Prepaid insurance.....	2,841	1,674
Cash on deposit to pay coupons.....	71,560	21,952
Work in progress.....	315,358	109,730
Accrued interest.....	47,590	.....
Treasury bonds.....	1,359,000	.....
Bills receivable.....	230,830	.....
Total.....	\$20,588,073	\$18,539,936

LIABILITIES.

Capital stock, common.....	\$12,500,000	\$12,500,000
Due W. T. & R. R. Co. stockholders.....	350	350
Funded debt.....	6,500,000	5,141,000
Loans and bills payable.....	1,005,000	305,000
Interest due and accrued.....	74,369	43,628
Rentals due and accrued.....	3,040	8,176
Reserve for renewal of equip.....	50,000	50,000
Coupons due, not presented.....	71,562	21,952
Due for wages.....	15,876	19,110
Due for supplies.....	175,345	99,263
Open accounts.....	32,836	6,160
Unclaimed wages.....	217	102
Profit and loss surplus.....	159,478	345,185
Total.....	\$20,588,073	\$18,539,936

MUNICIPAL TRACTION COMPANY BEGINS TO OPERATE IN CLEVELAND

Commencing with the free rides on Tuesday, there has been since then almost a continuous show of some kind in Cleveland, and people have been kept on the alert to guess what was coming next. The officials have been no less busy, and doubtless have found that converting a street railway system from private ownership to a so-called municipally controlled company is very serious business, especially where a so-called low fare is to be adopted and where promises made to employees have to be fulfilled at once under threats of a strike.

The people took full advantage on Tuesday of the announcement made by cards on the cars to the effect that April 28 was Municipal Day and that everybody was to ride free. Consequently, the cars were literally jammed all day. The up-town section presented the appearance of a popular holiday with all the excitement incident to a circus parade. School children flocked to the cars and kept them crowded, with the running boards jammed to the danger limit. So far as has been ascertained the accidents only resulted in a number of severe bruises.

On Wednesday the three-cent fare went into effect, but no transfers were provided, and those who were compelled to use two or three lines in reaching their destination paid either six or nine cents as the case might be. Residents of the suburbs were charged a straight five-cent fare, and if they did not make their destination known when paying the fare, an additional five-cent fare was collected when the city limits were passed. President DuPont stated that it had been impossible to secure transfers, and that this arrangement would have to continue until about May 7, when transfers would be issued at a penny each. The transfers will aid people who ride in the city, but fares for the suburbs will be settled in some other way.

Mayor McQuigg and members of the City Council of East Cleveland, in order to test the franchise agreement with the Cleveland Electric tendered 3-cent fares Wednesday morning, and were repeatedly ejected from the cars. A petition was at once prepared asking for a temporary restraining order to prevent the collection of more than three cents for riding either into or out of the village from the city, with the request that a temporary injunction be granted upon the final hearing. This was based upon the franchise agreement in East Cleveland, which requires the company to carry passengers at a five-cent cash fare, or 11 tickets for a half-dollar, and the provision that the village shall have the same rate of fare as is made on Euclid Avenue within the city, and that one fare shall be good for a continuous ride from any point in the village to Water Street or in the opposite direction, with full transfer privileges. This agreement was made to cover any change that might be made in the fare within the city, but makes five cents in cash or a ticket at the rate of 11 for a half-dollar the maximum limit. Mayor Johnson and President DuPont state that the agreement with the villages will be carried out, but that they did not believe the three-cent fare can be demanded by them. If they are able to secure any reduction under their agreement, it will be the legal rate fixed by the City Council and that is six tickets for a quarter in the security franchise. The excuse they offer is that the holding company can make any rate it sees fit, but that this is not legally binding upon it, either in the city or the suburbs as long as the rate is equal to or below that fixed by the security franchise. The citizens of Lakewood, a western suburb, are equally wrought up over the fares they have had to pay and threaten legal proceedings if something is not done at once.

To make matters worse, the motormen and conductors show no disposition to abide by the decision of the officials of the Municipal Traction Company in making an advance of one cent per hour, giving them a new uniform each year and then charging them full fare for their rides to and from work. They demand an advance of two cents an hour under the alleged agreement with the Cleveland Electric Railway Company in case its franchises were renewed before May 1, 1909, and, in addition, free transportation. The Municipal Traction Company had an agreement with the local union organized on its original lines and claims that it has lived up to its agreement with that organization and made the advance that this contract called for. The officials of the National Union, however, state that it was necessary for them to revoke the charter of this union, and that many of its members have now joined the branch formed of the Cleveland Electric employees. They say the contract made by this branch with the Cleveland Electric should hold good.

Mayor Johnson brought the union leaders and President DuPont of the Municipal Traction Company together on Saturday, but the conference broke up at 2:30 o'clock a. m. Sunday morning without reaching an agreement. It has since been decided by the executive committee of the Street Railway Men's Union to submit the question of the legality of their contract with the Cleveland Electric Railway Company to a board consisting of three attorneys, one to be selected by themselves, another by the Municipal Traction Company and the third by these two. Vice-president Behner asserts that this is not arbitration, but simply a means of securing an opinion on the legality of the contract which has been questioned by President DuPont and Mayor Johnson.

The managers of the interurban lines have been ordered to cease stopping cars for passengers within the city, but the Municipal Traction Company has not yet decided upon its final course with regard to this matter.

The Cleveland Electric Railway Company filed notice with the Secretary of State a few days ago of an increase of capital stock, from \$12,870,000 to \$35,000,000. This is in accord with the agreement entered into with the Municipal Traction Company. Secretary Henry J. Davies has notified the stockholders that the final meeting of the old company will be held on June 2 at 10:30 o'clock to vote on the change of name from the Cleveland Electric Railway Company to the Cleveland Railway Company. The new stock certificates will be ready to exchange at that time. It is possible that the number of directors will be reduced.

THE CHESTER STRIKE

The strike situation at Chester is unchanged, except that the lawless element seems to have been cowed by the presence of the state police. Cars are running unmolested, and traffic gives promise soon of becoming normal.

CONTRACTS TO BE AWARDED

The Montreal Engineering Company, Ltd., 179 St. James Street, Montreal, which acts as purchasing agent of the Trinidad Electric Company, Demarara Electric Company, Camaguey Electric Company, Dartmouth Electric Company, Porto Rico Railways Company, Porto Rico Power & Light Company and San Juan Light & Transit Company, expects to place contracts within a few weeks for considerable apparatus for the use of the companies which it represents. A 30-ton ice plant is to be erected in connection with one of the street railways and equipment will be needed for it. In connection with rolling stock equipment it is intended to purchase three 300-hp box-car type, 600-volt, direct-current, meter-gage locomotives. Somewhat extensive improvements are contemplated to a number of park properties, and contracts will be awarded for a carrousel, Ferris wheel, figure-8 coaster, miniature railway, shooting gallery, etc.

P. S. C. AUTHORIZES \$50,000,000 BONDS

The directors of the Public Service Corporation of New Jersey authorized on Tuesday, May 5, the execution of a \$50,000,000 mortgage to cover the bond issue of that amount which the company purposes to authorize. The bonds will carry 5 per cent interest, and will be dated May 1, 1908. They cover all the real estate of the company and its interest in its subsidiary companies, including both its stock holdings and leases. By the terms of the mortgage \$3,725,000 at par of the bonds is to be forthwith delivered by the trustees to the corporation to recoup the company for betterments recently made and contracted for; \$7,250,000 is reserved for retiring a like amount of collateral gold notes; \$6,250,000 is reserved for retiring a like amount, or so many thereof as may not have been converted of the convertible notes of the company, dated April 16, 1906, and the remainder is reserved for future betterments. The bonds required to be delivered to the company upon the execution of the mortgage, amounting to \$3,725,000, have all been sold by the company, together with a certain additional amount of bonds, which, it is expected, will be certified and delivered during the ensuing year for additional betterments, so that the company's financing for this year is completed, and it is not contemplated that any bonds secured by this mortgage will be offered to the public this year.

