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Topeka Lessons

Students of what can be done in the way of profitable improvement of small street railway properties will find much to interest them in the article on the Topeka Railway elsewhere in this issue. The experience of this company in scrapping a lot of old track and equipment, and along with them certain operating methods, is that the extra investment and interest charges made necessary in reconstructing a property of this kind are not at all to be feared. It does not do to generalize too much from specific cases, but this specific case is an interesting one and may aid those contemplating improvements in other small cities to come to an intelligent decision. The effect of poor track in increasing operating expenses is well brought out, and emphasizes the statement that good track is literally the foundation of all successful operation. Not only does it affect the life of the rolling stock and its cost of maintenance, but it decreases gross receipts and necessitates slow schedules, which in turn increase the platform expenses.

Saving Repair Parts

A great deal of carelessness is sometimes shown in repair shops regarding the disposition of broken or worn-out pieces of apparatus. As soon as these pieces are taken from the machines they are often relegated to the junk pile without having been stripped of special nuts, bolts, terminals or other parts which may be used in case of break-down of similar machinery. After the junk is disposed of and a break-down occurs, a special order is sent to the factory for the part just sold for junk, or a machinist must be put to work to make the article desired before the broken machine can again be put into service. All this trouble and delay might have been avoided had the previously discarded piece of machinery been stripped and the good parts removed and placed where they could have been gotten at quickly when needed.

We do not mean to recommend that every broken piece of machinery should be carefully stripped. Were this done the value of the time required might, in many cases, be greater than that of the parts saved. The value of the parts and the probability of their future use should determine largely whether or not they should be saved.

Generators for Single-Phase Lines

In planning a road to be operated by single-phase alternating current, the question usually comes up whether it is better to purchase single-phase generators or three-phase generators. The three-phase generator costs less per kilowatt than the single-phase, but if used, the road must be divided up into sections, different phases of this generator supplying different sections of the road. We are inclined to think that the same reasons that have prevented the extensive use of the three-wire direct-current system of distribution on electric railways will prevent the use of three-phase generators for single-phase railway work. It is a serious drawback in the operation of any railway not to be able to deliver a large per cent of the capacity of the generating machinery to any section of the line upon which there may be unusually heavy loads. The variations in load between one section of the line and another on a single-phase line make it necessary frequently either to overload one phase of the generator while the others are underloaded, or to operate considerably larger generator capacity than the total load would demand if the generators were only single-phase. Of course, such extra heavy load is likely to be but temporary on any one section, but it is a drawback nevertheless. The whole tendency of modern engineering practice

is to operate in parallel everything possible. The splitting up of a road into various phases is contrary to this general tendency, and is somewhat akin to giving each section an independent power supply.

The Unit of Acceleration

A tart bit of correspondence appears in a recent number of the London "Electrician" touching the proper measure of acceleration. It is in the form of a sharp protest from Mr. Mailloux against aspersions cast upon the American practice of stating acceleration in miles per hour per second. Our English friends reckon it in feet per second per second, and at this point of departure the row begins. A more beautiful example of the confusion which is unnecessarily introduced into what would otherwise be a perfectly simple condition by rival nomenclatures we have seldom seen. The only additional touch that could be suggested is the appearance of a third disputant insisting on the use of rods per minute per hour or furlongs per second per minute. Fortunately, as to one thing, there is no dispute. Everybody understands what is meant by acceleration. At this point let us start then and see what form the unit problem really takes. Acceleration is variation of velocity with respect to time, i. e.,

$$\frac{dv}{dt}$$

and its unit value obviously depends on the units chosen for v and t. From a physicist's standpoint, the only system which is actually correlated with any completeness is the C. G. S. system that forms the basis of scientific discussion the world over. In this system the fundamental units are the centimeter, gram and second, and the purely scientific unit of acceleration is 1 cm per second per second, and nothing else.

Outside of this, all alleged units require definition and an apology for existence. They all stand upon the same plane of illogical derivation. It is obvious, however, that in countries employing our English nomenclature, it is convenient and even necessary to make up a working unit to suit our habits. Such a unit is empirical on its face, but entirely justifiable, like the electrical "practical" units in common use, there being no law, written or unwritten, compelling one to use absolute units when multiples or sub-multiples are more convenient. What such a practical unit of acceleration should be depends on the practical units of velocity and of time from which it is derived, and not upon reference back to any theories about the absolute system. From this standpoint Mr. Mailloux has altogether the best of the case. If engineers, as they do in English-speaking countries, reckon the speed of trains in miles per hour, then

$$\frac{dv}{dt}$$

is miles per hour per (second, minute, hour) as the time unit may be chosen, preferably the first. The information desired in studying acceleration is generally the time required to gain or lose a certain velocity in miles per hour, and until people reckon the speed of trains in feet per second or in yards per minute or in fathoms per hour, it would seem the part of wisdom to measure acceleration in units which give the required facts without the solemn application of a reduction factor. For the same reason, if the engineers in France, Germany and Italy usually reckon the speed of trains in kilometers per hour, as they do, then for simplicity's sake the acceleration ought to be in terms of kilometers per hour per second instead of in meters per second per second, as it is often figured. If the units of both length and time concerned were interrelated on a decimal system, things would not be so bad. But so long as the decimal system is used in neither the English measurements of length or time, and is also omitted from the latter measurement in countries using the metric system for length, it seems the height of absurdity to employ any unit of acceleration which involves conversion every time that it is used in practice.

Still another and even more annoying variance between English and American engineering practice is found in the "long" and the "short" ton to which Mr. Mailloux also made feeling reference in his communication. The Englishman uses his misnamed hundredweight and ton pretty consistently, but while the American usually uses the short ton, he is never quite sure which he should employ, and sometimes fails to state which he has adopted or forgets himself and shifts from one to the other. The short ton is so convenient for conversion into and from pounds that it would seem to be by far the wisest plan for both to unite upon it, but if this were not possible, possibly a compromise might be made on a ton of 2200 lbs., which is simply related to both units, and also corresponds to the metric ton, so far as practical calculations are concerned. This, if adopted, would give a common basis of weight for all railway matters and would result in very little difficulty to anybody and in gains to all. We trust that ere long both English and Americans will drop their unnecessary differences in weights and measures, not to mention the matter of street railway accounting to which we have frequently referred, and will agree upon something which both can understand. So far as the ton is concerned, our own countrymen are perhaps the more culpable, since they shift from one to the other without proper warning. But we certainly think they have the best of the discussion of a proper acceleration unit, on the plea of convenience, which in the case of purely empirical or commercial measures is the natural criterion.

Tool Rooms in Small Shops

Although a tool room is usually considered as necessary only in larger repair shops, many advantages would no doubt be derived by their establishment in those of smaller size. In these shops there is usually no special place for keeping tools. No one person is responsible for them, and consequently they are often either left where last used, locked up in individual tool boxes, or otherwise misplaced, so that when needed an extended search must be made for them. Were the time spent by workmen in searching for tools about the average small repair shop summed up and brought to the attention of the superintendent, in many cases no additional argument would be needed in favor of a tool room.

The establishment of a tool room would usually be an incentive toward providing a sufficient supply of tools with which to do repair work properly. When no means is provided for keeping the tools, so many are destroyed or lost and, in some cases, stolen, that the management despairs of keeping a proper supply. Moreover, some superintendents would be so chagrined at the few on hand, were all the tools of their shop brought together, that they would no doubt increase the supply at once.

In shops employing only from fifteen to thirty men or thereabouts, to let one man devote all his time to the tool room would be rather expensive. But this is not necessary. The room may be conducted in connection with the storeroom or some other department, and the maintenance expenses kept very small.

Repair Shop Locations

From the earliest days of electric railway work the importance of locating power houses at points favorable to the economical generation and distribution of current has been generally appreciated. It would be stretching matters a little, perhaps, to urge the equal importance of locating repair shops near the principal centers of rolling stock movement, yet the question deserves very careful consideration on the part of managers contemplating extended improvements in the car maintenance department. In large centers of population the cost of real estate almost always prohibits the establishment of car houses and shops within the congested districts, and there is no doubt that the larger areas, better natural light, purer air, improved facilities for the shipment and storage of raw material, frequent convenient supply of water from ponds or lakes independent of the city mains, and other advantages common to outlying or even suburban districts go a long way toward offsetting the conveniences of a more centralized location. The decreased fire risk in the suburban location is another point worth mentioning.

The main point to be determined, however, in the long run is the comparative cost of maintaining the rolling stock, including the loss of time incurred by the absence of the cars from the service, in a shop or car house centrally located and in one situated in the outlying regions. The problem is enormously complicated when one considers the reduction in earnings caused by break-downs and resulting blockades on various parts of the system—questions which cannot be overlooked in comparing the cost and facility of repairs in different localities. Each system has its own peculiar features, yet the general limitations of the problem are pretty well defined. What every manager desires is the maintenance of his schedules at the minimum cost, and it is small satisfaction to repair a broken down car for $100 in an outlying shop and lose $150 in gross earnings on account of a prolonged blockade, when with a more centralized shop the repairs might have cost $150 and the gross earnings been decreased but $50—thanks to half an hour's saving in the time required to get the crippled car off the main lines of traffic. The actual cost of repairing a car includes the fixed charges pro rated upon the investment in real estate, buildings and appurtenances, as well as the shop expenses and injury to the earning power of the system as a whole. Taken over a year's time, all of these points but the last should be easily obtainable, and if the car-mileage records are accurate and available for each day's runs it ought to be possible to obtain at least a very rough idea of the actual money lost by blockades. The larger the system the more it will pay to figure up these details. It may seem like splitting hairs to attempt to evaluate the effect of such delays, but there is no doubt that an opportunity exists for some interesting analyses along these lines. Long ago the steam railroad people figured out the extra cost of stopping trains, and matters of similar import are no longer to be regarded as fanciful problems in electric railway finance.

Experience has clearly shown that elaborate repairs can almost always be carried out more economically in a large modern outlying shop than in the usual cramped and costly quarters available in the center of a densely populated community. Here the time required to reach the shop from the point of break-down is so small a precentage of the total repair time that there is nothing gained in attempting to carry out extended maintenance work in the congested district. It is more a question of providing facilities for making emergency repairs that leads to the establishment of small shops in division car houses and to the equipment of emergency stations with car replacers, jacks and other tackle. In every case the first thing to be done is to clear the main line so that traffic can proceed. Opinions differ as to the character of work which it is desirable to perform in car house shops, and probably no general rule could be satisfactorily applied, other than the desirability of confining car house repairs to emergency work. On a modern street railway system emergency repairs predominate, but the car house shop is not usually adapted to the most economical maintenance methods. Space is very limited; motor-driven tools are liable to be set up and operated wherever they can be squeezed into place; shafting, belts and supplies have a habit of getting pretty well mixed up; time is lost in hunting for tools, and labor-saving appliances are not as frequently available as in regular repair shops where the production cycle is recognized. For these and other reasons which readily occur to one after inspecting numerous shop facilities in car houses, there is little doubt that long-time repairs or overhauling should be treated in due course at the main shops of the operating company.

Such a course prevents the overcrowding of the shops at both ends of the line; it provides that the car house repairs shall be more in the nature of temporary relief, leaving the lasting cure to the main shops themselves. When the shops can be located without undue expense in a situation central to the movement of the rolling stock in service, just so much convenience is gained. Given provision for emergency repairs in the congested regions and facilities for permanent maintenance wherever the maximum shop economy can be secured, a road is in a fair way to enjoy the profits resulting from minimum delays and low cost replacements of rolling stock. The financial side of the matter is well worth investigating, with the intention of ultimately evaluating the strategics of car shop location in both large and small cities.

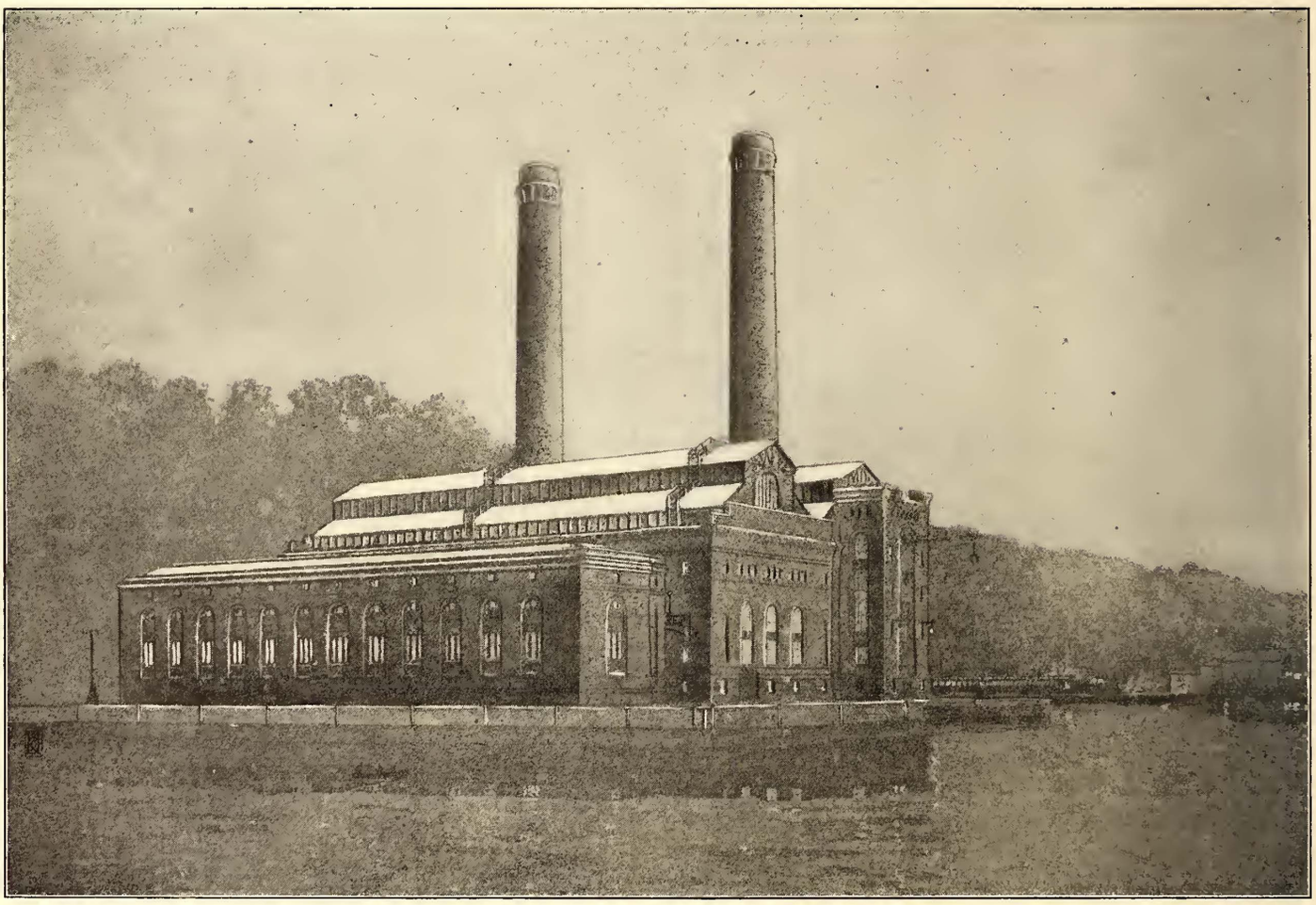
Overhauling According to Mileage

Just at present there is considerable interest among master mechanics in plans for overhauling motor cars according to the mileage they have run rather than according to the time that may have elapsed since the last overhauling. The communication from Mr. O'Brien, of St. Louis, on the system of overhauling according to mileage which has been put in operation on the lines of the United Railways Company, of St. Louis, is therefore very timely, and gives detailed information as to how the mileage records are kept and made use of that many who are thinking of adopting some such scheme may wish to know. The system is apparently by no means a difficult one to carry out, and even on a system as large as that at St. Louis, requires very little clerical labor. One of the striking things in connection with Mr. O'Brien's description of the system used at St. Louis is the great difference in the number of miles that various types of equipment are allowed to run before they are taken in for overhauling. The mileage that can be allowed, of course depends on the armature bearing wear, and it is quite evident that the motors lubricated with oil run a much greater mileage than those lubricated with grease, and the more complete the oiling arrangements, the greater the mileage that can be allowed. The normal amount of armature clearance and thickness of babbitt, of course, has also to be taken into consideration.

POWER STATIONS OF THE ELECTRIC ZONE OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD

As already stated in this paper, the current for operation in the electric zone of the New York Central & Hudson River Railroad will be generated at two power stations, one at Yonkers, on the Hudson division, and the other at Port Morris, on the Harlem division. These two stations will be cross-connected electrically, and each will have an ultimate capacity of 30,000 kw, which is sufficient to carry the entire load of a train service much greater than that now operated by means of steam locomotives.

The main buildings which enclose the boiler rooms, coal bunkers and the generating rooms are 167 ft. wide, 237 ft. long and 105 ft. high. The switch houses are separate buildings,



YONKERS POWER STATION OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD

located about 40 ft. distant from the main power stations.

The design of these power stations is such as to secure economy in space for the power generated, as the number of cubic feet per kilowatt capacity is only 102. The number of square feet of building per kilowatt is 1.49.

LOCATION

The locations adopted for the two power stations, besides being near the load centers of the electric traction system, are advantageous because they are on the water front and are also adjacent to existing tracks. They are thus convenient of access for delivery of coal by boat or car.

FOUNDATIONS

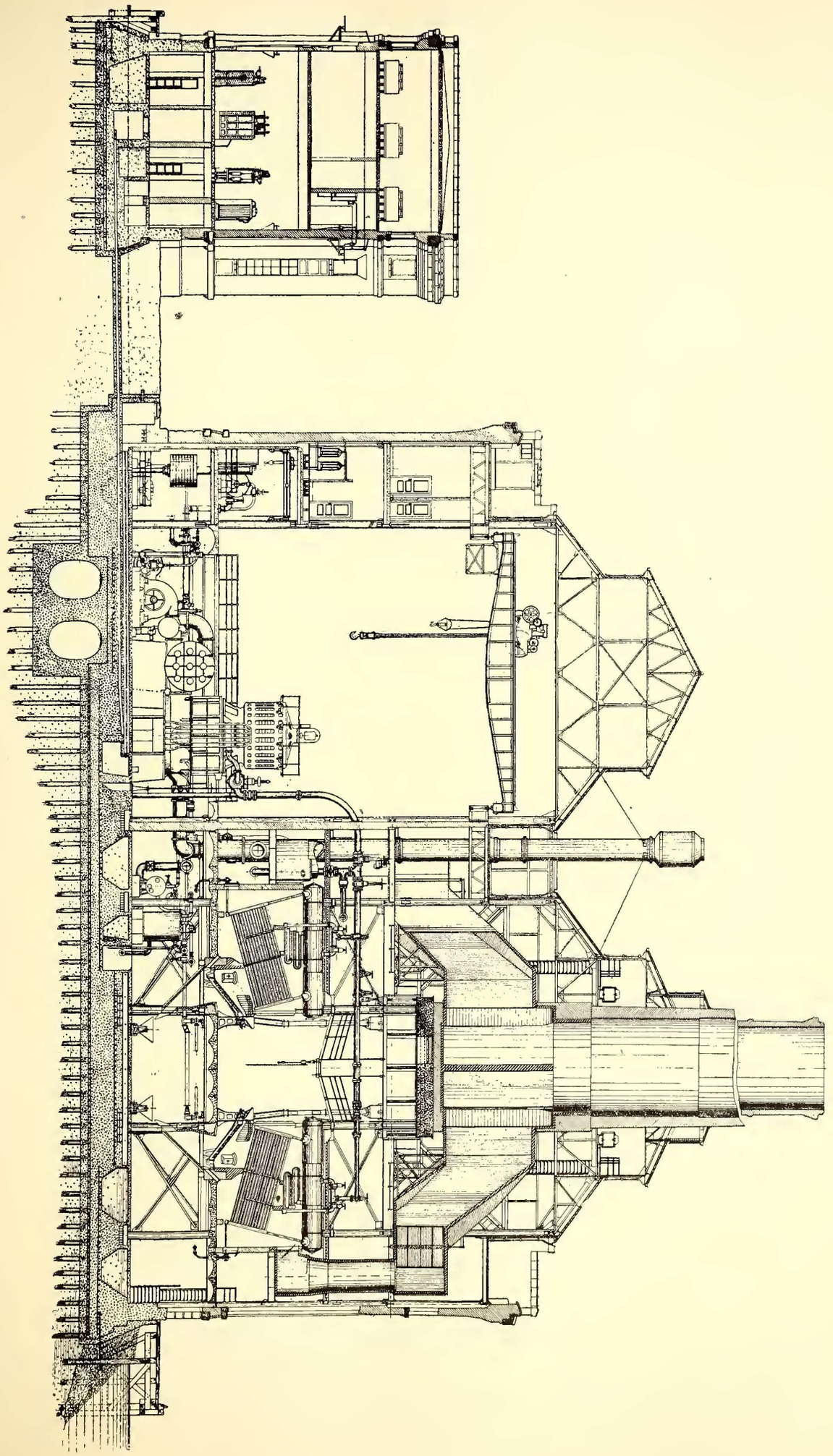
At Port Morris the solid rock is sufficiently near the surface to warrant carrying the concrete foundation down to it, and at Yonkers a bed of hard sand and gravel forms a good bottom for a pile and concrete foundation on the particular location selected. On the other hand, borings taken along the river front over all other portions of the territory near the load center of the electric traction system showed either a great depth of silt or other unfavorable conditions.

At Port Morris a concrete bulkhead, built along one side and the outer end of the building to form a slip and dock, was used as a portion of a cofferdam for the excavation of the foundation. An existing embankment over a sewer forms one wing to reach the shore and a timber cofferdam forms the other. An intercepting ditch on the land side caught the water which drained in from a swamp, and this, together with the seepage through the cofferdam, was easily disposed of with pumps.

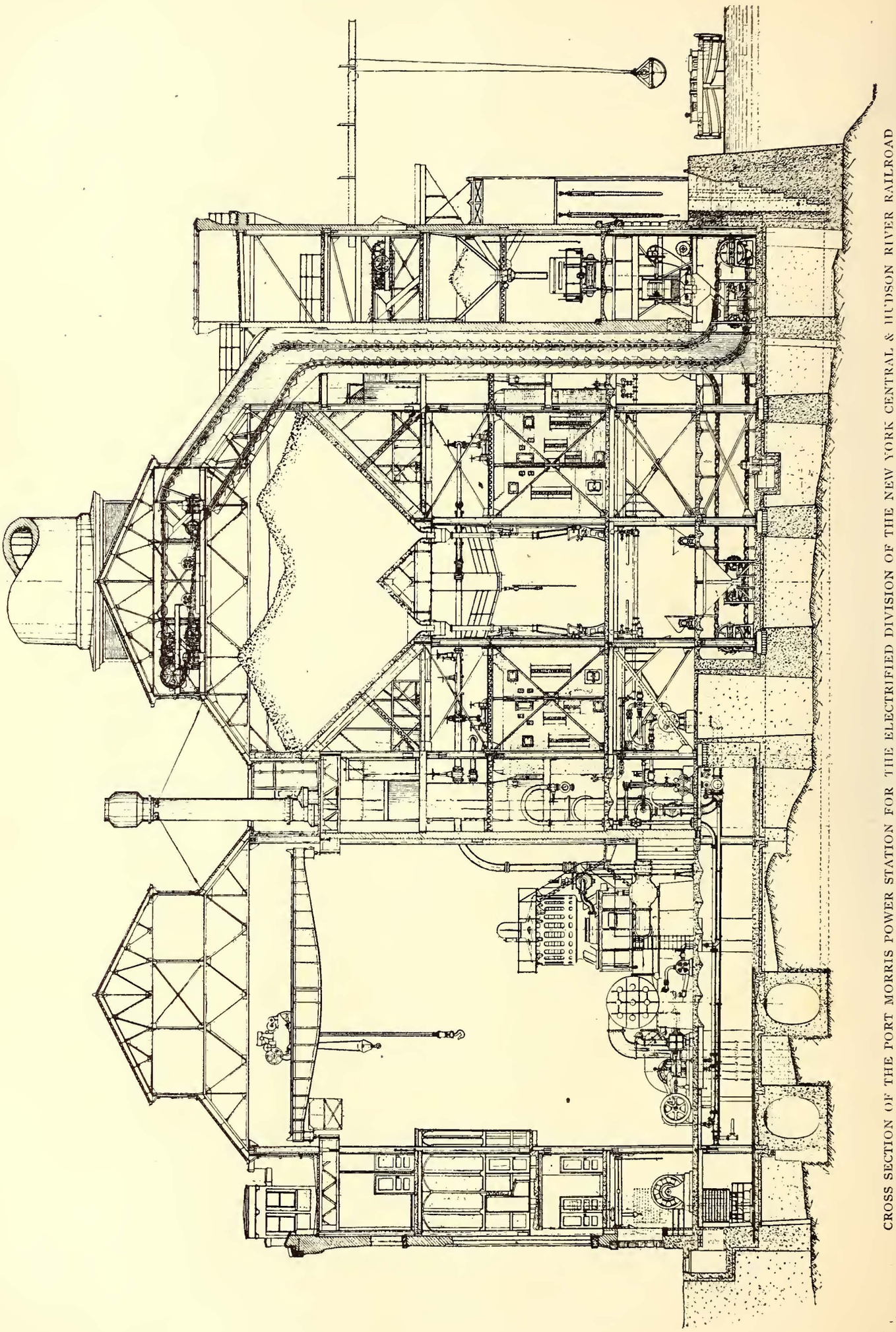
Excavation was made to rock over the entire area covered by the buildings. In some places the rock was disintegrated and in others it was extremely hard. The surface also was very irregular, so that there was a wide variation in the height of the piers. The maximum height was about 34 ft. A portion of the rock was excavated in order to build the intake and discharge tunnels of the circulating system for the condensers at the proper elevation.

