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Fender Tests

It is some time since any elaborate trials of fenders or life guards have been made in this country. The only extensive tests of this kind which we recall have been conducted under the auspices of the Railroad Commissioners of Massachusetts; one series was held about 1890, the other last year. In those which are to be conducted next month and the following month in Schenectady and Pittsburg by the Public Service Commission of the First District of New York great care will be used to simulate actual conditions; indeed this will be carried so far that the models to be employed will be life size and completely

dressed, and have been painted with features to resemble human beings. We presume the engineers of the commission as yet are unwilling to go on record as to the practical value of this kind of tests. There is a great difference in the action of a fender when striking an animate or an inanimate body. Nevertheless, experiments of this nature are useful and railway companies may find it worth while to accept the invitation of the commission to send representatives to attend the trials at Schenectady and Pittsburg.

Ventilation in the Subway

The subway is a good example of the fact that in no new undertaking is it possible to foresee and forestall all contingencies. It is true subways were constructed before that in New York, but none which coped with traffic of anywhere near the same magnitude. One of the most bothersome problems which has arisen since the opening of the line is that of ventilation, for which insufficient provision was made in the road as originally constructed. Its absence is indicated not by vitiated air, as tests have shown that the ventilation is sufficient to keep the carbonic acid gas practically as low as on the street, but by the heat, indicating that the designing engineers adequately provided for the hygienic conditions of the subway, but not for the heating effect of the enormous train service which is required to care for the present traffic. It is with this problem that Mr. Arnold has dealt in his report this week. Previous attempts have been made to reduce the trouble, but they have been inadequate to the requirements and the solution now suggested is that of securing suction and pressure from train movement by closing the space between the express tracks. The situation differs, of course, from that in the London tube railways, and even in the Hudson tunnels, because of the four tracks, so that the head area of each piston, or train, will be considerably less than half of the cross-section of the tunnel in which it will operate. Nevertheless, the experiment will be of interest and a section of track will be equipped to test the efficacy of this plan. Like other pioneers, the builders of the New York subway have had to work out problems from which others may benefit, but this is the way with all early workers in any field.

Fast Schedules for Interurban Roads

There is a growing tendency on the part of many interurban roads, especially in the Middle West, where competition with the steam roads for through traffic is sharp, toward cutting down the running time of limited cars to a point where, with every condition favorable, it is reasonably certain that the cars can finish their trips on time. The power house, the transmission system and the cars are pushed almost to the limit and little reserve is allowed to overcome slight delays. The result is that on these fast

runs the cars are sometimes late, which tries the patience of passengers, demoralizes the entire train schedule of the road and increases the chance for accident.

There can be no denying that the American public wants to get to its destination in a hurry, and quick running time is a strong argument in getting traffic. We believe, however, that the average person would rather be certain of getting to his destination at the time advertised than to take a chance on getting there a few minutes earlier by the fast schedule and then be disappointed if the car is late. The interurban roads have laid the foundation of their success largely on frequent and reliable service in the past. In the effort to compete with the steam roads in fast running time, reliability of service should not be forgotten. Few interurban roads can hope to equal the running time of through steam trains under the present conditions. In the open the interurban car can more than hold its own with the steam locomotive, and it has a tremendous advantage in accelerating from a stop. The interurban car, on the other hand, is at a great disadvantage in running through city streets, where a low speed is absolutely necessary for reasonably safe operation. Where the through interurban cars operate over the city street car tracks in a number of cities between terminals, there is always a chance of being delayed by city cars preceding the interurban cars or failing to make meeting points on time. These conditions are unalterable until such time as the interurban roads can afford to own a private right of way through cities or a belt line around them, over which through cars can be run. It is not wise, with existing standards of track and roadbed, to attempt to increase the speed on some lines to such a point that the slow time in towns can be compensated for and the average speed between terminals brought up to existing steam railroad speeds. There is little comfort in riding over rough track at high speed and on a long journey the attempt to make fast time as an inducement to travel by the electric road may be the cause of losing business on account of the discomfort. Merchants find that it pays to sell what they advertise. Interurban roads which advertise comfortable cars, run on time, will find that it will pay them to give this class of service.

Comparing Engine and Turbine Performance

In not a few power plants of comparatively modern design a steam turbine has been installed to increase the station capacity, while the original engines, at least those of large capacity, have been retained. Frequently the high capacity of a turbo unit per square foot of floor space has been the leading reason for its selection, but in other cases the operating company has bought the turbine largely with the idea of trying it out in the plant in order to see the fitness of such a machine in future extensions, in comparison with the reciprocating engine. This means that special care must be taken in studying the daily performance of the plant, and in not a few instances the conduct of economy tests of a more or less extensive character.

In most cases, however, the behavior of the turbine under commercial conditions is the important point to investigate. The records of many tests of both engines and turbines are available, but as the results vary in each sta-

tion with local conditions a full appreciation existing in a mixed plant can best be obtained by actual trial. The principal points to be established in such an examination are relative economy of power production under practically identical conditions, relative cost of maintenance for substantially the same service, cost of attendance in each case, ability to carry overloads and to operate without interruptions, ease of control, general flexibility of operation and fixed charges. Some of these points can be determined by reference to a well-conducted station log, while others require a little extra effort before they can be evaluated. The reason why definite comparison figures are so often lacking in mixed plants is the difficulty encountered in securing like conditions of operation for engines and turbo units in regular service. It is worth going to some trouble, however, to make the conditions as nearly identical in each case as possible. In plants where it is possible to operate engine and turbine units of the same total capacity together continuously for a period long enough to find out the heat unit demands of each type, a pretty close line can be drawn as to the relative generating economy of each type. The load may vary, in fact it can rarely be held steady in a commercial plant with a large railway output, but if the output is shared approximately evenly between the engines and turbine equipment, the economy of production can be ascertained on fairly comparable terms.

To reach these figures a division must be made in the amount of both engines and turbine equipment and of the heat units returned to the feed water. This means some extra trouble, but no serious difficulty should be experienced in a plant prepared to record properly the performance of its constituent parts. It will not matter greatly if the actual loads shared by turbo and engine equipment are not exactly even, but if the duties are reasonably near the same the cost of each kilowatt-hour in heat units can be determined closely enough to show the relative economy under like conditions. It is often the case in combined turbine and engine stations that the best efficiency is obtained by running the different types of machinery at different parts of the day. In such cases the only way in which to get an accurate comparison of the fitness of engine or turbine for similar service is to operate the plant one day with engines alone, and the next with engines and turbine. This presupposes that the total capacity of the plant is greater than the demand upon it at any single period, which should be the case in a liberal design. The heat unit demand of the turbine may be worth securing for different average loads, and also that of the engine equipment, but for the most accurate results in comparison the fluctuations of service should be imposed upon each type of machine at the same time.

Unless the engines and turbines can be operated together for a long period of time under similar conditions, which is rarely the case, the cost of maintenance and attendance will have to be reduced to the common basis of the expense per kilowatt-hour of output. This should give a reasonably good idea of the capabilities of the two types of machine, for it is improbable that the maintenance expense of a prime mover will vary much whether the work turned out is spread over a longer or shorter

period of time. It is largely a matter of keeping simple and accurate records of repair and attendance costs. Few companies operating mixed engine and turbo plants know with first class accuracy the labor cost of operating each kind of prime mover, except in cases where the plant is large enough to permit subdividing the engine room organization. It should not be hard to make up time cards for the use of engineers in such plants that will show by simple cross or check marks the amount of time put on each type of machine each day. A number of such forms have been published from time to time in this journal and with a little practice any one of these daily records can be kept up with a very small amount of clerical work on the part of the station force. From the data contained on these logs the management can very easily reach conclusions on the overload capacity, operating conveniences and general behavior of the station apparatus, and if the investment costs are properly filed, can still further compare the relative performances of the equipment on the basis of the fixed charges which each part should bear.

Reducing Substation Maintenance Expenses

The cost of maintenance in a modern rotary converter railway substation depends not a little upon the handling of the apparatus during the working shifts. Unlike the power plant proper, there are fewer conditions of an unfavorable character which tend to increase the wear and tear of the equipment far beyond the control of the operating staff, and the relative simplicity of the apparatus and the comparatively few separate parts to care for render proper maintenance a steady and reasonable task in the majority of instances. It pays to employ substation attendants at wages high enough to attract men who will take more than ordinary care of the equipment, and while it is possible to operate a substation of moderate capacity largely by rule of thumb, and with the aid of comparatively inexperienced men, there should always be a responsible chief operator capable not only of keeping current on the line with a minimum interruption of service, but of supervising the maintenance of apparatus which means so much in the reduction of repairs and breakdown expenses.

The essential points of substation maintenance are the care of brushes, collector rings, economy of lubricants, proper maintenance of bearings, blower and air cleaning equipment, transformers, regulators, lightning arresters, wiring and switching mechanism. Failure to look after these points with regularity invites trouble. In most substations there is plenty of chance during the day for this sort of work to be done, and unless the men in charge are overburdened by such duties as extensive ticket selling or taking care of park resorts, roadbed and line maintenance in the vicinity of the station, there ought to be no difficulty in securing proper care of the equipment.

Maintenance leading toward the prevention of interruptions is naturally the most important work. In this connection the condition of air blast apparatus is of the first consequence, for if a blower shuts down and a second is not at hand for emergency service the operation of rotaries is liable to be seriously affected at times of heavy output, leading to the complete shutdown of the substation if matters are not remedied, or else seriously straining the in-

sulation of the transformers and regulators. A weekly inspection and cleaning of all strainers and air ducts are desirable in this connection. Another point of importance is the heating of bearings. Frequent observation of the temperature of the air outside and of the different bearings is essential to reliable service, both in the interests of oil economy and freedom from shutdowns. When the rise in temperature above the surrounding air exceeds from 15 to 20 deg. C. it is a safe plan to remove the oil, filter it and replace it in the bearing by fresh lubricant. In some cases dust blowing through an open doorway in a substation has caused great annoyance in the operation of rotaries, and only a frequent examination of the bearings of all moving shafts will keep the apparatus in the proper condition.

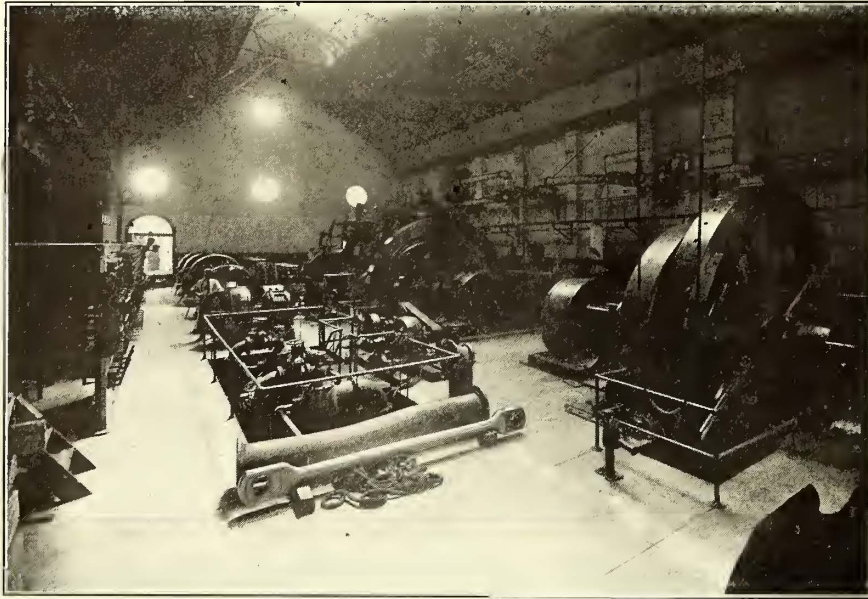
The maintenance of commutators, brushes and collecting rings, however, calls for more time on the part of substation attendants than almost any other work. With the increased capacity of substations now found in recent installations, the number of brushes to be cared for becomes very considerable. As pointed out in the discussion of a paper last year before the Western Society of Engineers, a 2000-kw rotary may have as many as 430 carbon brushes, with 112 on a 500-kw machine, costing in the one case \$180 and in the other \$40. It is clearly important to do everything one can to increase the life of brushes, aside from the question of continuous service. Wear on the commutator, sandpapering, cracking due to vibrations, explosions due to rapid expansion, and the burning off of pigtails due to poor contact or unsweating of pigtail caps, and the defective setting of brushes with resulting uneven distribution of load need to be decreased as much as possible. Few companies are able to obtain more than 25 per cent of the maximum theoretical life of brushes.

Proper brush maintenance includes equal spacing of the studs on the direct current side all around the commutator, with each line of brushes of the same polarity parallel with the commutator bars. Grooving should be avoided by staggering the brushes on alternate positive studs, so as to cover the entire commutator surface. Considerable experiment may be needed to establish the proper brush tension, but from $1\frac{1}{4}$ to $1\frac{1}{2}$ lb. on the direct-current side per square inch, and from $1\frac{1}{2}$ to about $2\frac{1}{2}$ lb. on the alternating side, according to conditions. Commutator maintenance in the large number of rotaries operated in the Chicago railway, lighting and power substations is facilitated by immersing the equivalent of one row of brushes in boiling oil, and then drying them after about an hour, to reduce friction and noise and aid lubrication. The commutator surface is frequently wiped with a piece of clean cheesecloth, and when a machine is shut down and is hot from its run the bars are wiped with a cloth having a trace of oil, following with a clean dry swab. The alternating current copper brushes naturally need much less attention, trimming and vaseline being desirable from time to time. Close observation of all operating parts of a substation with the idea of preventing overheating at any point will solve the problem of maintenance, provided cleanliness and careful phasing of equipment are also insisted upon. It pays to keep a close record of the life and cost of all substation supplies.

THE POWER PLANT OF THE KNOXVILLE RAILWAY & LIGHT COMPANY

One of the most modern mixed-service power plants in the middle South is the new station of the Knoxville (Tenn.) Railway & Light Company. The latter is one of the Newman properties and the station was designed by Ford, Bacon & Davis, of New York. In its de-

velopment this plant illustrates the tendency toward using steam turbines when conditions require additional capacity in existing steam engine stations, and it is noteworthy on account of the variety of equipment installed in the space available without sacrificing convenience. Like many other plants in the South depending upon steam generation, the requirements of the water supply have necessitated the installation of a cooling tower equipment, utilized in connec-

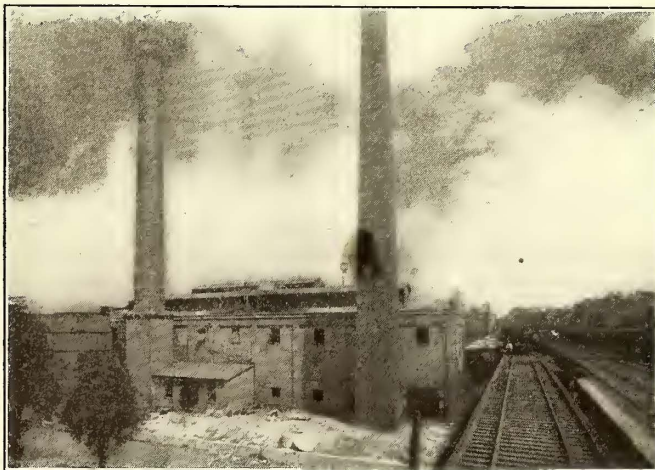


Knoxville Railway & Light Company—General Interior

tion with a small creek past the station and a nearby storage reservoir. The station is on Sixth Avenue, between Washington Street and First Creek. Coal is supplied by a spur track of the Southern Railway, carried alongside the station to enable cars to discharge by gravity into a pocket outside the boiler room. From the pocket the coal is delivered into the boiler room by a 6-ton Yale & Towne traveling hoist

driven by a 5-hp Jeffrey motor. One man can deliver all the coal by this telpher, and by riding on the bucket as it travels along the telpher runway the speed of loading and discharging can be greatly facilitated. The station building consists of a boiler house about 195 ft. x 45 ft., an adjoining fan house about 16 ft. x 30 ft., an engine and turbine room about 112 ft. x 60 ft. and a cooling tower motor house 31 ft. x 6 ft. The walls are of brick, with concrete foundations carried down to bedrock. The pitched roof is of book tile laid between T-irons, with wired glass skylights and monitor ventilation. Two stacks are provided, one 150 ft. high and about 6 ft. square inside, and the other an Alphons Custodis stack, 150 ft. high and 7 ft. inside diameter. The former stack is for two batteries aggregating 2400 boiler hp at the north end of the station, and the other stack handles the remainder of the installation, consisting of 1800 boiler hp. All the boilers in the plant have forced draft supply. Two Buffalo Forge Company's 130-in. fans, each driven by an 8-in. x 8-in. horizontal center crank engine, are installed near the Custodis stack outside the boiler room. From these fans two 4-ft. ducts lead underground to a main 7-ft. 6-in. duct, which traverses the boiler room laterally, splitting again into two tapering

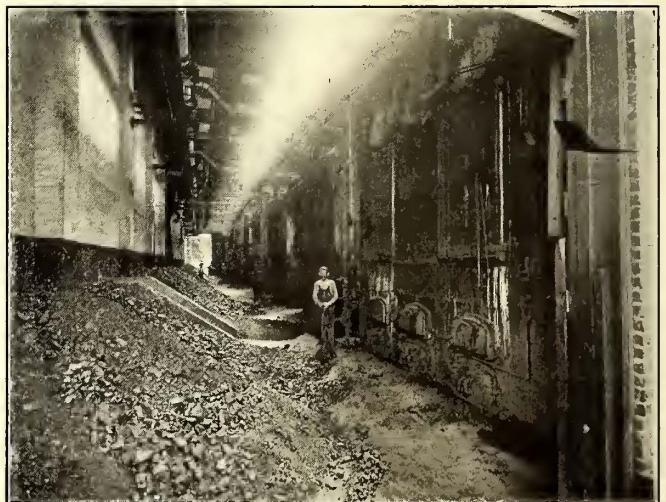
branches, which supply the boiler batteries on each side of the room. Each of the four boilers on the north side is supplied by three 18-in. ducts, and the width of the main duct carried along the underside of the floor in front of the boilers varies from 4 ft. to 3 ft. at the end of the run. On the south side the main duct decreases from a width of 4 ft. to 3 ft., with the addition of a short section 2 ft. in diam-



Knoxville Railway & Light Company—Power Station

eter to supply the last boiler of the row. Three manholes are provided in the ducts to facilitate inspection and repairs. Each of the five 600-hp boilers in the plant has 6042 sq. ft. of heating surface and 88 sq. ft. of grate surface. The 300-hp boilers have each 3000 sq. ft. of heating surface.