INTERBOROUGH INVESTIGATION COMPLETED—COMPANY PRAISED

From a memorandum issued by the Public Service Commission of the First District of New York, in connection with the approval of the \$55,000,000 bond issue of the Interborough Rapid Transit Company, it is learned that the commission had concluded its traction inquiry, so far as concerns that corporation. The memorandum is, in effect, a report upon the financial status of the Interborough. Various proposals were advanced on behalf of the commission. One of them was that the commission should suspend its inquiry into the Interborough, pass upon the mortgage, and at a subsequent date take up the inquiry again. This was rejected by the company, on the ground that if the bonds were issued with the approval of the commission or were used as security for an issue of notes, such as is now being made, the investors might stand to lose if the commission at a subsequent time began again to investigate the company and ultimately pass criticism on its finances.

The most interesting item in the report of the commission upon the Interborough is that relating to the subway equipment account, which, on the balance sheet of June 30, 1907, represented a cost to the company of \$25,147,451. This account was analyzed and audited by Marvyn Scudder, the expert accountant who has advised the commission throughout its traction investigation. It stood on the books of the company at \$24,768,903.46 at the end of the calendar year 1907, exclusive of real estate. When the commission was investigating traction affairs last fall certain items appeared charged up to the subway construction account as an asset, including discount on securities, lawyers' fees, National Civic Federation subscription, press agents' salaries, etc. Mr. Scudder reported that items of this character came to \$1,302,817, which he took out of the subway equipment account and put in a new account, to be known as "Contractors' Expense Account." The importance of this step is that the items so segregated will not be considered as assets for the purpose of the mortgage, which is a lien upon all the property of the Interborough.

The commission's expert engineer, Mr. McLimont, who made a careful investigation of the physical condition of the subway equipment, makes this report as to his findings:

"The general design and capacity of the working parts of the equipment are good and sufficient to meet the present requirements of the system. I found that the equipment was all in thoroughly first-class operative condition, having been exceptionally well maintained, and, in fact, in some instances the original apparatus has been improved since its installation, and depreciations should be set at the minimum for each part of the property."

The memorandum contains also the estimate of the company's auditor, based on the actual income expenditure for the first three months of the calendar year, with consideration for the actual earnings of the last calendar year. This is the estimate for the year 1908:

Gross earnings.....	\$24,959,728
Operating expenses.....	10,903,996
Net earnings.....	\$14,055,732
Other income.....	1,070,772
Gross income.....	\$15,126,504
Interest, rentals and taxes.....	6,896,832
Balance.....	\$8,229,672
Seven per cent on Manhattan Railway stock.....	4,200,000
Net income.....	\$4,029,672
Dividends on \$35,000,000 I. R. T. stock.....	3,150,000
Surplus.....	\$879,672

The commission reports that an item of \$275,000 should, for the purpose of conservatism, be eliminated from this surplus, inasmuch as that represents the estimate of the company as to its probable additional income from the Atlantic Avenue Subway extension in Brooklyn. With this reduction, however, the commission notes that the net income is still more than sufficient to meet the requirements of the company with its new financing.

It appears from the memorandum that the operations of the Interborough have been sufficiently profitable to enable the operating account to advance to the capital account the sum of

\$3,462,683 in the course of the construction that has been done since the original installation of the system. The company has sought leave to issue bonds to repay this advance to operating account. The commission does not pass on the application, inasmuch as the Interborough Rapid Transit Company has still a minimum obligation to the construction company of \$3,771,147 for the Brooklyn extension.

The commission disposes of the question raised as to the validity of the Interborough's investment in the stock of the Subway Realty Company, which owns the Belmont Hotel, by finding that there is warrant for such investment under Sections 40 and 42 of the stock corporation law, and under Article XII. of the Interborough's certificate of incorporation.

LOCAL BOARDS RETALIATE IN MASSACHUSETTS

Now that local boards of selectmen in Massachusetts towns are beginning to realize that the State law has concentrated most of the real power as to street railway locations and regulations in the hands of the Railroad Commission, they are showing signs of a willingness to use what authority they still retain for delaying or annoying the street railway companies in the attainment of final results. Although the companies may get what rights they need from the Railroad Commission in the end, the stated periods for routine procedure named in the law give the local boards power to delay progress or necessitate new proceedings if they feel so disposed.

Recent experiences of the Natick & Cohituate Street Railway illustrate how the opportunity exists, although in the present instance no reflections on the local authorities are intended. The company sought and obtained a local freight franchise in the town of Framingham. The Railroad Commission, whose approval is required, had previously declined to approve grants where the freight rights had been made terminable at the end of a stated period; but Framingham limited the privilege contained in the franchise to five years. When the case came before the Railroad Commission for public hearing, this limitation was noted, and the Commission, doubting its authority to approve for a stated period under the present law, postponed the ease to give the company opportunity to have the time limit stricken out. This required some time, but the matter was eventually adjusted with the local authorities; but the franchise, on coming to the Railroad Board the second time for approval, was found to contain a clause allowing the local authorities to terminate it at any time. The State board has uniformly declined to pass such grants unless the power to abrogate has been subject to the board's approval; and, accordingly, this week, proceedings were once more suspended to allow the local authorities opportunity to word the grant according to the regular form, if they wish.

A similar franchise for the Middlesex & Boston Street Railway, another of the Boston Suburban Electric Companies system, is in substantially the same position. The companies have secured freight rights in neighboring towns, stringing back through the Newtons to the edge of Boston. A slightly different stage of the same procedure is illustrated by the Springfield & Eastern Street Railway's attempt to get freight rights in the town of Palmer. The town's original grant made the rights terminable in five years, regardless of the State board's action. This was not approved by the Railroad Commission, and when the company, which is a lessee of the Springfield Street Railway Company, undertook to get a local grant in acceptable form—that is, without special conditions other than those generally applied in all towns for this kind of traffic—the town refused a grant altogether. Now the company has filed a petition with the Railroad Commission for a grant direct from the State board, under the so-called "missing link" law, with prospect of obtaining what it wants.

There is the same ground for the Commission's position in the matter, regardless of the exact provisions of the law, which enabled it to take the regulation of the speed of cars away from the local authorities a few years ago. The reason then was that as the electric railways were extended, so that a single company ordinarily operated through a number of different towns instead of within the limits of one, or perhaps two, a need arose for securing uniformity in speed regulation. Since nothing in the local conditions could insure uniformity, when towns of different interests were equally concerned, the State board came in as the natural and common authority. It is substantially the same with the regulation of freight over the electric railways.

TWIN CITY EARNINGS

The gross earnings of the Twin City Rapid Transit Company continue to show gains and the net earnings to show losses. For the first three months of 1908, the income account compares with that for the corresponding period of 1907 as follows:

	1908.	1907.
Gross earnings.....	\$1,408,458	\$1,355,947
Expenses	764,668	694,296
Net earnings.....	\$643,790	\$661,645
Charges	315,630	293,275
Balance	\$328,160	\$368,370
Preferred dividends.....	52,500	52,500
Surplus	\$275,660	\$315,870

The surplus of \$275,660 for common dividends for the 1908 period, as shown above, is equal to 1.37 per cent of the \$20,000,000 common stock. The period of course constitutes the least favorable quarter of the company's year.

ANNUAL REPORT OF UNITED RAILWAYS INVESTMENT COMPANY

The profit and loss account of the United Railways Investment Company for the year ended Dec. 31, 1907, compares as follows:

	1907.	1906.
Dividends on stocks owned.....*	\$1,457,772	\$1,295,398
Interest on loans, dividends, etc.....	103,092	38,824
Total income.....	\$1,560,864	\$1,334,222
General expenses, interest on bonds, etc.....	1,158,230	611,007
Net income for year.....	\$402,634	\$723,215
Profit and loss credits.....	422,282	473,567
Gross surplus.....	\$824,916	\$1,196,782
Profit and loss chg., including dividends....	.....	800,000
Profit and loss surplus Dec. 31.....	\$824,916	\$396,782

*Includes proportion accrued, at Dec. 31, 1907, of a dividend on the common stock owned by the Philadelphia Company declared subsequent to that date.

Profit and loss surplus, \$824,916, is equal to 5.5 per cent earned on the \$15,000,000 preferred stock.

The United Railways Investment Company's general balance sheet as of Dec. 31, 1907, compares as follows:

ASSETS.