At Port Morris the piping for steam and other connections to the turbine room is carried through tunnels under the floor of the power house. After building the tunnels and piers for columns and foundations for the generators and boilers, the area was filled with sand up to the level of the floor. The concrete floor and walls of the pipe tunnels, which extend below the water line, are waterproofed with alternate layers of coaltar pitch and felt.

The work on the foundations included 26,000 cu. yds. of earth excavation, 4500 cu. yds. of rock excavation, 16,500 cu. yds. of concrete, 5000 sq. yds. of waterproofing and 25,000 cu. yds. of back filling. The slip and bulkhead wall required 11,000 cu.



CROSS SECTION OF YONKERS POWER HOUSE AND SUB-STATION FOR THE ELECTRIFIED DIVISION OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD

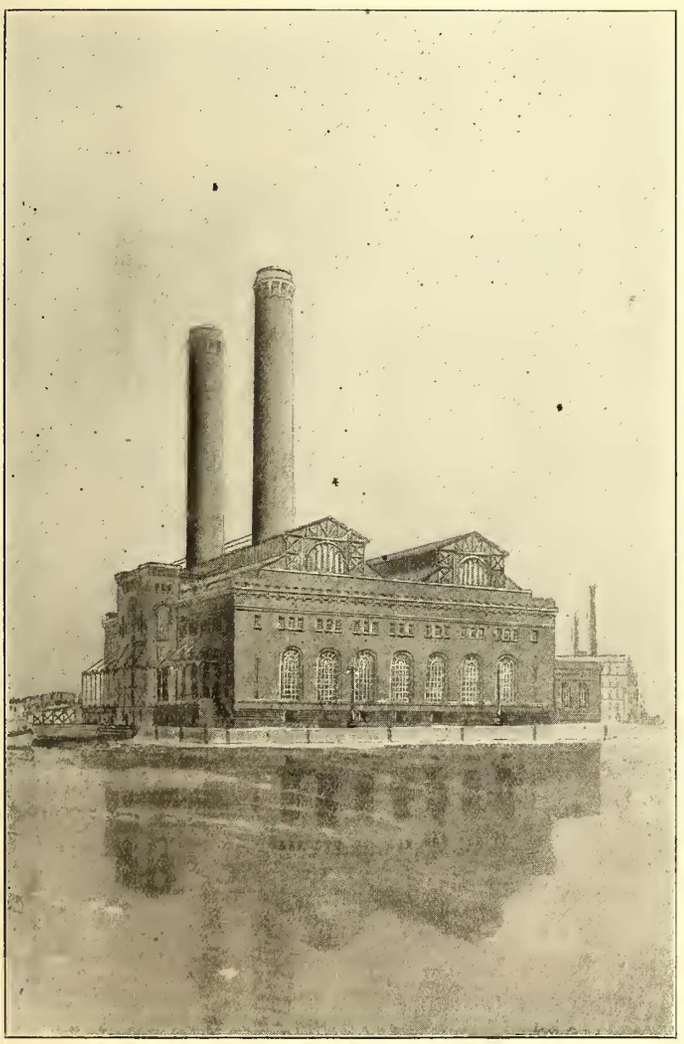


CROSS SECTION OF THE PORT MORRIS POWER STATION FOR THE ELECTRIFIED DIVISION OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD

yds. of earth excavation, 5000 cu. yds. of rock excavation and 3500 cu. yds. of concrete.

The Yonkers power station is built entirely on land under water at a point where the main line of the Hudson division runs along the bank of the Hudson River, with only a rip-rapped slope outside of the tracks. The land on the other side of the tracks rises abruptly and is valuable for residential purposes.

On the site selected for the power station, the water runs from a depth of 8 ft. near the shore to 16 ft. at the outer end, the bottom being sand and gravel. As the first step in construction, the piles forming the foundation, spaced in general 3 ft. apart under walls, piers and machinery, and somewhat further apart under the floor, were driven to refusal. Four



PORT MORRIS POWER STATION

marine pile drivers were employed in the work. The area was then surrounded with a cofferdam formed of a single course of 12-in. x 12-in. timbers with 3-in. x 4-in. strips spiked to the edges so as to form a tongue and groove joint. The driving point of each timber was beveled on the edge away from the timber previously driven, in order to force them as close together as possible, and great care was taken to see that no pebbles or other obstructions were allowed to get between the timbers and open the joint. Some of the joints which leaked between high and low water as the water was being pumped out were battened with canvas and a few joints under water were caulked by a diver. When the water was finally pumped out, however, there was no difficulty in keeping the bottom dry with an 8-in. pump, although the interior was excavated to a depth of about 20 ft. below the surface of the water at the outshore end. The piles were in general cut off at an elevation of 8 ft. below mean high water and the bottom of the concrete foundations was laid one ft. below the heads of piles, or at an elevation minus 9.

Under the intake and discharge tunnels for the circulating system for the condensers the bottom of the concrete reached a depth of about 18 ft. below high water, and under the tunnel for the coal and ash hoist, a depth of 13 ft. In the Yonkers power house there is no pipe tunnel under the floor as at Port Morris, the piping in the turbine room being carried under transverse galleries.

The main bed of the concrete foundation is 4 ft. thick, bringing the elevation up to minus 5, above which the walls and piers for the superstructure and machinery are carried up individually, the spaces between being filled with sand up to elevation zero, over which a 6-in. concrete floor is laid. Waterproofing consisting of alternate layers of coaltar pitch and felt is laid in a horizontal plane in the concrete bed at an elevation 6 ins. above the tops of piles and is carried up the side walls above high water. Six-ply waterproofing is used in all horizontal planes, five-ply in all vertical planes in the building and four-ply around all ducts exposed to surface or tidewater.

In order to take up any tensile stresses in the foundation, two courses of round steel rods 1 in. in diameter are laid in each direction at right angles to each other in the bed of concrete above the plane of the waterproofing. The foundation work includes 5540 piles, 16,500 cu. yds. of concrete, 270 tons of reinforcing rods and 9000 sq. yds. of waterproofing.

SUPERSTRUCTURE

Aside from the foundations, the two power stations are similar in general design. The base and floors are of concrete, the framework of steel, all designed so as to give no inaccessible surfaces; the walls are brick and tile, and the roofs are of concrete roofing slabs covered with copper, with standing seam joints. There are 2800 tons of steel structure in each power station.

Architecturally, the power stations have been designed with the idea of using the large proportions to obtain an impressive effect merely by the use of common brick and terra cotta of the same general color, relieved through careful design of the openings and recesses, but without any special ornamentation. The result gives economy in construction in proportion to the capacity. Special consideration was given to the design of the windows, not only to obtain a well-lighted interior, but also to present a striking and attractive appearance from the exterior at night, both power houses being located along the line of important water travel, besides being adjacent to railroad lines. The prominent feature of the design is a row of eleven arched windows of 10-ft. span on each side, lighting the main floors. A good effect is obtained by placing three small windows over each arch, these windows serving to light the upper gallery floor. The large window frames are all of built-up steel, the mullions being glass and steel, giving the largest possible area of lighting surface.

In the gable ends the lines of the end roof truss are left exposed, the spaces between the members being filled with concrete slabs, giving the effect of half-timbered stucco construction.

There are two Custodis radial brick stacks, 15 ft. 6 ins. inside diameter and 250 ft. high above grates, at each power station. They are supported on steel columns and a concrete and steel staging 40 ft. above the boiler room floor, the main boiler room alley passing underneath.

In interior arrangement the power stations are divided by a brick wall into the turbine room, 69 ft. x 231 ft. 8 ins., which is open to the roof, and a boiler room 88 ft. x 231 ft. 8 ins., over which the coal bunkers of 3500 tons capacity are placed.

At Port Morris there are three galleries on one side of the turbine room, the first gallery being used as a shop, the second

as an operating gallery and the third for offices. At Yonkers the level of the first gallery is carried across the room as the operating floor, with walkways between the generators. The exciters are placed under the galleries on the level of the operating floor, the operating gallery being immediately above them and the top gallery being used for offices and shops.

COAL-HANDLING APPARATUS

Coal delivered at the power stations on cars is dumped from the cars into pockets, from which it is delivered by suspended flight scraper conveyors into the hoppers of crushers, where it is reduced to the proper size for handling with the mechanical stokers. From the crushers it passes into a pocket conveyor, which lifts it to the top of the building and delivers it to longitudinal conveyors of the suspended flight scraper type, which dump it into the coal bunkers over the boiler room. From the bunkers it is delivered through vertical down-spouts to Roney mechanical stokers, operated by steam.

The ashes drop from the grates into hoppers, from which they are collected in push cars of 1-ton capacity running in an ash tunnel in the boiler room basement. These cars are dumped into a hopper, from which the ashes are lifted by means of a bucket conveyor into an ash storage bin directly over the coal trestle, from which they can be dropped through a spout in the bottom of the hopper into a car. Cars on the trestle are spotted by means of an electric winch. Coal delivered by boat is hoisted in a clamshell bucket of 1-ton capacity, operated by a steam hoist. The coal-handling capacity is 80 tons per hour and the ash-handling capacity is 25 tons per hour. The maximum coal consumption at the power stations will be about 220 tons per day.

APPEARANCE OF A CABLE TOWER AND PART OF THE TRANSMISSION AND THIRD-RAIL SYSTEM ON THE LINE OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD

Aside from the hoist for unloading coal from boats, which is operated by steam, the coal-handling apparatus is all driven by electric motors. The conveyors are driven by 220-volt three-phase induction motors, varying in capacity from 7½ hp for the ash conveyor to 40 hp for the coal crusher and conveyors.

BOILERS

Each power station is designed to accommodate a battery of 24 Babcock & Wilcox water-tube boilers, rated at 625 hp each, all located on one floor and arranged 12 on each side of a central alley. Sixteen boilers will be installed for initial operation. The total heating surface of each boiler is 6250 sq. ft., and the grate surface is 112 sq. ft., giving a ratio of 55.8. The boilers are designed for a normal working pressure of 185 lbs., and the steam will be superheated to 200 degs. F. over and above the temperature due to steam pressure. The superheaters in each boiler will contain 1230 sq. ft. of heating surface, and they are made up of 168 2-in. tubes, each 13 ft. 5 ins. in length. Each section of the power station containing four boilers is equipped with one boiler feed-pump of the duplex outside-packed piston type. The pumps are designed for hot water, and each pump has a capacity to supply eight boilers under full load conditions. The feed-water heaters are of the closed type corrugated tube Wainwright counter-current design.

PIPING

The piping is all mild steel with flange joints of a modified Van Stone pattern. Four boilers are piped direct to one turbo-generator, and by means of cross connections adjacent boilers can be arranged to supply turbo-generators of the next group. The sectional system of piping has been followed throughout for the auxiliary machinery.

CRANES

The turbine room of each power station will be equipped with a 50-ton traveling crane having an auxiliary 10-ton hoist.

TURBO-GENERATORS

Each power station is designed to accommodate six 5000-kw turbo-generators, four of which are being installed for initial operation. The turbines are of the Curtis five-stage vertical type. These machines are about 15 ft. in diameter at the base and 35 ft. high from the floor to the top of the generator.

The turbine structure is mounted upon a cast-iron base, forming an exhaust chamber, in which is provided the opening to the condenser and to free atmospheric exhaust. The shaft of the turbine is separated from that of the generator above, the connection between the two being made by a coupling, so that the machine can be readily taken apart.

The shaft is borne by a step bearing consisting of two cast-iron blocks, between which water is used for lubrication under a pressure of 800 lbs. per square inch, exerting a sufficient force to raise the moving structure slightly. One individual pump is provided for each turbine for the lubricating system, and in addition to this, two larger pumps, in connection with two accumulators, insure uninterrupted pressure at the step bearings.

The governing will be effected by successive opening and closing of automatic hydraulically-operated valves, which deliver steam to the different sections of two sets of nozzles.

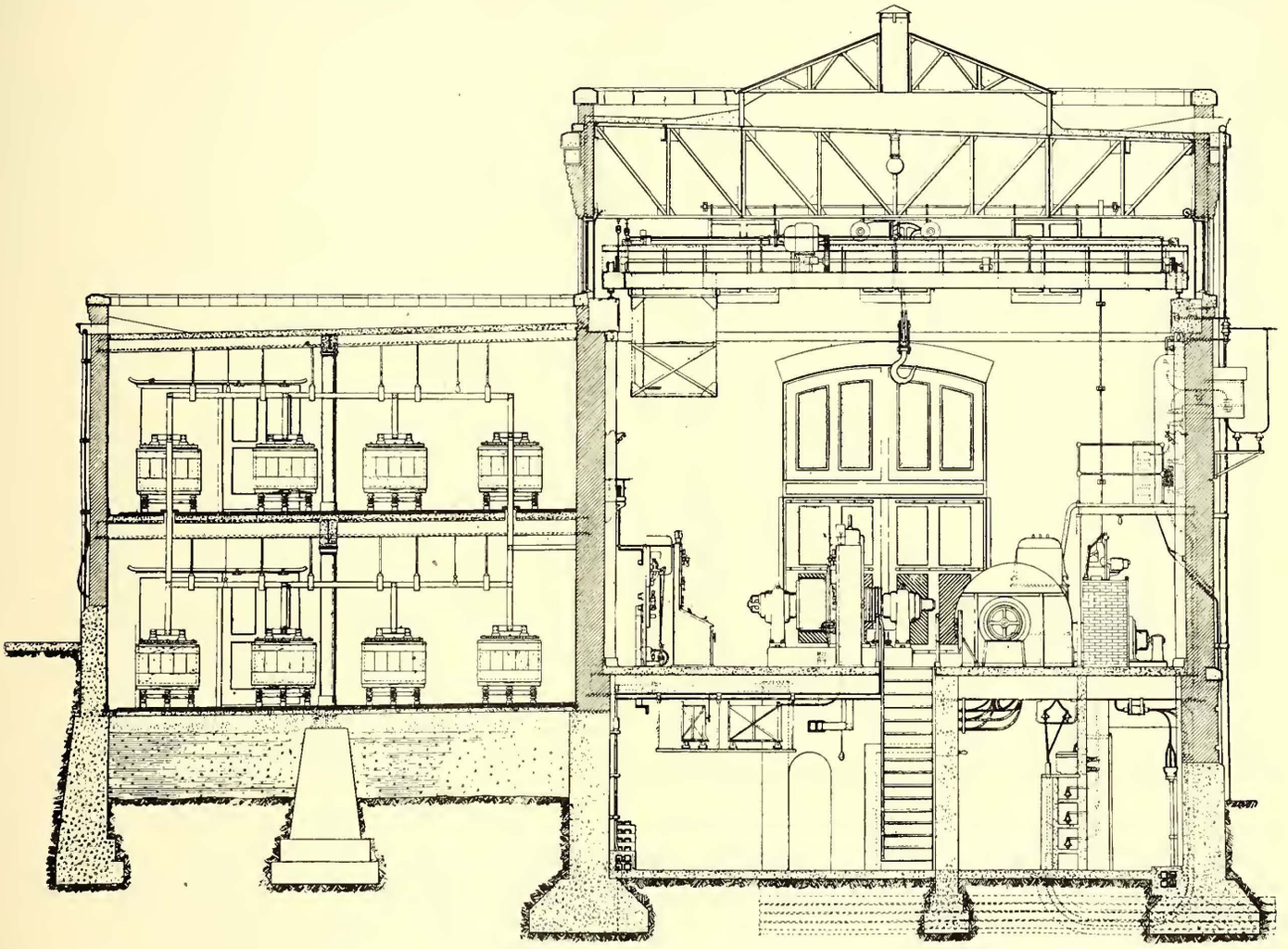
The turbines will be fitted with two centrifugal devices to check any excess of speed. After either one of these devices operates, the next revolution of the machine will bring it into engagement with a lever, which will trip the main steam valve, cutting off immediately the driving power and allowing the machine to come to rest in the shortest possible time.

CONDENSERS

The condensing apparatus is external to the turbines. The condensers are of the counter-current surface type, and each is directly connected to its turbine base and contains about 17,000 sq. ft. of cooling surface. They are guaranteed under full load to maintain a vacuum of 28 ins. with cooling water at a temperature of 70 degs. F., 30-in. barometer.

The auxiliary condensing apparatus is composed of independent units. Circulating water pumps are of the centrifugal type, directly driven by horizontal reciprocating engines. The dry vacuum pumps are of the rotative fly-wheel type, with air and steam cylinders in tandem, erected on a common base. The hot-well pumps are of the two-stage turbine type, and are driven by direct-connected d. c. electric motors.

As an evidence of the high efficiency expected of the condensing system, it may be stated that the manufacturer has guaranteed that the temperature of condensed steam measured in the condenser hot well will be within 1 deg. F. of that corresponding to the pressure measured in the condenser. All parts of the machinery have been designed to operate smoothly and quietly under all loads up to 50 per cent above the normally rated capacity of the turbines. The intake and discharge circulating tunnels for the condensing system are elliptic in shape, 7 ft. 3⅞ ins. x 9 ft. 11 ins.



CROSS-SECTION OF A TYPICAL SUB-STATION ON THE ELECTRIFIED DIVISION OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD

GENERATORS

The generators each have a capacity of 5000 kw, and are wound for three-phase current of 25 cycles and 11,000 volts pressure. The armatures are star-connected, and the neutrals are grounded through individual cast-iron grid resistances connected to a common ground bus, limiting the ground current to an amount sufficient to operate the line overload relays. The leads of the generators are brought down to the floor through brass pipes to the ducts leading to the high-tension switches, the arrangement being such that no high-tension conductors are exposed in the turbine room.

EXCITERS

The exciter system at each power station will consist of two 150-kw turbo-generators and one 150-kw induction motor-generator, furnishing current at 125 volts pressure; also one exciter storage battery consisting of seventy-four cells, type R-21, having a capacity of 1200 amps. for one hour, with spare space in the tanks for increasing the capacity to 1800 amps. for one hour. The exciter generators and battery are connected to two independent positive busses and one common negative bus. The battery has two end cell switches on the positive side. One positive bus serves for field excitation of the 5000-kw generators only, while the other serves for certain lights and motors in the station.

OPERATING GALLERY

The stations will be operated from the operating gallery on the north side of the turbine room. The arrangement of the switchboards in this gallery is symmetrical, and all cables and copper connections running to the switchboards are carried in concrete trenches under an Alberene stone floor. The main operating switchboard containing all the control switches and the instruments necessary for the operation of the station is located in the center of the operating gallery. A set of two exciter switchboards is located on each side; the main operating switchboard as well as the exciter switchboards are enclosed in an operating booth constructed of steel and wire glass. Three field switchboard panels are located outside on each side of the operating booth. An a. c. and a d. c. light and power switchboard on either end of the operating gallery complete the switchboard installation in the turbine room.

SWITCH HOUSES

At both power stations switch houses have been provided, separate from the main building, with the idea of obtaining the best conditions for the installation of high-tension switching apparatus, and at the same time increasing the safety of operation. At Port Morris the switch house is 50 ft. 10 ins. wide x 100 ft. long. At Yonkers the switch house and the sub-

station for that district are combined in one building, 37 ft. 4 ins. wide x 255 ft. 4 ins. long; the switch house occupies 147 ft. 8 ins. of the length and the sub-station 107 ft. 8 ins. In the switch houses are installed the high-tension switching equipment, consisting of bus-bars, oil switches, instrument transformers, etc.; also such instruments as are required for the complete equipment of generating stations, but which are not essential for the operator.

The switch house also contains auxiliary boards, which allow the main operating switchboard in the turbine room to be put out of service if it should be desirable for the purpose of cleaning and repairs. These boards will also permit the operation of the station should by an accident the main operating board become disabled.

High-tension busses, to which the generators are connected by means of a main switch and two selector switches, are installed in the basement of the switch houses. The feeders are equipped with selector switches only. Overload relays are installed in the generator and feeder circuits, but the generator relays will operate only under very extreme conditions.

In the generator circuits, in addition to overload relays, reverse current relays will be installed; these, however, are connected to indicating lamps only, not tripping the oil switches. All relays are of the inverse time-limit, bellow type.

All high-tension connections and apparatus are located in the basement of the switch house, and no such apparatus is located on the first floor, except the oil switches, to which connections are made from the basement through the floor. The basement is made inaccessible to any but authorized workmen. This precaution and the removal of the high-tension apparatus from the power house itself into a confined space in a separate building reduce the danger of coming in contact with high-tension apparatus to a minimum.

On the second floor are located the load despatcher's office, the exciter battery with booster and switchboard, laboratory, storeroom, toilet rooms and the apparatus for the hot-air heating and ventilating systems.

The arrangement of oil switches and connections is such that the apparatus belonging to one generator and three feeders form a unit which is entirely separated from the others by fireproof walls in the basement. All connections between oil switches and bus-bars are made with bare copper tubing 1¼ ins. outside diameter, the construction being such that practically no insulators will be required. The busses are enclosed in vertical brick and Alberene stone compartments, and all high-tension connections will be separated by brick or Alberene stone barriers. The oil switches can be disconnected from the high-tension system by means of knife switches located in the bottom of the oil switches accessible from the first floor. This arrangement prevents accidents which might be made by mistake in disconnecting switches from live parts. All cables coming through the duct system from the power house enter manholes in the basement of the switch house, and are so arranged that the high-tension cables enter the high-tension compartments entirely separated. Low-tension cables enter through manholes in a passage separated from the high-tension compartments by a fireproof wall, and are brought up in enclosed chases in the wall, so that they are positively insured against any accidental connection with high-tension conductors. The oil switches have a rated capacity of 500 amps., except the bus-tie switches, which have a rating of 1200 amps. The switches are of the motor-operated type, H-3, and have all recent improvements.

CABLES

All high-tension cables and the majority of the single-conductor low-tension cables are cambric-insulated and lead-covered. The insulation is 10-32 in. for high-tension cables and 4-32 in. for low-tension cables, with a lead cover 3-32 in. Multiple conductor cables for instrument and control wiring have a combined cambric and rubber insulation. Single conductor cables will be used for connecting the generators with the oil switches.

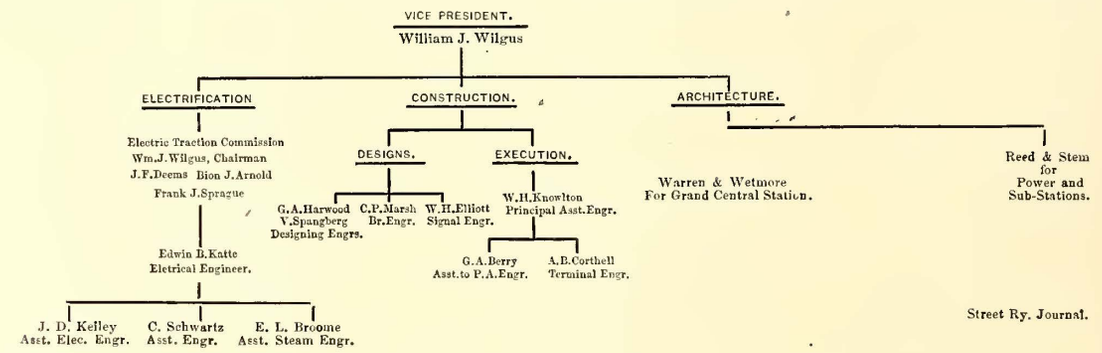
LIGHTS AND AUXILIARY POWER

About 1000 incandescent and thirty-six arc lamps will be required for lighting the Port Morris power station, and 1000 incandescent and forty-two arc lamps for lighting the Yonkers power station. The amount of power required for operating auxiliary machinery equals 240-hp a. c. and 180-hp d. c. at Port Morris, and 260-hp a. c. and 180-hp d. c. at the Yonkers power station.

LOAD DESPATCHER'S OFFICE

In each power station a load despatcher's office has been arranged for the proper distribution of power over the system and in order to give quick relief in case of accident or trouble. Only one of these will be in service at a time. Each load despatcher's office will be equipped with a record board, indicating by means of lights and plugs which generators, lines, rotaries, etc., are in or out of service and which switches are open or closed.

An independent telephone system, exclusively for the use of the load despatcher, interconnecting both power stations, all sub-stations and the train despatchers in the electric zone, will be installed.