Hand firing is employed in the plant, the firing aisle being 17 ft. wide. The telpher referred to before runs the whole length of the boiler room and enables coal to be



Knoxville Railway & Light Company—Boiler Room of Power Station

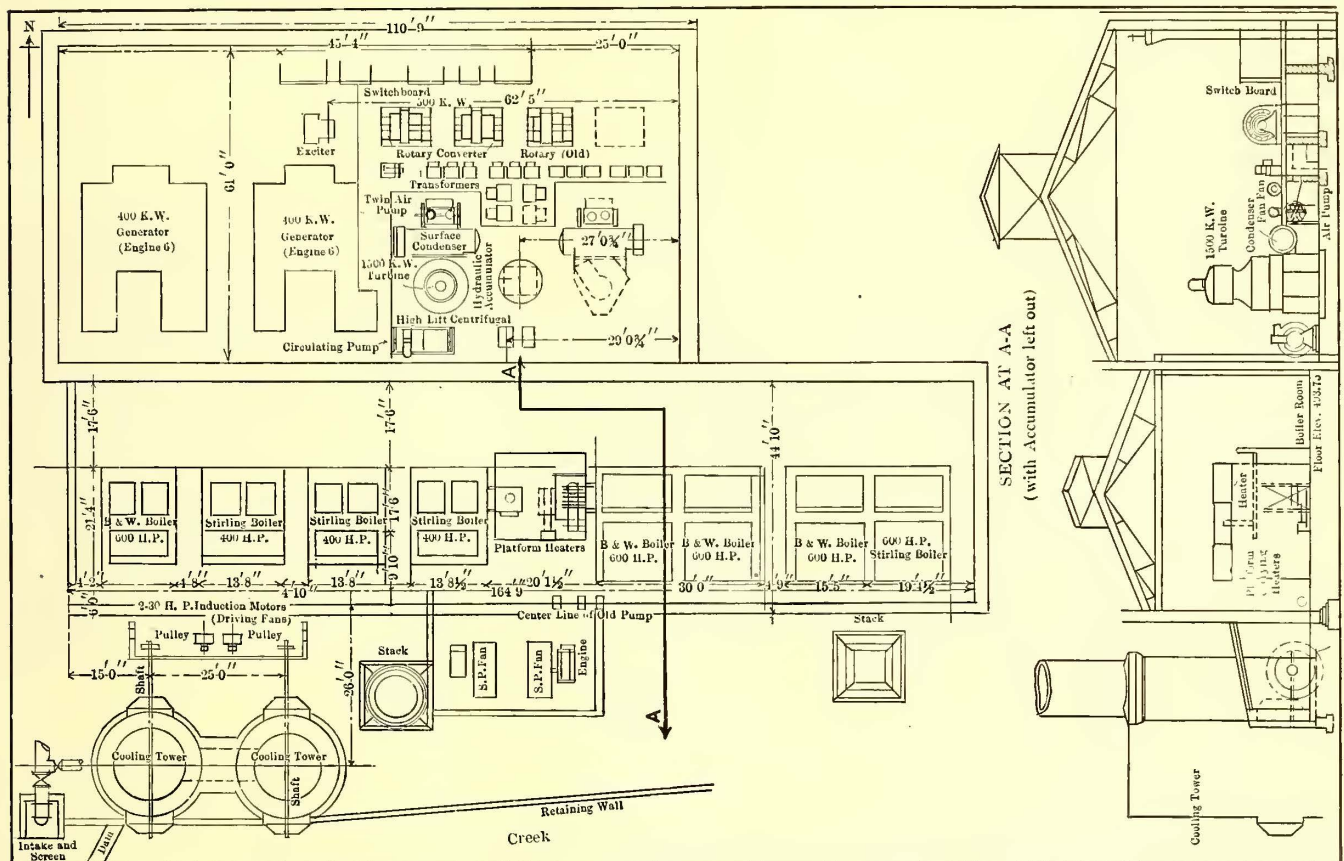
Hand firing is employed in the plant, the firing aisle being 17 ft. wide. The telpher referred to before runs the whole length of the boiler room and enables coal to be

stored temporarily in front of the boilers to meet emergency demands. The ducts supplying the separate boilers are made of vitrified culvert pipe, and each boiler is provided with a separate air damper, by which the intensity and volume of draft can be regulated separately from the manipulation of the fans. A clear space of 6 ft. 4 in. is provided behind the boilers and both the outer and inner boiler room walls are about 18 in. thick; in the latter instance the wall serves as a fire partition. The inside height of the boiler room is 28 ft. As is shown in the accompanying view of the boiler room interior, the monitor above the firing floor gives the firemen an admirable natural light supply. At night the room is illuminated by arc lamps.

The boilers can be fed either from the city service pipes or from the reservoir and creek connections. Two Cochran feedwater heaters aggregating 4000 hp are installed on a platform 16 ft. square and 10 ft. above the boiler room floor. The feedwater heaters utilize the exhaust steam of

the generators are three-phase, 2300-volt, 60-cycle units. The engine-driven generators are also 2300-volt machines. The engines exhaust into Cameron jet condensers. One turbine exhausts into a Wheeler surface condenser equipped with an Edwards twin air pump and a 15-in. high-lift centrifugal circulating pump. The second turbine, provided with an Alberger surface condenser of 6000 sq. ft. cooling area, served by a double suction 16-in. centrifugal circulating pump. A 25-kw exciter is provided for each turbine, each being driven by a single-stage horizontal Curtis turbine.

Outside the station on the bank of the creek are located two Alberger cooling towers, each 19 ft. in diameter and 32 ft. high. The blowers for these towers are belt driven by two 30-hp induction motors located in a separate house near the towers. The shafts of the fans are carried through the towers into the motor house, pulleys being mounted upon the ends to carry the belts from the motors. The



Knoxville Railway & Light Company—Plan and Section of Power Station

the station auxiliaries in the usual manner. Three feed pumps are installed, all being in the boiler room near the heaters: Two of the pumps are under the heater platform and the smaller unit is at one side, all in the center of the boiler room between the boiler batteries. This arrangement economizes space and leaves the pumps free for inspection at the floor level.

The engine room contains two 1500-kw Curtis turbo-alternators and two 400-kw GE revolving field alternators driven by Hamilton-Corliss direct-connected cross-compound engines. The plant originally was entirely a reciprocating engine station, but the oldest engines were taken out and sold at the time the present station design was carried into effect. It is probable that when additional capacity is needed the station will become simply a turbine plant. The turbines now installed are each four stage machines, operating at 165 lb. pressure and 100 deg. F. superheat, and

tower shafts are 25 ft. apart on centers. These towers are designed to operate either in connection with a water supply from the creek or the storage reservoir. The latter has a capacity of 1,000,000 gal. and is 8 ft. deep, with a pitch of 5 ft. in 100. It is connected with the circulating systems by two 24-in. pipes.

The piping for live steam supply to the various units consists of a 10-in. main carried through the boiler room and connected at its ends and with a central cross line to a similar pipe in the turbine room 10 in. in diameter. The boilers supply the main with live or superheated steam through 8-in. and 10-in. delivery pipes and expansion bends are provided twice in the run through the boiler room. The turbines are each supplied with steam through 10-in. leads and the reciprocating engines are fed with live steam through 6-in. lines, each cylinder having a connection of this size. The turbines have the usual free exhaust in addi-

tion to the connections with the condensing apparatus. The fan engines on the forced draft system are each supplied with live steam through 2½-in. lines, and their exhausts of 3 in. diameter are connected into the feedwater heater steam piping. The auxiliary steam apparatus is located mainly in the turbine room basement. Two boiler feed lines are provided, one on the top and the other below the floor on the front sides of the boilers. The blowoff piping on each side of the boilers at the rear of the batteries is connected into a 4½-in. line leading into the creek. The feed piping is cross-connected vertically and the sections on each side of the boiler room are tied together at a central point.

The cooling towers are connected with the circulating water supply system through pipe lines in multiple connection with the creek and the storage reservoir. A well with intake and screen is provided for the supply of water from the creek and a small dam has been constructed just above the towers to facilitate the drawing of water for make-up purposes. A retaining wall has been built along the side of the creek next the cooling towers to provide the necessary stability and for protection against high water.

Current for the local street railway service is provided by one 150-kw and two 500-kw rotary converters of GE make, supplied through step-down transformers. The

AN ELECTRIC RAILWAY LIVE STOCK CAR

The State Fair Grounds at Fargo, N. D., are 1½ miles from the nearest railroad, and many persons have refused to exhibit on account of the long walk to and from the grounds for their stock. The Fargo & Moorhead Street Railway reaches the grounds, however, and has entered into agreement with the Fair Association to transport live stock and exhibits generally. As it was found impossible to operate the regular railroad stock car over the Fargo & Moorhead Street Railway on account of the wheel flange and tread, the company purchased a railroad flat car 34 ft. 9 in. long and 9 ft. 4 in. wide for this service, and changed the wheels, using its standard wheel. The up-rights are of 4-in. x 4-in. x 9-ft. fir, spaced 44 in., using tapered iron stake pockets. To these uprights 1-in. x 6-in. pine boards were nailed spaced 6 in., with the exception of the two lower boards. The first board was laid even with the car floor and the next 1 in. above it, in order to prevent the stock from getting their legs through. The rear end is hinged to form a runway for loading when dropped. It is composed of 4-in. x 4-in. x 10-in. fir, spaced 6 in., to which 1-in. x 6-in. pine boards are nailed. On top of the boards are bolted 1-in. x 2-in. strips to form a foothold and prevent slipping. This end is raised and lowered by blocks



Live Stock Car on Fargo & Moorehead Street Railway, Drawn by Snow Plow

switchboard is divided into arc, railway, power and lighting sections and is equipped with standard GE oil switches and instruments. The transformers are of the air-blast type, with the blowers direct driven by induction motors. For certain outgoing lines a transformer room has been provided behind the main switchboard. The engine room is served by a 30-ton traveling crane of 59 ft. span carried on 18-in. I-beams, on pilasters 24 ft. 8 in. above the engine room floor. Work about the engines, turbines and rotaries is much facilitated by the installation of a monitor over the center of the room. Openings in the floor, railed off to protect attendants and visitors, are provided to facilitate the handling of auxiliary apparatus. This feature of the design enables trouble to be discovered more rapidly and allows the best use of the crane in erecting or alterations.

A tunnel more than a mile in length, said to be the longest in existence for use by municipal electric surface car lines in Europe, has just been opened for operation by the Genoa (Italy) Street Railway Company. It connects Genoa with the adjacent large commune of Rivarolo, which previously was reached by circling the mountain, the distance being now shortened by a mile and a half.

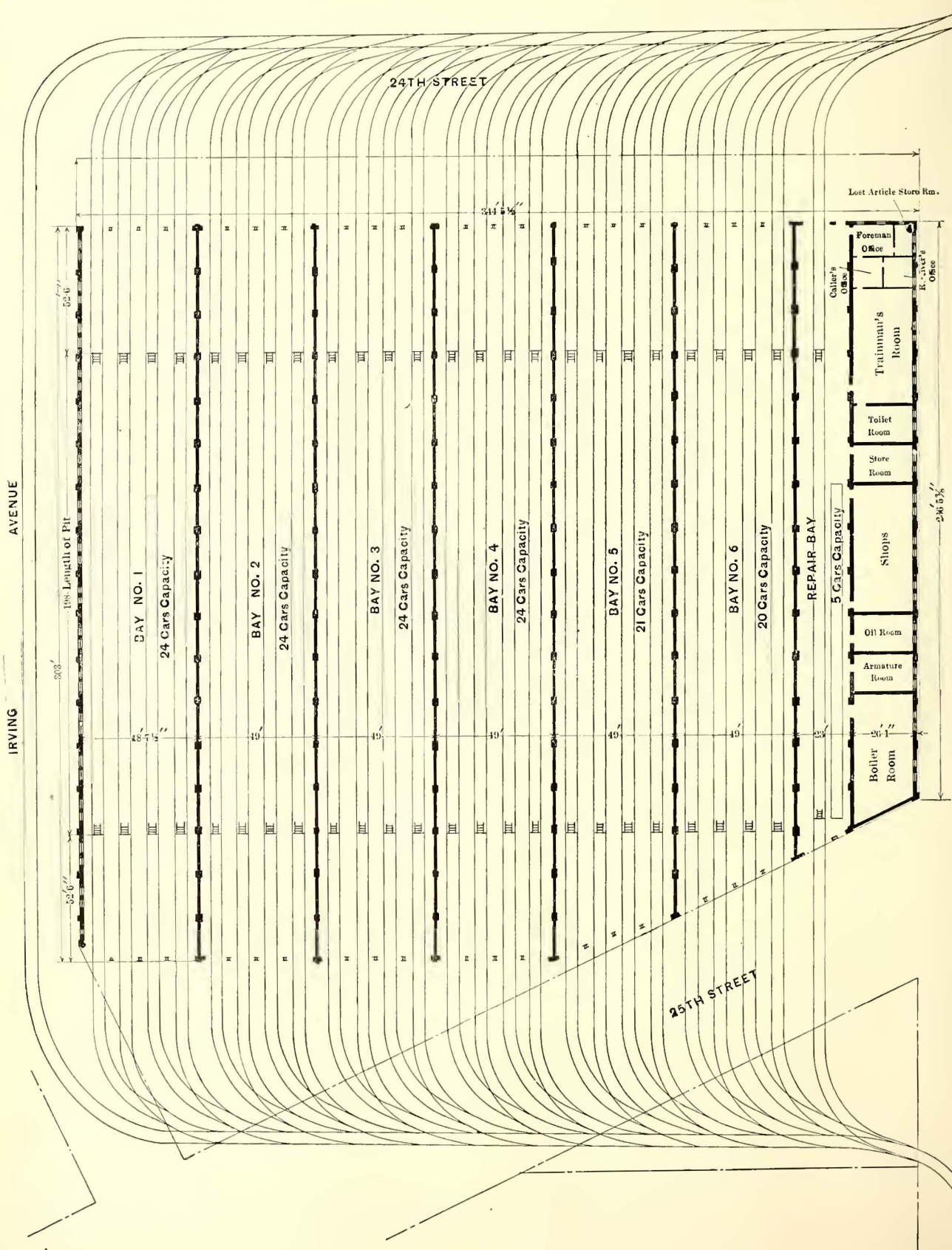
attached to each side. The top is prevented from spreading by cross pieces, bolted as shown in the illustration. Each side is made in two sections so that the runway can be removed, as the company expects to use the car to remove snow during the coming winter. The charge is \$5 per car each way regardless of the load, the shipper loading and unloading at his own risk.

A Brill nose plow equipped with two GE-67 motors and lever brakes handles the loads satisfactorily. The total weight of the load shown in the illustration is 67,000 lb. The average time consumed per trip, including loading and unloading, was 45 min. As the company operates a single-track line, loading and unloading has to be done rapidly in order not to delay the regular cars.

The Council of Hamilton, Ont., and the Dominion Power & Transmission Company have decided on a number of terms of the proposed new ordinance to be granted to that company. The company agrees, among other things, to install certain new rolling stock. The company also agreed to certain truck reconstruction and in addition will build a number of extensions, the first to be completed by July, 1910.

building will be served by a 10-ton electric crane spanning the full width of the bay. An equipment of tools for light

Reference to the accompanying block plan of this station will show that four tracks extend through each of the bays



Chicago Railways Improvements—Plan of Block Between Twenty-fourth and Twenty-fifth Streets, Irving Avenue and Leavitt Street

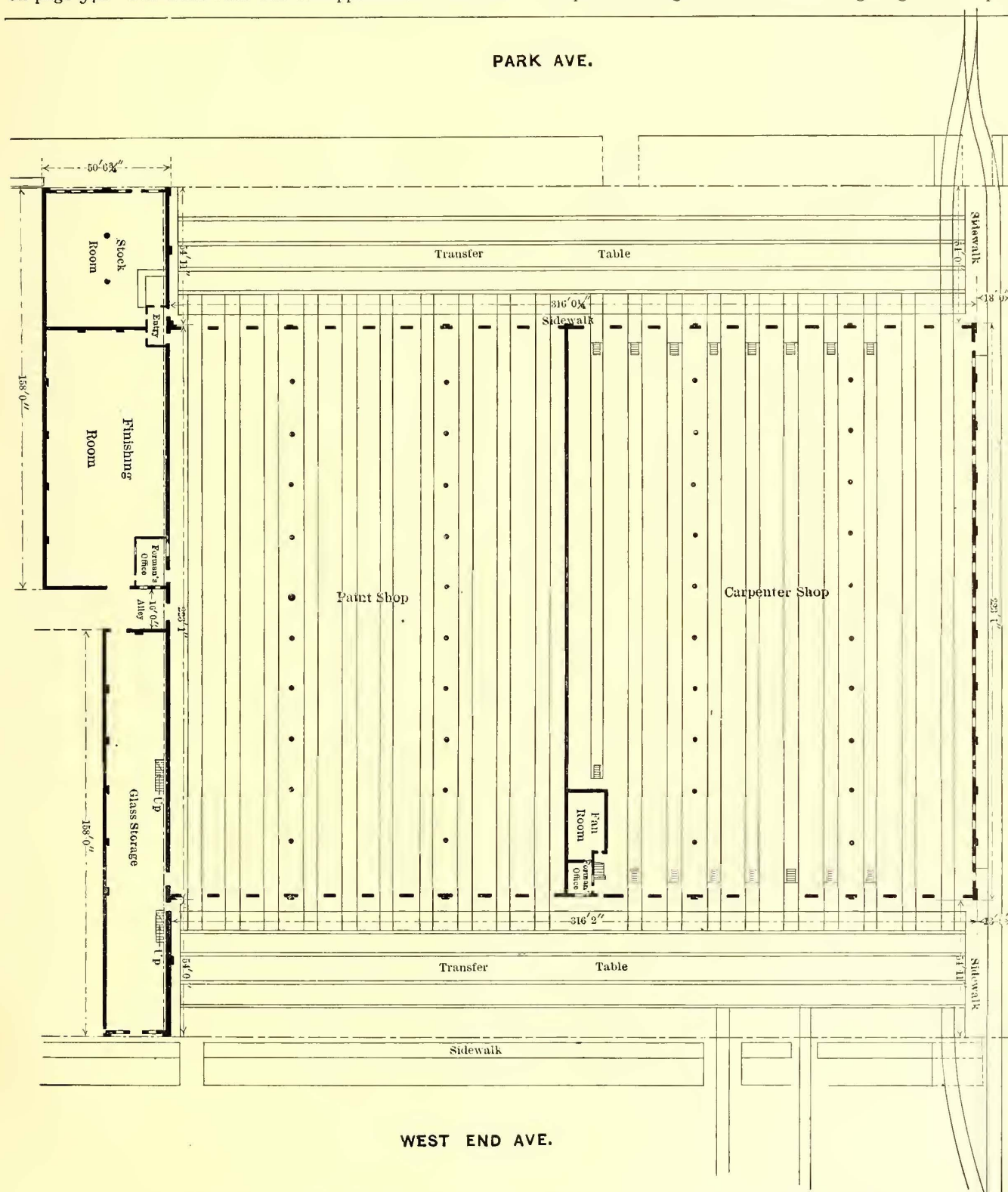
repair work will be included in this bay and in the adjoining shop.

of this car house connecting with a ladder at either end having leads to the main tracks on Leavitt Street. In ad-

dition to these through tracks there is to be a loop track around the building on the Irving Avenue side. Each of the 25 tracks which extend through the building will be provided with a pit 198 ft. long. The pits are to be of open construction, as shown in a transverse section presented on page 541. The track rails will be supported on cast-iron

ends of the building. The roof will be supported on steel trusses, fireproof with a covering of $1\frac{1}{2}$ in. of cement mortar held in place by wire lath. Ferroinclave roofing will be used to support a cement covering. This cement covering will have a $\frac{3}{8}$ -in. protection of tar and gravel.

A special arrangement of overhead lighting is to be pro-



Chicago Railways Improvements—Plan of Carpenter Shop, Paint Shop, and Additions

posts and the floors between pit tracks and below the pits will be made of reinforced concrete.