	1907.	1906.
United R. R. of San Fran. & Phila. Co. stock.....	\$55,342,818	\$53,052,818
Other investments.....	148,834	73,663
Notes receivable.....	125,000	.....
Cash	9,660	12,282
Philadelphia Co. collateral notes.....	45,560	.....
Demand loans.....	.....	276,725
Loans United R. R. of San Francisco.....	1,315,955	.....
United R. R. of San Francisco div., certfs....	.....	550,000
Interest accrued.....	1,463	5,680
Proportion of Philadelphia Co.'s dividend....	242,000	236,900
Furniture and fixtures.....	1,528	624
Contingent assets.....	5,717	103,472
United R. R. of San Francisco, car trust....	41,684	.....
Total.....	\$57,281,220	\$54,312,165

LIABILITIES.

	1907.	1906.
Preferred stock.....	\$15,000,000	\$15,000,000
Common stock.....	19,400,000	19,400,000
Collat. trust sinking fund 5 per cent bonds....	18,150,000	15,750,000
Preferred stock dividend certificates.....	1,462,500	1,087,500
Dividends payable January.....	.....	375,000
Cash overdrafts.....	80,554	487,027
Loans and bills payable.....	2,061,488	.....
Notes payable.....	.....	1,000,000
Drawn upon European credits.....	.....	603,875
United Railroads current account.....	53,399	48,103
Vouchers and coupons due.....	37,066	4,659
Interest accrued.....	211,296	159,217
Profit and loss surplus.....	824,916	396,782
Total.....	\$57,281,220	\$54,312,165

PHILADELPHIA COMPANY.

The income account of the Philadelphia Company and affiliated corporations for the year ended Dec. 31, 1907, compares as follows:

	1907.	1906.
Gross receipts.....	\$10,082,098	\$17,829,810
Expenses and taxes.....	9,668,328	9,266,477
Net	\$9,413,770	\$8,563,333
Other income.....	250,208	200,069
Total income.....	\$9,663,978	\$8,763,402
Deductions	1,288,684	1,296,713
Balance	\$8,375,294	\$7,436,689
Fixed charges.....	3,314,234	3,299,754
Balance	\$5,061,060	\$4,166,935
Improv., betterment, exten., sink, fund, etc..	2,136,726	1,160,150
Surplus	\$2,924,334	\$3,006,785
Dividends	373,334	331,532
Surplus	\$2,551,000	\$2,675,253
Prop. to other com. and pfd. stock of affil. co's	3,003	3,783
Net surplus.....	\$2,547,997	\$2,671,470

The proportion of the above surplus applicable to the United Railways Investment Company, based on its present stock holdings (72.80 per cent) of the Philadelphia Company, is \$1,854,941.

President Thalmann, of the United Railways Investment Company, says in his annual report:

"No dividends in cash or scrip were paid during the year 1907 by the United Railroads of San Francisco, all its receipts over and above fixed charges and expenses, and all the surplus earnings of the Philadelphia Company, above the amount of dividends paid by it, having been retained by the respective companies for their respective corporate purposes.

"During the last fiscal year, the most salient feature in the financial history of your company was the strike on the lines of United Railroads of San Francisco. At the date of the presentation of the last annual report of this company, your board of directors firmly hoped that some arrangement, fair and just, both to the employees and to the company itself, would be amicably reached, their hopes being founded on the facts that the United Railroads of San Francisco had fulfilled the requirements of the decision of the arbitrators fixing a rate of wages for the period terminating May 1, 1907, and that the officers of the United Railroads were prepared to meet the demands of the employees in a reasonable and conciliatory spirit.

"These reasonable expectations of the board were not fulfilled, and a strike on the part of practically all of the employees of the United Railroads of San Francisco began on the 5th day of March, 1907, and lasted approximately six months. As an incident of the strike, the lines of the United Railroads of San Francisco were subjected to a persistent and continuous boycott. Furthermore, the employees were exposed to repeated attacks, and their lives for the greater portion of that period were constantly in danger.

"Naturally, the earnings of that company during this period fell to an extremely low figure, but they have recently regained their former level, as is evidenced by the reports of the monthly gross passenger receipts as furnished to your company by the officers of the United Railroads of San Francisco.

"These reports show that the earnings for the month of March, 1908, were \$558,932, while those shown by the like statements for March, 1907, were \$537,700. This comparison furnishes reasonable ground for encouragement as to the future of the United Railroads of San Francisco.

"The consensus of reports received from those familiar with existing conditions in the city of San Francisco justifies a firm belief that the future prosperity of that city is assured, and in that future prosperity there is every reason to believe the United Railroads of San Francisco will fully participate."

The committee of interurban managers appointed by the Indiana Railway Commission to compile a new set of rules to govern the operation of electric railways held its final meeting in Indianapolis April 29. The book of rules is now being printed under the care of C. D. Enmons, general manager of the Ft. Wayne & Wabash Valley Traction Company, chairman of the committee. F. C. Carpenter, of Lima, Ohio, said the book would also be approved by the Ohio companies.

RELIEF OF CHELSEA SUFFERERS

At the monthly meeting of the executive committee of the New England Street Railway Club, held Thursday, April 23, it was voted that a notice be sent to the members, soliciting funds for the 59 street railway employees of the Boston & Northern Street Railway and Boston Elevated Railway, residents of Chelsea, Mass., whose homes were burned or who sustained other losses in the recent conflagration in that city. Members are invited to send their subscriptions to E. P. Shaw, Jr., South Framingham, Mass., who is a member of the finance committee of the club. Mr. Shaw has been authorized to distribute the relief fund among those who have suffered from fire loss.

THE TRIESTE-MONFALCONE RAILWAY

The Trieste-Monfalcone Railway will be 17 miles long. Some 13 miles more have been surveyed and application has been made for the right to build this addition, but for the present only the original 17 miles will be constructed. Work on the line is expected to begin within six or seven months. The plan is to build the track of 70 to 80 lb. rail laid on wooden ties. The overhead work will be of catenary construction. The generating station will be equipped with 500 to 800-kw turbo-generators, but later this equipment will be increased. Double-track, steel-frame, side-entrance cars are to be used, equipped with separate compartment for the use of first and second-class traffic. The motors will have to be designed to maintain a speed of 36 miles per hour up a 4 per cent grade, and as the cars are to operate in Trieste over the city railway they will have to be arranged for use on the 550 to 600-volt local lines. Dr. Gino Dompieri, Trieste, Austria, can give further details to those who might care to bid on equipment for the line.

ORDER OF TRUCKS FOR CHICAGO

The Chicago Railways Company has awarded to the Pullman Company an order for trucks on so-called M. C. B. lines for 450 cars.

SHAREHOLDERS URGED TO ASSURE SUCCESS OF WESTINGHOUSE REORGANIZATION

George Westinghouse has issued an urgent appeal to stockholders of the Westinghouse Electric & Manufacturing Company, calling attention to the necessity of supporting the recent plan of reorganization formulated by the merchandise creditors. Mr. Westinghouse says that if the shareholders do not subscribe to the \$10,000,000 of new stock, the property will be sold and the present stock interest eliminated. Mr. Westinghouse adds:

"In order to meet the situation resulting from this lack of support on the part of the stockholders, the Security Investment Company, with the aid of my personal resources (the Investment Company and myself owning together about 50 per cent of the outstanding assenting and preferred stock), made large contributions to the company in an effort to maintain its solvency. These efforts resulted in the exhaustion of my own resources as well as those of the Security Investment Company.

"The plan of the merchandise creditors provides that \$10,000,000 new stock shall be subscribed, of which \$4,000,000 is to be taken by creditors for debts and \$6,000,000 new money provided by stockholders.

"The most valuable feature of the merchandise creditors' plan is the willingness of those creditors to take stock at par for their claims to an amount aggregating \$4,000,000, and it is encouraging to note that in less than 20 days creditors representing \$3,250,000 of such claims have signed or agreed to sign the agreement required to make effective their part of the plan. The committee is confident that the entire \$4,000,000 of subscriptions will be in hand soon."

The stockholders' committee also say that if the stockholders do not subscribe to the new stock, the property will be sacrificed at forced sale.

It appears that already more than \$3,000,000 of merchandise debt has agreed to take stock for its claims, and that the remaining \$1,000,000 is expected to sign the agreement before the time allotted expires, which is on June 1. More than 500 shareholders have also subscribed to the stock at par, exclusive of Mr. Westinghouse and the Security Investment Company.