The accompanying chart shows the organization of the engineering department of the New York Central Railroad, which includes the design and construction of these two power stations, and which is under the direct management of Vice-President William J. Wilgus:

CONTRACTORS

The principal contractors on the work are as follows:

Foundations at Yonkers, Walter Butler; foundations at Port Morris, D. C. Weeks & Son; steel work, both power stations, American Bridge Company; superstructure at Yonkers, Butler Bros. Construction Company; superstructure at Port Morris, Thompson-Starrett Company; turbo-generators and complete switching equipment, General Electric Company; exciter storage batteries, Electric Storage Battery Company; boilers, Babcock & Wilcox Company; piping, M. W. Kellogg & Company; valves, Best Manufacturing Company; stacks, Alphons-Custodis Chimney Construction Company; Condensers, Henry R. Worthington; feed-water heaters, Taunton Locomotive Manufacturing Company; boiler feed pumps, Epping-Carpenter Company; flues, B. F. Hart, Jr., & Company; coal and ash-handling apparatus, Exeter Machine Works; mechanical stokers, Westinghouse Machine Company; electric traveling cranes, Alfred Box Company; light and power equipment, Thompson-Starrett Company.

THE RECONSTRUCTION OF THE TOPEKA RAILWAY

The Topeka Railway Company, of Topeka, Kan., has a property which is remarkable in a number of respects. It is a good example of what can be done by thorough reconstruction of the physical equipment and reorganization of operating methods of a street railway in a city of 40,000 inhabitants. While the street railways in cities of this size are as a rule in much better condition physically than they were ten or fifteen years ago, the owners of such properties, on account of their present small earnings, are too frequently inclined to let them run down or to hesitate to give them a thorough overhauling because of the risk that the net earnings will not be sufficient after the change to pay the great increase in fixed charges on the investment. The Topeka Railway was purchased by its present owners for about $400,000, and most of the property was immediately, figuratively speaking, thrown into the scrap heap, involving an investment of practically double its original purchase price in reconstruction. The result of the improvement in equipment and operating methods has been to increase the net earnings to such an extent that the returns are entirely satisfactory on the present investment.

These statements will no doubt be sufficient to arouse the interest of all street railway men connected in any way with similar properties, and an account of how these things were accomplished is of value. Before going into details, a general statement of how and why these results were attained is in order. To begin with, the tracks and rolling stock were in such a dilapidated condition that it was impossible to maintain a rapid schedule. Since the property has been overhauled, the car mileage per day has been increased 33 per cent without increasing the number of cars. This has an important bearing on the net earnings in two ways: First, it gives the public a more frequent and more rapid service, and second, it reduces platform expenses. This increase in schedule speed and car mileage was, of course, made possible by providing good tracks and rolling stock and sufficient feed wire to maintain such schedules, which would have been impossible with the property in the condition it was originally. Besides this, a number of other things have been done to stimulate travel, while at the same time decreasing operating expenses. It was formerly the practice to reduce the car service during the evening. The result was that cars were so infrequent people either stayed at home or walked. The present policy is to keep the same schedule, 18 hours per day. The result is that the evening business has been converted from a losing to a paying one. Trippers are added during the rush hours, morning and evening. Routes have also been changed in some cases better to accommodate travel and decrease the useless mileage.

TOPEKA RAILWAY BUILDINGS, FROM STREET

SPECIAL WORK AT KANSAS AVENUE AND SIXTH STREET

TRACK AND OVERHEAD WORK

It is unusual to find a road of this kind provided with such heavy and well ballasted track. The company has 36 miles of track, 8 miles of which is suburban and 28 miles in the city, with 17 miles in paving. The track in paving is 80-lb. Shanghai T. The balance is 75-lb. standard T-rail. The track is laid

in 6 ins. of concrete where in paving. In the unpaved city districts there are 6 ins. of broken stone ballast, while the suburban track is ballasted with 12 ins. to 18 ins. of broken stone. Sections of the different standards of track and overhead construction are shown on the opposite page.

The company owns its own cast-welding outfit, furnished by the Falk Company, and has cast-welded considerable track in paving. It is intended to cast-weld all such track ultimately. It has a well-equipped machine shop, where it made the special work used in reconstruction, except a large piece at Kansas Avenue and Sixth Street, which was furnished by the Falk Company.

KAW RIVER BRIDGE, BUILT BY RAILWAY COMPANY, TOPEKA

The city system consists of nine different lines, as seen on the map, requiring for their operation twenty-five cars on regular schedule. Besides this, there is a line to Vinewood Park and stone quarry over which passenger service is given during the summer months while the park is open, and stone is hauled the year round. The company owns two important steel bridge structures: one a bridge over the Kaw River between Topeka and North Topeka; and the other on the Vinewood line, a viaduct over the Santa Fe and Missouri Pacific Railroad tracks. The bridge over the Kaw River is owned and used exclusively by the railway, being alongside the Kansas Avenue wagon and foot bridge. It is 900 ft. long, with seven spans double track, set on tubular steel piers. These piers are filled with concrete and are 6 ft. in diameter, extending 28 ft. into the river bed. The bridge structure is 27 ft. above low water. It was designed by L. H. Stebbins, consulting engineer, of Chicago, and built by the Leavenworth Bridge Company, with steel furnished by the American Bridge Company. It is designed for supporting a weight of 200 tons. The piers of this bridge are set opposite the piers of the Milan arch bridge of Kansas Avenue, before referred to, the railway bridge being on the down stream side. The Vinewood viaduct is 112 ft. long, with a fill 1500 ft. long at one approach, 35 ft. high at the viaduct.

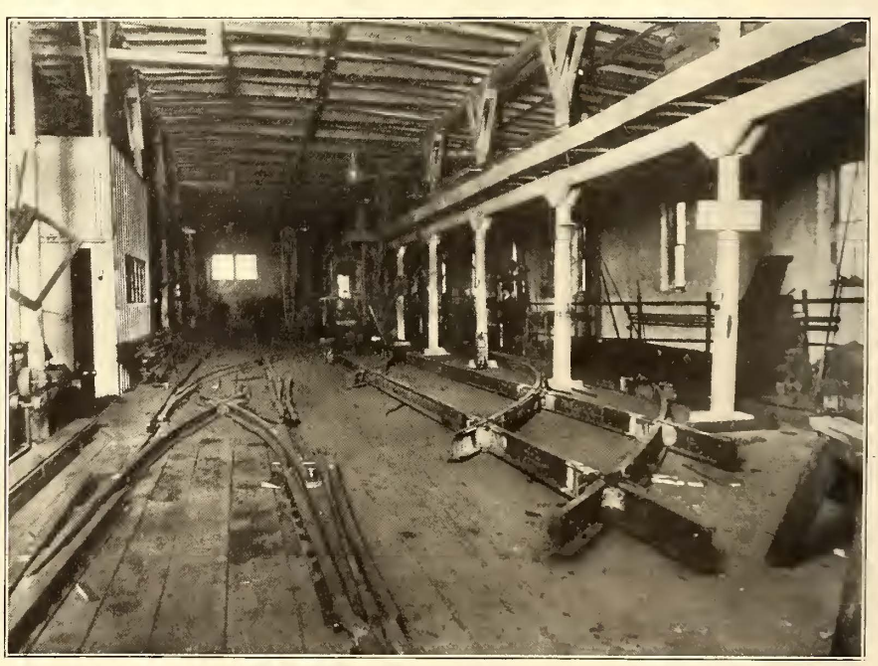
Power is obtained from the Topeka Edison Company, which has a power plant near the center of the city, and is controlled by the same interests as the railway. There are seven positive feeders, as indicated on the map, with cross sections from 1,000,000 circ. mils to 350,000 circ. mils. The positive feeders are as follows:

Feeder No. 0—South Kansas Avenue section, 500,000 circ. mils.

Feeder No. 1—North Kansas Avenue section, 350,000 circ. mils.

Feeder No. 2—Oakland & East Topeka division, 500,000 circ. mils.

Feeder No. 3—West Sixth Street division, 350,000 circ. mils.



VIEW IN THE COMPANY'S SPECIAL WORK SHOP

Feeder No. 4—West Eighth and Tenth Street division, 350,000 circ. mils.

Feeder No. 5—Vinewood division, 1,000,000 circ. mils.

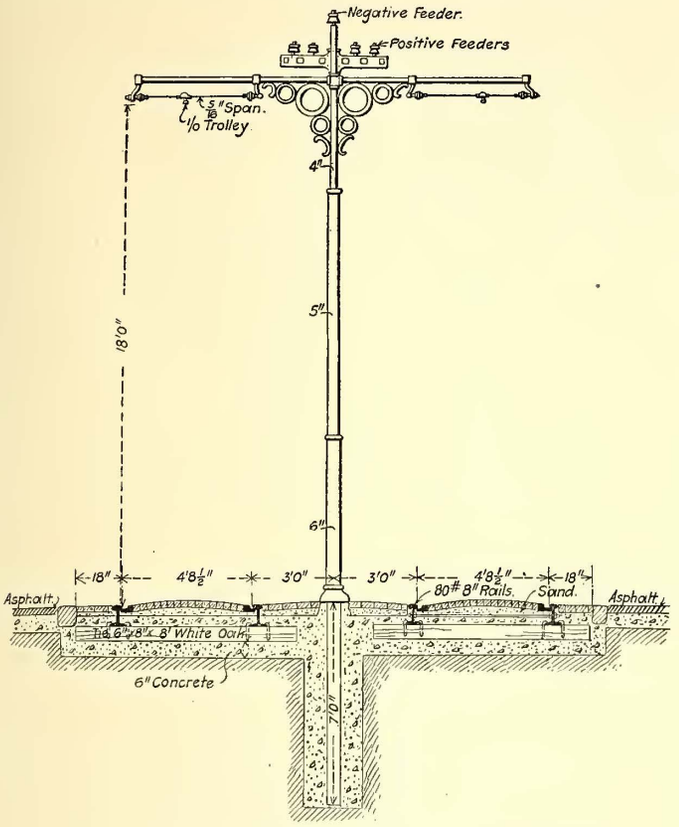
Feeder No. 6—Washburn & Quinton division, 500,000 circ. mils.

Feeders tap the trolley every 1000 ft.

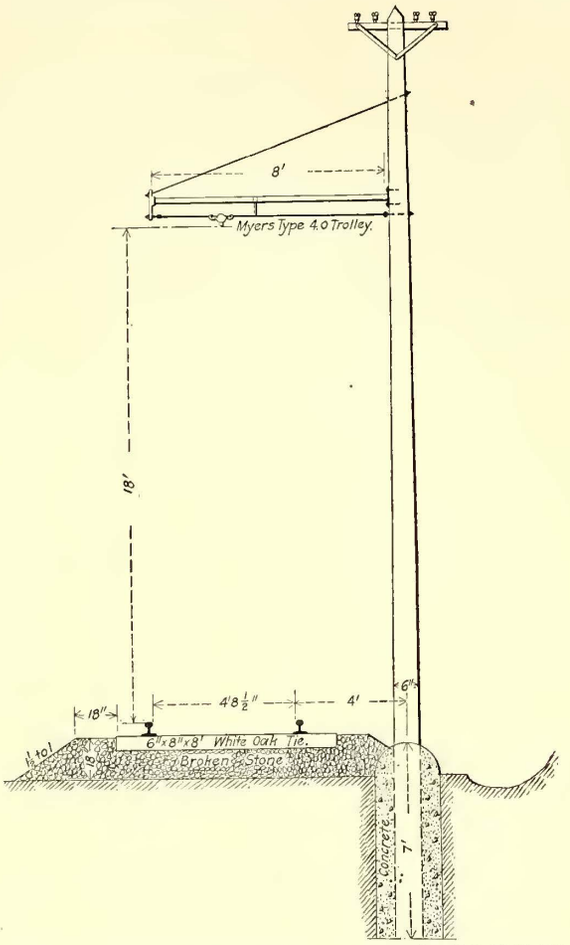
The trolley wire throughout the city is No. 0, except on the Washburn, Oakland and Vinewood lines, where it is Myers type No. 0000. The Myers type trolley wire is somewhat simi-

lar to the figure 8, except that the top is flat instead of rounded and the grooves on the sides are angular instead of rounded.

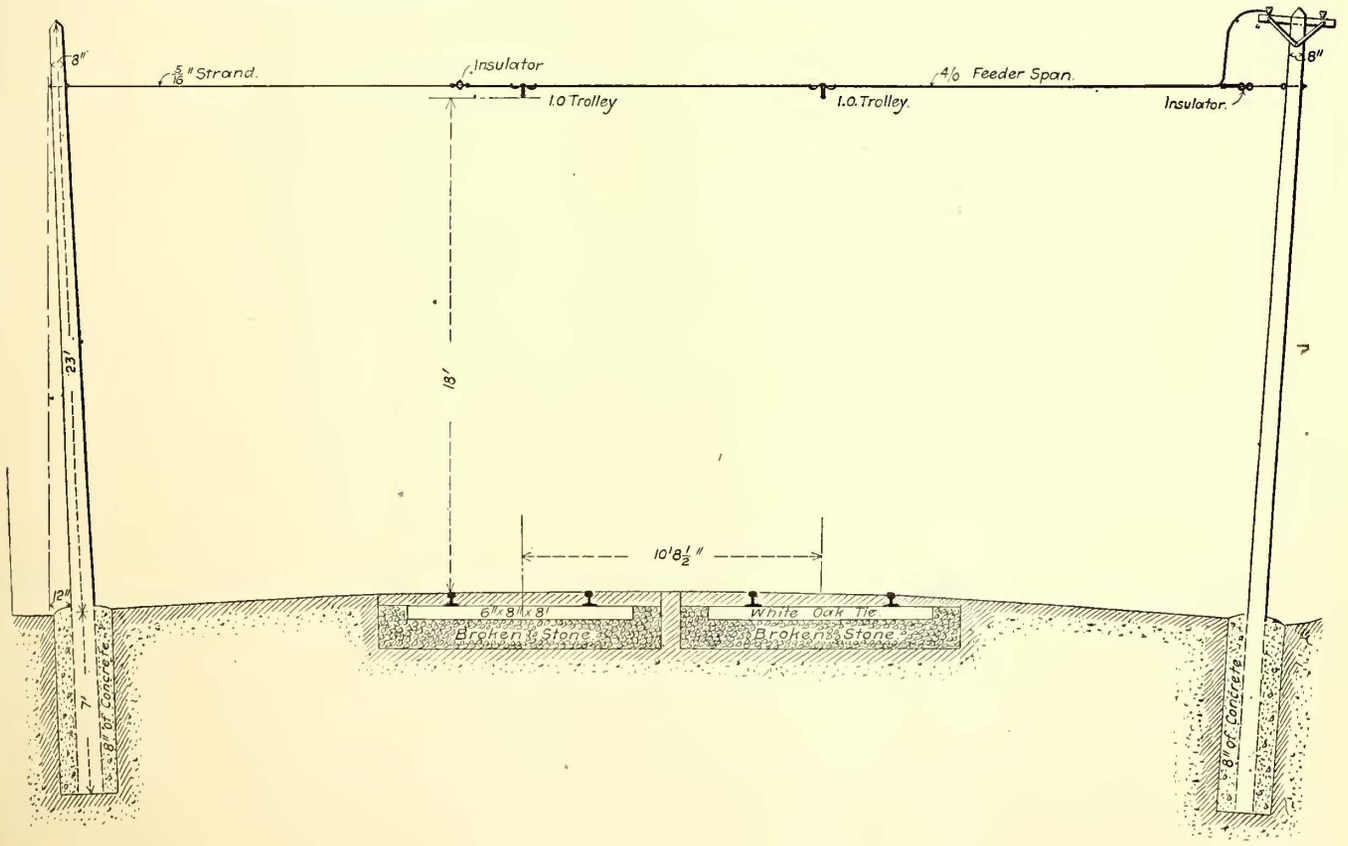
The trunk lines are double-bonded with No. 0000 concealed bonds made by the American Steel & Wire Company and the General Electric Company. The rails are cross-bonded every 500 ft. The same type of bond is used on the outlying lines.



STANDARD DOUBLE-BRACKET POLE AND CITY TRACK CONSTRUCTION



STANDARD SINGLE-BRACKET POLE AND SUBURBAN CONSTRUCTION



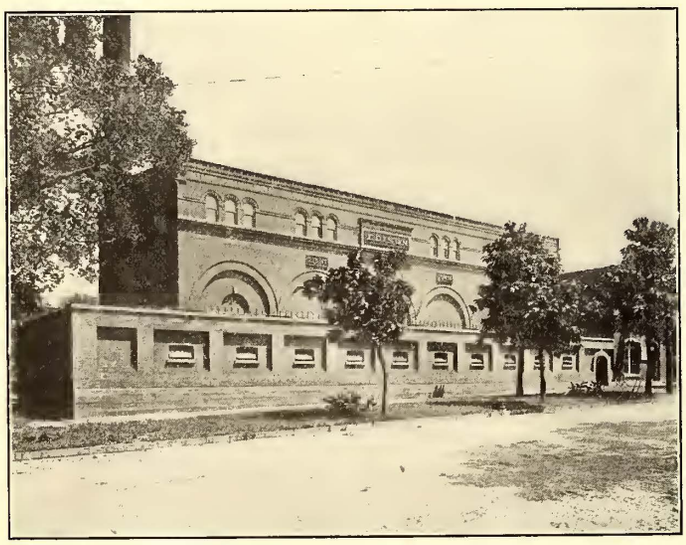
STANDARD SPAN-WIRE CONSTRUCTION ON PAVED STREETS

Besides the track bonding, there are three negative feeders running into the station. The one that starts at Vinewood Park, 6 miles distant, is 500,000 circ. mils as far as the heart of the city, and from there to the power station is 1,000,000 circ. mils. Another feeder ¼ mile long on Kansas Avenue to Fourth Street is of 500,000 circ. mils cross section. A cross-

town feeder north and south on Clay Street taps into four lines 4200 ft. west of the power station, with a capacity of 300,000 circ. mils. These negative feeders are connected to the rails every 500 ft. with No. 0000 copper wire. Copper wire of the same size is carried through all special work to supplement the bonding.

CONCRETE-BLOCK CAR HOUSE AND BRICK-PAVED YARD

In downtown districts iron center poles set in concrete are used. In outlying districts Idaho cedar poles are used, and these also are set in concrete. The reasons for setting these wooden poles in concrete are interesting and may be of value to other companies. When the old poles were taken down during construction it was found that these poles, which were of Michigan cedar set in concrete, were in almost as good condition as when new.



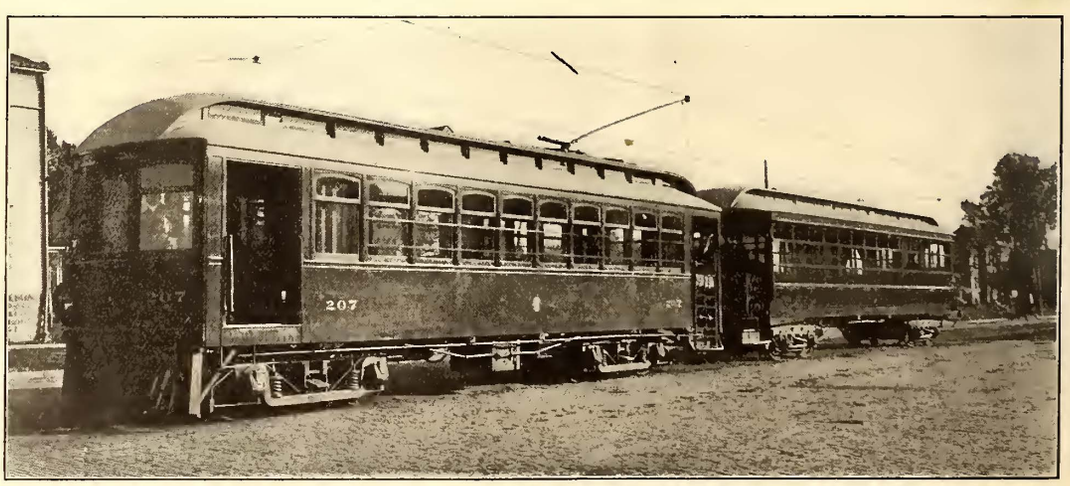
TOPEKA EDISON PLANT WITH 800 AMP.-HOUR RAILWAY BATTERY HOUSE IN FOREGROUND

It was thought that if such a good record as this could be made by setting poles in concrete it would be a good investment if all the wooden poles were set in this manner.

ROLLING STOCK

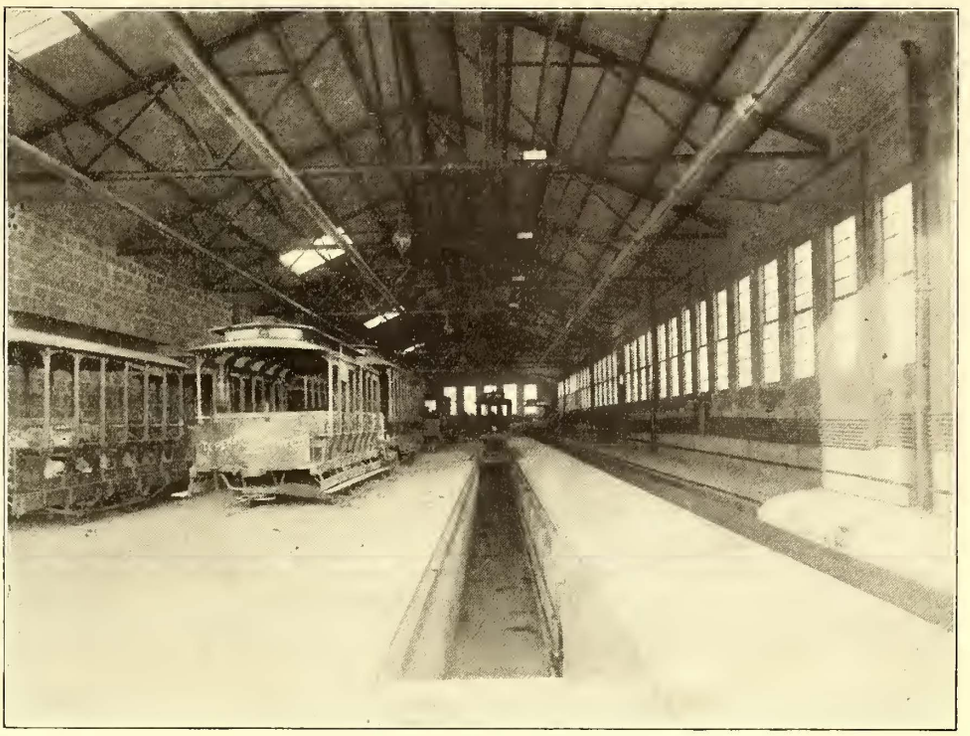
Most of the city rolling stock is single truck semi-convertible, with center aisles and cross seats, this being the best equipment for use in a city of this size. With such excellent track as exists in Topeka, these equipments ride as smoothly as any double-truck equipment. The double-truck cars are used mainly on the Vinewood line, over which the travel in summer is generally very heavy. There are thirty single-truck cars made by the American Car Company and by the Topeka Railway, mounted on Brill 21-E trucks with 26-in. wheel base and equipped with two GE 54, 25-hp motors and K-10 controllers. The single-truck cars have DuPont rear platforms and are designed to run single ended. The front vestibule is entirely closed and is carried on an extension of the main sills of the car. These cars are heated with Peter Smith hot-water heaters, with the heater and coal box in the front vestibule. The Minneapolis type of gate is used, which prevents passengers from boarding or leaving the car except when the gate is opened by the motorman. The cars have long side destination signs set in an angle-iron frame. Illuminated signs in which wire glass is used are placed at the front and rear. All the single-truck cars are equipped with Eclipse fenders. There are five double-truck Jewett cars mounted on Peckham No. 36 M. C. B. trucks. equipped with four GE 67 motors, Christensen air brakes, Con-

STANDARD SINGLE-TRUCK CAR



VINEWOOD TRAIN—STANDARD DOUBLE-TRUCK MOTOR CAR AND TRAIL CAR

solidated electric heaters and locomotive pilots. These cars are also of the semi-convertible type. For hauling freight, an electric locomotive is provided equipped with four GE 67 motors. The locomotive is in the form of a flat car, with a cab on one end. It is 30 ft. long by 8 ft. 6 ins. wide. It is mounted on American Car Company M. C. B. trucks. The company owns twelve flat freight cars, two McGuire snow sweepers, five snow plows and a Trenton trolley wagon.