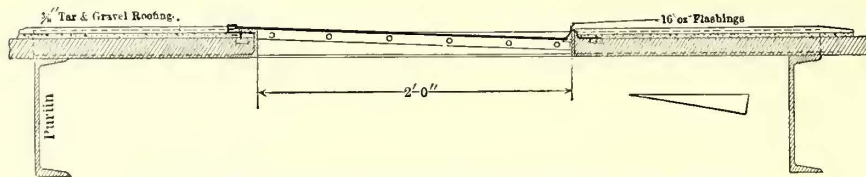
This structure, which, as earlier stated, is typical of others under construction and to be built, will have brick side and fire walls. Pressed brick will be used for the street

vided. Skylights of glass, 2 ft. x 4 ft. in size, will be placed directly over the aisles between the tracks. In this way the direct rays of light during the daytime will fall between the cars and, it is thought, give a relatively large amount of light in the pits. A detail sketch, presented on page 540, shows the

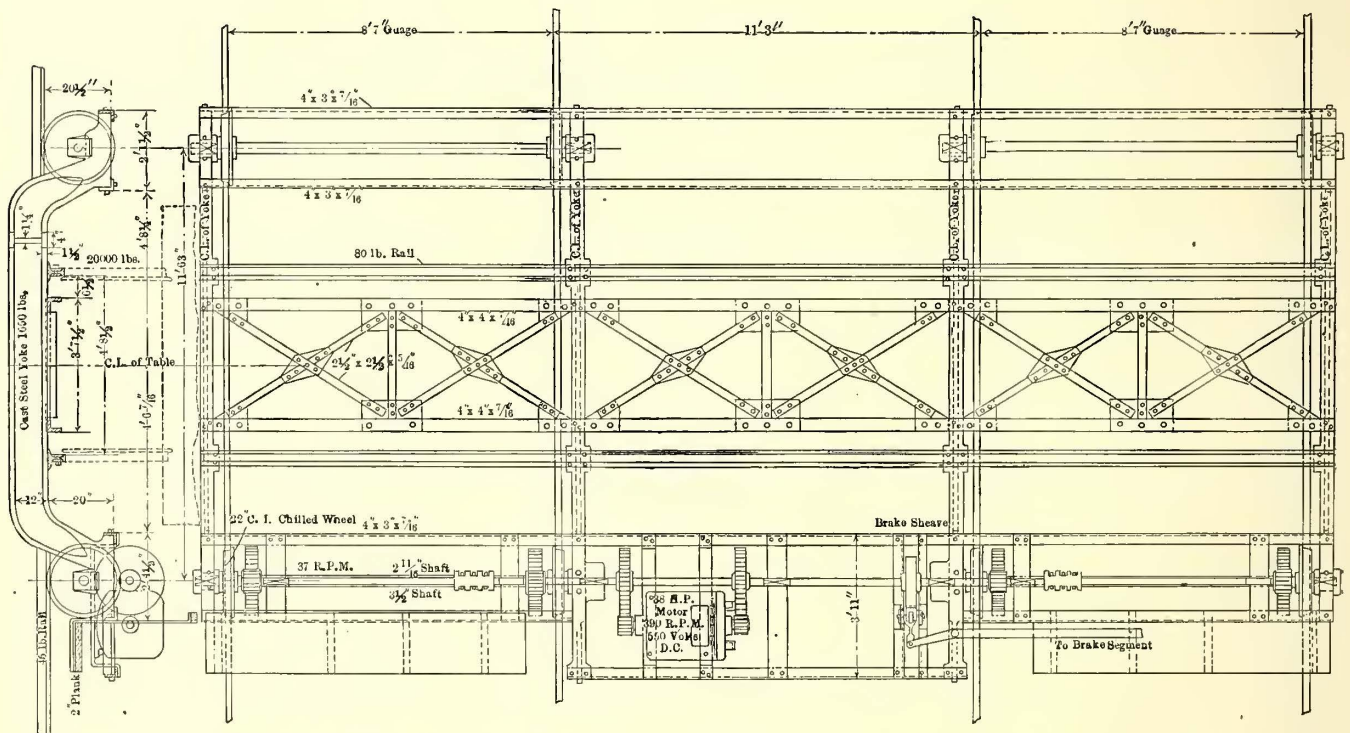
method of inserting these flat-glass skylights in the Ferroinclave roof. In the first design for these skylights it was proposed to use $\frac{1}{4}$ -in. wire-glass, held in place in an angle-iron frame, as illustrated. On further consideration with the insurance board representatives it has been decided to substitute in place of the $\frac{1}{4}$ -in. wire-glass, a single sheet of $\frac{1}{8}$ -in. plain glass, under which will be placed a

in ground dimensions. A general plan of the group of shop buildings here is presented on page 537. It will be noted that practically all of the shop buildings will be remodeled. The Madison Street car station adjoins this shop property.

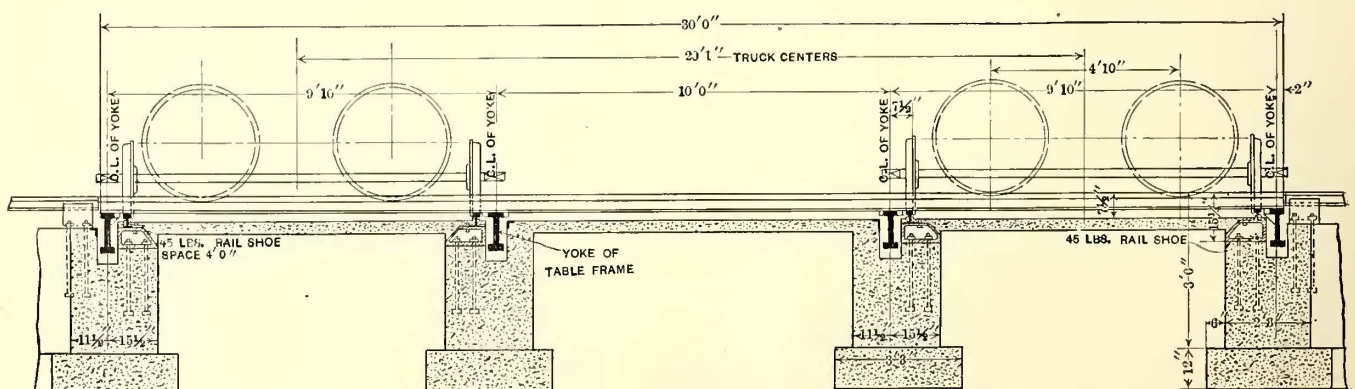
The new paint and carpenter shop addition is shown in plan. This structure will have brick walls. It will be provided with transfer tables at either end connecting with all tracks. By this arrangement of tracks and transfer tables as work on a car in the shop approaches completion, the car can be moved from one end of the building to the other, thus using the track space most effectively by taking all cars in at one end of the shop and send-



Chicago Railways Improvements—Section of Skylight



Chicago Railways Improvements—Transfer Table in Paint and Carpenter Shops



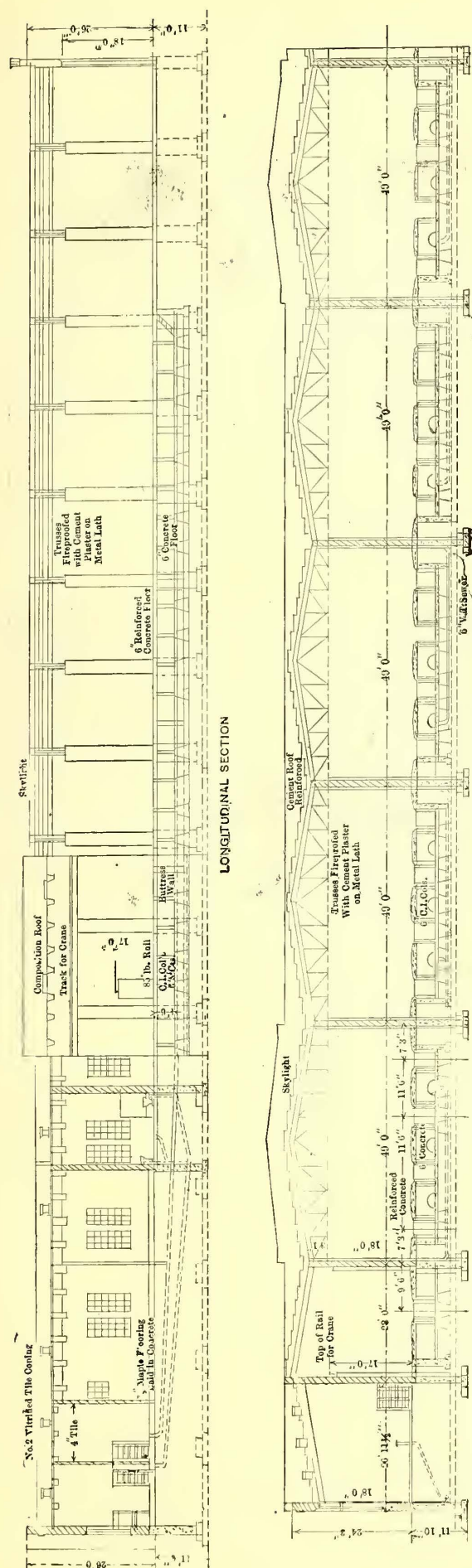
Chicago Railways Improvements—Details of Transfer Table Foundations

wire screen so arranged that it will catch any pieces of broken glass.

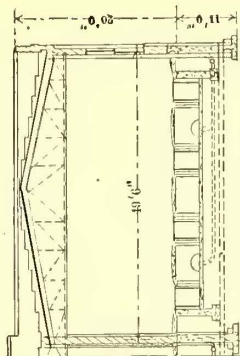
REPAIR SHOPS

At the present repair shops, located at Fortieth Avenue and Park Avenue, a two-story brick shop building has been torn down and in its place, and on adjoining property, are being erected a paint and carpenter shop 366 ft. x 223 ft.

ing them out at the opposite end. Detail plans of the transfer tables which will serve the new paint and carpenter shop buildings are presented along with the plan and sections of the new shop building. The transfer table includes some interesting features in its design. The track on the transfer tables will be made of 80-lb. T-rails supported by four cast-steel yokes 11 ft. 6 in. long. A 38-hp motor will



Chicago Railways Improvements—General Sections of Leavitt Street Car House



drive each of the four wheels on one side of the transfer tables.

These improvements in carhouse and shop facilities and the reconstruction of a large mileage of track will require the expenditure of practically all of the first year's appropriation for rehabilitation under the new ordinance. The company has long been in need of modern car stations adapted to the care and inspection of electric equipment. After the change from

cable to electricity no plans were made for remodeling the car houses, pending the adjustment of the franchise ordinances. This part of the rehabilitation work is, therefore, most imperative and is being pushed with all speed.

HUNGARIAN ELECTRIC RAILWAY STATISTICS

The following figures are taken from an official report on the Hungarian electric railways for the year ending 1907, from which it will be seen that the total mileage of the interurban railways was practically 28 km (17.36 miles) of single track, and the total mileage of the city railways 209 km (129.6 miles) of single track. During 1906 the electric railway mileage of the Vizinal railway system was reduced about 5 km (3.1 miles) of single track, owing to the suspension of electric service on the Szatmar-Erdöd Railway. Since Jan. 1, 1907, this system has been a part of the Hungarian State Railways. The city railways show a total increase in length of $8\frac{1}{2}$ km (5.27 miles) principally in Budapest and vicinity.

	Total track, km.	Double track, km.	Length of route, km.
a. Vizinal Railway System.			
Budapest-Budafok	7.835	....	8.675
Budapest-Szentlörinze	11.868	7.915	11.506
Miskolcz-Diosgyor	8.277	....	6.943
Total	27.980	7.915	27.124
b. City Railways.			
Budapest locomotive line (1,316 km. out of service)	71.850	67.845	71.850
Budapest (car lines)	44.856	44.032	44.785
Franz Joseph Subway (in Budapest) ..	3.700	3.700	3.700
Budapest-Ujpest-Rakospalota	16.488	11.267	17.208
Budapest and vicinity	6.841	3.725	6.770
Fiuman	4.413	....	3.982
Miskolcz	7.300	....	6.578
Nagyvárad	2.395	....	2.395
Pozsony	15.327	1.799	12.497
Sopron	8.002	2.516	7.800
Szabadka	4.575	....	3.830
Szombathely	10.000	....	10.000
Temesvár	3.026	....	2.810
Total	10.415	4.865	10.415
Total	209.188	139.749	204.620

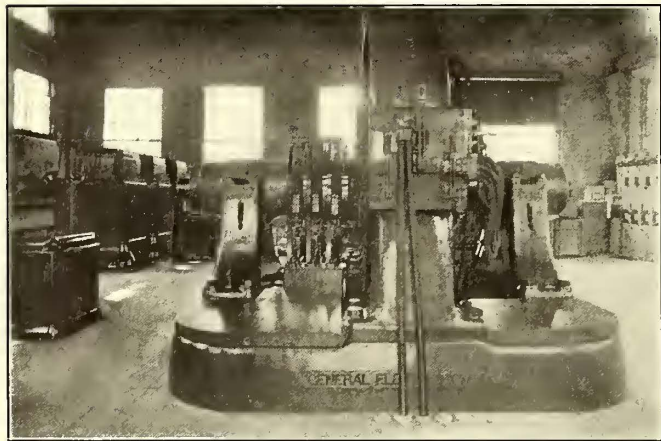
CAR CLEANING ON THE NORWICH & WESTERLY

The Norwich & Westerly Railway operates through a section of Connecticut close to the shore of Long Island Sound, where there are very heavy fogs, and this condition added to the fact that the cars run at a high rate of speed over a track laid with gravel ballast makes the subject of maintenance of the surface finish of the cars a serious one. S. J. Kehoe, master mechanic of the company, reports great success, however, with the use of a liquid cleaner which is applied on a soft rag once a week. The panels are then wiped off with a dry rag. In the middle of the week, the cars are rubbed off with a dry rag without using the cleaner. No water is employed. Mr. Kehoe reports the cost of cleaning a car per week is as follows: 2 hours at $17\frac{1}{2}$ cents, 35 cents; cleaner, $1\frac{1}{2}$ quarts at $10\frac{3}{4}$ cents, $16\frac{1}{2}$ cents; total $51\frac{1}{2}$ cents per car.

CONCRETE SUBSTATIONS IN MINNEAPOLIS

Illustrations are presented showing constructional details of the Lake Street and the Thirty-second Avenue substations of the Twin City Rapid Transit Company. These stations are both located in Minneapolis and are typical of this company's more recent substation construction. The buildings are alike in general design and contain duplicate converter installations. A comparison of the two structures shows a considerable reduction in floor area in the newer station and a steel-supported roof in place of one of reinforced concrete.

An illustration is presented showing a transverse section of the Lake Street substation. The building has limestone in cement mortar (monolithic concrete) foundations, which



Twin City Rapid Transit—Interior of Lake Street Station

support side walls of cement brick. The roof is a concrete slab supported by reinforced concrete girders spanning the entire width of the building. This roof has been found perfectly satisfactory, the only criticism being that the reinforced concrete work could not be executed as fast as the erection of a steel-supported roof. For this reason, when the Thirty-second Avenue substation was designed steel trusses were used to support its roof.

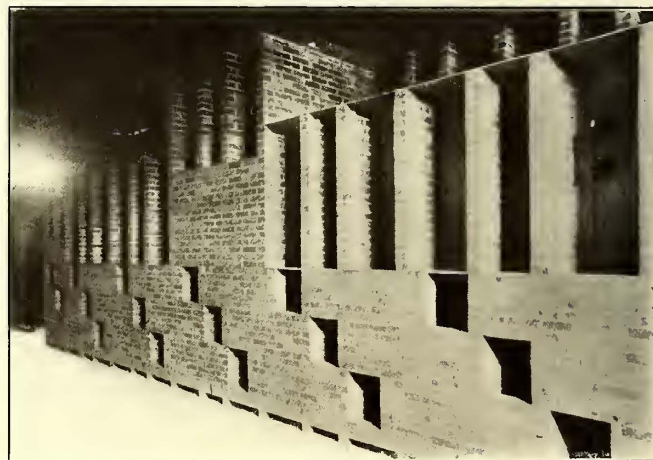
The Lake Street substation contains two 1,500-kw rotary converters, is 50 ft. x 51 ft. in ground dimensions and has a

substation, which is of the latter design, has ground dimensions of 48 ft. 6 in. x 45 ft. 1 in., and a clear height in the machine room of 21 ft. 8 in. This station also is designed for two 1500-kw rotary converters.

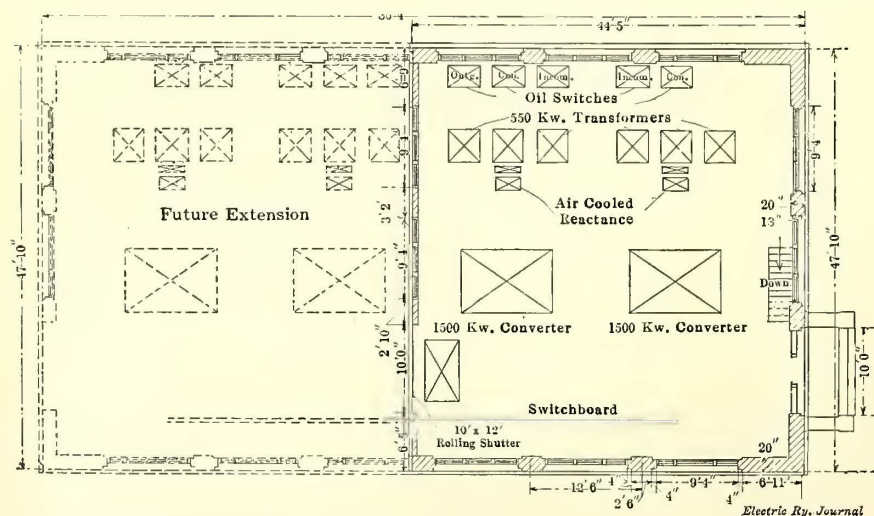


Twin City Rapid Transit—Lake Street Substation

The equipment in each station comprises, besides two 1,500-kw 6-phase rotary converters, six 550-kw air-blast transformers, five type H-3 remote-control oil switches, two



Twin City Rapid Transit—Bus Compartment in Basement



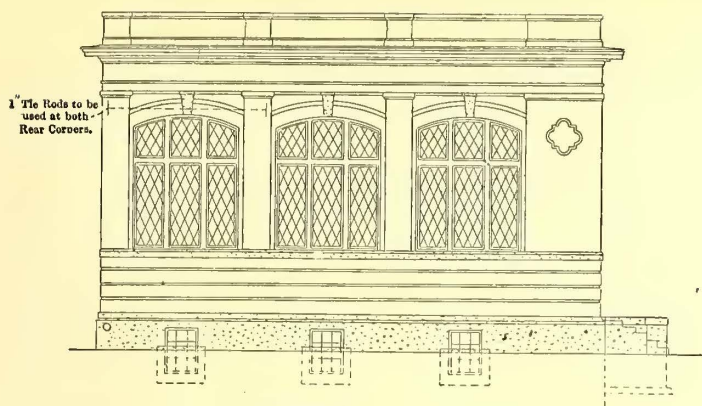
Twin City Rapid Transit—First Floor Plan of 32d Avenue Substation

clear height in the machine room of 23 ft. 5 in. In laying out the Thirty-second Avenue substation the blower fans were placed in the basement, thereby effecting a reduction in the size of the structure. The Thirty-second Avenue

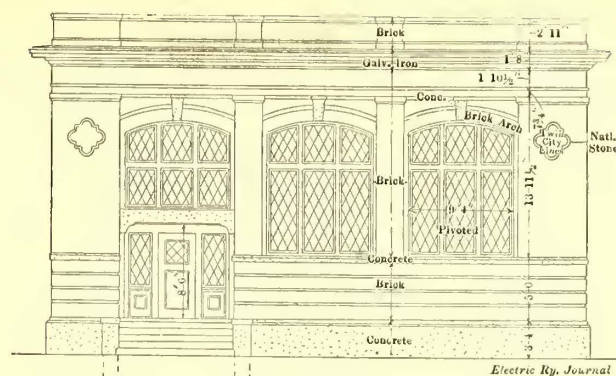
air-blast reactance coils, motor-driven blast fans of 20,000 cu. ft. capacity and a switchboard with the usual machine panels, line panels and direct-current panels for 10 outgoing feeders. Current for conversion in these substations is received at 13,200 volts over duplicate underground lead-covered cables. The electrical equipment in these substations was supplied by the General Electric Company.