PLANS FOR CHICAGO SUBWAY

On April 27 Mayor Fred A. Busse sent a special message to the new City Council urging the necessity for prompt action in preparing plans for subways under the streets of the congested district. The matter was referred to the committee on local transportation which will begin immediately to study the subject and outline the principal features to be embodied in the general scheme, and a method of financing the project. It is proposed to construct a system of subways within the district bounded by Chicago Avenue on the north, Halsted Street on the west and Twelfth Street on the south, which will be used by both surface and elevated cars. The proposed subway system is not intended to provide facilities for all surface and elevated cars within the congested district, as it is proposed still to utilize the existing surface and elevated tracks for carrying a large part of the traffic. The tentative plans are based on the subway system of Boston rather than on the subway system as built and operated in New York. The tunnels will be close to the surface of the street and above the level of the present Illinois Tunnel Company's system of subways. It is proposed to provide in the excavation in addition to the double track tunnel, galleries for electric mains and telephone cables, pneumatic tubes, high and low-level sewers, water and gas mains and high-pressure water mains.

In the opinion of engineers who have been consulted, no serious engineering difficulties are involved. The principal obstacle to be overcome is the matter of financing the project. The city proposes to build and own the subway system, leasing it under favorable terms to the surface and elevated roads. Under the terms of the traction ordinances recently passed, the surface lines pay the city 55 per cent of their net earnings, and this fund is available for the construction of the subway system proposed. For the year ending April 1, 1908, the city's share of the earnings of both of the surface systems aggregated \$1,500,000, approximately, and it is expected that this amount will be increased from year to year. The surface lines are also obligated under their franchises to advance \$5,000,000 within the next five years for the construction of subways. In the opinion of Walter F. Fisher, who drafted the ordinances, they are also bound to furnish more money from time to time as it is needed after the five-year period, the only limit being that the sum required of them shall not be so large as to reduce their earnings unreasonably. The city is not in a position to issue special subway bonds to finance the project without some new legislation.

During the last two weeks there have been persistent rumors which, however, cannot be confirmed, that a consolidation of all of the elevated railroads in Chicago was being formed. The leading figure in this consolidation is reported to be Samuel Insull, president of the Commonwealth Edison Company. The consolidation of all of the elevated roads has been one of the recommendations of every engineering report on the relief of the loop congestion. Through routing seems to be the most feasible plan for increasing to any considerable extent the capacity of the loop structure, but without consolidation and uniform operation through routing presents many difficulties. The four outlying elevated roads and the Union Loop operate a total of 166.6 miles of single track and have a total capitalization and bonded indebtedness of \$105,000,000. They earned last year \$7,971,000 gross and carried 156,000,000 passengers.

The Hamilton Club, through its committee on municipal art and civic improvement, has begun an active campaign to interest the steam railroads in the prevention of the smoke nuisance. Letters were sent to all of the railroads entering Chicago, requesting their views on the possibilities of electrification of their terminals and the elimination of steam locomotives entirely within the city limits. Replies have been received from the Illinois Central, the Chicago, Milwaukee & St. Paul, the Chicago, Rock Island & Pacific, and the Chicago, Burlington & Quincy. In all of these replies the statement is made that the steam roads are using every effort to reduce the amount of smoke emitted from locomotives in the city, but they are not optimistic about the possibilities of electric operation. E. W. McKenna, vice-president of the Chicago, Milwaukee & St. Paul, says that the substitution of electric power for steam locomotives in the terminal yards of the Chicago railways would be impossible and impracticable in the present state of the art. J. T. Harahan, president of the Illinois Central, says that he does not believe a sufficient saving would be made by the use of electricity to warrant the enormous investment involved in electrifying the Illinois Central tracks within the city.

THE U. R. & E. BULLETIN IN BALTIMORE

On May 2 the United Railways & Electric Company, of Baltimore, published in the daily papers of that city its tenth weekly bulletin to the public. It summarizes the previous bulletins and completes the series. Previous bulletins were printed in full or in abstract in the STREET RAILWAY JOURNAL for March 7, March 21 and April 11. The bulletin in full follows:

SUMMARY OF FORMER BULLETINS; THE RELATIONS BETWEEN THE PUBLIC AND THE COMPANY.

Our bulletins have been presented to the public regularly for the last 10 weeks. In them we have discussed many of the problems of street railway traffic and the relations between the public and the company. We have invited suggestions, criticisms and complaints. Some of the suggestions have been excellent and have been adopted; some of the complaints have been found to be just and the source of complaint corrected as far as possible. As the bulletins proceeded and the public understood our position better, we are glad to say that the complaints and criticisms fell off materially in number.

SUMMARY OF BULLETINS.

Some of the problems discussed by us in the bulletins have been:

(a) Taxes. We have shown you that, according to the United States Census reports on street and electric railways (1902), our company pays more proportionately in direct taxes and charges in the nature of taxes to the city and State than any street railway company in the country.

(b) Transfers. We have shown you, by virtue of the general transfer system in Baltimore city, that the people have saved since the consolidation immense sums in car fares; that over 55,000,000 of passengers availed themselves of the transfer privilege in 1907, and that the company, therefore, received an average of only 3½ cents per passenger per trip.

(c) Capitalization. We have shown you that, according to the United States Government reports, our company is capitalized at much less per mile than the companies in other large cities.

(d) City and Suburban Development. We have shown you that Baltimore per thousand of population has nearly four and one-half times the trackage of Glasgow, where the street railway is municipally owned; that the tenement house problem is a serious one in Glasgow; and we endeavor to indicate that the policy of our company had been such as to assist materially in dispersing the population of Baltimore; in adding largely to the city's taxable basis; in doing away with tenement houses, and in enabling Baltimore to be called the "City of Homes."

(e) The Rush-hour Problem. We have endeavored to illustrate the difficulties in handling the "rush-hour" traffic, when a crowd of over 150,000 people start for home, with the intention of taking the first car that comes, although the most modern car seats no more than 50 passengers. We have indicated the interruptions to traffic that occur by drivers using the tracks, rather than the cobblestones of the city. We then discussed the "shyster" lawyer and false claimants who endeavor to corruptly profit by the inherent difficulties of transportation in a large city. We have also tried to indicate pleasantly how the company and the traveling public can be mutually benefited.

THE RECENT HISTORY OF THE COMPANY. THE EFFECT OF THE GREAT FIRE OF FEBRUARY, 1904.

We now want to point out to you the work that has been done by our company since the great fire of 1904, and, with this, we shall close our present series of bulletins.

When in February, 1904, the business section of our city lay in ashes; when the "calamity howlers" said that the city was as a city of the dead; that its business and commerce would pass to more favored cities, and that our working population would seek homes elsewhere, what was then the policy of our company?

It was the hardest hit of any enterprise in the city. The great flames had swept into the Pratt Street power-house; the feed and trolley wires in the burnt district lay in twisted masses on the streets; the company's main offices were destroyed and its whole clerical force was without official home. Inside of 12 hours the company's cars were running through the unburned section and, as quickly as the streets were cleared, wires were strung and the company's cars followed.

THE COMMENT OF A PROMINENT CITIZEN.

We may be pardoned for quoting the words of one of our prominent citizens at the time. He said (see company's sixth annual report):

"The vigor and energy displayed by the United Railways & Electric Company in restoring its car service after the smoke lifted on Feb. 8, 1904, and revealed the destruction of main power-house, of all overhead work in the burnt district, that its tracks were buried under several feet of debris and threatened by miles of tottering walls, did more than every other agency combined to encourage our people and hold them together during the period of inactivity pending the enactment of new building laws and authority to widen streets and change their grades in the fire district."

THE COMPANY'S IMPROVEMENTS SINCE THE FIRE.

Was the company influenced by the prophecies of "calamity howlers"? Let us see. It not only responded quickly to the need of transportation service at the time, but the fire was hardly out before its board of directors developed larger and more comprehensive plans than ever before for the improvement and betterment of the street car service and for leading in the restoration of the city. These plans have been steadily pursued.

Since the fire the company has expended for the general betterment of the street car service, for the reconstruction of tracks with heavy grooved rails, for the purchase of large, commodious cars, for extensions, for conveniently located carhouses, for building, rebuilding and equipping power-houses and for other betterments which would increase the efficiency of service over \$10,000,000.