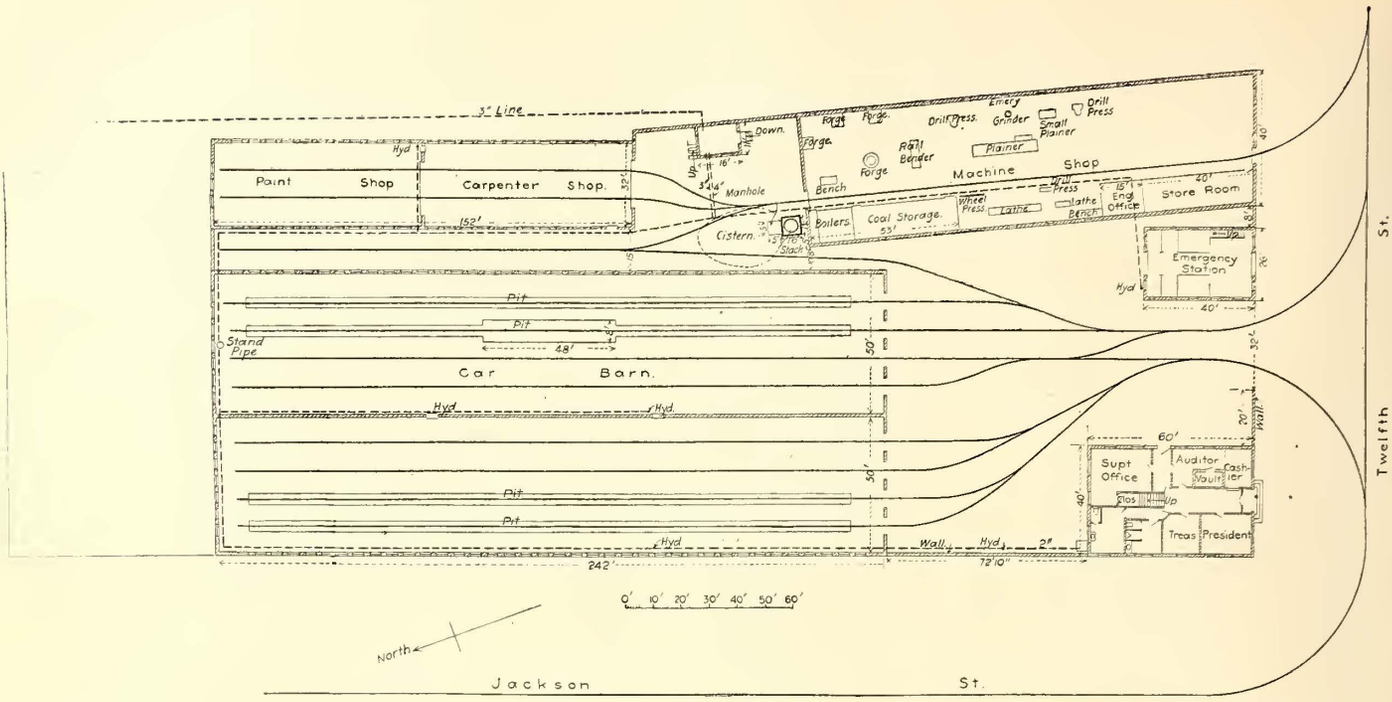
VIEW IN MAIN CAR HOUSE

BUILDINGS

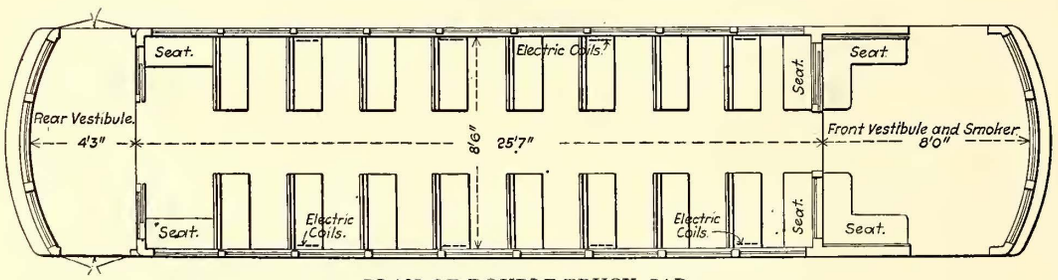
The shops, car house and offices make a remarkably fine set of buildings, as seen from the engravings. The company was fortunate in being close to a good supply of cement for concrete and also to Kaw River sand, which is excellent for making concrete. The buildings, as seen from the accompanying engravings, are all constructed of concrete blocks. These blocks are 12 ins. x 12 ins. x 24 ins., made of one part Portland cement to three parts Kaw River sand. The mortar used in building construction was one part cement to two of sand. These concrete blocks make very handsome as well as very substantial buildings. A view of the property showing the car houses, shops and offices is given on page 879. The roofs of the buildings are of the Carey composition roofing laid on 1-in. sheeting and supported on steel trusses. The yard is paved with vitrified brick laid on a 6-in. concrete foundation and grouted over the top with Portland cement. All large openings of car house and shop are provided with Wilson rolling steel doors. The small openings are closed with double standard fire doors.

Between the machine shop and the carpenter shop in the yard is a 6000-barrel cistern, into which all the roofs on the property are drained. This cistern is covered with reinforced concrete of sufficient strength to support the weight of cars or any wagon that may be driven over it. At the rear of the car house is a standpipe 32 ft. high and 3 ft. in diameter. An automatic electric pump maintains the pressure in this standpipe at from 30 lbs. to 60 lbs. per square inch, an air cushion being maintained in the top of the standpipe to keep up the pressure when the pump stops. The standpipe is connected with nine fire plugs, located about the building and yards, each of which has 100 ft. of 2½-in. hose. These provisions, in connection with the fireproof construction of the buildings, secure

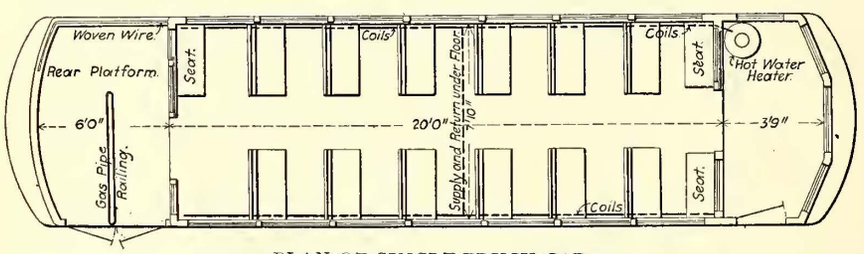
FREIGHT TRAIN AND ELECTRIC LOCOMOTIVE, TOPEKA



PLAN OF CAR HOUSE

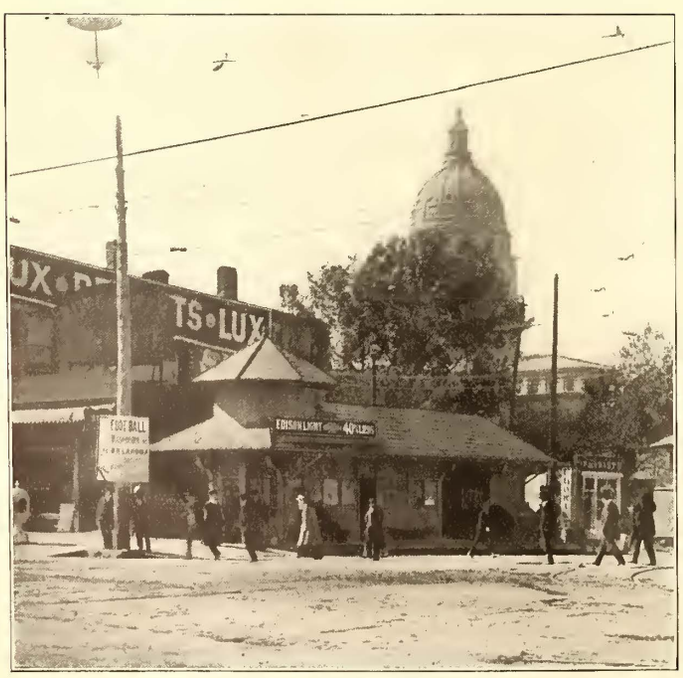


PLAN OF DOUBLE-TRUCK CAR

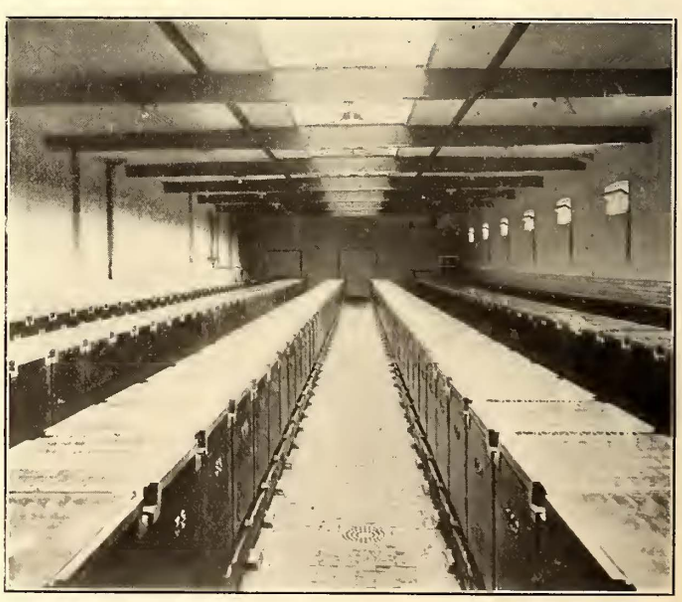


PLAN OF SINGLE-TRUCK CAR

a low insurance rate. The automatic electric pump is located in the basement of the oil house, and consists of a triplex Deming pump with a capacity of 300 gals. per minute, geared to a 25-hp G. E. motor. A home-made regulating device starts the pump automatically when the water pressure falls to 30 lbs., and shuts it off when it arrives at 60 lbs. The pump can maintain a fire pressure of 125 lbs. Above the pump room is the oil house, into the top floor of which oil is taken in barrels from a wagon driven up alongside the house. The barrels are hoisted with a block and tackle and run on a traveler into the house, where they are placed on racks and connected with pipes running to the floor below. The oil supply is obtained by the shop men from the faucets on the first floor, which practically does away with the waste which is usual with the



TRANSFER STATION AT STREET CORNER



RAILWAY BATTERY IN EDISON PLANT, TOPEKA, SHOWING GLASS COVERS AND NEAT TERMINAL-BAR ARRANGEMENT

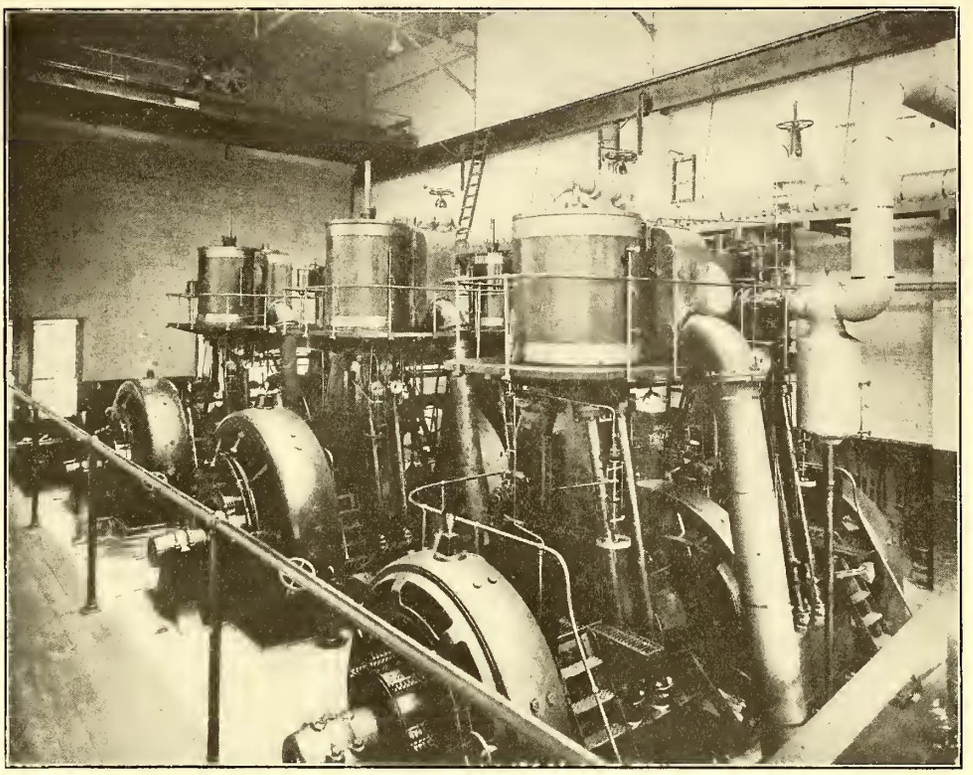
slip-shod methods of handling oil directly from the barrels.

A peculiar feature of street railway operation in Topeka is the transfer station at Eighth Street and Kansas Avenue, located between the sidewalk and the street. The company recently considered removing this transfer station, but so many protests were made against its removal, although it has no legal right on the street, that it was left. All the cars on the system, with the exception of one division, pass this point, and a large percentage of the transfers are made at this corner.

OPERATION

A headway of from 7 to 15 minutes is maintained on the nine city lines, which gives a headway of about 2 minutes on Kansas Avenue, the main thoroughfare. All cars are run on a time chart schedule, with regular meeting points on single track, except the cars on the Vinewood division, which are operated by the telephonic train despatching system, the despatcher being located in the assistant superintendent's office. The cars on this division are provided with portable telephones for receiving train orders.

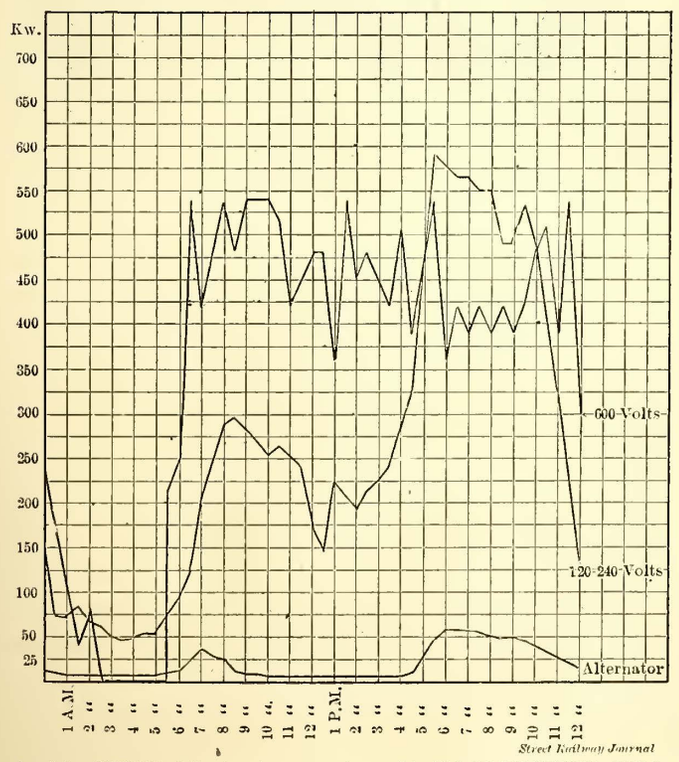
The company carries United States mail between the main postoffice and all of the sub-stations located in the city or suburbs, and also carries mail between Topeka and Oakland, a small town on a suburban line. Mail is carried on the regular passenger cars, each pouch bearing a tag which shows when received and when given up by each conductor, so that any delays can be at once located. Each conductor handling a pouch punches on the tag where the mail was picked up and the point where delivered, together with the time of each transaction.



THREE 500-KW RAILWAY UNITS IN TOPEKA EDISON PLANT

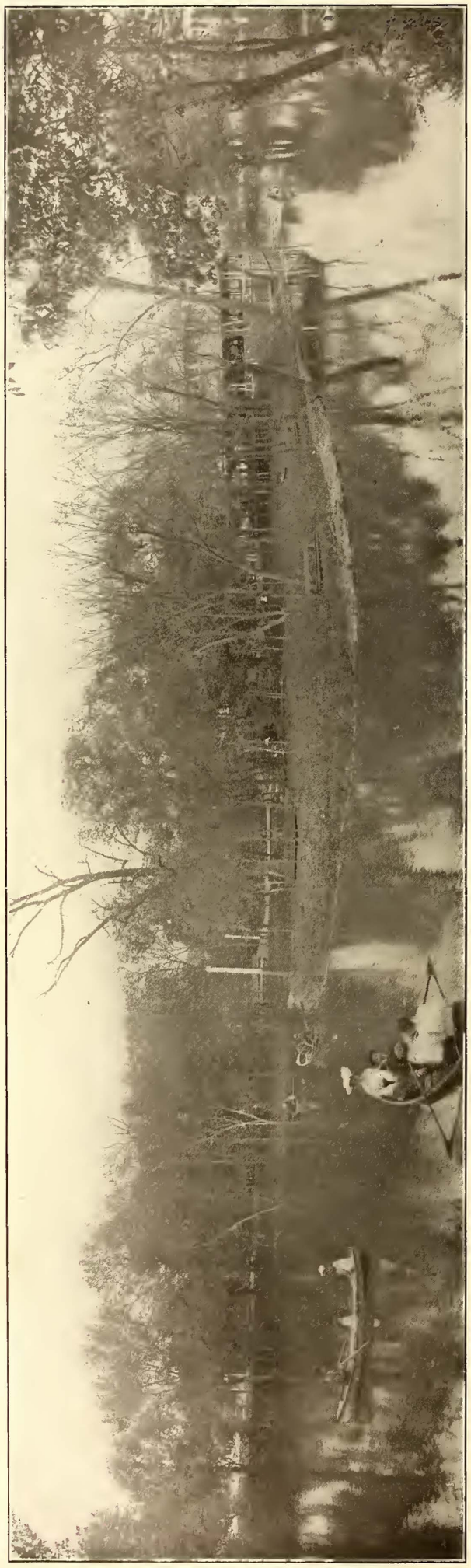
MUTUAL BENEFIT ASSOCIATION

The second floor of the company's office building is given to the club rooms of a Mutual Benefit Association, which is an unusual organization in a small city. The company bears the expense of maintaining these club rooms. They are provided with billiard and pool tables, reading tables, magazines, lockers, toilet rooms and shower baths. Only employees and officers of the company are eligible for membership in the association. In case of sickness, the association pays members $7 per week for fifteen weeks, or in case of injury from accident, $10 per week for ten weeks. In case of death, the member's beneficiary receives $50. The association maintains a reserve fund of



LOAD CURVE OF EDISON ELECTRIC ILLUMINATING COMPANY, TOPEKA, KAN., WITHOUT BATTERY ON RAILWAY LOAD

LOAD CURVE OF EDISON ELECTRIC ILLUMINATING COMPANY, TOPEKA, KAN., WITH BATTERY ON RAILWAY LOAD

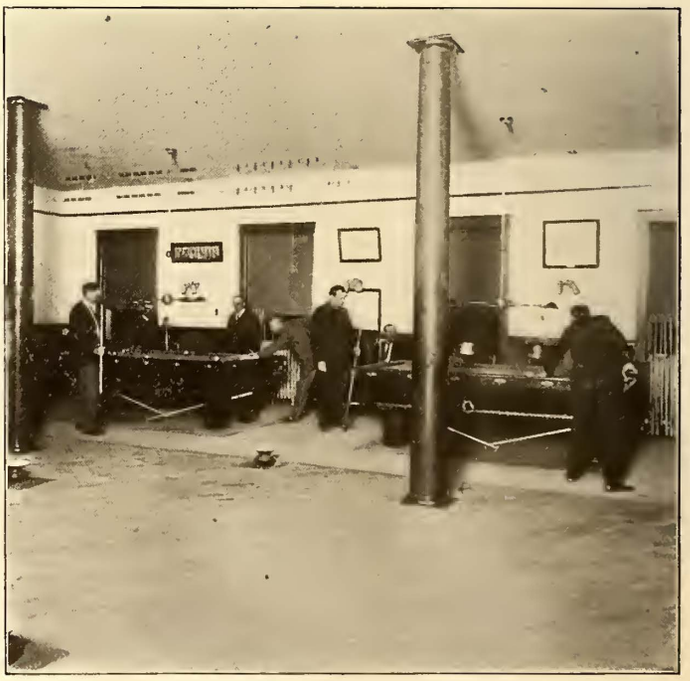


VIEW IN VINEWOOD PARK, TOPEKA

$200. Whenever this reserve fund is decreased by the payments of benefits, an assessment of 30 cents per month is levied on each member until the $200 reserve is reached, but for every

CHRISTMAS DINNER IN EMPLOYEES' CLUB ROOMS

EMPLOYEES' READING ROOM



EMPLOYEES' RECREATION ROOM

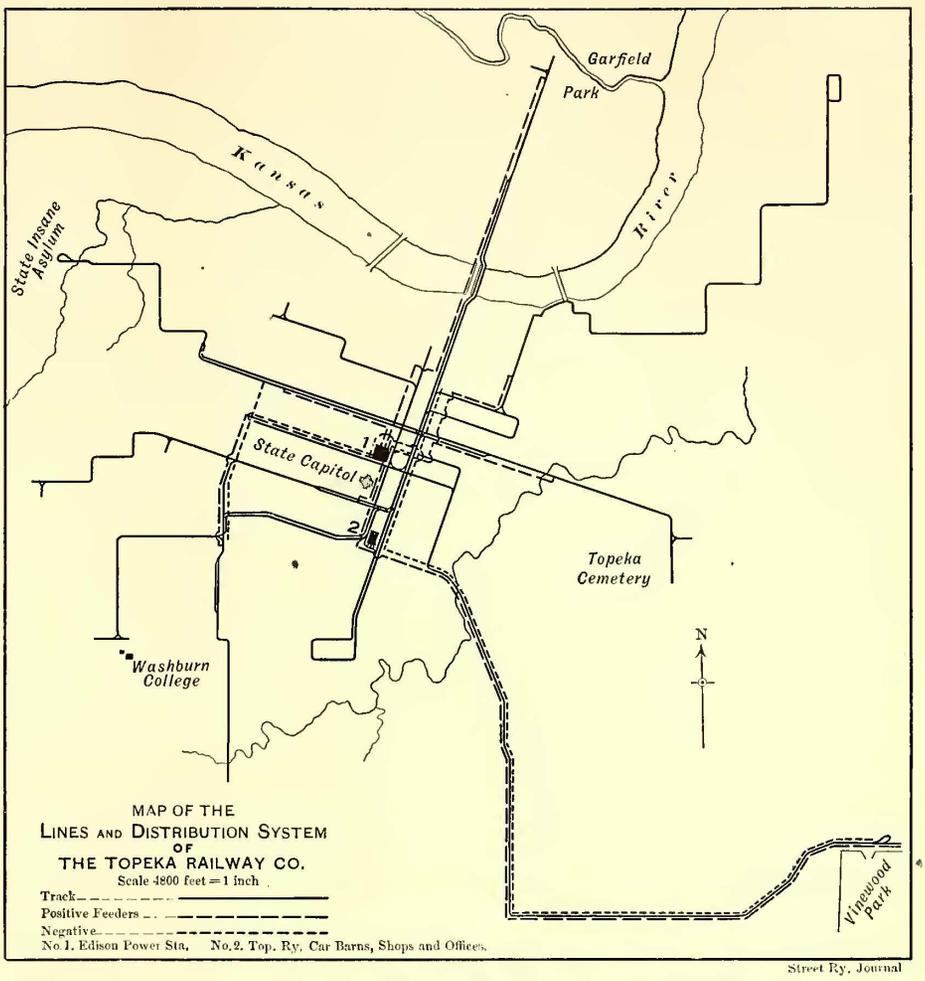
$1 paid by the members, the company contributes a like amount. There are ninety trainmen and thirty other employees, practically all of whom belong to the association. Five or six assessments a year take care of the payment of benefits. The president, vice-president, secretary and treasurer are chosen from the employees. The association is managed by a board of trustees, six of which are employees and three officers of the company. The members of the association are charged nominal fees for the use of billiard and pool tables and the use of bath rooms, and the money so collected goes into the fund of the benefit association. The association is a very desirable part of the company organization, not only on account of the insurance feature, but because of the opportunity it offers for employees and officers to become better acquainted. Entertainments are occasionally held at the club rooms for the members and their families, and the accompanying engraving shows a Christmas celebration held there.

FREIGHT TRAFFIC

By its franchise, the company is allowed to haul freight and delivers in carload lots from the steam roads to the factories and industries located on its street railway lines. It has a contract for hauling all the coal to the heating and lighting plant of the State Capitol Building. An average of ten cars of rock per day are hauled from the Vinewood quarry which is located near Vinewood Park.