A wiring diagram is presented showing the main and auxiliary circuit for the Lake Street substation. It will be noted that this arrangement of wiring is adapted for an extension of the apparatus and building to double its present size and capacity. Illustrations are presented showing the general arrangement

of machinery in the Lake Street substation and the general appearance and constructional details of the bus-bar compartments. These compartments, as illustrated, are built up of cement brick and asbestos board. Special

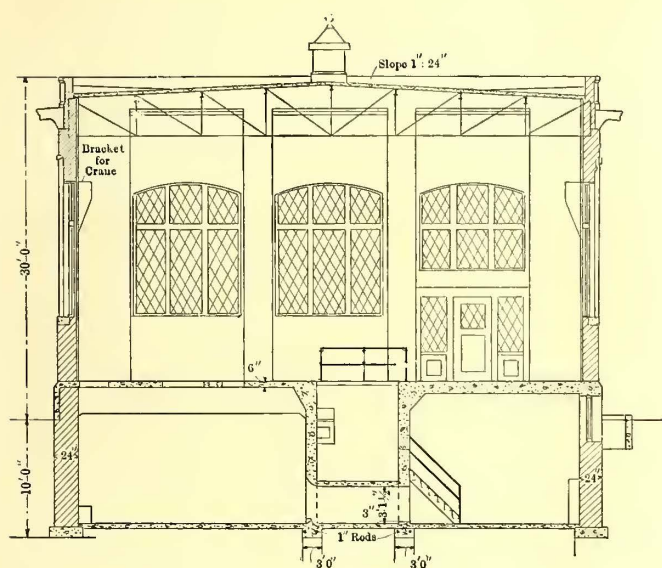


Side Elevation

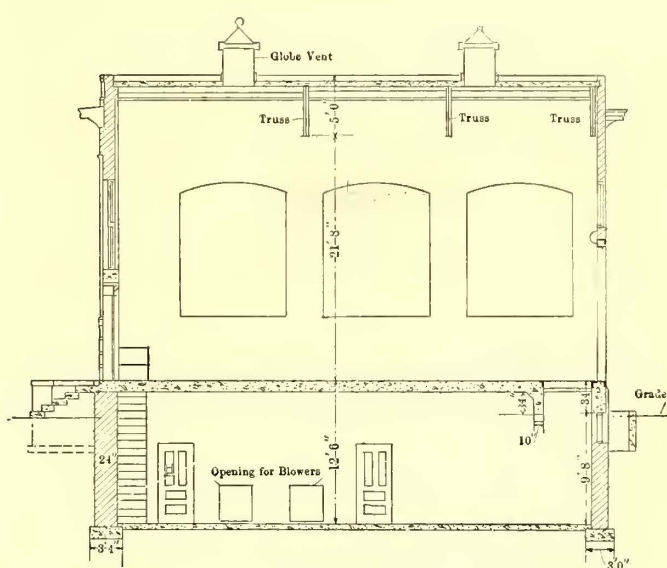


- Front Elevation

Twin City Rapid Transit—Elevations of Thirty-second Avenue Substation

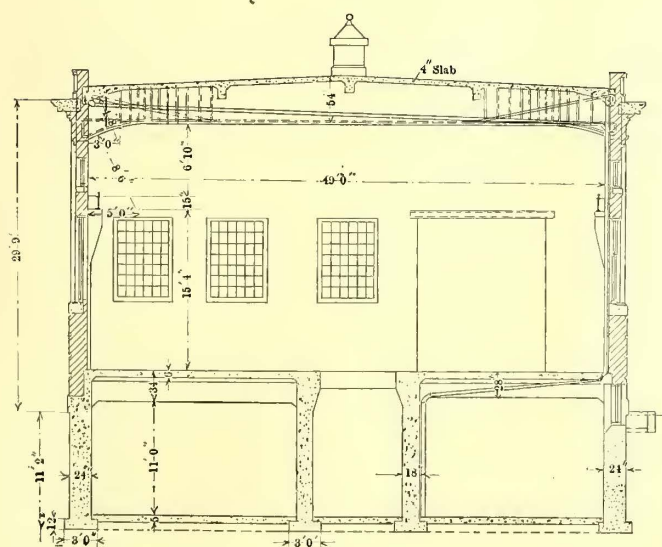


30
Transverse Section

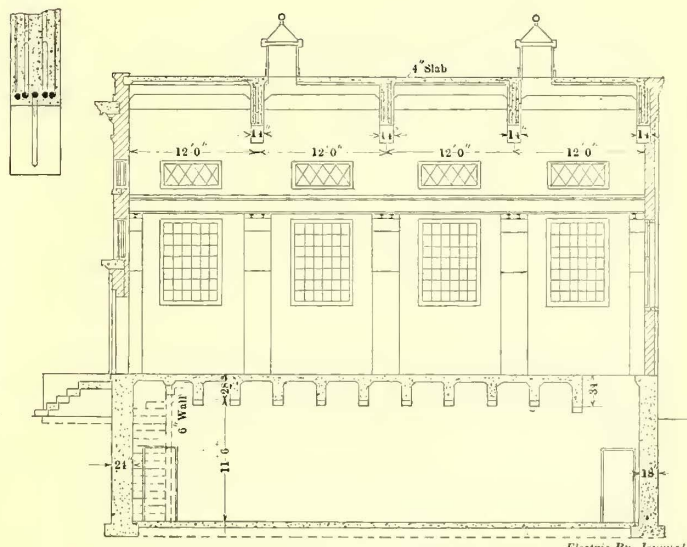


Longitudinal Section

Twin City Rapid Transit—Sections of Thirty-second Avenue Substation



Transverse Section



Longitudinal Section

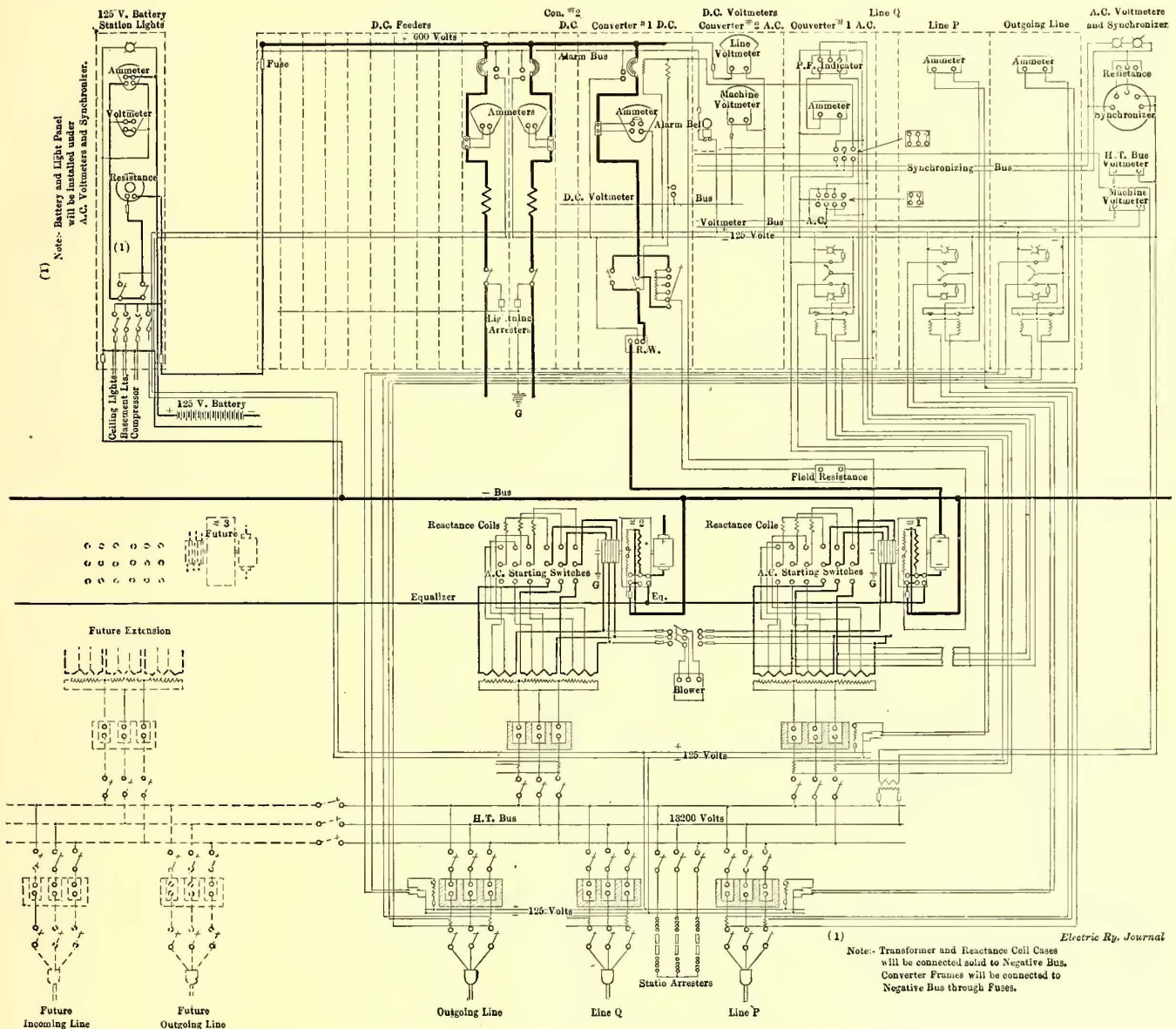
Twin City Rapid Transit—Sections of Lake Street Substation

effort has been made to keep the high-tension arrangements as simple as possible and thus provide against any accidental interruption of service. The vertical sections through the busbar compartments illustrate the simplicity of the high-tension connections between the switches, transformers, buses and incoming cables. Only one high-tension bus is provided at each substation, but this bus may be fed by either of two incoming cables, so that the factor of safety against interruption is large.

The substations are lighted by 80 incandescent lamps arranged in clusters beneath silvered reflectors supported close against the roof.

in a remote-control quick-break switch which serves to connect the telephone company's cable with the railway company's track-return cable. This connecting switch is placed in the basement of the substation, and in the machine room, directly above, the telephone company has erected a small board on which are the control buttons for the switch just described, and an ammeter and voltmeter.

It is the practice to close the connecting switch only when the rotary converters in this substation are running and open the switch when the rotaries are shut down. Thus the telephone company's cables are not grounded through this station when no current is being fed from it.



Twin City Rapid Transit—Wiring Diagram of Lake Street Substation

One of the telephone companies in Minneapolis has installed a rather interesting switch equipment in the Lake Street substation of the Twin City Rapid Transit Company. This switch equipment serves to tie the lead sheaths of the telephone cables to the negative return cables at the substation. To effect this connection the telephone company has installed a 500,000-circ. mil cable between its cables and this substation. The length of this cable is about 4000 ft. This connecting cable is joined to the common ground which connects the sheaths of all lead-covered telephone cables. At the substation the connecting cable terminates

This positive connection between the negative of the railway company's system and the lead sheaths of the telephone companies' cables is said very largely to prevent any electrolysis that might be occasioned by railway current.

The Auckland (New Zealand) Harbor Board calls for tenders for 16 electric cranes, to be submitted by Oct. 1 to W. & A. McArthur, Ltd., 18 Silk Street, London, E. C., England, from whom specifications and diagrams may be procured. Further particulars may be obtained from the Bureau of Manufactures, Washington, D. C.

MEETINGS OF THE COMMITTEES OF THE ENGINEERING ASSOCIATION

Meetings of the several committees of the American Street & Interurban Railway Engineering Association have been held recently to draft up reports to be submitted at the Atlantic City convention, or otherwise to prepare for that meeting. One of these was the committee on standardization, of which W. H. Evans is chairman. The meeting was not one of the full committee, but of a sub-committee of the main committee which was appointed to go over the final draft of the report, the main features of which had already been decided upon by the main committee. This sub-committee met in New York Aug. 21.

The committee on operating and storage car house designs, of which F. F. Low is chairman, met on Aug. 19 in Boston for similar purposes. The committee on power and generation, of which G. H. Kelsey is chairman, met in Buffalo on Aug. 5 to complete its report.

CAPITALIZATION, CARS AND MILEAGE OF ELECTRIC RAILWAY COMPANIES IN THE UNITED STATES

The accompanying table shows the mileage, number of cars and capitalization of the street, elevated and electric interurban railway companies in the United States and its insular possessions, including Porto Rico, Hawaii and the Philippines; also in Canada (including Newfoundland) and Cuba. The figures are given for the last two years, and are compiled from the last two editions of the Red Book of American Street Railway Investments. A few changes have been made in the form of the table. In former years the number of cable, steam and horse car railways have been tabulated. Last year these had become so few that the data were grouped in a single section, but even then the mileage amounted to less than 2 per cent. of the total. The number of these miscellaneous equipments have been still further decreased during the year, largely as a result of the electrical equipment of the cable lines in San Francisco and Chicago, and it does not seem worth while, therefore, to perpetuate this division longer. For this reason the cars are now divided into electrically equipped cars, which include passenger cars, sweepers and locomotives, and the second division, which last year was entitled "Trail and Service Cars," but this year has been made to include all other cars than motor cars.

In the compilation of the table a question arose as to the proper plan of entering the statistics relating to the electrical equipment of the steam railroads which have been put in service during the year. Last year the Baltimore & Ohio tunnel, the direct current electrified steam sections of the New Haven road and the small portion of the West Jersey & Seashore line which was in service last year, were included. This year it has been deemed best to classify all heavy traction lines by themselves, except that the Oneida Railway (West Shore Railway) and the Providence, Warren & Bristol division of the N. Y., N. H. & H., which partake more of a street railway character, have been included in the main table this year.

As many of these heavy traction lines use steam and electricity over the same tracks and as many of them are still in progress of installation, the statistics given below cover only rolling stock.

Baltimore & Ohio, Baltimore, Md.—Eight electric locomotives.

Erie Railroad, Rochester, N. Y.—Six motor cars.

Long Island Railroad, Long Island City, N. Y.—Two hundred and nineteen cars.

N. Y. C. & H. R. R.R.—Thirty-five electric locomotives, 125 motor cars, 55 trail cars.

N. Y., N. H. & H. R.R.—Thirty-five electric locomotives.

West Jersey & Seashore Railroad.—Eighty-seven motor cars.

The tabulation is, of course, based upon the actual reports received from the companies and does not take into consideration the differences in the companies between this year and last, so that the columns showing the increase during the year often represent variations which are more apparent than real. To illustrate, the Public Service Corporation of New Jersey, in 1906, reported its entire capitalization and there was no satisfactory way of separating the figures representing the railway capitalization from that covering the rest of the property. Since the compilation of the 1906 figures, the Public Service Railway Company has been organized to take over and operate the railway properties of the Public Service Corporation and the capitalization of this latter company only has been included in the figures of 1907. The large difference in capitalization in Illinois between 1906 and 1907 is mainly caused by the different plan of capitalization of the Chicago Railways Company. Last year, the capital stock of the Chicago Union Traction Company amounted to \$32,000,000, which was included in the table for 1906. This year the capital stock of the Chicago Railways Company is nominally \$100,000 against which participating certificates of no par value have been issued. This makes the recorded difference in the capital stock of this company \$31,990,000. The large increase in capitalization in California is mainly due to the increase in capital of the California Gas & Electric Corporation, which is largely a power company, but as it also owns and operates the street railway system of Sacramento, it has been included in the accompanying table.

The dates of the reports from the different companies as given in the Red Book vary, but practically all of those in the 1908 edition are within the limits of June 30, 1907, and May 1, 1908. The average is believed to be not far from Dec. 31, 1907, so for this reason the figures given in the table for 1907 may be considered as fairly representing the conditions at the close of that year.

Where reliable reports could not be obtained of the capital stock and funded debt of the companies estimates have been made based upon the known physical property of the separate companies. As the roads not thus reporting were very small, however, both in number and importance, these estimates do not vitally affect the accuracy of the table. More important estimates had to be made of the outstanding stock and funded debt in cases where holding or leased companies owned a portion of the outstanding obligations or capital of sub-operating companies. These estimates were required, as many of the holding companies do not report the proportion of the capitalization of sub-companies controlled by them.

Consul Roger S. Greene, of Dalny, Manchuria, reports that plans for the electric railway which is to be built by the South Manchuria Railway are beginning to take definite shape, and tenders for the supply of materials will shortly be called for. The estimated cost will be about \$1,000,000, and the chief electrical engineer of the company is expecting to visit the United States to study the latest developments in the street railway business that the road may be made up to date. Further particulars may be obtained from the Bureau of Manufactures, Washington, D. C.

UNITED STATES AND CANADA.

ENTS." EDITION OF 1908.

DEBT.		CAPITAL LIABILITIES.		
	INCREASE FOR YEAR.	TOTAL.		INCREASE FOR YEAR.
		1906	1907	
2,000	\$2,840,500	\$17,664,481	\$22,796,681	\$5,132,200
4,000	—1,583,000	13,844,006	11,500,000	—2,344,006
3,000	80,000	7,014,510	7,094,510	80,000
2,000	7,066,000	169,012,100	175,609,650	6,597,550
3,400	—3,761,300	42,707,700	39,125,400	—3,582,300
5,078	—10,486,515	77,359,093	74,456,178	—2,902,915
7,478	—5,844,513	327,601,890	330,582,419	2,980,529
5,244	16,639,161	740,020,439	809,815,093	69,794,654
3,750	3,514,662	200,062,968	204,102,340	4,039,372
2,985	2,586,188	413,430,917	442,799,915	29,368,998
2,000	—1,145,050	11,398,090	9,779,000	—1,619,090
1,809	4,687,370	60,413,439	66,860,609	6,447,170
2,000	840,000	79,261,400	80,353,050	1,091,650
2,800	—1,064,700	65,486,350	61,696,450	—3,789,900
2,000	185,000	19,007,200	19,261,000	253,800
5,588	36,242,631	1,589,080,803	1,694,667,457	105,586,654
5,500	780,000	89,926,500	90,053,700	127,200
5,500	7,348,500	328,643,875	346,459,973	17,816,098
5,750	11,490,500	129,207,840	166,805,730	37,597,890
5,300	2,288,300	33,270,050	36,354,500	3,084,450
5,000	9,499,000	50,036,200	68,450,000	18,413,800
5,500	50,638,500	308,055,200	345,199,300	37,144,200
5,000	749,000	51,026,000	54,385,000	3,359,000
5,500	6,199,500	47,651,000	58,803,700	11,152,700
5,000	2,067,000	183,094,000	187,961,000	4,867,000
5,050	91,060,300	1,220,910,665	1,354,472,903	133,562,238
5,800	109,800	5,731,500	6,839,900	1,108,400
5,000	7,000	9,386,000	9,783,000	397,000
5,100	1,696,600	39,808,394	43,869,494	4,061,100
5,000	—56,000	6,575,000	6,914,000	339,000
5,000	—806,000	24,666,900	27,997,000	3,330,100
5,500	529,500	6,605,400	7,770,900	1,165,500
5,000	2,932,500	37,767,000	41,968,700	4,201,700
5,000	3,434,000	61,313,000	84,199,800	22,886,800
5,000	—382,500	10,035,900	9,781,800	—254,100
5,400	7,464,900	201,889,094	239,124,594	37,235,500
5,000	3,000	650,000	663,000	13,000
5,000	50,000	50,000	150,000	100,000
5,000	50,000	19,257,500	22,804,600	3,547,100
5,000	.....	400,000	500,000	100,000
5,000	685,000	13,115,000	14,426,000	1,311,000
5,000	398,000	4,800,000	7,543,800	2,743,800
5,000	225,000	38,399,500	43,097,600	4,698,100
5,000	—1,800,000	40,106,100	39,128,000	—978,100
5,000	5,000	4,370,613	4,449,615	79,002
5,000	.....	700,000	700,000	.....
5,000	1,019,000	1,268,400	3,299,000	2,030,600
5,000	495,000	16,552,500	17,047,500	495,000
5,000	12,525,000	45,147,310	70,793,910	25,646,600
5,000	—1,773,000	41,986,000	40,393,000	—1,593,000
5,000	6,234,000	198,332,500	239,131,000	40,798,500
5,000	.....	700,000	860,000	160,000
5,000	18,116,000	425,835,423	504,987,025	79,151,602
5,516	147,039,516	3,765,317,875	4,123,834,598	358,516,523
5,000	2,858,000	8,921,000	14,758,000	5,837,000
5,300	2,000,000	83,155,671	85,605,496	2,449,825
5,000	1,088,439	40,474,061	42,262,500	1,788,439

STREET AND ELEVATED RAILWAY MILEAGE, CARS AND CAPITALIZATION IN UNITED STATES AND CANADA.