Since the fire the company has laid 74.28 miles of single track with heavy new girder rail, and has welded 18,385 joints, equivalent to 61 miles of single track.

The new cars it has purchased to take the place of smaller equipment would, if strung out end to end, reach the whole length of Baltimore Street from one end of the city to the other and back again. It has built five new carhouses and terminal stations. The Pratt Street power-house has been rebuilt and four new substations added. This will indicate better than anything else the confidence the company had in the future of the city and our recognition of the fact that the city's and the company's interests were mutual and reciprocal.

THE COMPANY A LOCAL ONE, AND THE STOCKHOLDERS LOOK TO FAIR TREATMENT IN TURN FROM THEIR FELLOW-CITIZENS.

The company employs about 4,000 men, all of them residents of Baltimore. All of its annual income goes in payment of wages, taxes, fixed charges and toward improvement of the property. It was estimated in the fifth annual report of the company that 95 per cent of the company's security holders were residents of this city and State. Its stockholders however, have never received one penny in dividends on stock. We feel that the company has dealt fairly with the public of Baltimore, and that it has met and is meeting its public service obligations.

It has adopted a liberal, progressive and generous policy. Its stockholders must look to the future for their rewards. They have dealt fairly with the people of Baltimore and, when the time comes for them to receive some return on their investment, we feel that, in turn, they will be fairly treated.

In some cities there is a constant agitation against the public-service corporations. In some places it is deserved; in some it is not. People do not always take the trouble to discriminate.

In Baltimore the spirit shown has been different, as we said in our first bulletin: "We feel that we are making friends with the people of Baltimore." May this era of good feeling long continue. Remember our invitation still holds good: "We welcome honest criticism, particularly if it is good-natured."

REPORT OF THE GENERAL ELECTRIC COMPANY

The sixteenth annual report of the General Electric Company, or that for the year ended Jan. 31, 1908, was made public this week. President Coffin says that the profits of the company for the year, after deducting all patent, general and miscellaneous expenses, and allowances for depreciation and losses, and writing off \$3,745,989.06 from factory plants, were:

	\$6,586,653.37
Paid in dividends during the year.....	5,183,614.00
Carried to surplus account.....	\$1,403,039.37
Surplus at the end of last fiscal year.....	15,110,796.77

Total surplus Jan. 31, 1908.....\$16,513,836.14

Late in the year there was a sudden and severe shrinkage in the value of all merchandise and materials used by the company, notably copper. All said materials, whether raw, manufactured, or in process of manufacture, which were on hand Jan. 31, 1908, were inventoried at the lower prices then prevailing. The book values of such inventories was thereby reduced by about \$2,000,000.

In valuing the notes and accounts receivable, in amount the largest in the company's history, great care was exercised and liberal reserves have been established to provide for possible losses thereon. These reserves, and allowances for depreciation of factory plants, and the shrinkage in inventory values have greatly reduced the profits of the company. As a result the amount in excess of dividends upon its share capital, which is carried forward to surplus account, is relatively small. During the year all the assets and liabilities of the Stanley G. I. Electric Manufacturing Company, Pittsfield, Mass., were taken over by the company, and the factories owned by that company at Pittsfield are now a part of the factory plants of the General Electric Company.

In view of the great expansion in business early in 1907, the

directors of the company deemed it wise to provide for future development at some point nearer the Central West, in preference to a further enlargement of the plants at Schenectady and Lynn. For this purpose the unencumbered fee of about 700 acres of land adjacent to the city of Erie, Pa., was purchased at a cost, including engineering and other expenses, of \$232,301.53. In view of the existing depression the erection of buildings thereon is deferred for the present.

Vice-president Lovejoy reports for the sales department that the total sales billed during the year were \$70,977,168, and the total orders received were \$59,301,040 in amount. The sales billed are an increase of \$10,905,285, and the orders received a decrease of \$1,182,619. "Orders received" include only apparatus manufactured by the General Electric Company. "Sales billed" include services of expert, labor of installation, freight and transportation, boilers, engines, etc., of outside manufacture, and bare copper wire. The orders received during the first six months of the fiscal year—Feb. 1 to July 31, 1907—increased 22 per cent over the corresponding period of the year 1906. Owing, however, to the disturbed financial conditions prevailing during the latter part of the year, orders received for the second six months of the fiscal year decreased 23 per cent, as compared with the previous year. Since November last there has been a heavy decrease of orders received as compared with the past three years. The total number of separate orders and contracts received during the year was 237,006, or an average per week of 4,558.

Among many important orders received during the year were:

Great Western Power Company, San Francisco, Cal.; three water-wheel generators, 10,000 kw each, together with the necessary transformers and other electrical apparatus for transmitting current at 100,000 volts from its power house on the Feather River to Oakland, Cal., a distance of about 165 miles.

The Central Colorado Power Company, Colorado Springs, Colo.; four 5000-kw generators and other electrical apparatus for water power development at Glenwood Springs on the Grand River, the electric energy to be transmitted throughout the central portion of the State for mining, general power, lighting and railway service.

The Detroit River Tunnel Company, a subsidiary of the Michigan Central Railway Company; apparatus for equipment of the Detroit Tunnel under the St. Clair River. The contract includes several 1000-kw motor-generator sets with accessories and six 100-ton locomotives equipped with four 250-hp motors.

The Great Northern Railway, for the electrification of the Cascade Tunnel; water-wheel generators and 100-ton locomotives each equipped with four 250-hp alternating-current motors giving a continuous output of 1000 hp per locomotive.

The Southern Pacific Railroad Company, for electrification of its suburban lines in Oakland and Alameda, Cal.; 44 four-motor equipments with Sprague-General Electric control. The motors are 125 hp each.

The Hudson Tunnels Company; the turbine-generators, rotary converters, motors and controlling apparatus for complete electrical equipment of its system of tunnels under the Hudson River connecting New Jersey and Manhattan. A portion of this system was put into successful operation on Feb. 25, 1908.

The West Jersey & Sea Shore Railroad Company, from Camden to Atlantic City, has maintained its record of satisfactory operation and orders for additional equipment have been received during the past year to provide for the increased traffic.

The New York Central & Hudson River Railroad Company is now operating in its New York City Terminal 35 electric locomotives of General Electric manufacture, each equipped with four 550-hp direct-current motors. Twelve additional locomotives have recently been ordered, making a total of 47 locomotives purchased from the General Electric Company.

The report on manufacturing and engineering, by Vice-President Rice, states that expenditures aggregating \$6,350,576.74 have been made during the year for real estate, erection of new factory buildings, extensions to existing buildings, additional machinery, patterns, special tools, fixtures, etc. Since the beginning of the business depression expenditures for plants have been limited to those needed to complete extensions already far advanced or to those which were clearly necessary for reasons of economy or maintenance of equipment and buildings. The floor space now occupied including the Pittsfield works is 6,460,000 sq ft., with 20,000 employees on Jan. 31, 1908.

Referring more particularly to engineering, Mr. Rice says that turbine units of 14,000 kw are now being built and that the engineering force has devoted considerable attention to the design of exhaust steam turbines. Single-phase railway equipments have been greatly improved during the past year and the new direct-current railway motor, referred to in the last report, is now rapidly being adopted as the standard. The gas electric car has been developed for branch lines. The tungsten incandescent lamp has now become a standard commercial article.

A consolidated balance sheet and profit and loss account are presented below. In referring to them Treasurer Darling states that \$872,345 were expended for patents, for licenses under patents and in patent litigation, but according to the policy of the company this amount is charged to profit and loss and the patents are carried in the balance sheet at a valuation of \$1. The factory plants were carried in the balance sheet on Jan. 31, 1893, at \$3,958,528. During the past 15 years \$30,892,485 has been expended upon them, but \$21,951,013 has been written off, leaving their book value \$12,900,000. This valuation is \$2 per square foot of floor space, including machinery, tools and equipment. Real estate other than factory plants includes the investment in the Edison Building in New York and other parcels of land, including that recently acquired at Erie, Pa. The copper mining investment represents the full amount invested in copper mining, and mining properties at Winthrop, Shasta County, Cal., including a railway. The stocks, bonds, notes and accounts receivable are carried at conservative figures.

CONSOLIDATED BALANCE SHEET OF JAN. 31, 1908.