VINEWOOD PARK

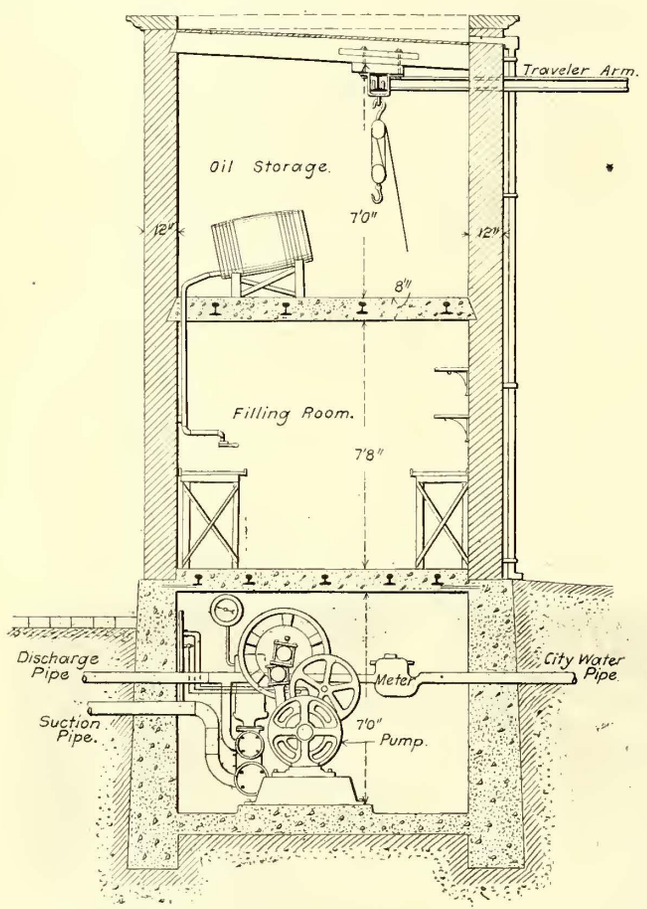
Vinewood Park, the only pleasure resort in the vicinity of Topeka, is a beautiful spot, located on a stream of water, the location of which, about 5½ miles from the city, is seen on the



Street Ry. Journal

SOUND-SHELL CONCERT AT VINEWOOD PARK, TOPEKA

map. There is a total of 375 acres in the property, 40 of which are improved for an amusement park. On the property is a quarry, which has a crushing plant with a capacity of 200 yds. of crushed rock per day. The park is not owned by the company, but by one of its officers. Admission to the park is free. The fare from the city is 10 cents one way. Among the artificial attractions forming the park equipment is a figure 8 toboggan and a large carousel made by the Philadelphia Toboggan Company. A very fine sound shell for use in giving open air concerts has been erected. The enclosure in front of this sound shell seats 1500 people. A summer theater built on the hillside seats 800 people. Besides this, there is a dance hall on the grounds, a café and an electric lighting plant driven by a gasoline engine. This plant supplies the incandescent lighting for interiors and decorative lighting, while the grounds are



SECTION OF OIL, LAMP AND PUMP HOUSE

lighted from sixty arc lamps off the trolley circuit. Two concrete dams in the stream flowing through the park make excellent lagoons for boating.

POWER SUPPLY

Power is purchased from the Topeka Edison Company, which is controlled by the same men as the railway. This company has a fine plant well equipped for taking care of both the commercial lighting and railway loads. There are three 500-kw G. E. 600-volt generators direct connected to compound vertical Buckeye engines for the railway service. A recent addition to the railway part of this plant is an 800-amp.-hour Gould storage battery with Gould booster arrangement, whereby the fluctuations of load are taken by the battery and a constant load is kept on the engines. A chart of the generator load "before and after taking" the battery is reproduced on page 885.

The battery room and arrangement of batteries is worthy of special attention. It is doubtful whether there is another battery room of this size in existence which is so free from fumes as this. Superintendent C. R. Maunsell, of the Topeka Edison Company, under whose direction the battery was installed, attributes this largely to the way in which each cell is thoroughly covered by a glass plate, as seen in the engraving of the interior of the battery room. The battery plate connecting bars are placed so low that the glass plate can cover the whole cell, with provisions for catching the drip from the corners of the plates. Each cell is insulated by porcelain insulators between it and supporting timbers. The supporting timbers are set on porcelain insulators mounted in turn on sulphur blocks. The floor is of vitrified brick.

ORGANIZATION

The Topeka Railway Company was organized in 1892, taking over the Topeka Rapid Transit Company and the Topeka City Railway Company. In 1903 the present management took hold and consolidated with it the Topeka & Vinewood Park Railway.

The reconstruction of this property was begun in August, 1903. The L. E. Myers Company, of Chicago, previous to that, had built under contract the Topeka & Vinewood Park Railway. Soon after the completion of this, Mr. Myers and associates bought control of the Topeka Railway and began its reconstruction. During the past summer the Topeka Edison Company was purchased by the same interests.

The officers of the Topeka Railway Company are: President, E. W. Wilson, Pekin, Ill.; vice-president and general manager, L. E. Myers, Chicago; secretary and treasurer, F. G. Kelley, Topeka; auditor, E. C. Flowers, Topeka; general superintendent, A. M. Patten, Topeka.

ELECTRIC LOCOMOTIVE TESTS IN SWITZERLAND

The following table gives the results of some tests on energy consumption recently conducted in Switzerland with the 45-ton single-phase converter electric locomotive built by the Oerlikon Machine Works and described on page 951 of the Street Railway Journal for Nov. 26, 1904. The values given are the averages of a large number of readings which were taken at the terminals of the trolley line at the primary station:

Speed		Weight of Train, Including Locomotive, in Metric Tons	Grade in Per Cent.	Energy Consumption in Kw
Kw per Hour	Miles per Hour			
42	25.0	45	0	90
42	25.0	45	0.8	139
37	22.9	120	0	90
37	22.9	120	0.8	129
32	19.8	160	0	190
32	19.8	160	0.8	235
30	12.4	250	0.8	320

As will be remembered, this locomotive takes current from an overhead contact line at 15,000 volts, and is equipped with a single-phase synchronous motor, direct connected to a d. c. generator, which drives the d. c. motors on the axles. The locomotive which is being given a test run had made up to Oct. 1, 4850 km (3031 miles), corresponding to 486,000-ton-km. During these tests no difficulties have arisen either with the locomotive or with the overhead line, in spite of the high voltage used.

In a recent article in the Street Railway Journal on the freight business of the Toledo & Western Railway, reference was made to the sugar beet industry along the line. This crop is now being moved and the company is delivering to the sugar beet plant at Blissfield, Mich., an average of 2000 tons a day. The finished product will soon give the company an increase over this business.

FROM A CONDUCTOR'S POINT OF VIEW

In the issue of the STREET RAILWAY JOURNAL for June 3, 1905, a number of suggestions received from a conductor on a large electric railway system were published. From the same source have been received the following suggestions, which may be of interest as showing how some of the operating details look from the conductor's point of view:

PAYING EMPLOYEES BY CHECKS

A number of roads pay all their employees by checks, but there is one serious objection to this method, inasmuch as many of the employees proceed at once to the nearest beer saloon to have the checks cashed. As a matter of fact, the saloon-keepers are always more accommodating than any other class of merchants about cashing checks, and the arrangement not only encourages employees to visit saloons, but also gives the saloon-keeper something of a hold upon the men. On roads that pay their employees by check, it might be well to permit each conductor to cash his own pay check as well as the checks of the motorman and other employees out of his day's receipts, and turn these checks into the car house in lieu of an equivalent amount of cash.

PROFESSIONAL MONEY LENDERS

Speaking of the matter of paying employees suggests the fact that in some localities the professional money lenders are coming to be detrimental alike to the interests of street railway companies and employees. These unscrupulous money lenders will take the last cent from a man, yet the various street railway managements unconsciously assist them in their nefarious dealings by posting orders that the company will not allow its employees to sign over their pay to professional money lenders. Every employee, even the best of the men, sometimes runs short of cash and is forced to go to the professional money lenders. These unscrupulous brokers are clever enough to know that the order acts as a boomerang, as the money lender can threaten to inform the company that the employee is dealing with them, in case he does not pay promptly the exorbitant interest demanded. Any company can break up the business of the professional lenders by permitting its employees, if they have a reasonable excuse, to draw a limited proportion of their pay from the company in advance.

COMPANY APARTMENTS FOR EMPLOYEES

Most electric railway companies have a certain amount of ground covered by car houses, and the suggestion is made that additional stories could be built over the car houses and utilized as apartments or flats for their employees. A company could afford to rent these apartments at reasonable cost to the men and at the same time pay an interest on the investment. It would be a good thing for the employees, and at the same time it would be advantageous to the company, to have its employees near their work where they could be easily reached in emergencies, as snow storms, etc.

CONTRACTS FOR EMPLOYEES

The question has been asked why would not it be good policy for electric railway companies to follow the practice of baseball managers and sign contracts for, say, two, five and ten-year periods with certain of their old and reliable employees. For instance, a company might make contracts of this kind with 10 per cent of its best men, binding them to give their services to that road for the given period, and in consideration of the contract the company might agree to pay a certain bonus to the contract men. This arrangement would give the new men something to work for, as they could be assured that after a certain period of service the company would make a contract with them, and they would therefore be sure of a good, steady place for several years to come. Of course, the advantage to the company would be that it would always have a certain proportion of its men under contract, and although perhaps all of the men would not feel under moral obligations to respect their contracts, a large percentage of them would respect their obligations and live up to the terms of their agreement.

EMPLOYEES AND THE CLAIM DEPARTMENT

An obviously important matter to the claim department is the names and addresses of the conductors and motormen. In case of an accident the claim department usually wishes to call the crew to the office and question them as to the details of the occurrence. On the other hand, it frequently happens that the claim department wishes to subpœna a crew that had an accident at some remote period, from one to five years back. The practice at present on many large roads is for the claim department when it wants the address of a crew to telephone the division superintendent, who looks in his address book (if he has one) and sends the desired name and address to the claim department. If the crew has left the employment of the company a lot of trouble ensues for the claim department if one of the crew has changed his address. When a man is hired in any capacity by an electric railway company, especially as a motorman or conductor, his name and address should be immediately sent to the claim department and kept on file, and if he is wanted at some future time he should be looked up from the claim office direct instead of advertising the fact throughout the division. In important cases, long pending and unsettled, the claim department could do a little follow-up work in this respect and keep track of the men it may require as witnesses by having an investigator every once in awhile visit the localities where the men reside and make cautious inquiries. By this means, if a certain former employee changes his address and is ever wanted as a witness, the claim department will be better able to locate him than it would if it waited until the last minute.

SUGGESTION TO DIVISION INSPECTORS

The inspector of an electric railway company who is detailed along a given route to help keep the cars running on their proper schedules can save himself considerable trouble if he will make out the schedules in the same form as is used in keeping a baseball percentage table, showing the relative positions of the various nines. He should have a book and use a separate leaf for each line, ruling the page with vertical and cross columns. At the top of the vertical columns should be written the run numbers, and down the left-hand side of the page should be written the numbers or names of the cross streets. Then, at the intersections of the columns, the time should be inserted at which each run is due at each of the cross streets. On a long line it may not be necessary to put in each cross street, but certain important points can be selected as timing points, and only these points indicated on the sheet. For the purpose of illustrating the idea, it might be assumed that the length of a given line is 120 blocks, requiring about 50 minutes to make a single trip. The timing point might be selected about every 30 blocks, and it would therefore take 12½ minutes to run 30 blocks, 25 minutes to run 60 blocks, 37½ minutes for 90 blocks and 50 minutes for the entire trip of 120 blocks. The inspector, located at one of the timing points, asks the motorman of each car as it approaches what his run number is, and the inspector, by running his eye down the column for the given run number to the point of intersection corresponding to the timing point at which he is standing, can tell whether the car is on time or not. This matter will also be expedited if each car carries the run number upon which it is operating, on a small tin or wooden tag hung on the dashboard or under the hood, and then the inspector does not have to ask the motorman what run he is working on. The practice of indicating the run number on the car is especially convenient if the regular motorman happens to be off and a new man is on the run.

CORRESPONDENCE

OVERHAULING BY MILEAGE

UNITED RAILWAYS COMPANY OF ST. LOUIS

St. Louis, Oct. 20, 1905.

EDITORS STREET RAILWAY JOURNAL:

Your request for information in regard to keeping records of mileage and the number of miles allowed for the different motor equipments, for the guidance of the repair shop, the system of repairs and inspection used in taking care of the car equipment of the United Railways Company of St. Louis, is received. Each type of equipment is allowed to make a certain mileage before being brought in for general overhauling. The following table shows the mileage allowed:

	Miles
Cars equipped with four G. E. 54s, in oil and grease	12,000
" " two G. E. 57s, in grease	5,000
" " two G. E. 57s, in oil	8,000
" " four G. E. 57s, in oil	12,000
" " two Westinghouse 56s, in oil	8,000
" " two Westinghouse 56s, in grease	6,000
" " four Westinghouse 56s, in oil	12,000
" " four Westinghouse 95s, in oil	35,000

Notices are sent to foremen when the mileage approaches the above limits. The mileage of each car for every day is taken from the daily car register report. This card shows the times at which the cars are put in and taken off service, and consequently hours run per day. As the miles per hour made on each particular line is known, the total mileage for car

35,000 miles - Oil

MILEAGE RECORD. Equipment 4-Inch 95 motor

- 1905 -

CAR NO. 2572

Brand 16,4?5	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT.	OCT.	NOV.	DEC.
1		3179	6473	9945	15110	18343	21060	24834	28458	31687	
2	164	3454	6594		15792	18465	21245	24969	28573	31754	
3	787	3374	6683	9958	15417	18510	21333	25095	28673	31913	
4	466	3444	6857	9971	15516	18751	21504	25717	28775	31980	
5	555	3618		10008	15697	18800	21610	25338		31965	
6	598	3787	6947	10035	15764	18876	21658	25491	28851	32084	
7		3901	7007	10216	15919	18867	21738	25634	29003	32466	
8		4030	7065	10402	16039	18947	21934	25706	29076	32645	
9	665	4109	7242	10617	16174	19068	22084	25900	29160	32716	
10	709	4197	7380	10617	16256	19180	22233	25990	29218	32806	
11	769	4415	7559	10784	16478		22388	26116	29343	32933	
12	897		7664	10941	16587	19290	22584	26217	29456	33003	
13	1071	4587	7690	10954	16608	19415	22717	26288	29580	33114	
14	1240	4586	7814	10967	16794	19587	22908	26483	29737	33275	
15	1346	4703	7991	11148	16961	19653	23091	26559	29895	33363	
16	1469	4887	8168		16909	19734	23212	26714	30009		
17	1549	5046	8194	11185	17034	19798	23289	26794	30051		
18	1713	5275	8381	11291	17147	19931	23567	26871	30275		
19	1767			13381	17278	20043	23679	26918	30363		
20	1936	5394	8407	13548	17287	20149	23692	27043			
21	2009	5467	8559	13561	17439	20268	23817	27196	30530		
22		5516	8704	13714	17564	20307	23902	27332	30655		
23	2178	5704	8877	13900	17577	20432	24096	27448	30747		
24	2246	5855	8917	14081 X		20460	24177	27548	30931		
25	2304	5980	9089	14248	17591	20533	24225	27761	31001		
26	2483			14429	17654	20547	24307	27804	31139		
27	2601	6075	9196	14571	17775	20633	24378	27915	31250		
28	2694	6254	9374	14693	17861	20646	24436	28016	31417		
29	2800		9537	14819	17974	20771	24513	28077	31498		
30	2918		9700	14979	18099	20896	24611	28179	31566		
31	3006		9800		18271		24770	28313			
Total											57577
Due											"
3											"
4											"

FIG. 1.—MILEAGE RECORD CARD MADE UP FROM DAILY CAR REGISTER REPORT

and day can easily be calculated. As it is necessary for the auditor to have the number of miles made by each car every day for his own records, there is no extra expense attached to this method in getting the mileage for use in overhauling cars.

On the mileage record card, Fig. 1, you will find that car No. 2572 has made 33,363 miles up to and including October 15. This record is made up from the daily register report in the way described. This card shows that the car was first overhauled in 1905, on May 24, which is indicated by the cross (drawn in red ink). This symbol means that the car was overhauled as to all four motors. The car ran 18,425 miles in 1904, since its previous overhauling, as shown in the upper left-hand corner by the word "forward," and as it had run 17,577 miles in 1905, making a total of 36,002 miles, the car had run its limiting number of miles. When only one motor is overhauled, on account of defective armature, etc., it is shown by using the figure 1-2-3 or 4 for whichever motor it happens to be.

Now, the mileage made by car No. 2572 up to May 24, during 1905, was 17,577, and as we allow this car to run 35,000 miles,

J 55.

THE FOLLOWING CARS WILL BE DUE FOR BEARINGS, OR WERE OVERHAULED ON DATES AS GIVEN. X MEANS BOTH ENDS.

Car No.	Date	Ends	Car No.	Date	Ends

FIG. 2.—SHOWING FORM SENT TO THE SHOP FOREMAN WHEN CAR IS DUE FOR AN OVERHAULING

as stated in the previous table, this car will not be due for overhauling on all four motors until it has run 52,577 miles, providing nothing happens to the armature, or some other trouble comes up which would necessitate the bearings being taken out of that particular motor.

You will note on the bottom of the mileage record card, in Fig. 1, spaces for four horizontal lines on which are shown when each motor is due for overhauling. Whenever a car reaches this mileage limit a notice is sent to the shop foreman on a printed form, Fig. 2. This blank is filled in with the car number, date when due and the ends to be overhauled. When this notice is received it is understood that the car should receive a general overhauling—that is, the car body should be raised up, the trucks run out, the motors opened up and cleaned, the fields tightened; the pinions, gears and all other electrical parts of the car as well as the trucks and car body receive a thorough inspection. In other words, when a shop foreman receives a notice from the office to overhaul a car on all motors, it means that the car shall not be defective in any way, shape or form when finished. This notice is also used by the shop foreman to notify the master mechanic's office whenever he puts new bearings on a car.

In addition, each car is run over the pit on an average of every four days and given a general inspection, when any defects are attended to at once. If the nature of the defects should prove to be such that repairs cannot be made in time for the car to go out on its regular run, the car is then marked on the board to be held in until all defects are remedied and the car is in proper shape to go on the road. Besides this general inspection every four days, we have repairmen who are specialists in their particular part of the work. For instance, the men going over the controllers carry a small book with all the car numbers of the division, and as they go over each controller its number is checked off. In this manner they

can see at a glance which is the next car to work upon. Our plan is to do the work systematically, so that those parts that are subject to wear will receive attention in proper time. In the writer's opinion, there is a decided advantage from the repair shop standpoint in keeping the individual mileage record of each car. M. O'BRIEN, Master Mechanic.

A WORD IN REPLY

New York, Nov. 6, 1905.

EDITORS STREET RAILWAY JOURNAL:

I have noted with some interest the comments called forth by my communication in the STREET RAILWAY JOURNAL, issue of Oct. 21, on the subject of the New Haven road's decision to adopt alternating-current locomotives for equipment and operation on the New York and Stamford division.

One of my critics says that I don't know, another that the possible future benefits may warrant any present inconvenience, and a third has it that the New Haven road may "fly the coop" and abandon the Grand Central Station.

All very interesting, no doubt, but somewhat wide of the mark, and I recommend to those who disagree with my conclusions a second and more careful reading, keeping in mind the specific existing conditions, before retiring with too much modesty behind a curtain of reluctance to publicly discuss engineering questions of great public interest, or losing themselves in shadowy speculations of a coming electrical millenium.

With all due respect, I beg to say that I see no reason to change my expressed convictions as to the general character of the decision announced by the New Haven people, even if pleading guilty to being "unfamiliar with the up-to-date development of electric locomotives"—especially the unfulfilled promises—of which defect in my engineering equipment I am, of course, painfully aware.

Despite my critical attitude, which seems to have given some concern to a few people, and which time will show whether justified, I am beginning to believe that I am a better friend of rational a. c. development, applied in a rational way to railway operation, while maintaining that the limit of d. c. operation is by no means reached, than a majority of those who sing its praises on a single strident but oft-times unmusical note—even if I am unwilling to see its present injection into the densest section of the train movement of two great railway systems, with almost inevitable adverse consequences.

Nor is it fair to the alternating-current system itself.

A proverb says:

> "A prudent man seeth the evil, and hideth himself;
> But the simple pass on and suffer for it."

What a lot the future holds for some of us!

FRANK J. SPRAGUE.

A GOOD WORD FOR GREASE

ST. FRANCOIS COUNTY ELECTRIC RAILWAY COMPANY

Farmington, Mo., Oct. 30, 1905.

EDITORS STREET RAILWAY JOURNAL:

Apropos of the discussion on changing over motors built to lubricate with grease in the armature bearings, so that oil can be used, the writer wishes to put in a word in favor of grease. In the writer's opinion there are at least two serious objections to the use of oil in the older forms of motors. These objections are the difficulty of obtaining satisfactory feeding and the obstacles in the way of getting (in practice) shop men to give proper inspection and attention to bearings and motors.

Take, for instance, the GE 800 motor. We all know that this motor is not easily changed so that oil can be used in the armature bearings, because there are no oil wells under the bearings. With this motor, therefore, it is necessary to employ an oil cup which will fit into the old grease box. To avoid splashing of the oil over the top, especially on city lines, the cup should have a cap to screw on the top, as the grease box cover is not sufficient. With a closed oil cup of any kind it is practically impossible to obtain regular feeding, because the motion of the car and the consequent splashing of the oil will upset the best of regulators. If the feeding device feeds too slowly, dirt and dust will accumulate at the end of the bearing, forming a black, gummy paste that will in time stop the flow of oil. The outcome of this is "rewind the armature." If enough oil is allowed to pass to the bearing to remove the dirt and keep the bearing clean, then there is a waste of oil which will amount to more than it would cost to keep a good attentive man to put in grease.

The GE 57 and West. 56 motors are more easily changed for oil lubrication by using some form of felt oiler, or by placing one or two layers of felt in the bottom of the grease box and a small piece of felt in the grease slot. Some master mechanics use charcoal on top of the felt, but it is a question if this is safe. Others use wool waste on top of the felt and pour the oil on top of the waste. Then the questions arise, shall a light or a heavy oil, or a cheap grade or a costly grade be used? But no matter what oiling device or what grade of oil be selected, it is the writer's experience that the oil will work into the motors. It will be thrown onto the brush holders, causing the dirt and carbon dust to accumulate on the brushes and holders in the form of a gummy paste that will soon cause trouble. Then some oil is bound to work into the armature insulation and cause slight grounds and short-circuits, materially reducing the efficiency of the motor.

The statement is frequently heard, "We have used or are using oil in the older styles of motors and have greatly reduced the cost of lubrication." In these cases the writer is prone to question: "No, it may not cost so much for lubrication, but do you know it is not costing more power than it did owing to oil-impregnated armatures? Are you using more armature and field material? Are your brush holder springs burning off any more than they did when you used grease?" These questions must all be considered carefully. We may equip three or four cars with oiled bearings, run them a while and say, these cars are doing well, we will equip all of our 500 or 1000 cars, as the case may be, for oil lubrication. But the point is, can the same attention and inspection be given the entire equipment that were given the three or four cars under test? The same care can be given, but under ordinary every-day conditions will it be given?

It is the writer's experience that where oil lubrication is attempted on the older forms of motors more men will be required to keep the inside of these motors free from dirt, especially around the brush holders and commutators, than when grease was used.

It will also be said that the bearings run longer with oil, but will the entire electric equipment run longer? It costs more to rewind an armature or field than it does to put in a new bearing.

On interurban roads where better inspection is possible and where the conditions are entirely different, oil lubrication is probably the proper solution, but on the average city system the writer believes that the motor built for grease and run with grease will in the end be more economical than the motor built for grease and run with oil. J. L. SULLIVAN, Master Mechanic.

Questions submitted to the Indiana Railway Commissioner indicate that the next Legislature will be asked to enact a law requiring interlockers at all crossing of steam roads and electric lines in the State, also to secure legislation that will result in compelling steam railroads to turn over to electric railways loaded freight cars for transportation over electric lines.

MEETING OF THE OHIO INTERURBAN RAILWAY ASSOCIATION

The Ohio Interurban Railway Association opened its winter campaign with a meeting at Columbus, Oct. 26. About fifty members were present, roads in West Virginia, Michigan and Indiana, as well as Ohio, being represented. It was decided to hold the next monthly meeting at Youngstown, in order to increase the interest in the association among the roads of Northeastern Ohio and Western Pennsylvania.

President E. C. Spring reviewed the work of the previous campaign and stated that, although a great deal had been accomplished, he felt that the association had reached a critical stage. He thought that while many innovations of mutual benefit could be worked out under present methods, the aims of the association could best be subserved in following the example of the national association in the formation of a permanent organization with a salaried secretary, who could handle the increasing work of the interchangeable transportation committee, compile data and information, and work out plans for bringing before the public the advantages and possibilities of travel by electric roads. He thought that such a permanent organization could be made self-supporting, or practically so, by the publication of an official organ, together with time-tables, maps, guides, etc. He stated that the matter had been thoroughly discussed at the meeting of the executive committee the evening before and that it had been decided to send a circular letter to the various companies to ascertain how many would agree to support this movement until it could be made self-maintaining. It decided that each company should be asked to guarantee a maximum of $50 within a year, to be paid in instalments of $5 a month each. An effort will be made to induce Michigan and Indiana roads to co-operate in the plan, and it will be decided upon at another meeting.

The transportation committee reported that six companies had entered into the interchangeable coupon book agreement since the last meeting. Reference to these additions have been made from time to time in these columns, the Indianapolis & Eastern and the Lake Erie, Bowling Green & Napoleon being the latest acquisitions. The books are now good on 1816 miles of roads—1138 in Ohio, 571 in Indiana and 170 in Michigan. A number of additional roads in these States have signified their intention of signing the agreement after the first of the year. The chairman is in correspondence with the various roads, parties to a similar arrangement in Northern Illinois, and it is believed that these roads will readily agree to join hands with the stronger movement. There are now 3800 books in use in Ohio, 1900 in Indiana and 400 in Michigan. One company, the Springfield & Charleston Traction Company, has withdrawn from the agreement by order of the court, in whose hands it is, but aside from this, all the roads are pleased with the arrangement and find that it has increased their business. Steps have been taken to advertise the book in certain periodicals read by traveling men, and the Associated Press has agreed to make mention of new roads entering the agreement in its railway reports.