COMPILED FROM THE STATISTICS OF THE VARIOUS PROPERTIES CONTAINED IN "AMERICAN STREET RAILWAY INVESTMENTS," EDITION OF 1908.

STATES.	No. of Ry.Cos.	ELECTRIC RAILWAYS.								CAPITAL STOCK.			FUNDED DEBT.		CAPITAL LIABILITIES.				
		TRACK MILEAGE.		ELECTRICALLY EQUIPPED CARS, SWEEPERS AND LOCOMOTIVES.		ALL OTHER CARS.		TOTAL CARS.		TOTAL.		INCREASE FOR YEAR.	TOTAL.	INCREASE FOR YEAR.	TOTAL.		INCREASE FOR YEAR.		
		1907	1906	1907	1906	1907	1906	1907	1906	1907	1906		1907		1906	1907			
New England States																			
Maine.....	16	477	446	498	502	281	245	779	747	\$8,612,981	\$10,904,681	\$2,291,700	\$9,051,500	\$1,892,000	\$2,840,500	\$17,664,481	\$22,796,681	\$5,132,200	
New Hampshire.....	18	296	292	358	355	78	69	436	424	7,207,006	6,446,000	—761,006	6,637,000	5,054,000	—1,583,000	13,844,006	11,500,000	—2,344,006	
Vermont.....	10	122	123	122	122	23	20	145	142	3,721,510	3,721,510	.....	3,293,000	3,373,000	80,000	7,014,510	7,094,510	80,000
Massachusetts.....	73	2,818	2,949	7,853	8,136	2,417	2,455	10,270	10,591	107,638,100	107,169,650	468,450	61,374,000	6,440,000	7,066,000	169,012,100	175,609,650	6,597,550	
Rhode Island.....	12	461	459	972	1,009	151	224	1,123	1,233	21,813,000	21,992,000	179,000	20,894,700	17,133,400	—3,761,300	42,707,700	39,125,400	—3,582,300	
Connecticut.....	15	774	855	1,682	1,690	293	350	1,975	2,040	29,107,500	36,691,100	7,583,600	48,251,593	37,765,078	—10,486,515	77,359,093	74,456,178	—2,902,915	
Total.....	144	4,948	5,124	11,485	11,814	3,213	3,363	14,728	15,177	178,100,097	186,924,941	8,824,844	149,501,793	143,657,478	—5,844,513	327,601,890	330,582,419	2,980,529	
Eastern States																			
New York.....	168	3,548	3,950	12,198	13,011	4,564	4,232	16,762	17,243	384,114,356	437,269,849	53,155,493	355,906,083	373,545,244	16,639,161	740,020,439	809,815,093	69,794,654	
New Jersey.....	38	1,213	1,215	2,200	2,590	226	330	2,426	2,920	105,348,880	95,873,590	—9,475,290	94,714,088	108,228,750	3,514,662	200,062,968	204,102,340	4,039,372	
Pennsylvania.....	165	3,636	3,950	8,084	8,333	1,092	1,178	9,176	9,511	237,734,120	264,516,930	26,782,810	175,690,797	178,282,985	2,586,188	413,430,917	442,799,913	29,368,998	
Delaware.....	5	111	85	200	170	10	5	210	175	4,924,040	4,450,000	—474,040	6,474,050	5,329,000	—1,145,050	11,398,090	9,779,000	—1,619,090	
District of Columbia.....	9	326	340	1,063	1,000	340	470	1,403	1,470	33,205,000	34,964,800	1,759,800	27,208,439	31,895,809	4,687,370	60,413,439	66,860,609	6,447,170	
Maryland.....	14	548	528	1,930	1,960	179	179	2,109	2,139	19,991,400	20,243,050	251,650	59,270,000	60,110,000	840,000	79,261,400	80,353,050	1,091,650	
Virginia.....	23	497	543	642	666	181	190	823	856	32,407,850	29,682,650	—2,725,200	33,078,500	32,013,800	1,064,700	65,486,350	61,669,450	—3,789,900	
West Virginia.....	19	310	349	364	421	31	38	395	459	10,775,200	10,844,000	68,800	8,232,000	8,417,000	185,000	19,007,200	19,261,000	253,800	
Total.....	441	10,190	10,960	26,681	28,151	6,623	6,622	33,304	34,773	828,500,846	897,844,869	69,344,023	760,579,957	790,822,588	36,242,631	1,589,080,803	1,694,667,457	105,586,654	
Central States																			
Michigan.....	34	1,682	1,700	2,073	2,011	263	492	2,336	2,503	43,191,000	42,538,200	—652,800	46,733,500	47,515,500	780,000	89,926,500	90,053,700	127,200	
Ohio.....	104	4,503	4,450	4,958	4,948	793	698	5,751	5,646	208,550,875	219,018,473	10,467,598	120,093,000	127,441,500	7,348,500	328,643,875	346,439,973	17,816,098	
Indiana.....	57	2,010	2,281	1,733	1,840	312	400	2,045	2,240	70,107,590	96,214,980	26,107,390	59,100,250	70,590,750	11,490,500	129,207,840	166,805,730	37,597,890	
Kentucky.....	14	339	349	590	599	291	303	881	902	20,128,050	20,924,200	796,150	13,142,000	15,430,300	2,288,300	33,270,050	36,334,500	3,084,450	
Wisconsin.....	22	776	785	821	831	120	110	941	941	25,176,200	34,091,000	8,914,800	24,860,000	34,359,000	9,499,000	68,450,000	68,450,000	18,413,800	
Illinois.....	70	2,830	2,821	5,595	5,096	2,318	2,184	7,913	7,280	181,960,200	168,465,800	—13,494,400	126,095,000	176,733,500	50,638,500	308,035,200	345,199,300	37,144,200	
Minnesota.....	9	538	546	1,031	782	184	78	1,215	860	29,955,000	32,565,000	2,610,000	21,071,000	21,820,000	749,000	51,026,000	54,385,000	3,359,000	
Iowa.....	28	802	756	877	896	211	140	1,098	1,036	31,700,000	36,653,200	4,953,200	15,951,000	22,450,500	6,199,500	47,651,000	58,803,700	11,152,700	
Missouri.....	23	1,132	1,172	2,220	2,254	666	372	2,886	2,626	85,462,000	88,262,000	2,800,000	97,632,000	99,699,000	2,067,000	183,094,000	187,961,000	4,867,000	
Total.....	361	14,612	14,860	19,898	19,257	5,168	4,777	25,066	24,034	696,230,915	738,732,833	42,501,938	524,679,750	615,740,050	91,060,300	1,220,910,665	1,354,472,903	133,562,238	
Southern States																			
North Carolina.....	11	115	115	168	180	25	39	193	219	2,593,500	3,592,100	998,600	3,138,000	3,247,800	109,800	5,731,500	6,839,900	1,108,400	
South Carolina.....	8	138	139	134	138	34	26	168	164	3,893,000	4,283,000	390,000	5,493,000	5,000,000	7,000	9,386,000	9,783,000	397,000	
Georgia.....	13	371	386	475	557	101	108	576	665	20,904,894	23,269,394	2,364,500	18,903,500	20,600,100	1,696,600	39,808,394	43,869,494	4,061,100	
Florida.....	13	181	151	137	175	54	39	191	214	4,271,000	4,666,000	395,000	2,304,000	2,248,000	—56,000	6,575,000	6,914,000	339,000	
Alabama.....	11	274	302	379	484	116	173	495	657	11,330,900	15,467,000	4,136,100	13,336,000	12,530,000	—806,000	24,666,900	27,997,000	3,330,100	
Mississippi.....	9	79	92	113	122	16	10	129	132	3,486,400	4,122,400	636,000	3,119,000	3,648,500	529,500	6,605,400	7,770,900	1,165,500	
Tennessee.....	11	337	352	620	650	115	92	735	742	18,085,500	19,354,700	1,269,200	19,681,500	22,614,000	2,932,500	37,767,000	41,968,700	4,201,700	
Louisiana.....	8	247	252	663	590	58	59	721	649	32,805,000	52,257,800	19,452,800	28,508,000	31,942,000	3,434,000	61,313,000	84,109,800	22,886,800	
Arkansas.....	9	120	128	180	192	40	35	220	227	5,333,400	5,461,800	128,400	4,702,500	4,320,000	—382,500	10,035,900	9,781,800	—254,100	
Total.....	83	1,862	1,917	2,869	3,088	559	581	3,428	3,669	102,703,594	132,474,194	29,770,600	99,185,500	106,650,400	7,464,900	201,889,094	239,124,594	37,235,500	
Western States																			
North Dakota.....	3	16	18	35	45	5	5	40	50	350,000	360,000	10,000	300,000	303,000	3,000	650,000	663,000	13,000	
South Dakota.....	3	4	25	3	6	2	2	5	8	50,000	100,000	50,000	.....	50,000	50,000	50,000	150,000	100,000
Nebraska.....	9	282	280	434	450	62	53	496	503	10,832,500	14,329,600	3,497,100	8,425,000	8,475,000	50,000	19,257,500	22,804,600	3,547,100	
Nevada.....	2	5	10	5	10	.....	.....	5	10	100,000	100,000	.....	300,000	300,000	.....	400,000	500,000	100,000
Kansas.....	18	281	279	186	230	74	80	260	310	7,200,000	7,826,000	626,000	5,915,000	6,600,000	685,000	13,115,000	14,426,000	1,311,000	
Oklahoma.....	13	209	213	95	120	22	24	117	144	3,000,000	5,345,800	2,345,800	1,800,000	2,198,000	398,000	4,800,000	7,543,800	2,743,800	
Texas.....	29	542	541	672	720	100	143	772	863	22,507,500	26,980,600	4,473,100	15,892,000	16,117,000	225,000	38,399,500	43,097,600	4,698,100	
Colorado.....	14	423	457	387	474	319	225	706	699	19,369,100	20,191,000	821,900	20,737,000	18,937,000	—1,800,000	40,106,100	39,128,000	—978,100	
Montana.....	6	75	81	107	106	26	24	133	130	2,725,613	2,799,613	74,002	1,645,000	1,650,000	5,000	4,370,613	4,449,615	79,002	
New Mexico.....	2	19	11	14	14	3	3	17	17	350,000	350,000	.....	350,000	350,000	.....	700,000	700,000	.....
Idaho.....	7	187	138																

OPERATION OF THE CLEVELAND STREET RAILWAY SYSTEM BY A NEW COMPANY—VI

The principal changes in methods of operation of the Cleveland railway system have been described. For the future broad plans are entertained. President du Pont, of the Municipal Traction Company, states that these plans include the following:

Introduction of express service on the city lines.

Installation of a type of "pay-as-you-enter" cars throughout the city.

Construction of new car houses and shops.

The Cleveland experiment depends for its future upon the outcome of both financial and legal problems. The financial standpoint is the one of immediate importance, because the company cannot succeed unless it can obtain sufficient revenue to meet all charges, taxes and expenses. How much more than this, if any, will be required is a question that must be decided by the directors of the Municipal Traction Company.

FINANCIAL PROBLEMS

While the new company can control its revenues in large measure by increasing or decreasing the rate of fare, its expenditures must follow certain prescribed lines that do not leave much room for reduction except at the expense of the service. This statement, of course, applies to the operating expenditures. The provisions with respect to capital expenditures are so drawn as to protect the investment in the property, provided they are observed according to the letter and spirit of the lease.

It must be clear, even to the thoughtless, that neither those who own nor those who control the street railway system of Cleveland are likely to dissipate their rights. The Municipal Traction Company must follow the terms of the lease with perfect integrity or it will forfeit its control. The most important terms of the lease, so far as the capital and operating expenditures are concerned, are: (1) The clause providing that but 80 per cent of the cost of capital expenditures shall be charged to capital account, the other 20 per cent to be met from earnings. (2) The provision for an arbitrary car-mile charge on account of maintenance.

The slightest deviation from the provisions of the lease safeguarding these important features would, if discovered, furnish grounds for eventual forfeiture. As the holders of both the stocks and the bonds of the Cleveland Railway Company—that is, the owners and the principal creditors—are vitally interested in the rigid enforcement of these terms, the most careful supervision which can possibly be exercised under the lease will undoubtedly be enforced by the Cleveland Railway Company. As there is ground for some difference of opinion, as well as a possibility of improper decisions, in charges as between the capital and operating accounts, even though the motives of those concerned may be above suspicion, it is difficult to see how conflict between the Cleveland Railway Company and the Municipal Traction Company will be avoided if the latter corporation retains its control of the property. The standpoint of one of these two companies is necessarily somewhat opposed to that of the other in various respects. It is the duty of the Cleveland Railway Company, in justice to its security holders, to make certain, so far as possible, that the property is maintained perfectly in the condition in which it stood at the time of the lease. The present desire of the officials of the Municipal Traction Company appears to be to cheapen the cost of operation as much as possible, even at the expense of good service, in order to keep fares

low. The policy of the Municipal Traction Company might be changed either by the sale of the stock to other interests than those now in control or by the adoption of a course of action designed to permit the accrual of the largest profits to the stockholders of the Municipal Traction Company.

When the financial aspect of the situation is considered in connection with the possibilities of the future it must be remembered that the Municipal Traction Company is a corporation. The extent of the profits made will depend upon the revenues received and the service rendered. Maintenance of the property cannot be disregarded under the terms of the lease in the interest of either larger dividends or lower fares. Assuming, then, that the Municipal Traction Company lives up to the requirements of the lease, the issues arising from the financial results of operation must be settled as between the small group of stockholders of that company and the riding public. A plan of action that suited these stockholders might not please the public, and that which would be approved by the people might not yield the profit, if any, desired by the holders of the stock. It appears that the future political ambitions of Mayor Johnson rest upon a course that will please the public; that is, upon a system of low fares with universal transfers; but financially, he would prosper more if he sought only the profit possible to holders of the stock of the Municipal Traction Company. Whether, in the future, one of these motives will predominate, or whether a mixture of both will mark the career of the company, only the future can tell.

THE QUESTION OF FARES

If the future may be judged by the fare system of the past, there will be continued changes in the systems of routes, fares and transfers for some time. The deficits from the operation of the property in May and June were shown, in spite of a reduction in car-mileage, which has effected a saving in operating expenses at the cost of service. The scheme of fares in force at last accounts permitted a 3-cent fare if a disk was presented, although the cash fare was 5 cents. A transfer was given for 1 cent when the fare was paid, but this charge was refunded when the transfer was tendered for passage. The peculiar routing of cars, however, makes it impossible for many people to take advantage of as low a fare as they received when the lines were operated by the Cleveland Electric Railway Company. Mayor Johnson is quoted during the present week as saying that 3-cent fares with a charge of 1 cent for transfers may be necessary for part of the first year, and it is not unlikely that this announcement is preliminary to a formal notice that the charge for transfers will be restored because the experiment yielded a greater deficit than had been anticipated. Mayor Johnson says in his latest statement that the July operations showed a surplus, but it should be recalled that until the twenty-eighth day of that month the method of operation comprised a unique combination of limited routes, 3-cent fares and transfers for which 1 cent each was charged.

OPERATING COSTS

All influences of the present time make for lower operating costs than it has been possible to reach for several years. To the effect of these economic influences the Municipal Traction Company has added several factors to which reference has been made in previous articles, notably the abandonment of unprofitable lines, the freedom from municipal exactions, and the employment of untrained platform men at a lower scale of wages than the employees who had been in the service for years received.

Unless there is interference from the city officials, which is probably out of the question while the present city administration is in control of both the city and the company, it may be assumed that the saving effected by the abandonment of unprofitable lines is permanent. When the operating costs are calculated, no one fact is of more importance than the remarkable freedom from municipal exaction which characterizes the daily operations of the company. It would be erroneous to assume that this favoring influence is due wholly to the fact that the principal city officials and their associates are the owners of the stock of the Municipal Traction Company. The ordinance granting the franchise under which the Municipal Traction Company operates the property is so framed as to lessen materially the usual burdens of municipal taxation. It is, therefore, apparent that during the life of the present franchise the operations of the company may be conducted with less taxation than the Cleveland Electric Railway Company was compelled to meet under its old ordinances.

The situation respecting the employment of low-priced trainmen is, however, not so favorable to the new company. The reason why the new administration found no difficulty in filling the places of the trainmen who went out on strike is perfectly clear. The business depression had deprived of employment a large number of men who were glad to obtain employment on any terms that would provide a livelihood. The conditions which made it possible to secure a large number of men without difficulty are in process of change now and the probability is that, like other corporations, the company will be confronted in time by the problem of locating competent men for the positions of motormen and conductors. The present saving in operating expense from the employment of new men in place of the old will, therefore, be maintained, if at all, with some trouble.

The new company must sell at not less than par the stock designed to furnish funds for capital expenditures. As the market value of the stock is about 95 on the Cleveland Stock Exchange, the Municipal Traction Company has sought to avoid the difficulty thus raised by creating its own stock exchange and guaranteeing to redeem at par the shares sold through its own exchange for that price.

LEGAL OBSTACLES

The principal legal difficulties with which the Municipal Traction Company may be confronted might affect its control of the situation. Non-compliance with some of the strict terms of the lease would undoubtedly involve eventual forfeiture. A suit has been filed by a stockholder of the Cleveland Electric Railway Company to annul the lease with the Municipal Traction Company on the ground that it was made by the directors without the consent of two-thirds of the stockholders. Of allied importance is the situation concerning a referendum. The city officials have finally admitted the validity of the petition demanding a referendum on the "security" franchise, but have refused to fix a definite date for submission of the ordinance to popular vote. The resolution of the City Council provides that the time shall not be set until the courts shall have passed upon the validity of the lease, but that the date shall not be delayed beyond the time fixed for the next municipal election in November, 1909.

CONCLUSION

With the situation at Cleveland still in a somewhat chaotic state, it is nevertheless clear that the company has not furnished a service equivalent to that rendered by the old company. If the people of Cleveland expected 5-cent

service for 3-cent fares they reckoned on a condition which has never yet been attained in any city. If the operation of all the street railways of the country should be restricted suddenly to the lines which are profitable, many routes would be abandoned, real estate in outlying districts which had not yet been developed would lose its value and homes therein would be useless because of the withdrawal of transportation facilities. To what extent the Cleveland company is justified in discontinuing the operation of some ends of routes is, of course, for its directors and stockholders to decide. The plan of charging a higher fare to the suburbs than is demanded within the city limits is not comparable in its results with the abandonment of lines, but its adoption by the Municipal Traction Company suggests the zone principle rather than the single fare, universal transfer scheme which the people of Cleveland appear to have expected.

One of the features of the situation, which is not without an important bearing on the future, is the attitude of the daily newspapers of Cleveland. Certain newspapers have supported all the principal movements of Mayor Johnson and the company which he and his associates control. The service afforded under the new administration, although admitted generally to be less satisfactory than that given by the old road, is regarded without disapproval by these papers. The editor of one of the papers has sat in conference with the board of directors of the Municipal Traction Company when decisive questions were under discussion. These papers have shown no inclination thus far to do otherwise than regard the frequent changes with tolerance.

The prospect that the Cleveland Railway Company will regain control of the property is a topic for prophecy, into which the *ELECTRIC RAILWAY JOURNAL* will not enter. President du Pont is quoted as saying: "Rather than see the lines revert to the Cleveland Electric we will raise the fare to the figure formerly charged." Another supporter of the administration, who has a financial interest in the perpetuation of control by Mayor Johnson and his associates, expresses confidence that because they have always won they will do so this time. To point out that other men have used the same language, but have lost, would be merely to discuss the frailty of the power of humanity to foretell the future. The lines in Cleveland cannot give more in service than the revenues permit.