ASSETS.	
Patents, franchises and good-will.....	\$1.00
Cash	12,250,720.92
Stocks and bonds.....	\$18,000,089.85
Real estate (other than factory plants).....	541,900.50
Notes and accounts receivable.....	29,857,726.84
Work in progress.....	1,276,294.22
	\$49,676,011.41
Merchandise Inventories:	
At factories.....	\$18,339,652.06
At general and local offices.....	2,422,678.59
Consignments	234,725.16
	20,997,055.81
Factory plants (including all lands, buildings and machinery).....	\$12,900,000.00
Copper mining investment.....	2,701,976.00
	15,601,976.00
	\$98,525,765.14
LIABILITIES.	
5 per cent gold coupon debentures of 1892.....	\$55,000.00
3½ per cent gold coupon debentures of 1902.....	2,047,000.00
5 per cent gold coupon debentures of 1907.....	12,872,750.00
Accrued interest on debentures.....	108,791.67
Accounts payable.....	1,759,517.47
Unclaimed dividends.....	1,469.86
	\$16,844,529.00
Capital stock issued.....	65,167,400.00
Surplus	16,513,836.14
	\$98,525,765.14

CONSOLIDATED PROFIT AND LOSS ACCOUNT OF JAN. 31, 1908

EXPENSES.	
Cost of sales (incl. depreciation of plants, \$3,745,989.06)....	\$65,536,305.06
Interest on debentures.....	362,029.63
Profit for the current year.....	6,586,653.37
	\$72,484,988.06
Dividends paid in cash.....	\$5,183,614.00
Surplus at Jan. 31, 1908, carried forward to next year.....	16,513,836.14
	\$21,697,450.14
EARNINGS.	
Sales	\$70,977,168.46
Royalties, dividends, bond interest, readjustment in stocks and bonds account, and sundry profits	\$1,010,961.63
Interest and discount.....	487,079.04
	1,498,040.67
Profit on sales of stocks and bonds.....	9,778.93
	\$72,484,988.06
	\$21,697,450.14
Surplus brought over from last year.....	\$15,110,796.77
Profit for the year ending Jan. 31, 1908.....	6,586,653.37
	\$21,697,450.14

AFFAIRS IN NEW YORK

The Public Service Commission will open bids for the construction of the Fourth Avenue subway in Brooklyn, Friday, May 8. It is expected that there will be a number of bidders. The Fourth Avenue subway will run from the Brooklyn end of the Manhattan Bridge under Flatbush Avenue extension to Fulton Street, under Fulton Street to Ashland Place, under Ashland Place to Fourth Avenue, and under Fourth Avenue as far as Forty-third Street. The work is divided into six sections, and separate contracts for each section will be let, but there is nothing to prevent one contractor from bidding on all six sections. The estimated cost of the six sections is about \$15,000,000. Under the law which permits alternative construction, the commission has decided to let contracts now for construction only, and arrangements for the equipment and operation of the road will be made later, so that no bids for operation and equipment will be received at this time.

The Public Service Commission of the First District of New York has adopted a resolution requiring every street railroad corporation under its jurisdiction to file on or before May 10 a complete statement of the number and kind of cars operated by it, together with the kind of trucks used, the weight of the car when loaded, the length over all, the style of fender, style of guard, style of brake and the names of the manufacturers. Commissioner Maltbie made the motion, as a first step toward a reduction of the number of accidents upon the street railways of the city. He pointed out that for the six months ended Feb. 1, 299 persons had been killed and 944 seriously injured in the greater city. The total number of accidents due to collisions of street cars was 1,196, and the number of vehicles and persons struck by cars was 7,059. Mr. Daggett, the chief of the division of accidents of the commission, Mr. Maltbie said, was of the opinion that fully one-half of the accidents might have been prevented by the use of proper brakes and fenders and wheel guards. The electrical engineer of the commission will examine the relative efficiency of the various types in use, and the commission will then be in a position to issue orders compelling every street railroad company to get the approval of that body for such types as it may plan to use on its cars. For the year ended June 30, 1907, Commissioner Maltbie stated, the street railways of New York City had paid out for injuries and damages, due to accidents, something over \$2,500,000.

The Interborough Rapid Transit Company put its subway extension to the Long Island Railroad station in Brooklyn in operation May 1. The Brooklyn extension, as far as Borough Hall, has been in operation since the first of the present year. The line now connects with the Long Island Railroad.

STREET RAILWAY PATENTS

UNITED STATES PATENTS, ISSUED APRIL 21, 1908.

[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 140 Nassau Street, New York.]

885,055. Locomotive; Ernest V. Ketchum, Boston, Mass. App. filed July 3, 1907. A boiler mounted upon a car and a steam turbine driving a generator. Also has a form of radiator condenser at the front end of the car.

885,061. Interlocking Relay; Thomas L. Lee, Westfield, N. J. App. filed June 6, 1907. Relates to relays for use in connection with electrical apparatus in which it is necessary to arrange for automatically preventing the contemporaneous opening or closing of two or more circuits; for example, in connection with an electric alarm bell for signaling the approach of trains on a single-track railroad, and the object of the invention is to produce an interlocking relay for this purpose.

885,063. Trolley Stand; William A. Loudon, Chicago, Ill. App. filed Aug. 9, 1905. A trolley stand particularly adapted for operation in tunnels, mines, etc. Has a vertical pedestal to which the pole is hinged, the pole being impelled upward by a spring and plunger longitudinally movable within the pedestal. Permits of the pole being reversed in narrow passages.

885,089. Guard Rail for Street Cars; George D. Secor, South Bend, Ind. App. filed Sept. 16, 1907. A guard rail for open cars, operated by means of a chain and sprocket and having a counterweight attached to the chain to hold the guard rail in position.

885,128. Motor Control; Ernst F. W. Alexanderson, Schenectady, N. Y. App. filed Jan. 26, 1907. Relates to the control of commutator motors which are designed to be operated as series motors on direct current and as repulsion motors on alternating current. Provides a novel control system for such motors designed to avoid commutator troubles and so arranged that the alternating-current voltage may be made about twice that of the direct current without increasing the strain on the insulation of the motors.

885,168. Automatic Signaling Device; Guy Milburn, Baltimore, Md. App. filed May 11, 1906. A block signal system in which signals are automatically displayed in the cab of the locomotive by means of circuits which are completed between the different trucks of the train when the latter passes sectionally electrified track rails.

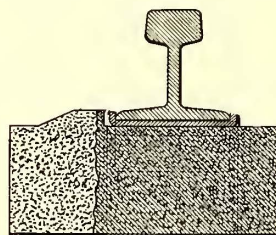
885,280. Actuating Mechanism for Fare Registers; John F. Ohmer, Dayton, O. App. filed June 13, 1907. The actuator is electrically operated to cause a registration of a fare on a counter, instead of pulling upon a rope or actuating member on the interior of a car as heretofore. The conductor may push a button to electrically connect an electro-magnet or solenoid through which the actuating member of the counters is operated.

885,345. Electric Switch; Benjamin Hughes, Montreal, and Herbert N. Young, Rockfield, Quebec, Canada. An electric railway track switch making use of magnets on the car which selectively attract armatures constituting a circuit controller and which acts to selectively energize solenoids which move a switch point through a reciprocating plunger.

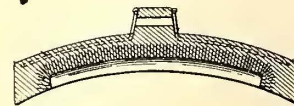
885,367. Railway Signal and Telephone System; Frederick L. Odenbach, Cleveland, O. App. filed July 10, 1907. Provides means upon moving trains enabling the operator of each train to determine whether the other is behind or before him, and at what speed such other train is moving; to apprise the operator of a moving car or train of an open switch or danger signal ahead of him, and to adapt such means to a block system.

885,368. Ice-cleaner for Trolley Poles; Jacob M. Olinger, Springfield, O. App. filed Nov. 23, 1906. Instead of the usual trolley wheel, a Y-shaped casting is provided which has cutting edges to scrape ice from the wire.

885,414. Brake Shoe; Edwin S. Woods, Chicago, Ill. App. filed Aug. 14, 1907. The wearing face of the shoe is formed



Pat. No. 885,456



Pat. No. 885,414

partially of soft metal and has a depression of substantial depth the side and bottom walls of which depression are chilled to provide hardened areas on the sides and bottom thereof.