The chairman of the committee urged that the various roads, parties to the agreement, make their exchange reports to each other on or before the 5th of the month, as provided for in the contract; certain roads having failed to do this, causing some dissatisfaction and annoyance.

The treasurer reported all debts paid and a good balance on hand.

F. W. Coen, representative of the association at the Philadelphia convention of the American Street and Interurban Railway Association, reviewed briefly his impressions of the convention, which he stated was the most successful and most interesting gathering in recent years. He expressed the opinion that the greater prominence given to subjects of interest to interurban operators, together with the formation of a permanent organization, were responsible for this. He dwelt at some length upon the appointment of an insurance committee and the work already accomplished in the line of mutual insurance, and suggested that a committee be appointed to investigate this matter for the Ohio Association. The chair later appointed F. W. Coen, Theodore Stebbins and R. E. DeWeese to serve on this committee.

Henry N. Staats, secretary of the mutual insurance companies formed in Cleveland, and which have been referred to on a number of occasions in these columns, outlined their plans. As an example of the importance of this insurance proposition to all traction companies, he said that Henry J. Davies, secretary of the Cleveland Electric Railway, had recently corresponded with traction companies all over the country, inquiring the cost of insurance and the fire losses for a period of ten years. Some 420 roads replied giving tangible information, from which it was deduced that these roads had paid out $6,485,645 in premiums and had recovered $1,673,285 from fire losses in ten years, the per cent of recoveries to premiums being 27.66 per cent. "And yet," said Mr. Staats, "the old-line companies have had the temerity to tell you they have been insuring street railway properties at a loss." He said that 25 per cent of the premium went to the agent who carried the contract from his office to the street railway company's. The new mutual companies, he said, would issue policies at 1 per cent of the valuation, and he thought this would be reduced to half that amount after they were fully organized. Twenty-seven companies, some of them the most prominent in the country, have agreed to give all or part of their insurance to the traction mutual companies, and he said they expected soon to have sufficient guarantees to make the plans operative.

Judge E. P. Mathews, of Dayton, was appointed chairman of the legislative committee in place of the late Dr. J. E. Lowes, of Dayton.

Prof. E. P. Roberts, of Cleveland, invited members to visit the new club rooms of the Cleveland Electric Club, Schofield Building, that city, and to attend its monthly meetings and smokers while in that city. Prof. Roberts has just been elected president of the organization and has instituted an enthusiastic campaign for building up the club. Prof. Roberts also suggested that Ohio members investigate and inquire into the development and the merits of gasoline and oil engines for traction service. He predicted that there would be interesting and important developments in such lines in the not distant future.

A part of the noon intermission was devoted to inspection of certain new lines of material exhibited by supply men. W. P. Caspon, of the Garton-Daniels Company, showed the automotoneer and a number of specialties; W. E. Hinmon, of the Ohmer Fare Register Company, exhibited the Ohmergraph transfer issuing machine and the latest Ohmer register for interurban roads; while Murdock MacDonald, of the MacDonald Ticket & Ticket Box Company, Cleveland, showed an improvement on the MacDonald cash-fare receipt system which is in use on a number of Ohio interurbans.

AFTERNOON SESSION

The afternoon was to have been devoted to a discussion of the subjects: "What should be the proper width of interurban cars in order to give passengers the same comforts which they receive on steam roads?" "What should be the space between seats and width of aisles?" "What should be the width of devil strips between tracks on city and interurban lines?" "What is the best track construction on paved streets." But the session was cut very short in order to accept an invitation to inspect the line of the Scioto Valley Traction Company. The matter was put to a vote and passed by a small margin, but there was considerable dissatisfaction, especially from those who came from distant points, with the general proposi-

tion of breaking off the work of the association to take in what are frequently purely pleasure trips and social functions. In this case, however, the time was well spent, as the line in question is the only third-rail line in the State, and is considered to be one of the best built and best operated roads in the country.

E. P. Roberts opened the discussion on the subject of the width of cars. He said that while it was desirable to standardize car widths, there occurred to him three important points to be considered: First, the width permissible due to municipal restrictions; second, the methods of making use of the available space to provide for different kinds of service; third, the cost of grading on interurbans and the cost of paving on city streets.

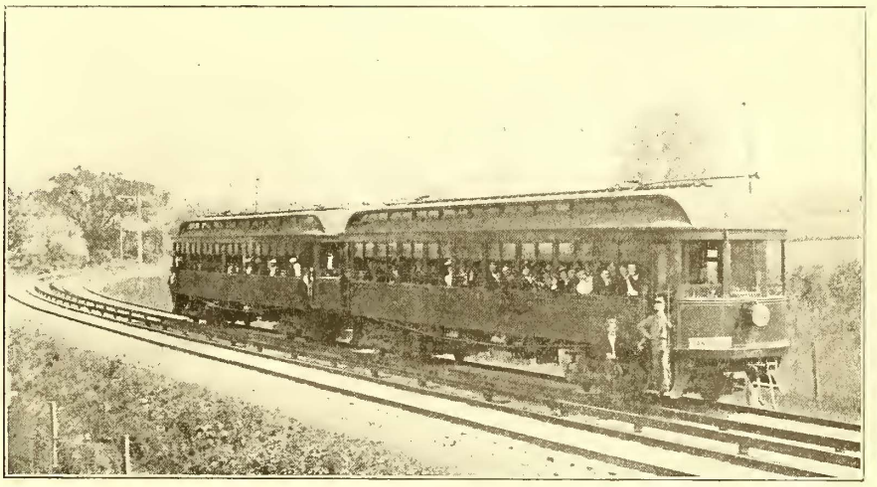
On the first point it was generally the rule to get as wide a strip as possible in the cities, although sometimes city companies declined to take all they could get on account of increased cost of paving. He thought interurbans might well help to pay for increased width of devil strips in cities. As interurban lines become longer and interline traffic greater, there is more and more complaint of uncomfortable and narrow seats. He thought interurban companies should design a different type of car for the long limited runs than for the local runs. He referred to the chair cars in use on some roads, but the objections to these is that they limit the seating capacity. The long-distance cars should have wide and deep seats, high roll backs and tilting cushions so that passengers will not tend to slide off from seats. Arm-rests he thought desirable, and for this class of travel he thought there was no objection to cutting down the aisle-space to the smallest possible degree in order to make the seats wider and more comfortable. There should be plenty of knee room and seats against partitions should have a slanting back as well as other seats; the space left by this slope could be used for storing card tables or other accessories. Seats should not be too high from the floor and there should be foot-rests. For local and short-haul traffic, he said the seats should be narrow and the aisles wide. Low back seats were more desirable than high back for such runs, as they afforded a maximum seating capacity. There should be no arm-rests and the backs should be hollowed out to afford free passage in the aisles. There should be longitudinal seats near the doors so that a number of passengers could stand there. This would also effect quick loading and unloading. He referred to a car which his company is designing for one of the most prominent high-speed roads in the country. This car will be 9 ft. wide over all and 8 ft. 6 ins. over sills. The seats will be 35 ins. center to center, 35 ins. from inside of panel to edge of arm-rest; cushions, 17 ins. x 35 ins.; corrugated backs, 26 ins. high; aisles, 19 ins. wide. The cars will have a smoking compartment, toilet room and washstand and a small baggage compartment, and will be 60 ft. long.

J. C. Gillette, master mechanic of the Columbus, Delaware & Marion Railway, said they had some cars which had 36-in. seats and very narrow aisles. On these the eaves and drip board had been dispensed with. The windows came down almost flush with the car seats, and the bodies are 4 ins. narrower at the sills than at the windows. These cars are 67 ft. long.

Further discussion was interrupted by the adjournment for the Scioto Valley trip.

THE SCIOTO VALLEY TRIP

General Superintendent S. S. Bradley, assisted by his master mechanic and his passenger agent, was in charge of the car. Each of these gentlemen took particular pains to point out the most interesting features of operation and construction, so that the trip was the source of a great deal of valuable information for many. This property was quite thoroughly described in the STREET RAILWAY JOURNAL of Dec. 3, 1904, and the large and well-equipped power station and the substantially built roadbed and third-rail construction, which were profusely illustrated in that number, were the subjects of many favorable comments. The line has recently been extended from Circleville to Chillicothe, and this work, which was done by the company under the supervision of Mr. Bradley, is even better than the old. The roadbed is graded 16 ft. wide, and from 20 ins. to 30 ins. of excellent gravel is placed under and around the ties, covering the ends. This piece of track, which has been in use less than sixty days, was in beautiful condition, and the managers all agreed that it was as fine as any they had ever seen on an electric line. The road has many long tangents and the cars equipped with four 125-hp motors make better time between terminals than the steam road which closely parallels the line. New station buildings have recently been erected in all important towns. They were designed for the future, the machinery rooms having space for two 400-kw rotaries and controlling apparatus, and there is a large passenger waiting room with ticket office, and an unusually large freight and express room with unloading platforms for cars and teams. The buildings are of natural colored brick with concrete foundations and floors and tile roofs. It was figured that it was economy to erect buildings of this character and carry no insurance on them rather than to build frame station buildings, making insurance necessary. The cost of third-rail maintenance as compared with overhead interested many, and Mr. Bradley stated that thus far it had cost less to maintain the entire third-rail and high-tension systems than the 1½ miles of trolley line in village streets. As to removal of snow and ice, he admitted that they had discovered no absolutely reliable method of keeping the third rail clear in certain kinds of weather, but the road was only tied up once for a period of 30 minutes last winter.



TWO-CAR TRAIN ON THE SCIOTO VALLEY TRACTION COMPANY, CARRYING MEMBERS OF THE OHIO INTERURBAN RAILWAY ASSOCIATION ON INSPECTION TRIP

Motormen on this line are all old steam locomotive engineers, a number of them from the parallel steam road. They are paid 25 cents an hour, and conductors 20 cents. The plan of promotion by order of seniority has been dispensed with; in fact, all runs are equal, as they are changed regularly. A man starts early in the morning for one period of two weeks and then starts in the afternoon and works until late at night, and the men are shifted from one division to another at regular intervals. This eliminates all dissension and the men are all on the same footing. Mr. Bradley claims they are well pleased

with this arrangement after they become accustomed to it. Steam rules are followed as closely as is practicable. Orders are issued in duplicate on tissue paper, and the orders are complete, no abbreviations being used.

It will be remembered that the road has two divisions which join 12 miles out of Columbus. Formerly the cars of the two divisions ran in and out of the city 5 minutes apart, but now they are brought into the city in trains, and frequently three cars are hooked together. The sight of three big 60-ft. cars running through the narrow streets and into the business district of the city was one which excited the admiration of the managers. The cars have type M controllers, with Westinghouse straight air brakes and VanDorn couplers with 9-ft. beams, so that they make the right angle curves in the city without difficulty. In increasing the service for summer traffic, Mr. Bradley believes it is much better to operate cars in trains than to give half-hour headway, and it was pretty generally agreed that the cars on the half-hour usually run light, while those on the hour are crowded. People do not become accustomed to the half-hour cars until they have been on for a number of months, and then when they are taken off in the fall there are complaints, so it is better not to put them on at all. With train operation, the labor cost is, of course, reduced, although Mr. Bradley makes it a practice to have a conductor on each car. This not only increases the safety of operation, but insures getting all the fares. Bell ropes are not carried through the trains, and while it takes a few seconds more to ring two or three bells, there is not the liability of accident.

The company is just preparing to take up the freight proposition and it is building a passenger and freight terminal in Columbus. It is located in the wholesale district, and it will have ample room for loading and unloading a number of cars. When this is completed the company will entirely abandon the use of the interurban loop which traverses the heart of the shopping district and which is responsible for a great loss of time and excessive wear and tear on equipment. For freight service it is the intention to install a number of box-car trailers, which will resemble the interurban cars by having windows and steam road roof.

The passenger business thus far has proven most gratifying, and it is believed the freight business will place the property on excellent paying basis. The company has never sold any of its bonds and will not do so until the property is more thoroughly developed.

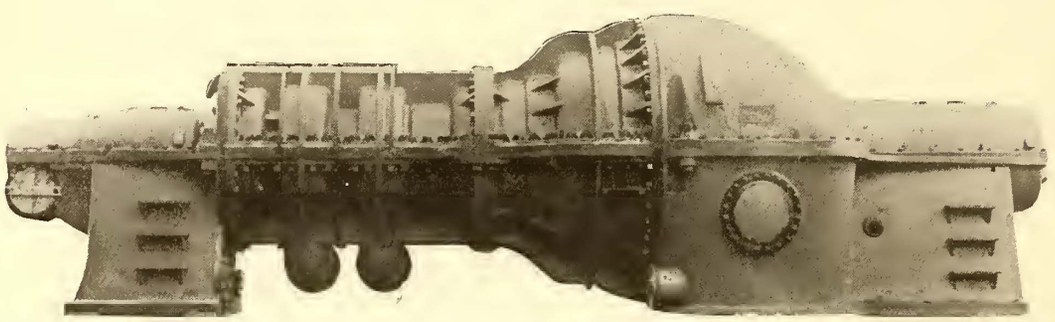
The Indiana Supreme Court has decided that a baseball park owned by an interurban traction company in connection with a pleasure resort, and communicating with it by gates, through a high board fence, used for playing baseball on Sunday, requiring persons to purchase tickets for the privilege of passing through said gates and sitting in the grand stand to watch the game, in preference to standing at the two sides of the park where there is no fence, and for the privilege of which no fee is charged, is a violation of the law prohibiting the playing of baseball on Sunday where an admission fee is charged.

9000-HP STEAM TURBINE FOR BROOKLYN

The sixth of the huge power plants to be constructed for the Brooklyn Rapid Transit Company will show, in some respects, a radical departure from the features usually found in stations where reciprocating engines are installed. Among the more important of these is the small floor space needed for the machinery. The engine room of the ordinary station requires 60 per cent of the total ground space, and the boiler section 40 per cent. In the new turbine plant, the turbine floor occupies but two-thirds the space required for the boilers.

The Brooklyn Rapid Transit Company's new Williamsburg station is designed to accommodate a total of nine steam turbine and generator units, three of which are now being installed. One of the most interesting of these is the Allis-Chalmers 9000-hp unit. A view of the body of the turbine, as it appeared when loaded on a 36-ft. flat car for shipment from the West Allis works of the Allis-Chalmers Company, is shown in the accompanying illustration.

The turbine is of the horizontal multiple-expansion, all-around parallel-flow type, generally known as the Parsons type, operating at 750 r. p. m. The generator is a Bullock alternating-current machine, built by the Allis-Chalmers Company at its Cincinnati works. It will carry 25 per cent overload continuously and 50 per cent overload for three hours with but small temperature rise.



9000-HP STEAM TURBINE FOR WILLIAMSBURG STATION OF BROOKLYN RAPID TRANSIT COMPANY

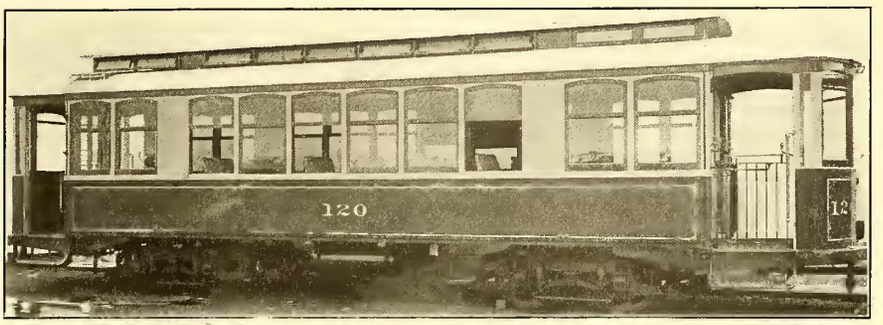
A noteworthy feature in the construction of the Allis-Chalmers turbine is the blading; the blades are made of a special alloy and of such form and dimensions as will secure the highest economy. The individual blades are mounted in groups, each group forming one-half of a circular row. The inner ends of the blades are swaged, firmly secured in accurately spaced slots in foundation rings and riveted in slots in their respective channel-shaped shrouds. The blade rings are secured by special calking strips in accurately machined grooves in the cylinder and rotor, thus absolutely insuring against throwing out due to centrifugal force. The channel-shaped shroud secures the blades in a substantial manner at the proper angle and spacing, and eliminates the danger of stripping, permitting the turbine to be safely operated with a minimum radial clearance. This special design of blading does away with hand work. The machine construction insures great strength, perfect alignment and uniformity in the spacing of the blades. Having adopted the proper working principle, the efficiency of a steam turbine depends on the accuracy of the angles, the spacing and the form of the blades. All of these factors are obtained in the construction of the Allis-Chalmers turbine.

The lubricating arrangement is free from complications, complete and efficient. It is equipped with a direct-acting steam pump for use on starting up the turbine. The turbine and generator rotors are direct connected by a flexible coupling, each being carried in two bearings of the ball and socket type. In the generator design especial attention has been given to thorough ventilation.

The turbo-generating unit measures approximately 47 ft. in length over all. 13 ft. 3 ins. in width and 11 ft. 6 ins. in height above the engine room floor. Its height above the foundation is scarcely more than that of the low-pressure cylinder of a reciprocating engine, of equal capacity, above the upper platform, and such cylinders are frequently more than 30 ft. above the engine foundations.

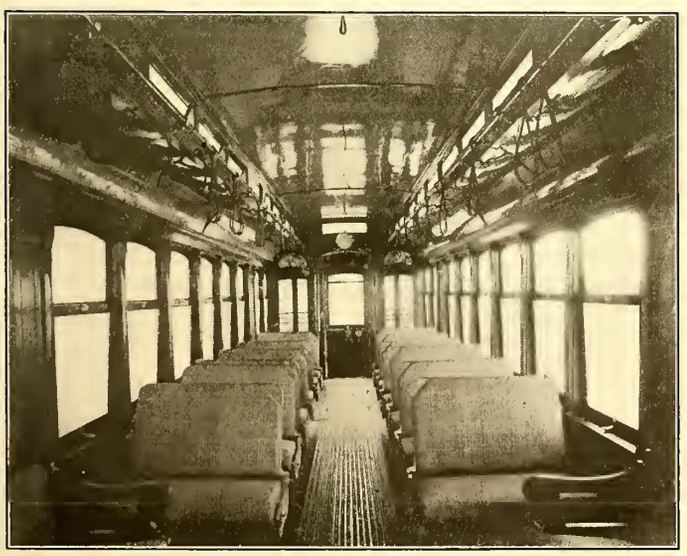
CLOSED VESTIBULE CARS FOR THE ELECTRIC RAILWAYS OF SEATTLE AND TACOMA

The Seattle Electric Company has recently received fifteen closed vestibuled cars, and the Tacoma Railway & Power Company three cars of the same type from the American Car Company, which were ordered through Stone & Webster, Boston. As the cars are identical in every respect, one description will suffice for both orders. The length over the end panels is 30 ft., and over the crown pieces, 40 ft.; the length of the platforms is 5 ft.; the width over the side sheathing is 8 ft. 4½ ins.; the distance between the centers of the posts is 2 ft. 8 ins. Double side sills are used, 3¾ ins. x 7¾ ins. and 2½ ins. x 7 ins., with 7-in. I-beams in place of sill plates. The corner posts are 3¾ ins., and the side posts, 2¾ ins. Only the lower sashes of the double sash windows are movable. These sashes drop into pockets in the side walls, which have hinged covers.



ONE OF THE NEW CLOSED VESTIBULE CARS FOR SEATTLE AND TACOMA

An interesting feature of the side construction noticeable in the view of the exterior of the car is a dead light between the second and third windows at each end. This construction is on account of the longitudinal corner seats, which are made to accommodate five passengers each, and the arms of which come in the center of the dead light. The transverse seats, which are of Brill manufacture, are upholstered in spring cane and have push-over backs and tilting cushions. Another feature, which is unusual, is the employment of double vestibule corner posts, with a light between. The vestibule entrances are without doors, and as the vestibule is brought well around to the sides, the light is placed between the double posts to extend the range of the motorman's vision. The platform timbers are reinforced with angle iron, and angle iron center knees extend 4 ft. 9 ins. back of the body bolsters. The height from the track to the platform step is 16⅝ ins.; from the step to the platform, 14½ ins., and from the platform to the car floor, 8 ins. The trucks are the Brill No. 27 G-E-1 type, having solid forged side frames. The wheel base is 4 ft., and wheel diameter, 33 ins. Four motors of 40-hp each are used per car.



SEATING ARRANGEMENT OF NEW CLOSED VESTIBULE CARS FOR THE SEATTLE AND TACOMA ELECTRIC RAILWAYS SHOWING THE LONGITUDINAL CORNER SEATS

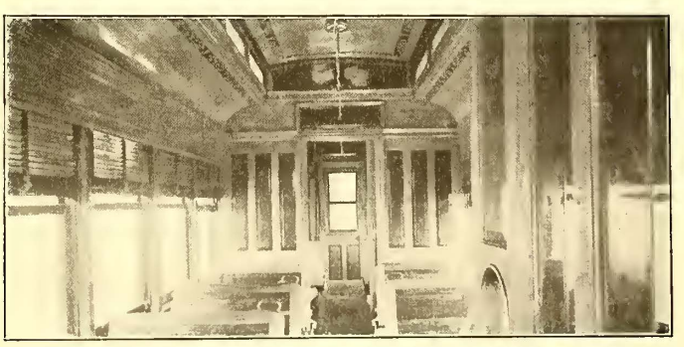
The Rio de Janeiro Tramway, Light & Power Company, incorporated under the laws of New Jersey, has filed a certificate changing its name to the Villa Isabel Tramway Company.

NEW EQUIPMENT FOR RAILWAY IN COLOMBIA

The J. G. Brill Company is shipping in sections the type of car illustrated to the Ferro Carril de Antioquia, a 42-mile line between Puerto Barrio and Caracoli, in the department of Antioquia, Colombia. The first-named city is on the Magdalena River, the chief navigable waterway of the country, and is at the point where navigation stops, owing to rapids. It is therefore an important commercial center, through which most of the business, from the capital, Bogota, to the south, and Medellin to the west, is transported. An extension of the railroad will shortly be completed to Medellin, which is 118 miles from the present terminus. The railway is a government line, administered by the Antioquia Department, and most of its equipment has been supplied by the J. G. Brill Company.

EXTERIOR VIEW OF CAR FOR ANTIOQUIA, COLOMBIA, FITTED WITH FIRST AND SECOND-CLASS COMPARTMENTS

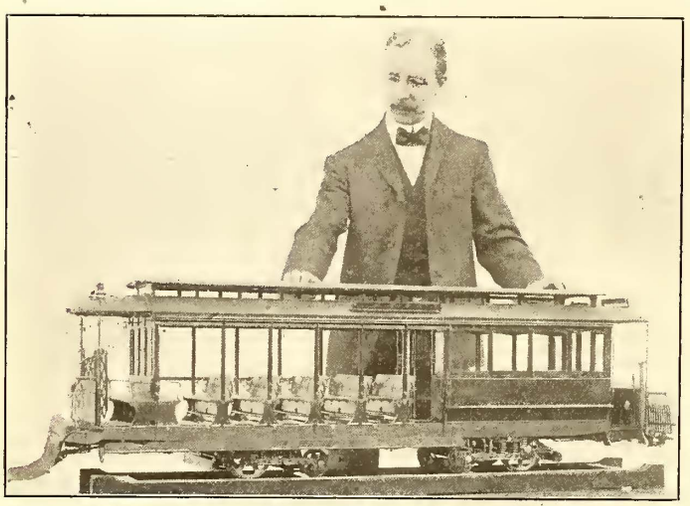
An interesting feature of the cars is in the fact that, although but 21 ft. long over the bodies, they are divided into first and second-class compartments, and in the second-class compartment have a saloon of standard character. The cars are handsomely finished in cherry and ash, and have decorated birch ceilings. The seats in the first-class compartment are of spring cane, while those in the second-class have cherry slats. The seats have reversible backs and are manufactured by the builder. The trucks are the standard type used on the line, and are also built by the Brill Company. The wheel base is 4 ft., and the diameter of the wheels, 24 ins.



INTERIOR VIEW OF ANTIOQUIA CAR, SHOWING SLAT SEATS IN SECOND-CLASS COMPARTMENT AND CANE SEATS IN THE FIRST-CLASS COMPARTMENT

AN INTERESTING MODEL OF THE METROPOLITAN COMBINATION CAR

The model shown in the illustration was recently presented to H. H. Vreeland, president of the New York City Railway Company, by the J. G. Brill Company. It is a perfect working model of the type of car known as the "Metropolitan Combination," and was built to the scale of one-eighth of the full sized car. The type is a familiar one to New Yorkers and



MODEL OF NEW YORK CITY RAILROAD COMPANY'S "METROPOLITAN COMBINATION" CAR

very popular with them. It was first introduced in New York early in the fall of 1898 to meet a decree of the Board of Health, that every fourth car in summer be closed. Smoking was allowed in the open part, and when cold weather came along, the requests to continue the combination cars in service were so numerous that they became a regular part of winter as well as summer equipment. The car is a modification of the "California" type, and was planned by John A. Brill, vice-president of the J. G. Brill Company.