BADGES FOR ATLANTIC CITY

The committee on badges of the American Street & Interurban Railway Manufacturers' Association has selected a very attractive badge for the Atlantic City convention. The upper part of the badge represents a clam shell on which the words "Atlantic City" appear on a scroll. Below is a representation of a modern interurban electric car with the year 1908. Below the car is an eagle with outstretched pinions surmounting a scroll which bears the name of the association. The lower part of the badge is flanked on each side by representations of the flags of Mexico, Canada and the United States.

As usual, the different classes of attendants will be indicated by various colors of ribbon to which the metal part of the badge is attached. Only one change in colors will be made this year. Heretofore both guests and ladies have been given white badges. This year white will be retained for the ladies' badges, but the guests of the association will be given badges of another color not yet selected.

COOLING AND VENTILATING THE NEW YORK SUBWAY

A report on this subject, the fifth in the series of subway reports made by B. J. Arnold to the Public Service Commission of the First District, was made public this week. Mr. Arnold says in part:

Except at infrequent periods of sudden rise of temperature in the street, the temperature of the air in the subway is at all times higher than that of the street air. In the winter the higher temperature may then be considered an advantage, but in the summer it is a decided inconvenience. As this air acts as a carrier for fine particles of black, metallic, adhering dust and oily odors it creates an impression upon the passenger that the air is impure. The conclusions of the elaborate report of Dr. Geo. A. Soper, however, made from a study carried on in 1905, were that the subway air, although carrying an unusual amount of dust, was practically as pure as the air in the streets; that the odors, while annoying, were not harmful; that the number of bacteria was less; that the temperature was higher; and that the relative humidity was lower than that of the street air.

George S. Rice, chief engineer of the Rapid Transit Board, made an investigation at the same time of the problem of heat disposal and of ventilation, and as a result of his recommendations in March, 1906, grated openings were made in the subway at the stations; 25 exhaust fans in conjunction with 14 ventilating chambers with automatic louvres were installed bordering the subway between Fifty-ninth Street and Fulton Street; automatic louvres were placed on the 17 roof ventilating openings in the parkway between Ninety-sixth Street and Fifty-ninth Street and an experimental air cooling plant was placed at the Brooklyn Bridge station. As a result of these extra openings and louvres, it was estimated that there would be a complete air renewal every 27 minutes in the section between Fifty-ninth Street and Fulton Street, and when combined with the air discharged by the fans there would be produced in this section a renewal of the air once in about 10 minutes. In the section between Ninety-sixth Street and Fifty-ninth Street it was estimated that there would be an air renewal once every 33 minutes.

PRESENT CONDITION

While the installation of grated openings at stations and fans and automatic louvres between stations tended to relieve the heated condition and to increase the ventilation of the subway, it is manifest that the subway is still too hot for comfortable travel during hot weather. The automatic louvres, acting independently, accomplish a change of air about once an hour; the fans, acting independently, accomplish a change of air about three times an hour; but when the fans and louvres are acting jointly the efficiency of the louvres decreases because the discharge of fans, being into the same chamber as that of the louvres, creates a pressure therein against which the louvres have to act when opening. This fact, with the limited results shown by the louvres, when operating independently, makes it impossible to obtain at present a change of air once every 10 minutes, as expected at the time the fans and louvres were installed. The fans are not operated between 7 o'clock a. m. and 7 o'clock p. m., presumably due to the fact that the discharge of the heated air through the gratings in the sidewalks is objectionable to pedestrians during these hours. The experimental air cooling plant at Brooklyn Bridge produces only a localized cooling effect which, although noticeable to persons waiting at the station, does not extend its effect any great distance into the subway. While a small amount of heat is radiated from each passenger, the great part comes from the electrical losses in the motors and resistance on the cars; from the mechanical friction of the brake shoes in stopping the trains; the friction of the bearings and the third-rail shoes, as well as from contact on the rails. During the summer months about one-fifth of the heat, using the air as a carrier, passes out through the openings along the subway into the street, the other four-fifths tending to escape through the sides and bottom of the subway.

In the sections under the East River and the Harlem

River and in the Broadway tunnel north of 145th Street, a considerable part of the heat is carried off through the subway walls, but in most of the subway the ability to carry away large quantities of this heat does not exist, as the subway is located so near the street surface that only the two sides and bottom are favorable to thermal flow, and these are restricted for this purpose on account of the waterproofing of the subway and the boiler rooms of the adjacent buildings. The amount of heat given off by the train operation in 24 hours in the subway between Ninety-sixth Street and Brooklyn Bridge approximates the heat liberated from burning directly in the subway two tons of coal at each of the 20 stations in this section or a total of 40 tons during the 24 hours. A conception of this comparison will give a good idea of the problem for solution if the subway is to be cooled its entire length and have the same temperature therein as in the street.

METHODS OF COOLING THE SUBWAY

The most available ways for reducing the temperature of the air of the subway are as follows:

First—Refrigeration.

Second—Cooling by water.

Third—Blocking the automatic louvres open, and providing additional openings.

Fourth—Frequent air changes by means of a center wall and train movement.

An analysis of these methods is as follows:

First—Refrigeration.

There are two methods under this plan:

(a) By the rapid expansion of compressed air.

(b) By the evaporation of volatile liquids.

Method "A" of delivering air which has been compressed to a considerable extent into the subway and absorbing heat by its rapid expansion where exhausted, is known to be so inefficient as to make it practically impossible of adoption owing to the fact that it takes 55 cu. ft. of free air to absorb one heat unit through a range of 1 deg. Fahr., and there are millions of heat units that must be absorbed. Moreover, the first cost and operating expenses of the system would be so great as to make its adoption prohibitive.

Method "B," consisting of the evaporation of a volatile liquid for absorbing the heat, adapts itself to different ways for making its cooling effect available. In the four-track section between Ninety-sixth Street and Brooklyn Bridge plants of 300 tons of ice per day refrigerating capacity at each express station and plants of 150 tons capacity between each local station would be required. This makes a total capacity of 3300 tons of refrigeration in this part of the subway, for which it is estimated the total first cost would be \$1,500,000, with a yearly cost of operation of \$225,000 exclusive of interest and depreciation on the original investment. To cool the remaining heated portions of the subway would require an equal investment and operating expense, making a total original investment of \$3,000,000, and an annual operating expense of \$450,000, exclusive of fixed charges, for reducing the temperature of the subway approximately 6 deg. below the present average temperature.

The result obtained would not justify these expenditures, especially in view of the fact that other methods herein-after set forth, while perhaps not as effective, would materially alleviate the present unsatisfactory condition.

Second—Cooling by water.

There are two methods under this plan:

(a) Forcing the air by fans over pipes in which cool water is circulated by pumps.

(b) Drawing the air through fine sprays of cool water and forcing this air by fans into the subway.

Method "A," which is now in use at the Brooklyn Bridge station, produces a localized zone of cooler air and has shown some benefits, but on account of the large ducts needed for carrying the air this system could not be used generally throughout the subway as a cooling factor, although it could be used at the express stations.

Method "B" would require an extensive layout for controlling the air movements, so that all entering air would first come into washing contact with sprays of water and then be forced directly by fans into the subway.

While the temperature can be noticeably reduced by air

washing, the resulting increase in the humidity of the air in the subway by such an operation would be excessive and would likely cause much more discomfort than is now experienced under the present conditions. Both methods "A" and "B," moreover, are limited to localities where plenty of cool water at reasonable cost is available. Any water to be effective should have a temperature not higher than 65 deg. Fahr. and it is doubtful if a sufficient quantity of water at an economical rate could be obtained along the route of the subway for such purposes.

Neither of the above methods, when their limitations are considered, appears feasible for the work necessary to be performed.

Third—Blocking automatic louvres open and providing additional openings.

The automatic louvres connected with the 14 ventilating chambers bordering the subway between Fifty-ninth Street and City Hall are so constructed as to prevent any street air passing through them into the subway. They open upon sufficient air pressure being created by an approaching train and then only to allow the heated air to be discharged. This plan of operation was intended to draw the cooler street air into the subway at stations and to discharge the heated air from the subway through these louvred openings between stations. On account, however, of the conflicting air currents set up by the opposite train movements and the slow speed of the trains in approaching some of these louvres, there often results an absence of the necessary air pressure to open them. As a consequence these louvres are open only about 25 per cent of the time. Mechanical devices should be arranged to keep these louvres open during the day and to allow them to operate at night so that the exhaust fans could be used to remove some of the heated air. This should be done. By this arrangement these openings would add an area for free passage of air equal to one-half the area of the present effective station openings, and would allow large quantities of the cooler street air to be drawn into the subway, thus making these openings much more effective than at present.

The keeping of the louvres open and thereby producing "cold spots" in the vicinity of the louvres would not noticeably change the present ventilating system, for the small quantities of air now passing through the louvres do not cause any noticeable influx of air at the stations to take the place of this discharged air. If, on the other hand, these louvres were blocked open there would be an appreciable effect of cooler air upon the passengers when passing these free openings, thus relieving the depressing effect due to the constant temperature now existing between the stations. Every effort should be made to get as many openings as practicable from the subway to the street surface wherever such openings can be protected from street traffic.

Fourth—Frequent air changes by means of a center wall and train movement.

The more often fresh, cool air is drawn into the subway and heated air discharged, the lower will be the temperature therein. The subway air averages about 6 deg. hotter during the summer than the street air, although there are some times during the summer when the subway is from 12 to 15 deg. hotter than the outside air. While there is a difference in temperature between the street air and the subway air, the openings along the route of the subway are practically on the same level as the roof of the subway, so that the quantity of heated air rising and replaced by the cooler entering air (an action similar to the ordinary fireplace ventilation in dwellings) is practically negligible. This air can be made to travel in the same direction as the trains by constructing a division wall between the tracks upon which trains travel in opposite directions. This division wall would enable each train to push out a large quantity of air as it approaches a free opening and to draw in considerable air as it passes the opening, thus producing what might be termed "piston ventilation." This system operating in the subway would make a change of air therein at least six times per hour during the day, instead of two times per hour as at present, thus noticeably increasing the present ventilation, as well as relieving, to a considerable extent, the heated conditions prevalent during the summer, making the subway more responsive to the outdoor temperature changes and decreasing the power necessary to overcome the air pressure which now exists against the

front of the trains, due to the counter currents caused by the rapidly moving trains in opposite directions.

Moreover, the present system of ventilation would be made much more effective. The openings at the stations which now have a slow, uncertain and changeable velocity of air passing through them, would pass greater quantities of air in long extended draughts, making the passengers feel the air movements. The 25 exhaust fans, which now can just about take care of the heat given off by the trains during the night operation, could remove some of the stored heat for which they are well adapted. All of these increased operations would combine to draw cool air into the subway in quantities at least three times as great as at present.

The continuous air movements which are obtained by trains running in tubes or where they travel in the same direction in one space can be shown to exist in the Brooklyn tubes of the subway under the East River; in the section between the Grand Central station and Thirty-third Street station; in the Hudson tunnel and sections under Sixth Avenue and in the London tubes. All tubes now being installed under the rivers to Manhattan Island will have this piston ventilation.

DETAILS OF DIVISION WALL

Between Ninety-sixth Street and Brooklyn Bridge this wall for controlling the air movements should be constructed on the center line of columns between the express tracks.

The "H" section plate and angle columns in the subway are well adapted for the construction of a 4-in. terra cotta block wall laid in cement mortar, between the columns. This type of wall would be very strong and would strengthen the present structure. A concrete wall would be satisfactory, but more expensive, and would not serve the purpose for which the wall is installed to any greater advantage. It would, however, be more effective as a guard in case of derailment of trains. As the express trains do not run in the early morning hours, this wall could be put in quickly. While it would stop employees working in the subway stepping between center columns to escape the trains, it does not make a dangerous condition, as they could use the space between the local and the express tracks the same as is now done in any place where two-track construction is used.

The cost of a 4-in. terra cotta block wall between Ninety-sixth Street and Brooklyn Bridge should not be over \$76,000, or \$2.25 per running foot. The cost of a concrete wall in the same section should not be over \$130,000, or \$3.85 per running foot.

AUXILIARY DISK FANS AT EXPRESS STATIONS

Should the expense of this division wall prevent its prompt installation, it would be advisable to install at an early date large fans at the Grand Central station and Fourteenth Street express stations to draw the air from the street through the kiosks and force it in large quantities and at a moderate but noticeable velocity down upon and among the persons awaiting trains on platforms. Disk fans are advised at these stations instead of blowers with cooling coils and distributing ducts on account of the difficulty of obtaining sufficient cooling water at reasonable cost at these locations.

Since at Seventy-second Street the congestion of transfer passengers is not excessive and the Ninety-sixth Street station has many free openings to the street, it does not seem necessary to install fans at these stations, as it is believed that the piston action of the trains will be sufficient at these points.

Four disk fans should be installed at each station at a cost of not over \$5,000 per station.

RECOMMENDATIONS

To decrease the heated condition of the subway and increase its ventilation, the following recommendations are made:

- (1) Block the present louvres open during the day and allow them to operate at night when the fans are being run.
- (2) Construct as many protected openings as practicable between the subway and the street.
- (3) At the Fourteenth Street and Grand Central stations

install large disk fans located in such a way as to draw air from the street through the kiosks and force this air in large volumes down upon and among the persons waiting for trains upon the platforms.

(4) Construct a solid continuous division wall between the downtown and uptown express tracks extending from the north end of Ninety-sixth Street station to and including Brooklyn Bridge station.

For the purpose of demonstrating the feasibility of such a wall, it is suggested that the section extending south from the center wall now at Thirty-third Street station be constructed first far enough south as to include the Fourteenth Street station. At stations the upper half of the wall to have vertically sliding counterweighted windows between columns.

COMMUNICATIONS

PREVENTING ABUSE OF TRANSFERS

UTAH LIGHT & RAILWAY COMPANY

SALT LAKE CITY, Utah, Aug. 8, 1908.

To the Editors:

When I was appointed superintendent of this property a little over a year ago, I found that transfers were issued at any time and accepted at any time without regard to a time limit, and at any point without regard to a junction point. I determined to make a study of the transfer situation, realizing that any changes I might make would cause considerable stir on account of the loose methods followed previously.

After a careful study, I found that at the principal corners in the business districts people would get transfers when they left the car and that others standing on the corners would also receive transfers, as it was impossible for the conductor to remember all of his passengers.

Passengers would also get transfers at the time fare was paid and again when they left the car, as it was impossible for the conductors to remember the people on account of the heavy traffic. Passengers would also obtain transfers on transfers.

Schedules were interfered with by these practices, as I have seen ear after ear waiting on the principal streets while the preceding conductors issued transfers to passengers leaving cars. Too much of the conductors' time was taken up in issuing transfers, and they were prevented from being on the rear platform to assist in avoiding accidents, etc.

I finally decided that the only course to follow was to hold passengers strictly to the use of transfers at junction points, and a 15-minute time limit, and to issue no transfers except upon request at the time fare was paid. The first of this year we posted notices in the cars stating that effective on Jan. 15, 1908, transfers would be issued only upon request at the time fare was paid; but I refrained from making any hard and set rule as to just how much leeway conductors should have in issuing transfers upon request after the fare was paid.

After this new order went into effect it was found necessary to issue specific instructions as to when and how transfers should be issued; conductors had different ideas on the subject and the public did not take kindly to the new order at first, as people had been accustomed to receiving transfers under any circumstances since Salt Lake first had a street railway.

The following rules governing the issuing of transfers were printed and distributed to the public, as well as to the car men:

Transfers should be issued only upon request at time fare is paid.

In issuing transfers only upon request at time fare is paid, conductors will be governed as follows:

When making your first collection through the car you are permitted, in the event that a passenger did not request a transfer at the time the fare was actually handed you, to issue a transfer upon request, provided you have not passed beyond reach.

On second and subsequent collections this same rule applies to all passengers paying fare on those collections, but not to previous collections.

The above rule does not apply to passengers sitting on rear seats or standing on back platforms, who are, of course, in reach at all times while you are on duty on the rear platform, but transfers may be issued to such passengers upon request at any time before completion of the particular collection during which their fare was paid.

In case of small children unaccompanied you will issue a transfer should they forget the rules governing the issuing of transfers.

Should a passenger fail to ask for a transfer at the proper time, and offer to pay a second fare to secure a transfer, refuse to accept the second fare.

We made a full explanation in person and through the papers as to the necessity for changes in the transfer rules, but with only fair success in impressing the public.

After the order had been in effect about four months, we adopted a new transfer with the dates printed thereon and a p. m. coupon, etc., so as to reduce the abuse still more. As numerous complaints were made then, the newspapers agitated the subject and it finally reached the Council through an ordinance drawn up by the assistant city attorney, which provided that we should issue a transfer at any time after the payment of fare or until the passenger had left the car and that for each and every violation we should be subject to a fine of \$100.

When the ordinance reached the Council it was referred to the municipal laws committee, which notified the company to have a representative present at the next meeting to show cause why the ordinance should not be passed. At this meeting, as one newspaper expressed it, I "talked transfers and answered questions that pertained to every feature of a street railway company until the lights were turned out."

After this talk of some hours, giving reasons, explaining why it was necessary to make the change, etc., the municipal laws committee was thoroughly convinced that we had taken a step in the right direction, not only so far as the effect on our transfers was concerned, but that the improvement of our service had shown that we understood what we were doing.

The only request of the committee was that we permit conductors to ask passengers at the time fare was paid if they wanted transfers; we agreed to take this under consideration, and in a week's time notified the committee that we would grant the concession requested, effective on June 10, 1908.

In other words, our instructions to conductors regarding the issuing of transfers remain the same as in the past, except that we have eliminated the two words "upon request," and permit conductors to ask passengers at the time fare is paid if they want transfers. The Council has accepted this, refraining from passing any ordinance whatever.

In my talk with the committee I said that we were there for a frank, open talk with the idea of respecting the public rights and at the same time protecting our income, and that we felt that the operation of the street railway should be left to the decision of those in charge, who were best able to know what was necessary and who were responsible for the results obtained.

I desire further to state that in order to know that all conductors carried out our orders regarding the issuing of transfers we had a secret service force that watched this particular point, and for the first violation a conductor was suspended 5 days, for the second 10 days, and for the third 15 days. This had the desired effect.

To ascertain whether or not transfers were accepted at junction points and at the right time, we had our uniformed inspectors board the cars after leaving the junction points and ask the conductors for all transfers lifted on that particular trip, so as to check against any errors. The adoption of new transfer rules, etc., to eliminate abuses is all well and good at the start, but it is not worth the time and trouble to make the changes unless you use the "follow-up system" and see that the new plan is carried out. This I have done and expect to continue to do, as I consider the transfer privilege one of the most abused features connected with a street railway.

R. E. HUNT,
Superintendent.

CIRCUIT WIRING ON SURFACE CARS

THE J. G. BRILL COMPANY

PHILADELPHIA, Pa., Aug. 19, 1908.

To the Editors:

In the *ELECTRIC RAILWAY JOURNAL* of July 25, "A Wiring Expert" enters a number of objections to the conduit system of car wiring and apparently seeks to prove that conduit wiring fails as a fire protection. He contends that if the conduit is grounded, as is usually done, insulation will be subjected at all times to any or all of the following potential stresses:

1. High potential during lightning storms.
2. High potential due to discharge of the motor fields in the event of sudden interruption of circuit.
3. High potential due to reversal of motors when at high speed.
4. Line potential during normal operation.