885,456. Rail Fastener for Concrete Ties; Edgar J. Drayer, Dayton, O. App. filed Oct. 18, 1907. Comprises a tie clip embracing the bottom and vertical sides of the tie and terminating in outwardly-extending ends in a plane with the upper surface of the tie, a rail plate between the rail and upper surface of the tie embracing the edges of the rail flange, and clamping bands embracing the outwardly-extending ends of the tie clip and extending over the rail flange.

885,631. Housing for Electric Alarm Mechanism; James Blount Mayberry, Houston, Tex. App. filed Aug. 13, 1907. Relates to semaphore signals for railways. Has a housing for batteries, bells, and other electric appliances, the arrangement being such as to render these parts easily accessible without interfering with the movements of the switch handle employed for operating the track and for actuating the signal mechanism.

885,510. Electric Signal; John Rebar, Smithdale, Pa. App. filed Nov. 11, 1907. A signal system for railways comprising a device whereby the engineer may be communicated with from convenient points throughout the length of the train. Has resiliently-supported contacts preferably carried by the car couplers and adapted to have a wiping frictional contact.

MAY MEETING OF THE A. S. M. E.

The next meeting of the American Society of Mechanical Engineers will be held Tuesday Evening, May 12, in the Engineering Societies Building, New York. The paper will be by Henry Souther, of the Henry Souther Engineering Corporation, Hartford, Conn., on the subject of "Clutches," with special reference to the types used on automobiles.

PERSONAL MENTION

DR. HANS GOLDSCHMIDT, president of the Goldschmidt Thermit Company, is in this country on a short visit from Essen, Germany.

MR. JOSEPH F. GEISER, for four years superintendent of the Chambersburg, Greencastle & Waynesboro Street Railway Company, has resigned from the company.

MR. L. S. RUDD has succeeded Mr. J. T. Cousins as superintendent of the New London & East Lyme Street Railway, Mr. Cousins having become superintendent of the Norwich & West-erly Street Railway.

MR. HENRY A. EVERETT was taken to his home at Willoughby, Ohio, a few days ago in a private car over the Lake Shore from New York. He has been ill from pneumonia and pleurisy for some months and his condition is still serious.

MR. JAMES McCREDIE has been elected a director of the United Traction Company, of Albany, N. Y. He succeeds Mr. George P. Hilton, who recently resigned. The vacancy caused by the resignation of Mr. C. F. Burns, of Troy, however, has not been filled.

MR. W. A. LARRABEE, who has been superintendent of the Eastern Division of the Atlantic Shore Line, has severed his connection with the company. He has made his headquarters at Kennebunk and has been in charge of the line from Biddeford to York Beach and from Sanford to Cape Porpoise.

MR. W. S. SWENEY has been placed in direct charge of the electric railway classification of the Department of Statistics and Accounts of the Interstate Commerce Commission. He takes the place of Mr. C. F. Balch, who represented the Commission on the joint committee last December and who has been assigned to another section of the department.

MR. JOHN J. STANLEY, vice-president and former general manager of the Cleveland Electric Railway, will take a long rest before he engages in business again and is unable now to announce any plans for the future. Mr. Stanley has his business headquarters at 710 Citizens' Building, Cleveland, where he will be found until he again engages in business.

MR. HORACE E. ANDREWS, president of the Cleveland Electric Railway Company, will make his headquarters in New York City in the future and give his attention to the electric railway interests of the Andrews-New York Central system. It is probable that he will make his residence in New York as well. At present he is making headquarters at 710 Citizens' Building, Cleveland.

MR. C. G. BACON, JR., has been appointed engineer of tests of the Schoen Steel Wheel Company, of New York. Mr. Bacon for the past five years has been continuously engaged in making specific studies and investigations in connection with the subject of wheels, not merely from a theoretical, but more particularly from a purely practical standpoint, in shops and on steam and electric railways throughout the United States, and during that time has contributed to the technical press a number of articles on the subject.

MR. JOSEPH E. WAYNE, whose resignation as general superintendent of the York Street Railway Company, of York, Pa., was announced in the STREET RAILWAY JOURNAL for April 25, has entered upon his duties as general manager of the Chambersburg, Greencastle & Waynesboro Street Railway Com-

pany and the Waynesboro Electric Light & Power Company. Mr. T. R. Newman, master mechanic of the York Company, will act temporarily in the capacity of the general superintendent until a successor to Mr. Wayne is appointed.

MR. IVAN OFVERHOLM, chief engineer of the Electrification Department of the Swedish Government Railways, arrived in New York April 30. The question of the electrification of the railways in the southern part of Stockholm is an important one, owing to the high price of coal, and as is well known, the government engineers have been making a study of the possibilities of electric power. No detailed plans have yet been decided upon. Mr. Ofverholm will visit a number of the most important heavy electric traction and single-phase railways while here, and expects to return to Sweden May 27.

MR. WILLIAM E. PRICE, heretofore in charge of the electrical department of the Pueblo & Suburban Traction & Lighting Company, Pueblo, Colo., will henceforth act as consulting electrical engineer of the company, with headquarters at Pueblo. The work of remodeling the Pueblo plant of the company, which is about completed, has been under the supervision of Mr. Price. Mr. T. C. Roberts, master mechanic of the Pueblo plant of the American Smelting & Refining Company, has been appointed superintendent of power and shops for the Pueblo & Suburban Traction & Lighting Company, with headquarters at Pueblo.

MR. HARRY B. IVERS, who for the past year has been assistant to the president and treasurer of the Bangor Railway & Electric Company, has been appointed general manager of the Lewiston, Augusta & Waterville Railway Company. The system over which Mr. Ivers is to be placed in control is the largest in the State and the company is building 50 miles of track which, when completed, will make about 150 miles of continuous road connecting all the larger cities in the central part of the State. It includes nearly all the street railway lines in Central Maine, and will make it possible to go from Waterville to Portland by trolley.

MR. J. T. CORNISH, M.I.E.E., chief engineer of the La Capital Traction & Electric Company, Metropolitan Tramway, Grand National Tramway Company, Buenos Aires Electric Tramway Company, Belga Argentina Tramway Company and consulting engineer of the Córdoba Light & Power Company, has been appointed resident engineer of the City of Santos Improvements Company, of Santos, Brazil, controlling the gas, water, electric lighting and tramways and left Buenos Aires to take up his duties on May 1. The conversion of some 100 miles of single track of the Grand National Company's system to electricity was carried out under Mr. Cornish's supervision. This will not be Mr. Cornish's first visit to Brazil, as he went to the State of Sao Paulo in 1891 and remained some years in connection with electric light construction. He was subsequently engaged in the construction of the first electric tram system in Buenos Aires some 11 years since.

MR. C. F. BAKER, who for the past 20 months has been a member of the engineering staff of Mr. L. B. Stillwell, for 12 months superintendent of power and construction in charge of the work at Baltimore, and for the past eight months superintendent of equipment in charge of the construction of power station and substations for the Hudson Companies, has resigned recently owing to the cessation of the work upon the latter installation. Mr. Baker is a member of the American Society of Mechanical Engineers, past president of the American Railway Mechanical & Electrical Association and of the New England Street Railway Club, and has long been prominently identified with the electric railway field. His first street railway work was with the West End Street Railway Company, of Boston, which he joined in 1893, having previously been connected with the E. P. Allis Company in charge of construction and C. A. Pillsbury & Company, of Minneapolis, of whose steam plants he had charge. While with the Boston system, Mr. Baker's titles were master mechanic and superintendent of motive power and machinery, and under his designs and supervision the East Boston, Charlestown, Dorchester and Harvard power stations were built and the central power station was changed from a belted to a direct-connected plant. Mr. Baker resigned from the Boston system in 1905 to become connected with the Brooklyn Rapid Transit Company as superintendent of power, and while there supervised important extensions to that company's power station equipment. Mr. Baker's future plans have not been fully settled.

NEWS OF THE WEEK

CONSTRUCTION NOTES

Items in this department are classified geographically by States, with an alphabetical arrangement of cities under each State heading.

For the convenience of readers seeking information on particular subjects, the character of the individual item is indicated as follows:

- * Proposed roads not previously reported.
- o Additional information regarding new roads.
- † Extensions and new equipment for operating roads.