The model was made entirely at the works of the J. G. Brill Company, and both the body and trucks are completely operative. The window sashes may be raised and lowered, the seat backs reversed, each section of the twin-doors open simultaneously, the brakes are operated by ratchet-brake handles, and every other part is reproduced exactly in miniature. The model was exhibited in the Brill parlors at the Bellevue-Stratford Hotel, Philadelphia, during the recent American Street Railway Association convention, and was examined with interest by a large number of the delegates.

TORONTO ELECTRIC MILEAGE DATA

The following table shows the mileage of the Toronto Railway Company and the number of passengers carried from 1892, when the system was converted into an electric railway, up to the end of 1904:

	Mileage of Tracks	Passengers Carried	Population
1904.....	92.93	60,127,460	293,395
1903.....	92.78	53,055,322	250,757
1902.....	90.09	44,437,678	237,144
1901.....	88.91	39,848,087	221,583
1900.....	85.06	36,061,867	214,967
1899.....	85.00	31,826,940	208,340
1898.....	84.83	28,710,388	201,439
1897.....	86.14	25,271,314	197,826
1896.....	85.28	23,537,911	192,440
1895.....	85.22	23,353,228	191,007
1894.....	81.43	22,609,338	188,914
1893.....	78.84	21,215,010	188,914
1892.....	70.42	19,122,022	188,914

THE NEW YORK CENTRAL-NEW HAVEN SITUATION

In a recent interview in the New Haven "Register," E. H. McHenry, fourth vice-president of the New York, New Haven & Hartford Railroad Company, discussed the letter by Frank J. Sprague on the New York-New Haven situation published in the Street Railway Journal for Oct. 21. Among other things, Mr. McHenry said:

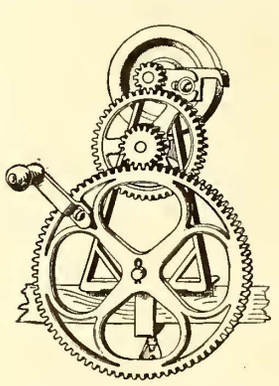
The new electric engines of the New York, New Haven & Hartford Railroad, now under construction by the Westinghouse Electric & Manufacturing Company, are of the interchangeable type. They are expressly designed to operate under all practical conditions within wide limits. They will be able to use both alternating current and direct current, high tension or low-tension alternating current, to take current from the "deadly third rail" or from overhead conductors, from high conductors or low conductors at varying heights between 14 ft. and 22 ft., and to operate with equal facility on either or both of the two track levels of the Grand Central Station. On sections equipped for direct current, they will operate in every respect as direct-current engines of high commercial efficiency, and on sections equipped for alternating current, with still higher efficiency.

The adoption of this most flexible type of engine by the New Haven company introduces no new features or difficulties in the track equipment, or operation of the Grand Central terminal, and will not entail upon the New York Central the necessity of an additional dollar nor the transposition of a wire. It would certainly seem, therefore, that no departure from the standards established by the Electric Traction Commission of the New York Central Railroad could be less objectionable from any point of view. The public is informed that its interests are imperilled by the action of the New Haven company, but so long as travelers resist all temptations to sit on the third rail or to "skin the cat" on the trolley they can safely ignore the harrowing technicalities elaborated by Mr. Sprague.

Regarding the multiple-unit system, the New Haven company has been lately assured by competent authority of the perfect feasibility of adapting interchangeable alternating and direct-current motors to such service, subject to disabilities of increased weight and cost, and the New Haven company is, accordingly, not estopped from the use of this kind of equipment should it prove desirable. The adoption of this equipment is, however, subject to other considerations quite independent of motor design and control, and is still under consideration.

HIGH-SPEED CARBORUNDUM GRINDER

The carborundum grinder shown herewith is a compact and durable portable machine which the Royal Manufacturing Company, of Lancashire, Pa., has in successful use on a number of electric and steam railways for maintenance of way work, rail bonding and bridge building. Where this machine is in use it is necessary to carry only two or three drills to avoid delays due to cases of breakage. The grinder, which is known as the "Practical," is geared for high speed, and presents the advantages of a high-cutting abrasive tool easily installed and operated in any position along the track where work is going on or in the shop or tool room. It is claimed for this grinder that it will not glaze nor require much pressure in carrying on its work, thereby increasing the life of the wheel. The grinder and frame are made of gray iron and the spindle of steel. All of the parts are interchangeable. A wheel can be taken off and any desired wheel of any shape fitting the same size hole put in its place. The dimensions of this grinder are 12½ ins. high over all and 7½ ins. wide. The wheel is 4-in. x 1-in. x ⅜-in. hole. Total weight of machine, 6 lbs.



CARBORUNDUM GRINDER

FINANCIAL INTELLIGENCE

WALL STREET, Nov. 8, 1905.

The Money Market

Considerable firmness developed in the local money market during the week, rates for all classes of accommodations rising sharply, as a result of a more active speculation in stocks, and the unusually heavy demand for funds at Western and Southern points for crop moving and other purposes. During the week ending Nov. 4, the net cash loss sustained by the New York banks was the largest, with two exceptions, since the beginning of the outward movement of funds last August, and at the present time indications point to a continuance of the outflow of money for some time to come. Prevailing rates of exchange at the principal interior points show that the demand from this source is still urgent, which, together with the extremely low bank reserve, is likely to result in a continued firm market. The European markets have also ruled firm, largely on account of the disturbance throughout Russia, but apart from an advance in the discount rate to 5½ per cent by the Imperial Bank of Germany, rates show no decided change from those ruling at the close of last week. The demand for gold at European centers has been urgent, especially at Paris, and shipments of the precious metal from this side have been averted only by the high rates prevailing in the local money market. Quotations for foreign exchange, however, are still near the gold export point, but the general opinion is that shipments of gold have been arrested, at least for the present. The bank statement published on last Saturday was a decidedly unfavorable document. Loans increased $16,453,000, due largely to the activity in the securities market. Cash decreased $7,405,100, which was somewhat larger than had been expected. Deposits increased $10,686,200. The reserve required was $2,671,550 larger than in the preceding week, which added to the $7,405,100 decrease in cash reduced the surplus reserve by $10,076,650. The surplus now stands at $2,354,275, as against $10,112,400 in 1904, $5,394,225 in 1903, $17,852,350 in 1902, $8,689,925 in 1901, and $4,606,050 in 1900.

Money on call loaned at 4½ and 10 per cent, the highest since July, 1903, the average for the week being about 6 per cent as against 5 per cent in the preceding week. Short time loans were placed at 5 and 5¼ per cent, as against 4¾ and 5 per cent a week ago, while six months' funds held firm at 4¾ per cent. Commercial paper has ruled quiet and firm at 5 to 5¼ for the very best indorsement.

The Stock Market

A notable feature of the stock market during the past week has been the unusually heavy selling for London account, based in very large measure upon the greatly disturbed condition of affairs in Russia, which lead to a temporary suspension of the proposed big loan by that government, though the further advance in the Bank of Germany's discount rate and talk of another increase in that of the Bank of England likewise served as more or less disturbing factors. Added to the above were still higher rates for call loans in the local money market, the highest in fact for years past, and the doubts which prevailed with reference to the outcome of the election in New York. These unsettling elements led to a good deal of selling for home account, which, coupled with that by the foreigners already noted, created considerable irregularity at times, and at the close, when the money rate reached its highest level, some weakness was apparent. On the whole, however, the market may be said to have acted exceedingly well under the circumstances, and to have given every evidence of a maintenance of that remarkable power of absorbtion which has characterized it for so long a time. Many stocks not only made decided advances, but also sold at the highest figures on record, the most notable cases in point being American Smelters and Reading. Fears were again revived of a corner in the last named, and because of this the general market did not sympathize at all times with the decided buoyancy in that stock. Assurances were forthcoming, however, that no corner was being worked in Reading, although it was admitted that a good deal of the upward movement was due to a squeeze of the extensive short interest in the shares. Respecting general business conditions everything continues decidedly healthful, and the existing heavy demand for funds from the interior, and particularly from the West and South, is indicative of unusual commercial activity in those sections. In the iron and steel trade the situation is brighter than ever, as shown by the fact that October was a record breaking month in the matter of output, the railroads, especially in the West, continuing to report an unprecedented volume of traffic moving, and earnings of the transportation companies are in practically all cases thoroughly satisfactory. All these matters go to explain the comparative steadiness of the general share speculation in the face of the unsettling conditions above set forth.

Very naturally a great deal of interest centered in the local traction stocks during the week on account of the election, with its attendant active agitation of the question of municipal ownership. In consequence the shares of these companies displayed more or less feverishness, and even though the head of the municipal ownership ticket suffered defeat at the polls, these stocks failed to show any resiliency at the close, but on the contrary were weak, in sympathy with the decline in the general list resulting from the higher money rates. Despite this reactionary tendency there was good buying of some of these issues, this being especially true of Brooklyn Rapid Transit, which was purchased on the excellent showing which the earnings of the company made for the September quarter.

Philadelphia

Increased activity developed in the local traction issues this week, and prices generally have displayed a decided firmer tendency. Interest centered almost entirely in Philadelphia Company common. Dealings were upon an enormous scale, upwards of 56,000 shares changed at prices ranging from 48⅞ to 53⅞, the highest price attained in several years. At the high figure some profit taking developed, which carried the price off to 58⅛ at the close. The activity and strength in this stock was attributed to an announcement that an offer has, or will, shortly be made for the entire capital stock of the company, and it is understood that the local interests in the company have agreed to go into the syndicate. The price at which the stock is to be acquired has not as yet been fully agreed upon, but it is said to be between 60 and 65. It is also stated that the company has sold 20,000 shares of treasury stock, the proceeds of which will be used for betterments, additions and other corporate purposes. The preferred stock ruled extremely quiet and without material improvement in prices, about 600 shares selling at from 49 to 50. Philadelphia Rapid Transit displayed moderate activity, about 2500 shares changing hands at from 27⅝ to 28¼. Other transactions included 447 Union Traction at 62⅝ and 62¾, 280 Consolidated Traction of New Jersey at 81¾ and 81⅜, Railways general at 4¼ and 4½, American Railways at 52¾ to 53¼, Rochester Railway at 104½, Union Traction of Pittsburg at 31, and Philadelphia Traction at 100¼ and 100½.

Baltimore

There has been a general improvement in tractions at Baltimore. The demand for these issues has increased materially, and as a result prices in many instances show substantial net gains over those ruling at the close of last week. United Railway issues constituted the leading feature, trading in them being stimulated by renewed reports of refinancing the company. The income bonds were heavily bought, upwards of $186,000 changing hands at from 65½ to 66¾. The 4 per cents ruled firm at 92⅝ and 92¾, about $65,000 being traded in. More than 2000 shares of deposited stock sold at 16 and 16½, while $4,000 deposited incomes brought 66¼. City & Suburban 5s sold at 114⅞ for $5,000, and $2,000 Washington City & Suburban 5s brought 106½. Other sales were: $1,000 Baltimore City Passenger 4½s at 101, $1,000 Newport News Railway at 96, $5,000 Virginia Railway & Development 5s at 99¾, $6,000 Macon Railway and Light 5s at 100, $2,000 Knoxville Traction 5s at 106½, $1,000 Philadelphia Companys 5s at 110¼, and $2,000 Pittsburg Union Traction 5s at 115¼.

Chicago

Trading in the Chicago market was dull and devoid of special feature. Chicago Union Traction was stationary at 12½, 700 shares changing hands at that price, and 10 shares of West Chicago brought 60. South Side Elevated held firm, 227 shares of the common selling at 97 and 97½, while small lots of the preferred stock brought 105 and 105½. Chicago & Oak Park common brought 6¼ and 6 for 210 shares, and odd lots of the preferred sold at 20½ and 20, the closing transactions being 20¼. Other sales were: 115 Metropolitan Elevated common at 27⅞ and 28, 100 preferred at 72 and Northwestern Elevated at 23 and 23¼

Other Traction Securities

The Boston market was irregular. Boston & Suburban, after selling at 19 at the opening, broke to 15, and later rallied

to 18, while the preferred rose from 62 to 64, and closed the week at 63. Boston Elevated ruled firm, sales of 150 shares being reported at from 154 to 153 and back again to 153⅞. Massachusetts Electric common was steady, 800 shares selling at 13, while the preferred fluctuated between 56½ and 55, closing at the lowest. Boston & Worcester preferred rose from 72 to 74, and closed at 73½. West End common brought 99½, and the preferred brought 114½. On the New York curb, Interborough Rapid Transit has ruled weak, about 2200 shares changing hands at from 211½ to 206½. Later, however, the stock rose sharply to 212¼, on the defeat of the Municipal Ownership candidate at Tuesday's election, but near the close the price reacted 2 points in sympathy with the decline in the general stock market, the final sale taking place at 207. New Orleans Railway common sold at 38¼ for 100 shares, and 200 preferred sold at 83⅝. The 4½ per cent bonds held firm, $33,000 selling at 91. Washington Railway common sold at 43 for 90 shares.

A week of comparative inactivity in Cleveland with declining values for a number of issues heretofore very active. Cleveland & Southwestern common dropped from 19 to 16, and Lake Shore Electric from 17 to 15¼. Western Ohio receipts declined a point to 18; Aurora, Elgin & Chicago preferred sold at 93, a slight decline, and the common at 32½ to 33½ as compared with 35 the week before. Northern Ohio Traction made a factional advance to 27¼ on reports of prospective dividends. Cleveland Electric was a trifle weaker at 83¾.

Cincinnati, Newport & Covington common had a boom at Cincinnati on a statement that it will soon pay a dividend. Some 3800 shares changed hands with an advance from 46 to 47¾. The preferred sold at 95 and 95¼. Detroit United sold at 90¾ and 91, a decline from recent prices. Cincinnati, Dayton & Toledo issues were in good demand and about a thousand shares of the common came out at 26¼ to 26½. The 5 per cent bonds sold to the extent of more than $100,000 worth, the price advancing to 99, the best on record. A small lot of Toledo Railways sold at 40, an advance of several points from last sale.

Security Quotations

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

	Nov. 1	Nov. 8
American Railways	52	52
Boston Elevated	153	153
Brooklyn Rapid Transit	75⅝	75⅜
Chicago City	200	200
Chicago Union Traction (common)	11	11¼
Chicago Union Traction (preferred)	—	—
Cleveland Electric	—	—
Consolidated Traction of New Jersey	82	82
Consolidated Traction of New Jersey 5s	108½	108½
Detroit United	91½	92
Interborough Rapid Transit	210	210
International Traction (common)	36½	36½
International Traction (preferred) 4s	74	76½
Manhattan Railway	165½	165
Massachusetts Electric Cos. (common)	13	13
Massachusetts Electric Cos. (preferred)	56	55½
Metropolitan Elevated, Chicago (common)	27	28
Metropolitan Elevated, Chicago (preferred)	71	71
Metropolitan Street	119⅝	121
Metropolitan Securities	77⅝	77
New Orleans Railways (common), W. I.	38	37
New Orleans Railways (preferred), W. I.	83⅝	83⅞
New Orleans Railways, 4½s	90⅝	91½
North American	97½	96½
North Jersey Street Railway	28	28
Philadelphia Company (common)	50¼	52⅞
Philadelphia Rapid Transit	27½	27⅝
Philadelphia Traction	100	100
Public Service Corporation 5 per cent notes	96	96
Public Service Corporation certificates	64	64
South Side Elevated (Chicago)	96	97¼
Third Avenue	122	123½
Twin City, Minneapolis (common)	116½	115½
Union Traction (Philadelphia)	62½	63
West End (common)	99½	99½
West End (preferred)	114	114

W. I., when issued.

Iron and Steel

The "Iron Age" says October will go down in the history of the iron industry for record breaking. The monthly statistics show that there were produced by the anthracite and coke furnaces of the United States 2,053,127 tons of pig iron, which compares with the previous achievement of 1,963,717 tons in May. Both figures do not include the output of charcoal pig, which may be estimated at about 30,000 tons a month. The steel companies produced 1,370,960 tons in October, as compared with 1,287,438 tons in May. Of this October product the United States Steel Corporation has 950,752 tons. The Carnegie Steel Company in October broke seventy-eight past records of production at its furnaces and mills, not counting turn and day records, which would greatly add to the number. The Edgar Thomson rail mill made in October 83,568 tons of steel rails. The plants of the United States Steel Corporation produced 1,172,951 gross tons of ingots in October. The pig iron markets throughout the country are exceedingly firm, and the conviction seems to be gaining ground that further advances are inevitable. Production, however, is at an enormous rate. Southern furnaces are now squarely on the basis of $14 for No. 2 foundry at Birmingham, but have made only moderate sales lately, being heavily booked. Moderate sales of steel rails are reported, with further heavy contracting in sight.

NEW TRAFFIC ARRANGEMENTS IN OHIO

The Dayton & Troy Electric Railway and the Western Ohio Railway, which heretofore have operated limited cars through from Dayton to Lima, have arranged for all local passenger and express cars as well as limiteds to operate through without change. General Manager F. D. Carpenter, of the Western Ohio Railway, has also completed arrangements with the Toledo, Bowling Green & Southern Traction Company whereby, as soon as the Western Ohio extension from Lima to Findlay is completed, limited parlor cars will be operated through from Dayton to Toledo, a distance of 162 miles. On the basis of present limited schedules on these roads, this trip will be covered in 5 hours, which is only 30 minutes slower than the trains on the parallel steam road.

ANNUAL REPORT OF MONTREAL STREET RAILWAY COMPANY

The Montreal Street Railway Company has issued its annual report for the year ended Sept. 30, 1905. The income account compares as follows:

	1905	1904
Gross receipts	$2,707,474	$2,463,825
Operating expenses	1,650,566	1,510,998
Earnings from operation	$1,056,908	$952,827
Charges, etc.	363,739	309,485
Net earnings	*$693,169	$643,342
Dividends	691,667	642,520
Surplus	$1,502	$822
Passengers carried	66,631,206	60,281,874

* Equal to 9.90 per cent earned on the $7,000,000 capital stock.

The general balance sheet as of Sept. 30, 1905, compares as follows:

Assets—	1905	1904
Road construction and equipment	$7,971,544	$7,461,586
Stores	187,470	187,548
Real estate and buildings	1,810,721	1,665,876
Accounts received	82,544	90,570
Park & Island Railway advertising	229,755	163,241
Cash	56,411	25,289
Fire insurance fund	266,000	206,000
Stocks and bonds other companies	1,223,265	1,215,265
Total	$11,827,709	$11,015,376
Liabilities—		
Capital stock	$7,000,000	$6,600,000
Bonds	2,509,368	2,479,368
Bank of Montreal loan	650,000	318,166
Accounts and wages paid	232,222	199,546
Accrued interest	34,568	33,351
Accrued tax	156,551	135,788
Employment section	14,389	12,984
Unclaimed dividends	1,957	1,957
Unredeemed tickets	30,728	26,766
Suspended accumulations	115,302	125,750
Dividends payable Nov. 1	175,000	165,000
Fire insurance fund	304,930	267,905
Contingent account	81,626	129,231
Surplus	521,067	519,565
Total	$11,827,709	$11,015,376

SCARCITY OF HELP IN NEW ENGLAND

Several companies in New England are reported as experiencing considerable difficulty in securing conductors and motormen for winter service. The statement is made that the work is attractive in summer to a certain class of efficient but itinerant help that seeks indoor employment for the winter at whatever it can turn its hand. That men in New England are able to shift so easily from one place to another at wages fairly remunerative is due to peculiar industrial conditions that obtain there. The industries of the East are all booming, and the demand for help is greater than the supply. Consequently men are changing from one position to another, with the thought uppermost in their minds only of their present convenience. One of the companies seeking new men is the Connecticut Railway & Lighting Company. At Bridgeport the company has posted notices of its desire for more help, and promises steady employment during the period of satisfactory service.

EARNINGS OF CONNECTICUT COMPANIES FOR YEAR

The reports of the street railway companies operating in Connecticut, filed with the Railroad Commissioners at Hartford, are very gratifying. A summary of the figures available for publication at this time shows results as follows:

The Consolidated Railway Company: The net earnings for the year were $855,328, the gross income $943,285, and taxes paid to State $123,786. This company has a capital stock outstanding of $10,000,000, with bonds of $17,024,400. The capital stock a mile of road owned is $49,476. This is low, compared with the capital a mile of the Connecticut Railway & Lighting Company, which is $72,075. For the Consolidated company the report shows a total cost of construction and equipment of $16,462,969; gross earnings from operation, $2,024,502; operating expenses, $1,169,174. The company carried 38,778,053 passengers in the year on its various lines; the number of accidents was 226, of which eleven were fatal. The company owns 548 passenger cars of all kinds, and a total of 616, including mail, express and freight.

The Connecticut Railway & Lighting Company, which is owned by the United Gas Illuminating Company, of Philadelphia: Capital stock, $15,000,000, and bonds outstanding of $12,776,192. The total cost of construction and equipment is $29,526,719; the cost of construction and equipment a mile of road owned and operated is $166,571; gross earnings from operation were $1,420,093; operating expenses, $837,615; net earnings, $582,477. The company now owns 177 miles of track, and carried 28,351,395 passengers last year.

A large number of reports of smaller companies have been filed in Hartford. The Hartford Street Railway Company shows an increase in gross earnings from operation of $64,638, the total being $961,760. The operating expenses increased by $32,000, and were $672,565. The gross income, less operating expenses, was $289,897, or $32,839 more than the previous year. The surplus for the year was $282,280, or $60,000 more than in 1904. The total number of accidents was sixty-five, of which four were fatal.

The Hartford & Springfield Street Railway shows gross earnings of $128,168, operating expenses of $74,969, and net earnings from operation of $53,198. The net income was $3,248, and surplus for the year $3,020. As there was a deficit of $18,797 at the close of last year, this road shows now a deficit of $15,387. Two persons were killed and two injured in the year.

The Hartford, Manchester & Rockville Tramway Company shows gross earnings of $147,794; operating expenses, $113,687; net earnings from operation, $34,107; net income, $18,648; surplus, $106,218.

The net earnings of the Farmington Street Railway Company were $2,346, and surplus $5,010; the Suffield Street Railway, net earnings, $5,640; surplus, $2,261; the Bristol & Plainville Tramway Company, net earnings, $22,900; surplus, $75,681; the Meriden, Southington & Compounce, net earnings, $12,902; surplus, $14,644; the Cheshire Street Railway, net earnings, $1,177; surplus, $1,994; the Providence & Danielson Railway Company, net earnings, $14,375; surplus, $59,590; the Torrington & Winchester Street Railway, net earnings, $19,647; surplus, $39,218; the Willimantic Traction Company, net earnings, $10,693; deficit, $4,330; Stamford Street Railway, net earnings, $31,755; surplus, $37,340; Groton & Stonington Street Railway, net income, $17,112; surplus, $7,737; Danbury & Bethel Street Railway, net earnings, $24,950; surplus, $33,147; Branford Lighting & Water Company, net earnings, $28,905; surplus, $37,735; Manufacturers' Railroad of New Haven, net earnings, $3,833; surplus, $13,733.

STEAM TURBINES IN WASHINGTON TERMINAL STATOIN

When the large Union station at the Washington terminal of the Pennsylvania Railroad is completed, it will be one of the finest and best equipped railroad stations in the world, serving all incoming and outgoing trains of Washington. In conformity with the rest of the station the power plant will be equipped with the most up-to-date and best machinery obtainable, steam turbines being selected as prime movers, partially on account of the limited amount of space devoted to that purpose. Four 500-kw steam turbines have been ordered from the Westinghouse Machine Company, of East Pittsburg, Pa., adapted for driving alternating-current 60-cycle generators, running at 3600 r. p. m. Dry, saturated steam will be used at 150 lbs. pressure and 25-in. vacuum, and the turbines will be capable of developing 670 e. h. p. each. The alternating-current generators will be of the turbo-rotating field type, with two poles and a frequency of 7200 alternations at a normal speed of 3600 r. p. m. They will deliver three-phase current at 2300 volts, and, being of the enclosed type, will operate practically without noise.

ONE OF THE NEW COMPANIES IN JERSEY SECURES LARGE LAND GRANTS THERE

The Hudson Street Railroad Company, allied with the Belmont interests, and organized to operate street railways by electricity in New Jersey and become a competitor of the Public Service Corporation, has taken over the interests of the Hackensack Meadow Company, formed to reclaim the big area of marsh in Hudson County.

The new company, which will fill in or drain the meadows, is the New Jersey Terminal Dock & Improvement Company, with a capital of $3,000,000. Its close connection with the proposed trolley corporation is manifest in the directory selected, as Pliny Fisk, W. M. Barnum, W. L. Laud, Andrew Freedman and W. C. Kinney are on the boards of the two corporations, and Walter G. Oakman, who has been elected president of the New Jersey Terminal Dock & Improvement Company, and Anson M. Bangs, the vice-president, are also prominent in the Hudson Street Railroad Company.

It was also announced that the trolley and tunnel companies in the syndicate have architects at work preparing plans for two buildings to be erected in Church Street, one to occupy the block between Cortlandt and Dey Streets, and the other the block between Dey and Fulton Streets. These will be office buildings, will cost $7,000,000, and will have the trolley terminals in the basement and connect with the subways and the "L" roads.