It is safe to admit the truth of all these points, yet there is every reason to believe that conduit remains the best possible means of reducing the fire risk. For even admitting the further possibility that the insulation, which has been subjected to tests indicating its ability to withstand such stresses, becomes weakened or punctured from circumstances such as are cited, if the conduit is grounded, the circuit-breaker or fuse will blow almost immediately and at once protect the woodwork of the car from any current sufficient to ignite it. If the conduit is not grounded, a puncture of the insulation from any cause will quite probably allow the passage of sufficient current to ignite the woodwork of the car before the blowing point of the circuit-breaker or fuse is reached; but as conduit is almost invariably grounded and the underwriters' specifications prescribe a grounded conduit, it is scarcely worth while to consider that phase of the matter.

Theoretical exposition of the dangers of the conduit system may appear convincing, but the proof of the pudding is in the eating thereof. In this connection I may say that in a considerable number of instances which have come to my attention where there were the unfavorable conditions of the underground trolley to which "A Wiring Expert" directs consideration, on puncture of the insulation the circuit-breaker or fuse blew so promptly that there was in no case the slightest indication upon the woodwork of anything resembling a scorch.

In view of the demonstrated ability of the conduit wiring to protect from fire, it would seem to be *prima facie* a

form of wiring superior to others which have not demonstrated their ability to protect from fire, but, on the other hand, have been sources of severe fire loss, as, for instance, in New York. The point is perhaps too generally overlooked that the primary purpose of conduit wiring is to secure mechanical protection for the insulation which insures its continued efficiency. Adequate wiring insulation installed in conduit should be in fine condition for a long term of years following its installation. Can the same thing be said for the insulation under any other system of car wiring?

J. D. SHIPPER,
Chief Electrician.

INFORMAL CONFERENCE ON UNIFORM ACCOUNTING SYSTEM FOR NEW YORK RAILWAYS

An informal conference regarding the proposed uniform system of accounts for electric railways in New York State was held at the offices of the Public Service Commission of the First District in New York City on Aug. 21. The following were present: A. F. Weber, statistician for the First District Commission; W. J. Meyers, statistician for the Second District Commission; E. F. Benson, attorney, and E. F. J. Gaynor, auditor, Interborough Rapid Transit Company; A. L. Linn, Jr., general auditor, Mohawk Valley Company; Howard Abel, comptroller, Brooklyn Rapid Transit Company; and A. B. Bierck, auditor, Long Island Railroad.

After the conclusion of the meeting it was stated that the commissions will probably be prepared to promulgate the new classification of accounts on Oct. 1, with the idea of making the system effective as of Jan. 1, 1909. Under this plan the New York companies would use the old system for the six months beginning July 1, 1908, and the new classification for the six months starting Jan. 1, 1909, making two reports for the operations of the fiscal year ending June 30, 1909. It is expected that the lines of division for the classification of operating expenses will be annual gross revenue of \$250,000 and over, \$500,000 and over, and \$1,000,000 and over. If this division is finally promulgated by the two commissions it would be a material change from the lines of division in the tentative classification. Those who were at the informal conference went over a number of minor changes in the accounts. It is not expected now that any further hearings on this subject will be held.

NEW SOUTH WALES RAILWAYS AND TRAMWAYS REPORT

The report of the Railways and Tramways Commission of New South Wales, Australia, for the year ended June 30, 1908, states that the railway mileage of the State amounted to 3472 miles. The gross earnings amounted to £4,944,134. The interest on the capital was 4 $\frac{7}{8}$ per cent. The tramway mileage amounted to 133 miles. The gross earnings amounted to £1,011,994. The interest on the capital was nearly 5 $\frac{1}{2}$ per cent. The surplus, after providing for working expenses and the payment of interest, amounted to £648,356. The earnings of the railways for the year showed an increase of £234,728 on those for the preceding financial year, while those of the tramways showed an increase of £103,293. The proportion of the working expenses of the railway to the revenue was 55 per cent. Large additions to the rolling stock have been made during the year. Further large supplies are in course of construction. The commissioners state that the prospects for the present year are very satisfactory.

SOME INTERESTING FENDER TESTS IN LOS ANGELES

As the result of a series of important fender tests made on its Long Beach line on July 15, the Pacific Electric Railway Company, of Los Angeles, placed an order for 500 fenders a few days ago with the Worcester Railway Supply Company, of Worcester, Mass. With these fenders the Pacific Electric Railway Company will at once equip all of its interurban cars, which number exactly 242 at the present time. New cars are now under construction by the company itself, while orders for others will be placed in the East in the near future, for all of which fenders will be required.

Joseph McMillan, general manager of all the Huntington interurban lines in Southern California, has devoted much time for the last two years investigating fenders and conducting experiments, to obtain a type suitable for high-speed interurban cars. Fenders that have given satisfaction on city street cars were found to be useless on the

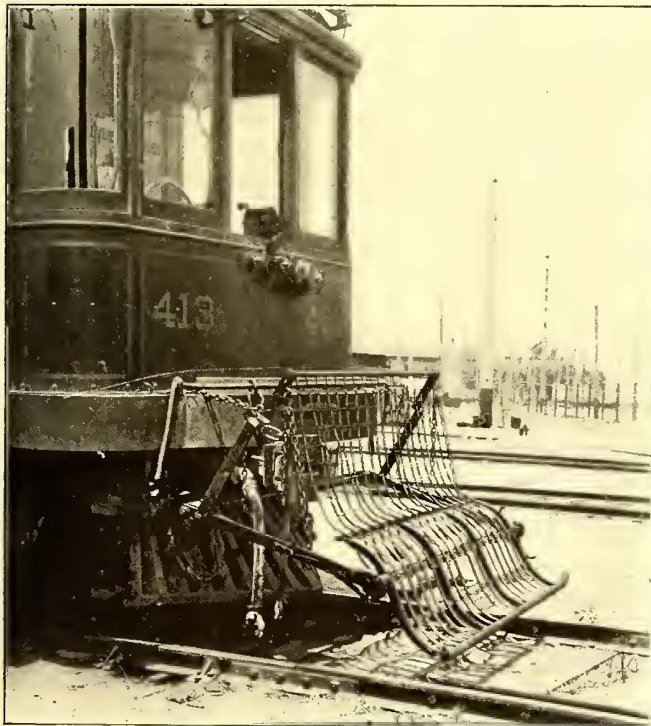


Fig. 1.—Fender Ready for Service on Los Angeles Interurban Car

great high-speed electric coach. The impact kills, while the danger of a dangling fender bending under and derailing the car is constant. Not only was the element of high speed to be reckoned with, but it was difficult to find a fender that would permit the coupling of numerous cars for heavy interurban service without the necessity of removing the fender.

"We long ago concluded," said Mr. McMillan to a representative of the *ELECTRIC RAILWAY JOURNAL*, "that we should equip our interurban cars with a suitable fender, not in the hope that a human being unfortunate enough to be struck by a coach running from 40 to 60 m.p.h. can be spared his life, for the tremendous impact that is unavoidable under these circumstances makes such a result impossible in the absence of a miracle, but to assure the maximum safety of passengers on the colliding car."

Mr. McMillan maintains that fender regulation affecting interurban cars should by law be made a State affair, and thus removed from the power of municipalities. This

step would assure uniformity and make it impossible for interurban electric railway companies to become victims of the whims of the governing bodies of the numerous towns and cities through which their lines run. In Los Angeles County 22 cities and towns are self-governed.

The following memorandum of tests of the Worcester double-acting fender, attached to interurban car No. 327, July 15, 1908, was instrumental in securing the order from the Pacific Electric Railway Company:

First Test—Dummy weighing 50 lb., speed of car approximately 18 m.p.h. Fender picked up and retained dummy.

Second Test—Same dummy as in the first test, speed decreased to 6 m.p.h. Fender picked up and retained dummy. This test was made at a slow rate of speed at the request of Dr. John R. Haynes, who wished to demonstrate whether the light impact would be sufficient on a light dummy to trip the apron. Test fully demonstrated same.

Third Test—Same dummy as in first and second test, speed of car increased to a little better than 30 m.p.h. Fender did not pick up or retain dummy. Dummy destroyed in this test.

Fourth Test—Dummy weighing 100 lb. Fender picked up and retained same at a speed of 18 m.p.h.

Fifth Test—The same dummy as in the fourth test, speed

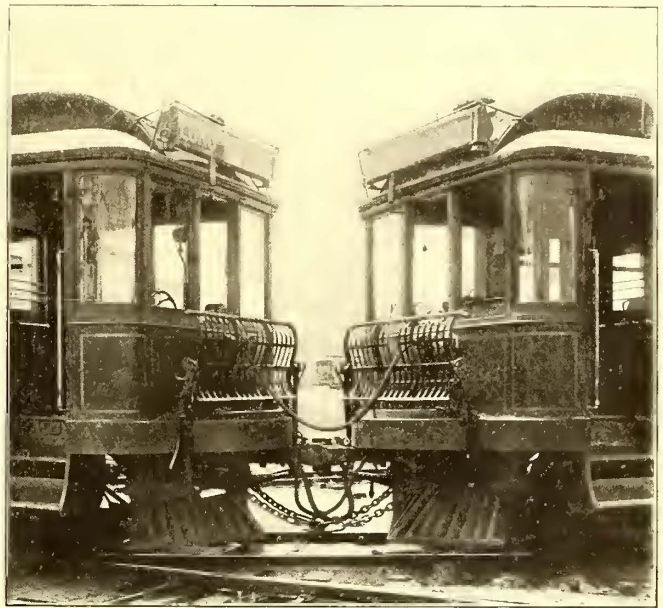


Fig. 2.—Fenders Folded to Permit Coupling of Interurban Cars without Removing Fender

increased to between 39 and 40 m.p.h. Fender picked up and retained dummy.

Sixth Test—Dummy weighing 150 lb., at a speed of about 18 or 20 m.p.h. Fender picked up and retained dummy.

Seventh Test—The same dummy as used in the sixth test, at a speed of 30 m.p.h. Fender failed to pick up and retain dummy. Tripping device of fender slightly bent.

Eighth Test—Dummy weighing 200 lb., at a speed of about 39 or 40 m.p.h. Fender picked up and retained dummy. Fender slightly bent.

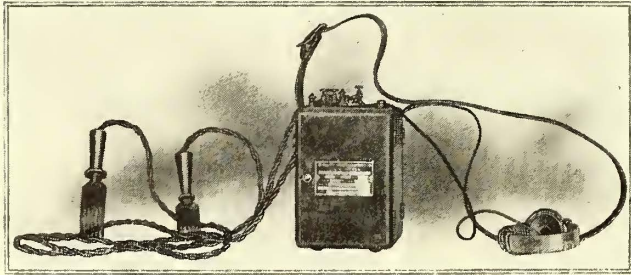
Fig. 1 shows the Worcester fender attached to car No. 413, in service position, while Fig. 2 shows how these fenders may be folded up against the dashboard out of the way to enable the coupling of cars into trains without removal. This view also discloses how the multiple unit train line is handled through the meshes of the fender without inconvenience.

A fender of other make totally destroyed a sawdust dummy, weighing approximately 175 lb., partly by contact and then by causing the dummy to get under the running gear of the car. At the time of striking the dummy the

speed of the car was $27\frac{1}{2}$ m.p.h. The test was made in the presence and under the direction of Dr. John R. Haynes, of Los Angeles, and it was agreed by Dr. Haynes and observing officials of the Pacific Electric Railway Company that the car would have been derailed and wrecked but for the pilot carried by this car, which prevented the mass of fender iron from passing under the wheels and running gear of the car.

THE ELECTRIC FAULT FINDER

An instrument has just been brought out by The Electric Controller & Manufacturing Company, of Cleveland, Ohio, for detecting and locating grounds, short circuits, open circuits, leaks and other faults in armature coils, field coils,



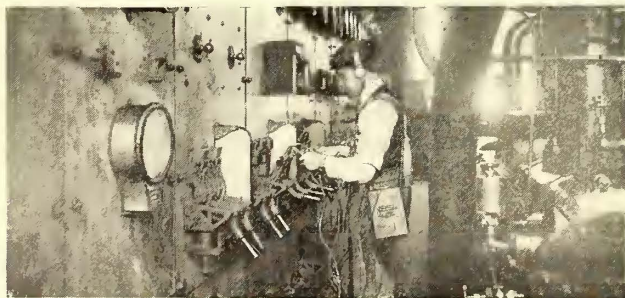
Electric Fault Finder

control circuits, switchboard wiring or any other electrical circuit. Its name, the Electric Fault Finder, truly describes its use since it not only indicates trouble which is all that a magneto will do, but finds or locates the trouble.



Testing an Armature

For instance, in a motor armature a faulty coil can be absolutely located and the nature of the trouble definitely told, or if a field coil is damaged the layer in which the fault lies can be absolutely determined. Should there be trouble in



Testing a Switchboard Circuit

a bunch of control wires, in a multiple unit, train control or other magnetic switch control, the faulty wire or pair of wires can be promptly located and the nature of the fault quickly found.

As will be seen from the accompanying illustration, the instrument consists of a small box provided with a strap

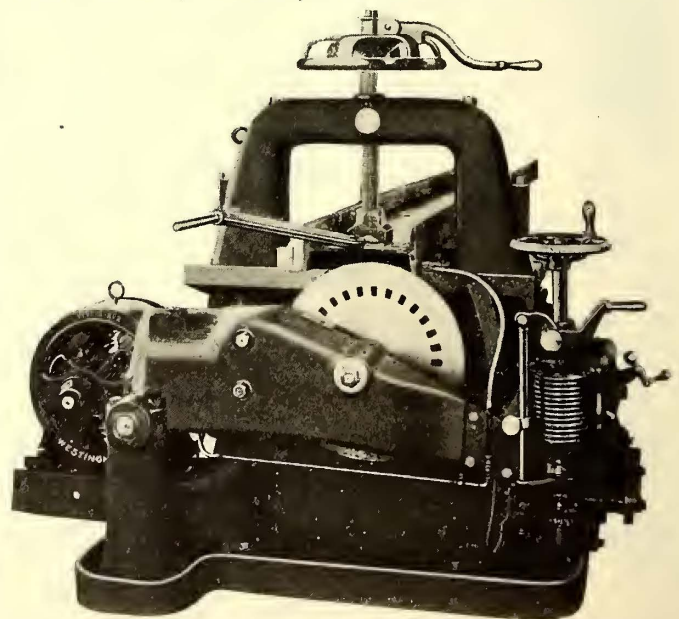
so that it can be slung over the shoulder when testing motors in place, as under a car or on an electric traveling crane. From this small box leads go to a telephone receiver fitted with a head piece so as to leave both hands free for testing. For working in very noisy places the head piece may be fitted with two receivers, one for each ear, which will shut out all sound save that received from the instrument. This arrangement allows perfect testing to be done in noisy places and also enables partially deaf persons to use the instrument. In one case by adjusting the rheostat to give a very loud sound (more than the normal ear could stand) and using two receivers, a very deaf man did accurate work with this instrument. From the box, leads of convenient length go also to two test terminals.

This instrument is portable and requires no outside current to operate. Its operation requires only one man under any conditions, so there is no excuse for the tester desiring a helper.

MOTOR-DRIVEN COLD METAL SAW

The use of small cold saws for metal work has become general because of the utility of the saw itself and the fact that individual motors have been most successfully fitted to such saws. The cold saw illustrated, which is one that does not require a bevel gear, is especially adapted to motor drive. The saw is manufactured by the Lea Equipment Company, of New York, and is fitted with a Westinghouse shunt motor. The size shown requires a $2\frac{1}{2}$ -hp motor and is capable of cutting 8-in. round stock. A Morse silent chain is used to connect the motor to the saw, in preference to gearing, as experiments have shown the former to be more satisfactory.

It is necessary to be able to adjust the speed of the saw to cut different metals with maximum efficiency. For instance, it has been found that the peripheral speed of the saw should be 52 ft. per minute with a very coarse feed for structural iron, machinery steel and metals of this class.

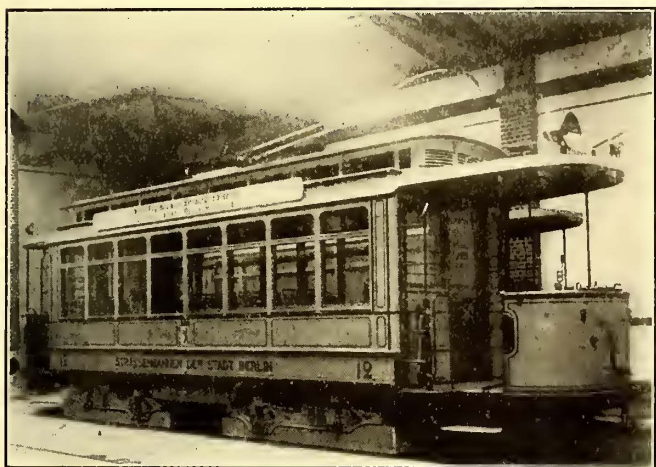


Motor-Driven Saw

For annealed tool steel a speed of but 37 ft. a minute is the most efficient. The latter speed is also used on Krupp's chrome-nickel steel. To obtain these speeds a motor with a speed range of $1\frac{1}{3}$ to 1 is used, with a speed-controlling rheostat. It is only necessary to move the handle of the controller to obtain any desired speed.

MUNICIPAL LINE IN BERLIN

The city of Berlin, Germany, has recently established a short municipal line. One of the cars used is illustrated in the accompanying engraving, as it is typical of modern German construction. It is of the semi-convertible type, in which the lower part of the sash is dropped, and is equipped with the long platforms for holding seven passengers on the front platform and eight on the back platform, as under the Berlin regulations no passengers are allowed to stand inside the car. There are 24 reversible



Car Used on Municipal Line in Berlin

cross seats, but owing to the narrowness of the car the aisle is placed at one side of the center, and each seat on one side of the aisle can hold only one person. The car is marked with the coat of arms of the city.

Other interesting features of the car are the headlights and marker lights, which are carried on the hood, the ventilator in the end of the monitor, the hose coupling through the upper part of the dash, the steel ladder at each end of the car for giving access to the roof, the wheel guard completely surrounding each truck, and the support for the hood sign.

IMPROVED TICKET BOX

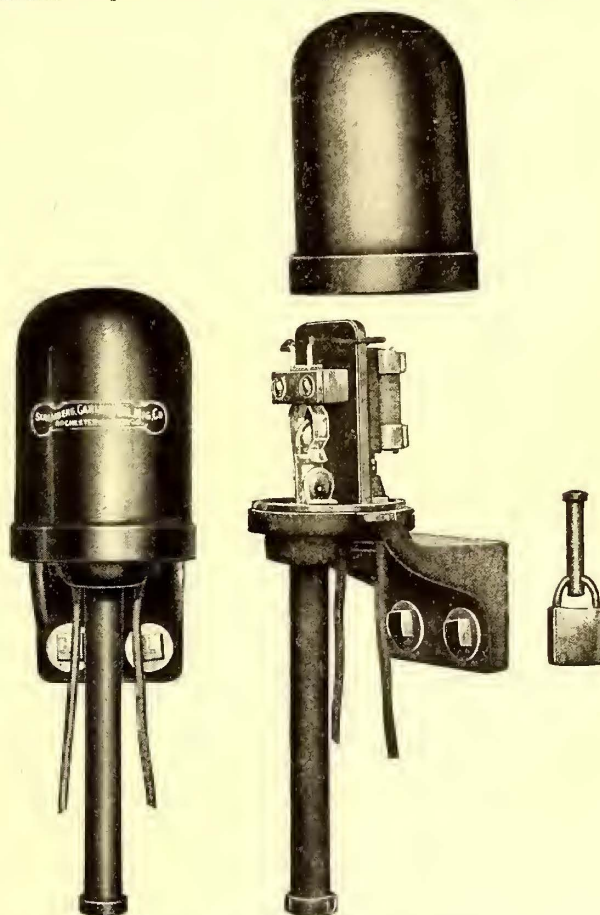
After several years' experimenting with different forms of ticket holders used with its closed system of cash receipts, The Macdonald Ticket & Ticket Box Company, of Cleveland, Ohio, has perfected a device designed to cover 40 additional station names with 50 per cent less weight than could be obtained with its former bent pad type. It has also eliminated all clerical work in connection with charging out holders, other than the actual recording of the number of pads given each conductor from day to day, in the same manner as that employed where the ordinary old style duplex is used. The holders are constructed to permit the conductor loading an empty case while on duty, while the agent can remove the audit stubs therefrom in a few seconds. This does away with the necessity of loading holders before being charged out to conductors, of detaching cut tickets from a stapled pad and recharging unused portions of pads back to the original conductor, as was customary with the former holder. The new arrangement also places a very decided barrier against the tickets being taken from the floor and reissued, by requiring the conductor to indicate upon the passenger's portion the day and hour upon which they are sold. This indication is noted between the hours issued to allow the conductor to punch, in advance, as many tickets as he considers safe for use

upon that particular trip or train number. Of course, the day can be punched in lots of 50 or 100. The holders are constructed of german silver, and are manufactured in all sizes from 5 in. to 10 in. The paper to be used is a high-grade short fiber bond, manufactured especially for the maker of this ticket box.