Numerals preceding these signs indicate items referring to:

1. Track and roadway.
2. Cars, trucks and rolling stock equipment.
3. Power stations and substations.
4. Car houses and repair shops.
5. Parks and amusement attractions.

oMONTGOMERY, ALA.—The Nashville & Huntsville Railway Company has filed with the Secretary of State a copy of its articles of incorporation and notified the latter officer that an office of this new railway line will be maintained at Huntsville. The representative of the corporation thereat will be Tracy W. Pratt. This is a new line of projected railroad, and the line runs from Huntsville, Ala., northwesterly to the southern line of Tennessee and thence ultimately to Nashville, it is understood. The corporation is capitalized at \$150,000. Notice is given that for the present \$10,000 will be expended in Alabama for the purposes of acquiring rights of way, terminal facilities and for expenses of construction.

2 † SHEFFIELD, ALA.—We are advised that the Sheffield Company will place a contract during the next four weeks for a double truck combination passenger and baggage car for interurban service. J. B. McClary is general manager of the company.

oFAYETTEVILLE, ARK.—The Western Promotion & Improvement Company, it is reported, is looking over the field preparatory to installing an electric interurban system, with Fayetteville as a nucleus. O. J. Johnson, of Fayetteville, is said to be interested. The system will probably take in Fayetteville, Huntsville, Springdale, Rogers and Siloam Springs.

1 † FORT SMITH, ARK.—It is reported that the Fort Smith Light & Traction Company has broken ground for its extension to the Oklahoma addition to Fort Smith and has a large force of men making excavations for the laying of the track. The start was made at the present terminus of the Towson Avenue line at Sulphur Springs.

1 † PINE BLUFF, ARK.—The Citizens' Light & Transit Company is engaged in building a double track on West Sixth Avenue from Main Street to Cherry Street, a distance of ten blocks, replacing T-rail single track with 73 lb. girder rail, concrete foundation. It is expected to complete the work within four to five weeks.

1 † SAN BERNARDINO, CAL.—The Board of Supervisors has granted the petition of A. G. Hubbard, of Redlands, for an electric railway franchise east on Barton Avenue from Redlands to the westerly line of California Street, the purpose being to extend the Redlands Central Railway toward Redlands Junction.

1 † STOCKTON, CAL.—The City Council has passed an ordinance granting the Central California Traction Company a franchise for an electric railway.

* PUEBLO, COLO.—Representatives of 12 cities in the Arkansas Valley in both Colorado and Kansas met in Pueblo recently with a representative on the Northern Electrical Company, of Madison, Wis., to discuss plans for the industrial development of the valley by means of electricity. The company plans to build a power station near the coal fields of Cañon City, to build an interurban railway from Cañon City to Dodge City, Kan., and an electric power line to furnish power to all the cities in the valley. The development of the scheme will mean the outlay of \$15,000,000. The plans were indorsed by the business men present.

* HARTFORD, CONN.—The Geneva Railway Securities Company, of Stamford, has filed a certificate of incorporation with the Secretary of State's office, the company having the authority to purchase and hold bonds, shares of capital stock and other securities, franchises and real and personal property of the Geneva, Waterloo, Seneca Falls & Cayuga Lake Traction Company, a New York corporation, or any company merged with that company. The capital stock is \$567,000, there being 5,670 shares of stock at a par value of \$100 each. The company starts business with a capital stock of \$1,000. The incorporators are Walter G. Merritt, of 31 West Forty-fifth Street, New York; David B. Henney, of Hartford, and James A. McNelis, of 362 Seventh Street, Brooklyn.

† WASHINGTON, D. C.—Acting Secretary Oliver has again extended

the time allowed the Washington, Alexandria & Mount Vernon Railway Company to comply with the law prohibiting the use of an overhead trolley on the approaches to the Highway Bridge across the Potomac River.

* TAYLORVILLE, ILL.—Articles of incorporation have been issued by the Secretary of State to the Taylorville Electric Railway Company, which proposes to build an electric street railway in Taylorville at a cost of \$130,000. The company has purchased 40 acres of land at one end of the proposed line which it will convert into a park.

1 † CRAWFORDSVILLE, IND.—The officials of the Indianapolis & Western Traction Company made a tour of inspection during the past week over a route for an extension of the line from Crawfordsville to Danville, Ill., and also for an extension from Crawfordsville to Hoopston, Ill., by way of Attica. The company will soon decide which extension will be constructed this year.

5 † DECATUR, IND.—T. W. Shellon is said to have organized a stock company to build and improve a new park on the Fort Wayne & Springfield Traction line. The park will be opened May 30, 1908.

1 † EVANSVILLE, IND.—It was recently announced that the Evansville & Eastern Traction Company's line, running from Evansville to Rockport, Ind., will be extended from Rockport to Louisville in the near future, passing through Grandview, Tell City, Cannelton, White Sulphur Springs, Wyandotte Cave, Corydon and New Albany. Officials of the company have gone over the proposed route, and it is said the work of surveying will start in a short time.

3 † FORT WAYNE, IND.—General Manager C. D. Emmons, of the Fort Wayne & Wabash Valley Traction Company, announces that he has completed arrangements to overcome a low voltage which exists at the Bluffton end of the Bluffton branch which has made it difficult to maintain its schedules. The company will purchase current from the Indiana Union Traction Company at Bluffton with a view of improving the service.

3 † CEDAR RAPIDS, IA.—The Cedar Rapids & Iowa City Railway & Light Company, we are advised, will be in the market during the next three or four weeks for a 750-kw motor generator set for railway purposes. William G. Dows is the president and general manager of the company.

* RED OAK, IOWA.—The Red Oak & Northwestern Interurban Promotion Company has made an application for a charter in Iowa to build an electric railway from Red Oak to Des Moines, a distance of 107 miles. The road as planned will start at Red Oak and will pass through Milford, Fontanelle, Greenfield, Stuart, Redfield, Adel, Waukee and thence into Des Moines. The company at present is capitalized at \$10,000. The incorporators are as follows: Judge H. E. Deemer, Thomas Griffith, H. C. Houghton, D. B. Miller, A. R. Tracy, O. J. Gibson, M. N. Spencer, Gordon Hayes, M. E. Fisher, Paul P. Clark, Wm. Cochran, E. M. Carey, Wm. Thomas, Samuel Payne, L. D. Ashby and Wm. Boll. The first officers chosen were: B. B. Clark, of Red Oak, president; G. W. Curtis, of Redfield, vice-president; M. N. Spencer, of Red Oak, secretary; L. D. Goodrich, of Red Oak, treasurer; directors, H. E. Deemer, Thos. Griffith, A. R. Tracy, O. J. Gibson, H. C. Houghton, Gordon Hayes, Elmer Smith and L. D. Foote.

o COFFEYVILLE, KAN.—A corps of engineers under Paul Julien, of Indianapolis, Ind., has begun the work of surveying the route of the proposed line of the Kansas Traction Company. As planned, the road will extend from Coffeyville to Lawrence, branching at that place to Kansas City and Topeka. The line will pass through Cherryvale, Iola and Ottawa and will be about 200 miles in length. The main power plant will be located in the natural gas field. It will be a third-rail system.

1 2 † SALINA, KAN.—We are informed that the Salina Street & Interurban Railway Company intends to construct a mile or two of new track during the next few weeks. The company has recently purchased new cars, material for overhead construction and new rails. J. E. Williams is general manager.

1 † LOUISVILLE, KY.—Under consideration by the directors of the Louisville Railway Company is a plan to extend the Okolona line to Mt. Washington, with Shepardsville as the ultimate terminal. The Okolona line is now eight miles long, and building to Mt. Washington would mean an additional 16 miles to be constructed.

o COVINGTON, LA.—It is reported that work on the St. Tammany & New Orleans Electric Railway between Covington and Mandeville is rapidly nearly completion, and those in charge of the work expect to have the grading completed to the Bogue Falaya River by the end of this week. The railway company has just completed the Ponchitoawa Bridge, which is about 500 ft. in length and the longest on the line. It is said that the company expects to have the road completed from Covington to Mandeville by Aug. 1 and connection established by fast boats to New Orleans. Preston Herndon is the chief engineer of the company.

o SHREVEPORT, LA.—Representing the Shreveport Suburban Railway Company, J. W. Atkins several days ago purchased from the parish a franchise to permit the operation of a street railway from the city