OCEAN SHORE COMPANY AWARDS CONTRACTS

The Ocean Shore Railway Company, which is constructing a double track electric railway from San Francisco to Santa Cruz, has closed contracts for its electric equipment and power house plant. The power house will be erected at Balboa, on Half Moon Bay, by Chas. C. Moore & Company, who have the contract to supply and erect everything except the electric equipment, which will be furnished by the General Electric Company. Two 2000-kw, 2300-volt, 25-cycle fly-wheel-type generators will be direct connected to two McIntosh & Seymour vertical cross-compound engines, making 107 r. p. m. Of the two 125-kw exciters, one will be driven by a Harrisburg engine and the other by an electric motor. Seven 1000-kw oil-cooled transformers will raise the voltage from 2300 to 30,000 volts. Thirty 250-kw lowering transformers will reduce the current to 440 volts at the sub-stations, where ten six-phase rotary converters will furnish direct current at 500 volts to the trolley wires. Eight sub-stations will be located at intervals of about 10 miles, and two will be mounted on cars so as to be portable. Forty four-motor car equipments, each motor of 125 hp, have been ordered, arranged for multiple control, although, as a rule, cars will be operated singly except when there is a rush of traffic. The overhead work will be of catenary construction, insulated for 6000 volts, so that whenever it becomes advisable the line can easily be changed over for operating by the alternating-current system. The boiler plant will include five 600-hp Babcock & Wilcox wrought steel boilers carrying 200 lbs. pressure and equipped with superheaters. Wheeler condensing apparatus will be installed and all auxiliaries will be steam driven. A salt water pumping system will supply circulating water from the Bay. Crank and fly-wheel air pumps of the Edwards type will be used and centrifugal circulating pumps. Improved oil-burning apparatus will supply the furnaces. There will be a Weber concrete steel stack, 8 ft. in diameter and 125 ft. high.

CHICAGO TRACTION MATTERS

Negotiations between the Chicago traction companies and the local transportation committee of the Council have reached a much more businesslike stage than ever before. The Council, by two-thirds majority, has a fourth time rejected Mayor Dunne's recommendation to cease negotiations with the traction companies and take other steps for immediately acquiring the lines. In drafting the ordinances the local transporation committee has called upon Bion J. Arnold for expert estimates on earnings on which to base compensation to the city for the franchise and also to plan routes for the cars through the business district. Mr. Arnold has already reported to the committee on routes, enumerating twelve such, many of them to extend across the city.

THE QUESTION OF RELIEVING CONGESTION IN CLEVELAND

In line with the proposed plan for eliminating congestion in the Public Square by placing loops around all four corners of the square and having all lines start from the square instead of running across the city, as at present, Walter Warner, president of the Chamber of Commerce, which is investigating the proposition, recently suggested that the company experiment with reduced fares and make a charge of 1 to 2 cents for transfers. The company agreed to prepare statistics as to the number of transfers at the square and the percentage of through traffic, and the matter will be further discussed at a joint meeting of the Chamber, the city officials and the street railway company. President Horace Andrews, of the street railway company, still adheres to the idea that subway loops is the only real solution of the problem, and he claims that the plan of surface loops would serve only for a short time and would be unsatisfactory to the public on account of transfers.

THE WINTERS-CLEGG SYNDICATE DISSOLVES

The so-called Winters-Clegg syndicate, which controls the Oakwood Street Railway and the Citizen's Railway Company, of Dayton, together with the Dayton & Troy Electric Railway and the Dayton & Western Traction Company, has dissolved partnership so far as the two interurban lines last mentioned are concerned. The two lines have been peculiarly situated and handled. The first mentioned runs due north from Dayton, forming part of the through system to Toledo, while the other runs due west, forming part of the system to Indianapolis. Both roads have about the same mileage and their earnings have been practically the same, being among the most prosperous in the Central West. Neither road has any bonded or floating indebtedness, and the securities are owned practically outright by the interests mentioned. Mr. Valentine Winters has been president of both roads, but has devoted his time entirely to the Dayton & Western, while Harrie C. Clegg has been vice-president of both roads and general manager of the Dayton & Troy. Recently, by an exchange of securities, the Dayton & Western passed into the absolute control of the Winters family, while the Dayton & Troy passed into the hands of H. P. and C. B. Clegg. For some time past the so-called Widener-Elkins syndicate has been desirous of acquiring these properties, but the interests mentioned have been unwilling to dispose of them at the prices offered. Now that the two interests have been dissolved, it is thought that negotiations for the control of these properties may be successful.

PROSPECTS FOR DEVELOPING FREIGHT TRAFFIC IN MASSACHUSETTS

Documents filed recently with the Railroad Commissioners of Massachusetts and reports from town authorities seem to warrant the statement that the movement to extend the carrying of freight by the electric railways within the State has attained impetus enough to insure important developments along this line.

As a rule, Massachusetts roads have been slow to develop the business of carrying parcels, to say nothing of anything heavier. There has been a little business of this sort over the Shaws' line to Plum Island, from Newburyport; and a little on two or three of the lines in the Western part of the State. The Dartmouth & Westport, joining the important manufacturing cities of Fall River and New Bedford, has been about the only line that has profited by carrying freight. It has only two box cars for freight. The Middleboro, Wareham & Buzzard's Bay has for some time done a small freight business, but has only one box car for freight with two platform cars not equipped.

The Boston & Worcester line was equipped at the start with box freight cars, and it turns out that Mr. Shaw has been busy practically ever since the opening of the road in developing a system that would enable him to operate these cars with profit. Rumors pretty well substantiated in Boston within the last week or two were to the effect that those in control of the Boston & Worcester company had at length obtained control of a Boston & Suburban Express Company, operating a wagon service, and that thirty new wagons were being made ready to be placed in commission as distributors and gatherers of freight and express matter carried in and out of the city by the Boston & Worcester line. Mr. Shaw, the principal owner, is known to contemplate an extension of this proposed freight and express service over the projected Hartford & Worcester Street Railway.

While this Boston & Worcester development is in a way an old story, there are other recent developments which are new. One is the activity of the Old Colony Street Railway to secure freight and express privileges from the cities and towns in Southeastern Massachusetts. The company is actively at work with the local authorities at the present time, and it can be stated on the authority of the first vice-president of the company that its principal aim is to establish an express and parcel service from Fall River and New Bedford up through its entire territory to Boston.

While the through business is mentioned as the company's main object, the general impression prevails that the recent activity of the Taunton & Pawtucket Street Railway, as now controlled by Choate, Hall & Stewart, the firm which has taken over a number of formerly unprofitable trolley roads in Massachusetts, has spurred the Old Colony Company into a show of competition. The Taunton & Pawtucket has recently received the Railroad Commission's approval of local permits that will enable it to carry freight and express matter such as may be included in a special list; and this road with the old Middleboro, Wareham & Buzzard's Bay line, which is now in the same control, will give a through service from the neighborhood of Monument Beach through Taunton and, by means of connecting roads in Rhode Island, into the cities of Pawtucket and Providence. This territory is reached to some extent by lines of the Old Colony Company, and the local express opportunities may be a factor in that company's new activity in securing privileges.

Another feature of the mid-State situation that has aroused interest is the petition recently made to the Railroad Commission for approval of freight and express privileges for the Springfield Street Railway. This is the line which has just had its lease of the Springfield & Eastern approved. It is owned by the New York, New Haven & Hartford Railroad, and is in territory which is expected to bring it into competition with the Shaw lines. It seeks the new freight rights in the district around West Springfield and Agawam.

James F. Shaw's father, Hon. E. P. Shaw, former State Treasurer, is president of the Boston Company, operating wagons in a suburban express service. The company has been in operation about a year, and its wagons will be used to and from the terminal station to be established in Boston for the trolley express cars.

SOME RECENT WESTINGHOUSE-PARSONS TURBINE ORDERS

The Westinghouse Machine Company, of East Pittsburg, Pa., manufacturers of the Westinghouse-Parsons steam turbine, has within the last few weeks received numerous orders for its turbines, among them being one from the Lumberton Cotton Mills, Lumberton, N. C., for one 300-kw turbine; from the Waltham Gas Light Company, Waltham, Mass., for four 500-kw turbines; from the Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., for two 500-kw turbines; from the Suburban Electric Company, Scranton, Pa., for one 500-kw turbine; from the Pennsylvania Light & Power Company, Pittsburg, Pa., for one 500-kw turbine; from the Water, Light & Gas Company, Hutchinson, Kan., for one 500-kw turbine, and from the Winston-Salem Power Company, Winston-Salem, N. C., for one 750-kw turbine.

The turbine ordered by the Lumberton Cotton Mills will be of the well-known multiple expansion parallel flow type, driving a 60-cycle direct-connected generator, running at 3600 r. p. m. It will operate at 150 lbs. steam pressure and 26-in. vacuum, and deliver three-phase current at 440 volts. The turbines for the Waltham Gas Light Company will be of the same type and frequency, operating at 3600 r. p. m., with dry, saturated steam at 175 lbs. gage pressure and 28-inch vacuum. The alternating-current generators will be of the rotating field turbo type, delivering three-phase current at 2300 volts. The Suburban Electric Company's turbine, with characteristics similar to the above, will operate with dry, saturated steam at the throttle of 150 lbs. gage pressure and with atmospheric pressure in exhaust pipe, and will be capable of developing 750 e. h. p. The turbines for the Gulfport & Mississippi Coast Traction Company will operate under 150 lbs. pressure, 28-inch vacuum and 100 degs. F. superheat, and will be direct connected to 60-cycle turbo-generators running at 3600 r. p. m.

CHANGE IN SCHEDULE OF LONG ISLAND TRAINS—REDUCTIONS IN RUNNING TIME RESULT OF ELECTRIC OPERATION

Under the winter time-table of the Long Island Railroad Company, which went into effect Sunday, Nov. 5, the electric service, heretofore confined to the suburban trains, was extended to the through or express trains, and the running time of these trains was cut down from 25 minutes to 17 minutes. Under the new schedule trains leave Flatbush Avenue, Brooklyn, for points on Long Island from 1 to 3 minutes earlier than the trains with which they connect at Jamaica leave Long Island City. This little difference is made only in order to give passengers from Brooklyn time to get out of the cars at Jamaica before the trains from Long Island City arrive.

There are seventy-five electric passenger trains each way daily between Flatbush Avenue, Brooklyn, and Jamaica, and twenty-five of these are local trains that go through to Queens and Belmont Park, extending the suburban service 5 miles beyond the village of Jamaica, and fare on these trains is only 10 cents from Flatbush Avenue to Jamaica, and 20 cents to Queens. Sixteen electric trains run each way daily.

The steam trains from Long Island City will make close connection with the local electric train from Brooklyn at the platform of the station at Ozone Park, where passengers will transfer from one train to the other and the steam train will then run from there as express across Jamaica Bay, making no stops between Ozone Park and Hammils, and all intervening stops will be made by the local electric trains from Brooklyn.

TECHNICAL PUBLICITY ASSOCIATION

At a meeting and banquet of the Technical Publicity Association, held at the Aldine Club, New York, Friday evening, Nov. 3, the following officers were elected: President, C. B. Morse, Ingersoll-Rand Drill Company; first vice-president, H. M. Cleaver, Niles-Bement-Pond Company; second vice-president, Frank H. Gale, General Electric Company; secretary, Rodman Gilder, Crocker-Wheeler Company; treasurer, H. M. Davis, Sprague Electric Company; members of executive committee, Graham Smith, and Charles M. Manfred, Johns Manville Company.

H. M. Davis addressed the association on "The Advertising Appropriation." An informal discussion followed, in which the members exchanged views on the disposition of advertising appropriations, the relative amount that should be spent in magazine and circular advertising, the relation between the advertising appropriation and the volume of business, etc.

MEETING OF THE BRITISH IRON AND STEEL INSTITUTE

On the occasion of the autumnal meeting of the British Iron and Steel Institute, of which R. A. Hadfield, the well-known manufacturer of special work, is this year the president, the members of the institute and other guests were invited to luncheon at Hadfield's Steel Foundry Works at Tinsley, after which an inspection of the extremely extensive works was made. For the convenience of those coming direct from London a special train was run from London to the works, and after the inspection the same train returned to London in the evening. The prominent guests present included the Spanish ambassador, the Japanese minister, Gen. A. Chaffee, etc. After luncheon the party was conducted over the East Hecla works. It would be impossible in this article to enumerate all the interesting things that were seen, but as regards tramway work there might be mentioned steel rail and joint grinding machines for petrol and electric driving, the Parr patent automatic electrical point controller, and the layout ground on which there were track and other special work for railways and tramways, including overhead and conduit electrical track work for the London County Council and other tramways. A number of Hadfield's special steel-tired electric car wheels were also inspected. These wheels have been in service on the Sheffield Corporation Electric Tramways for the past two and a half years, in which period they had run 79,860 miles before being taken out of service. The steel foundry also proved of vast interest to the various visitors, covering, as it does, 6 acres, and being probably the largest foundry in the world. The central power station, which supplies power to the whole of the works, was also visited, after which visits were paid to the annealing shop, pattern shop and machine shops, in which all kinds of machinery were shown in various processes. Altogether a most interesting and profitable day was spent.

AMERICAN OPERATIONS IN BRAZIL

The United States Consul at Rio de Janeiro, Brazil, gives, in a recent report to the Department of Labor and Commerce, a brief review of the operations of Americans in Brazil as exemplified in the work of the Rio de Janeiro Tramway, Light & Power Company. He tells about the organization of the company, the development of power by it, the taking over of the existing street railway properties, its plans for unifying its interests, and the managing personnel. In regard to the plans of the company he says: "The concessions of the constituent companies vary from thirty to fifty years, with monopoly of zone. The new company is applying for a new concession unifying all the existing ones. The company has also acquired the "Société Anonyme du Gaz de Rio de Janeiro," which, under its concession from the Federal Government, controls the illumination of the city until the year 1945. At present there is a small amount of electric lighting from steam plants operated by the company. The new company is applying for various modifications in the existing concession. The company has also a concession from the municipality of Rio de Janeiro, which included a monopoly for the distribution of electric energy for power purposes until the year 1915, after which date the concession continues for a long period without monopoly. The company has also recently acquired the property of the Rio Telephone Company, the business of which has heretofore been conducted by Siemens & Halske. The telephone concession includes a monopoly for a period of thirty years."

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED OCT. 24, 1905

802,498. Retaining Clip for Third-Rail Insulators; William Courtney, New York, N. Y. App. filed Dec. 6, 1904. Transverse holes through the insulating base or support and a pair of opposite hooks for clamping the rail.

802,518. Pin of Brake-Rod Jaws or the Like; Arthur Lipschutz, St. Louis, Mo. App. filed March 15, 1905. Recesses cut in the pin to economize material.

802,519. Car Seat; Richard D. Long, Iola, Kan. App. filed Jan. 26, 1905. A pair of corresponding members which are reversible to form either a seat or back. The legs are constructed to brace and lock in either position.

802,538. Switch Operating Device for Street Railways; Richard M. Van Eaton and Julia M. Van Eaton, Pueblo, Col. App. filed June 19, 1905. Two cams in the roadbed, one to throw the switch in either direction, are adapted to be engaged by a cam on an approaching car.

802,539. Trolley for Electric Cars; George F. Warburton, Denver, Col. App. filed Aug. 6, 1904. Two tandem trolley wheels and harps yieldingly mounted upon the trolley pole.

802,716. Protected Rail; Louis Steinberger, New York, N. Y. App. filed Nov. 2, 1904. The third rail consists of a U-shaped metal strip having a web set into a slot in an insulating support, and a hood of insulating material.

802,723. Brake Head; George A. Woodman, Chicago, Ill. App. filed March 9, 1905. A brake beam and brake head mounted thereon, one of which has an odd number and the other an even number of locking faces, any two of which are adapted to engage and form a locking connection between the beam and head.

UNITED STATES PATENTS ISSUED OCT. 31, 1905

802,993. Trolley Wheel Bearing; Robert Kissinger, Columbus, Ohio. App. filed March 27, 1905. The trolley-wheel axle is provided with a spring-pressed, two-part bushing, thereby obtaining efficient contact with the trolley wheel at all times.

803,020. Controller for Electric Cars; Francis A. Roche and Francis J. Roche, Somerville, Mass. App. filed March 15, 1905. A construction of controller which compels an intermittent step by step movement of the controller. Steel balls are contained in an annular recess which co-operates with lugs to produce the desired effect.

803,208. Trolley Catcher; Warren W. Annable, Grand Rapids, Mich. App. filed March 31, 1905. A sliding carriage mounted at the base of the trolley pole, the trolley cord leading downward around the carriage, thence back through a pulley at the upper end of the pole and thence to the car platform, and means whereby when the pole leaves the wire the carriage will grip the pole and prevent the same from flying upward.

803,210. Trolley Retrieving Device; Henry B. Clarke, Chicago, Ill. App. filed Jan. 16, 1905: A sudden movement of the trolley

cord opens an air valve which operates to release a spring drum to retrieve the cord.

803,215. Overhead Structure for Electric Railways; Harry P. Davis and Theodore Varney, Pittsburg, Pa. App. filed Oct. 19, 1904. Means for connecting insulated trolley wire sections of different voltage, consisting of a wooden strip or bar with fixtures secured to each end for the attachment of the wires. The bar is suspended at both ends from insulators.

803,216. Suspension Device for Trolley Conductors; Harry P. Davis and Theodore Varney, Pittsburg, Pa. App. filed Jan. 17, 1905. The trolley is suspended from two messenger cables by means of V-shaped fixtures depending from the messenger cables and clamping the trolley wire at their apexes.

803,240. Belt Casing for Axle-Driven Dynamos; Roger M. Newbold, Birmingham, Ala. App. filed March 8, 1904. A novel casing for the protection of a belt from the car axle to a dynamo for lighting purposes.

803,241. Gravity Roller Side Bearing; John F. O'Connor, Chicago, Ill. App. filed July 6, 1905. The lower bearing plate is furnished with reversely inclined or gravity tracks for rollers, the tracks for the rollers in the upper and lower bearing plates being preferably curved about the king-bolt as a center.

803,252. Trolley for Electrically-Propelled Vehicles; Norman W. Storer, Pittsburg, Pa. App. filed Feb. 15, 1905. A trolley bow having a contact member provided with a wide, flat contact surface and with one or more lubricant-containing grooves.

803,258. Track Sander; John H. Watters, Augusta, Ga. App. filed June 24, 1905. An air jet is directed into the sand-box immediately above the discharge opening, said air-jet having a passage of contracted diameter in advance of its discharge end, to thereby prevent the destructive sand blast.

803,313. Brake Beam and Method of Making the Same; John F. Streib, Avalon, Pa. App. filed Oct. 29, 1904. A beam made from a sheet of metal having a hole in its bolt and cuts extending from said hole, the beam having pressed flanges on both inner and outer margins.

803,382. Switch-Tongue Throwing Mechanism; John C. Wilson, Nespelem, Wash. App. filed April 14, 1905. A switch-tongue throwing mechanism comprising a pair of pulling arms, each provided with a beveled portion and a tooth, the beveled portion of one arm adapted to shift the other arm out of the path of the first-mentioned arm, means for suitably connecting the arms with the switch-tongue, and means for operating the said arm, causing the shifting of the switch-tongue.

803,399. Switch Operating Mechanism; Claude G. Colwell, Clyde, Kan. App. filed Aug. 2, 1905. Details of construction of a lever on the car for engaging a switch-throwing trip-lever in the roadbed.

12,394. Controller (reissue). John P. Durkin, Philadelphia, Pa. App. filed Dec. 27, 1904. The controller arm has a pawl which may be thrown outward by centrifugal force. If the motion of the controller arm is too rapid, the pawl catches on notches, but immediately drops back so as to permit further movement of the arm.

PERSONAL MENTION

MR. J. T. ROSS, of Cleveland, for a number of years construction expert for the Everett-Moore syndicate, has become chief engineer for the Toledo Railways & Light Company, of Toledo.

MR. D. H. KIMBEREY, a prominent citizen of Cleveland, Ohio, and president and promoter of the Kansas City & Leavenworth Railway Company, died at his home in Cleveland a few a days ago.

MR. WILLIAM P. GRAVES, formerly secretary to the president of the Cook County Board, Chicago, has been made secretary to President T. E. Mitten, of the Chicago City Railway Company.

MR. HOWARD E. ARNOLD, formerly auditor of the Dayton & Northern Traction Company, of Dayton, has gone into the supply business at Dayton, acting as sales agent for Shelby trolley poles, Barret jacks, Lyon sheet steel gear cases and other specialties.

MR. ISAAC McQUILKIN, comptroller of the Indiana Union Traction Company, of Anderson, Ind., has resigned from the company, to become auditor of the Clinchfield Corporation, owning large coal interests in Virginia and building a 300-mile coal road in its territory. Mr. McQuilkin was formerly auditor of the Lehigh Valley Railroad.

MR. LEWIS P. STILLWELL has been appointed consulting electrical engineer, and Mr. H. S. Putnam electrical engineer, of the New York, Westchester & Boston Railway Company, which is building a high-speed interurban electric line between New York and Port Chester, N. Y. Mr. Stillwell will advise Chief Engineer William A. Pratt upon all matters relating to the electrical and mechanical equipment, while Mr. Putnam will have direct charge of the work, and see that it is carried out along the lines suggested by the consulting engineer. Mr. Putnam has been associated with Mr. Stillwell since 1902 in the Interborough and other railway undertakings.

MR. BYRON CLINGERMAN, of New York, formerly with J. G. White & Company, has been appointed electrical engineer and assistant to the manager of the Appleyard lines in Ohio. He succeeded Mr. Howard Oskamp, who resigned Nov. 1, to take a position with the Bullock Electric Manufacturing Company, of Cincinnati.

DR. KARL GOLDSCHMIDT, of Essen, Germany, sailed for Europe from New York on Nov. 7. Dr. Goldschmidt has been spending about five weeks in this country investigating the progress of the thermit welding process and other business affairs which he has in this country. On the eve of his departure he gave a delightful dinner at the Waldorf to his associates and a few other gentlemen whom he had met on his trip.

MR. EDGAR JAY RAUCH, of Toledo, has resigned as general superintendent of the Canton-Akron Railway Company, the Canton-New Philadelphia Railway Company and the Tuscarawas Traction Company, the Tucker-Anthony properties in Ohio. Before going with these companies Mr. Rauch was superintendent of rolling stock for the Old Colony Street Railway. He has had wide experience in all branches of city and interurban railway operation.

MR. BENJAMIN H. GLOVER has been appointed to fill the newly created office of superintendent of motive power and way on the Metropolitan West Side Elevated Railway, of Chicago. Mr. Glover was for a number of years in charge of the underwriters' national testing laboratories in Chicago, under Secretary W. H. Merrill, Jr. He left this position to go with the General Railway Signal Company, at Buffalo, and recently has been with the Westinghouse interests.

MR. W. S. MENDEN, whose appointment as general superintendent of the Metropolitan West Side Elevated Railway Company, of Chicago, was recently announced, has resigned to become chief engineer of the Brooklyn Rapid Transit Company, succeeding Mr. Eugene Clapp. The office of general superintendent of the Metropolitan company has been abolished. Mr. M. J. Feron has been appointed superintendent in charge of train and station service of the Metropolitan Company.

MR. M. C. DRAPER, of Cleveland, Ohio, has been elected second vice-president and general manager of the Eastern Wisconsin Railway & Light Company, to succeed Mr. T. F. Grover. Mr. Frank B. Huntington has been named first vice-president and secretary. Mr. Draper has been connected with the Westinghouse Company as its Ohio representative. Mr. Huntington came to Fond du Lac from Milwaukee, where he was freight train agent of the Wisconsin Central Company, in 1903, to assume charge of the accounting department of the Railway & Light Company.

DR. H. B. ROCKWELL has recently been made general superintendent of the Mobile Light & Railroad Company, of Mobile, Ala., and in addition to handling operating details is to have entire charge of the claim department. Mr. Rockwell is a graduate physician, and has been identified for a number of years with street railway claim adjusting work, particularly in New England. For several years he was manager of the Electric Railway Pool, with headquarters in Boston. The "Pool" consisted of some thirty or forty suburban electric roads in New England and the Middle West, which were associated for the purpose of securing mutual accident insurance and protection against loss by improper damage claims. As a claim adjuster, Dr. Rockwell has met with pronounced success, and his experience in this line has well fitted him to take up general operating work.

MR. C. P. ORTH has resigned as master mechanic of the New York & Long Island Traction Company, of Hempstead, L. I., to take a vacation before taking up work in the Middle West. Mr. Orth started with the Short electric railway department of the Brush Electric Company, of Cleveland, in 1890. In 1892 he was appointed electrician with the Broadway & Newburgh Street Railway Company, of Newburgh, N. Y., with which company he remained until 1896, when he became master mechanic of the Lorain Street Railway Company, of Lorain, Ohio, then controlled by the Lorain Steel Company. In 1901 he entered the employ of the Cleveland Construction Company, which built the New York & Long Island Company's line. Here he remained during construction, and later entered the operating department of the New York & Long Island Company as master mechanic. Mr. Orth will be succeeded in the company by Mr. J. C. Hayes, of the engineering staff of the Interborough Rapid Transit Company, of New York.