A NEW JACK BOX

A new iron-clad jack box for electric railway telephone dispatching has recently been brought out by the Stromberg-Carlson Telephone Manufacturing Company and is illustrated herewith. The form of housing for the terminal springs and fuses combines strength, and although thoroughly protecting the enclosed apparatus from moisture, is designed to be readily moved. The top cone-shaped casting is turned half way round to remove after taking out a dowel pin permanently locking the jack by use of a regular switch lock.

The frame casting supporting the terminal springs and fuses also separates these parts to protect the springs from the arc caused by burning of the arrester fuses. The heavy contact springs are rigidly mounted in hard rubber with a maximum separation between springs to afford proper in-



Telephone Jack Box Closed and Open

sulation. The opening for the connecting plug is covered until met by the plug when "plugging-in" by a spring trap door which covers the opening until pushed up as shown in illustration of the open view of jack box. Porcelain bushings are provided for the connecting wires and heavy lag screws with washers for mounting on poles or flat surfaces as required.

The company reports that many favorable comments have been received from companies which are using this new device.

ELECTRIC RAILWAY LEGAL DECISIONS

LIABILITY FOR NEGLIGENCE

Massachusetts.—Carriers—Injuries to Passengers—Evidence—Admissibility.

In an action for injuries to a street car passenger, thrown from his seat by the jolting of the car passing over a cross-over and switch, the exclusion of evidence that about a year after the accident, and at the time of the taking of a photograph of the tracks at the point of the accident received in evidence, the outer rail and its mate showed wear, was within the discretion of the trial court, where the evidence was offered to show improper construction of the track, and where it did not appear whether the worn rail was down at the time of the accident, nor whether it was worn at the time it was placed there, nor how long it had been down.—(Marshall v. Old Colony St. Ry. Co., 83 N. E. Rep., 860.)

Massachusetts.—Misrepresentations—Capacity—Evidence—Sufficiency.

In an action for injuries to a passenger on defendant's street railway, the defense being a release of liability, a statement by defendant's agent, when presenting the release to plaintiff to sign, that other passengers had signed the paper, was not a misrepresentation of fact, where some of them had signed a similar release, though not the identical paper.

In an action to recover for injuries received by a passenger of a street railway, evidence examined, and held insufficient to warrant a finding that plaintiff did not understand the nature of her act when she signed a release of liability for such injuries.—(McNamara v. Boston Elevated Ry. Co., 83 N. E. Rep., 878.)

Massachusetts.—Street Railroads—Actions for Injuries—Sufficiency of Evidence.

In an action against a street railway for injuries to person and property caused by a collision between defendant's car and plaintiff's wagon, evidence examined, and held not so conclusive in regard to plaintiff's want of due care or the absence of negligence on the part of defendant as to warrant the direction of a verdict for the latter.—(Le Baron v. Old Colony St. Ry. Co., 83 N. E. Rep., 674.)

Massachusetts.—Street Railroads—Collision with Pedestrian—Contributory Negligence.

An 11-year-old child cannot recover for injuries received in a collision with a street car, where she saw the car approaching in full view, and with full knowledge of the danger and without necessity attempted by hurrying to cross the track in front of it.—(Casey v. Boston Elevated Ry. Co., 83 N. E. Rep., 867.)

Massachusetts.—Carriers—Depot Steps—Condition—Negligence—Outgoing Passengers—Personal Injuries—Questions for Jury—Sufficiency of Evidence.

It is the duty of a carrier of passengers to maintain a stairway used by outgoing passengers in making an exit to the street in a reasonably safe condition for travel; and if he allows the steps to become covered with a thin coating of mud, whereby the steps become slippery and unsafe, it fails to perform its duty.

In an action for injuries sustained by an outgoing passenger by slipping on depot steps, whether the steps were muddy and slippery, and unsafe to travel on, held, under the evidence, for the jury.—(MacLaren v. Boston Elevated Ry. Co., 83 N. E. Rep., 1088.)

Missouri.—Carriers—Street Railroads—Injuries to Passenger—Complaint—Instructions—Misleading Instructions.

Plaintiff alleged that, as he was entering a grip car, the motorman suddenly and negligently started the car with a quick motion, throwing plaintiff out of the approach to the seat, so that his body projected out beyond the side of the car, and that thereupon plaintiff was struck by a car approaching from the opposite direction and knocked to the ground by the negligence of defendant's servants in charge of such other car in failing to stop the same before striking plaintiff, after having discovered plaintiff's peril. Held, that the petition alleged two acts of negligence, which were not contradictory; hence plaintiff's failure to prove negligence on the part of the operatives of the car by which he was struck did not preclude him from recovering for the negligence of the operatives of the car on which he was riding in improperly starting the same.

Where, in an action for injuries to a passenger, the only negligence referred to in the operation of the cars was that of suddenly starting the car that plaintiff was on, and of failure to stop the passing car so as to avoid striking him,

and the latter element was specifically withdrawn from the jury's consideration, an instruction authorizing a recovery unless the jury believed that defendant's servants in managing the cars were not guilty of "any negligence" in causing the injury was not objectionable as misleading the jury to charge defendant with some act of negligence other than that submitted.—(Spaulding v. Metropolitan St. Ry. Co., 107 S. W. Rep., 1049.)

Missouri.—Carriers—Injuries to Passengers—Questions for Jury—Evidence—Weight and Sufficiency.

Where plaintiff's own testimony that her injury was the result of the premature starting of defendant's street car while she was attempting to alight was corroborated by physical facts, the question whether she was injured in the manner claimed, or in attempting to alight in an improper manner before the car came to a stop, as defendant claimed, and as five disinterested witnesses testified, was for the jury.

In an action for injuries to a street car passenger, it is proper to instruct the jury that before they can find for defendant on the ground of plaintiff's contributory negligence, they must believe from the greater weight of the credible evidence that plaintiff was negligent, and that by the greater weight of the credible evidence is not meant the greater number of witnesses on the one side or the other, but it is that evidence which, under all the circumstances of the case, convinces the mind of the truth of the fact.—(Cartlich v. Metropolitan St. Ry. Co., 108 S. W. Rep., 584.)

Missouri.—Master and Servant—Injuries to Servant—Street Railroads—Negligence—Defective Appliances—Demurrer to Evidence—Trial—Instructions—Material Facts—Omissions—Cure by Other Instruction.

Where, in an action for injuries to a street car conductor by a rear end collision, there was substantial evidence that the grip of the colliding car was defective, so that it would not hold the cable, and that this condition was known to defendant, and was the proximate cause of the accident, the court properly declined to give an instruction in the nature of a demurrer to the evidence.

Where a petition for injuries to the conductor of a street car in a collision affirmatively charged that the collision was caused by a defective grip on the colliding car, and that defendant knew of such defect, an instruction attempting to enumerate the facts necessary to authorize a verdict for plaintiff, but omitting to require that defendant must have had knowledge of the defective grip, was prejudicially erroneous.

Where plaintiff claimed the right to recover for injuries in a street car collision because of a defective grip on one of the cars, of which defendant was alleged to have had notice, a defect in an instruction attempting to state the facts necessary to be found in order to entitle plaintiff to recover, which omitted the question of defendant's knowledge of the defect, was not cured by the fact that the court submitted the question whether the grip was "negligently" permitted to be and remain out of repair, and that such negligence, if it existed, necessarily implied knowledge.—(Toncrey v. Metropolitan St. Ry. Co., 107 S. W. Rep., 1091.)

Missouri.—Street Railroads—Action for Injury to Child—Negligence—Failure to Sound Gong—Running at Dangerous Speed—Failure of Motorman to Keep Watch—Ignoring Issues.

The running of a street car, without giving any warning of its approach, over a crossing in a thickly populated locality, where ordinary care for the safety of people on the street required that warning be given, resulting in the killing of a child, while he was in the exercise of due care, renders the company liable to the parents, in the absence of contributory negligence on their part.

The running of a street car at a high and dangerous speed, whereby a child in the exercise of due care was run over and killed, renders the company liable to the parents, in the absence of contributory negligence on their part.

The failure of a motorman to keep a vigilant watch for persons on or approaching the track, and failure to stop the car when first seeing a child approaching the track in the shortest time and space possible consistent with the safety of the passengers and the means under his control, resulting in the killing of the child, renders the company liable to the child's parents, in the absence of contributory negligence on their part or on the part of the child.

In an action for the negligent death of a child killed by a street car, an instruction that, if the child passed suddenly upon defendant's track in front of its car, and so close thereto that it was impossible for the motorman to stop the car in time to avoid collision with him, then there can be no recovery, was properly refused because ignoring the question of defendant's negligence and every element in the case leading up to the child's death, except his getting on

the track so close that the car could not be stopped in time to save him.—(Cytron et ux. v. St. Louis Transit Co., 104 S. W. Rep., 109.)

New York.—Carriers—Injuries to Passengers—Instructions.

In an action against a street railway company for negligence in operating a car on which deceased was riding, resulting in his being thrown from the car while passing around a curve, it is error to instruct that, if the car was propelled at an unusual rate of speed, it became the duty of defendant's servants to give deceased notice of that fact, or indicate to him that he must exercise at that point increased care for his safety, since the precautions required by ordinary care were for the jury, and the effect was to charge as a matter of law that defendant knew or should have known that the curve was dangerous, and that it owed an imperative duty to warn passengers if the car was operated around the curve at an unusual rate of speed.—(Loewe vs. New York City Ry. Co., 106 N. Y. Sup., 488.)

New York.—Carriers—Street Railroads—Acts of Conductor—Assault on Passenger—Courts—Municipal Court—Jurisdiction—Pleading.

A carrier is absolutely liable as an insurer for injuries to a passenger from an aggravated assault perpetrated by the carrier's conductor, followed by the passenger's arrest.

The Municipal Court has jurisdiction of an action by a passenger on a street car against the carrier for an aggravated assault, followed by his arrest, committed and caused by the carrier's conductor.

Where a complaint against a carrier for injuries to a passenger alleged the passenger's unwarranted arrest caused by the conductor, it was competent to show both the arrest and an unwarranted assault committed on the passenger by the conductor, though the complaint was silent as to the assault; it being within the power of the court to have ordered an amendment of the complaint to conform to the proof.—(Baumstein vs. New York City Ry. Co., 107 N. Y. Sup., 23.)

Texas.—Trial—Instructions—Assumption of Fact—Trial—Instructions—Application of Instructions to Evidence.

Where in an action for negligent death, the fact that decedent received injuries in a collision was undisputed, and a witness testified that a blow received on the neck caused death, and other witnesses testified to other injuries which also might have produced death, an instruction authorizing a verdict if death was caused by any of the injuries, etc., was not misleading, as assuming that decedent received the blow on the neck in the collision, as to which there was a conflict in the evidence.

Where, in an action for negligent death, brought by the husband and daughter of decedent, the evidence showed that decedent had been running a laundry producing a net weekly income, and that the daughter had received a weekly contribution from decedent, a charge that, if the death caused any pecuniary loss to "plaintiffs or either of them," the verdict should be "for such plaintiffs," was not misleading, as authorizing a verdict for both plaintiffs on proof that one of them only sustained pecuniary loss by decedent's death.

Where, in an action for the death of a street car passenger in a collision between cars, caused by the negligent construction of a switch and the running of a car at an excessive rate of speed, the answer was a general denial, and there was nothing in the evidence to show that a third person had displaced the switch, and the court required the jury, before they could find for plaintiff, to find that the collision was caused by negligence of the carrier, and restricted the inquiry to the negligent acts alleged, the refusal to charge that, if the switch was thrown by a person not connected with the carrier, there could be no recovery, was not erroneous.—(Dallas Consolidated Electric St. Ry. Co. v. Lytle et al., 106 S. W. Rep., 900.)

Utah.—Street Railroads—Death of Pedestrian—Care Required—Crossing Tracks—Contributory Negligence—Question for Jury—Evidence—Reputation for Care—Reception of Evidence—Necessity of Objection—Motion to Strike—Discretion—Instructions—Assumed Facts—Judicial Notice—Appeal—Right to Allege Error—Inconsistent Position—Injury to Persons on Track—Instructions—Appliances—Care Required—Safety Appliances—General Use—Words and Phrases—"Fender"—Judicial Notice—Fenders on Street Cars—Death of Pedestrian—Care Required—Crossing Streets—Place—Duty of Railway Company—Rights in Streets.

A person crossing a street in front of an approaching street car is not required to use the same degree of care as persons traveling along, on, or across a steam railroad.

A pedestrian desiring to take a street car standing on an opposite track was entitled to hastily cross an intervening track on which a car was approaching, provided he exercised ordinary care for his own safety in view of the surroundings.

Evidence held to require submission to the jury of the issue of the contributory negligence of a pedestrian, struck and killed by an approaching street car as he was crossing the track.

Where, in an action for the death of a pedestrian in collision with a street car, there were several eyewitnesses to the occurrence who testified, evidence that decedent was a careful and cautious man was inadmissible.

In an action for the death of a pedestrian by collision, with defendants' street car, plaintiffs' counsel asked a witness how decedent was as to being a careful and cautious man. The witness answered, without objection, that he was careful, when defendants moved to strike the answer, and excepted to the court's refusal to do so. Held, that as the question indicated on its face that it called for incompetent evidence, in the absence of an objection to it, it was not an abuse of discretion to refuse to strike the answer.

Where the fact that fenders were generally used on street cars was treated as a matter of general knowledge, of which the court would take judicial notice, and proof thereof was excluded for that reason, the court was entitled to assume that such fact existed, in its instructions, as if it had been proved.

Where defendants objected to evidence to show that street cars generally were equipped with fenders, because the matter was one of general knowledge, they could not object on appeal that an instruction, in which the court took judicial notice of such fact, was erroneous because of the absence of evidence thereof.

Defendants, having objected to evidence that street cars generally were equipped with fenders, on the theory that such fact was a matter of common knowledge, which objection the court sustained, requested an instruction that there was no evidence that at the time of the accident fenders were in general use, and that there was no proof of negligence because the car that struck decedent was without a fender. The court charged that, if the jury found that the car did not have a fender, they could not find against defendants on that alone, unless they also found that, if the car had a fender, the "accident" might have been averted thereby. Held that, the term "accident" having been used in the instructions and evidence to refer to the collision itself, the instruction given in effect told the jury that the fender was not in the case as effectually as if the word "collision" had been used.

A street railway company is only required to adopt methods, machinery, and appliances in accordance with the ordinary usage of the business.

The rule that it is necessary to prove that certain appliances are in general use by street railway companies before negligence can be predicated on the omission to supply them does not apply to appliances, the use of which is a matter of common knowledge.

As applied to street railway cars, a fender is a guard or protection against danger to pedestrians coming in contact with a car.

Where negligence, in an action for death of a pedestrian by being struck by a street car, was predicated entirely on the omission to provide the car with any fender or guard whatever, the court was entitled to take judicial notice of the purpose of fenders, as applied to street cars; such appliances being in common and general use on street cars.

Where decedent was killed in a collision with a street car, and the court called attention to the particular circumstances of the case, an instruction that decedent was required to use his senses, and exercise that degree of care that men of ordinary prudence would have exercised under the particular circumstances of the case as disclosed by the evidence, was not objectionable, as requiring too low a degree of care, in view of evidence that decedent was familiar with the surroundings and conditions prevailing at the place of the accident.

Where the court repeatedly charged that decedent was required to use all his senses to avoid collision with a street car by which he was killed, and that, unless he did so, plaintiffs could not recover, an instruction was not objectionable in the use of the expression "observing the car," instead of requiring decedent to have "looked for the car" before attempting to cross the track.

Where decedent was killed in a collision with a street car, as he was crossing the track, at a point some distance from a street crossing, but at which a large number of persons habitually crossed the track, an instruction that he was entitled to rely on the assumption that the company and its servants would discharge their legal duty in approaching crossings by having their cars under control was not objectionable because the accident did not happen at a public crossing.

Where a point in a street some distance from a crossing was habitually used by a large number of persons in crossing the tracks of a street railway, it was the duty of the railway company to conform the movements of its cars to such condition and to approach such point with the same degree of care it was required to approach street crossings.

Where a street railway company is authorized to lay its tracks on a street, no part of the street is thereby withdrawn from the use of the public, the street being merely burdened with an additional casement in favor of the street railway company, with a preferential right of passage over it.—(Spiking et al. v. Consolidated Ry. & Power Co. et al., 93 Pac. Rep., 8.)

News of Electric Railways

Changes in Mohawk Valley Properties

The New York Public Service Commission, Second District, has approved the preliminary applications in the plan of reorganization of the Mohawk Valley Company.

Prior to the enactment of the Public Service Commission's law, the Mohawk Valley Company could lawfully acquire and hold stock of railroad and lighting companies to an unlimited amount. Its operations have been conducted upon the assumption that this right continued in the control and management of the companies in which it owns a majority of the stock and the financing has been carried on upon this assumption.

Section 54 of the Public Service Commission's law provides that where stock shall be transferred or held for the purpose of collateral security, no stock corporation of any description, domestic or foreign, other than a railroad corporation or street railroad corporation, shall purchase or acquire, take or hold, more than 10 per cent of the total capital stock issued by any railroad corporation or street railroad corporation, or any other common carrier.

Under this provision the Mohawk Valley Company was required to change its method of financing, and it has been found necessary to devise other measures for handling its property. An extensive scheme of reorganization, which involves a series of complicated changes in the handling of stocks and the amount thereof of the various companies concerned in the transaction, has been framed.

The essential feature of the plan when it is entirely consummated is that there shall be no more securities afloat than now and that there shall have been accomplished no increased issue of stocks or bonds. The end to be attained is a change in the ownership of stocks so that the financial operations of the various companies may be placed in harmony with the existing law. The whole scheme has been informally submitted to the commission for its opinion.

The companies in which the Mohawk Valley Company is interested and its holdings are as follows:

Name of company:	Amount out- standing	Mohawk Valley Company owns	Company owns, per cent
Utica & Mohawk Valley Railway.....	\$7,500,000	\$7,500,000	100.00
Oneida Railway	1,923,000	1,922,700	99.98
Syracuse R. T. Railway.....	†3,918,071	2,317,500	59.14
Rochester & Eastern Rapid Railway..	1,500,000	1,500,000	100.00
Schenectady Railway	4,100,000	2,050,000	50.00
Rochester Electric Railway.....	200,000	173,900	86.95
Rochester & Suburban Railway.....	420,000	400,800	95.42
Rochester & Sodus Bay Railway.....	1,850,000	1,100,000	59.45
Ontario Light & Traction Company....	100,000	100,000	100.00
Rochester Railway	6,000,000	900	0.03
Rochester Railway & Light Company..	9,498,860	7,638,900	80.41
Canandaigua Railway & Gas Light Co.	50,000	20,550	41.00
Eastern Monroe Electric Light & Gas Company	250,000	250,000	100.00

*\$77,000 owned by Oneida Railway Company.

†\$1,928.26 owned by Syracuse Rapid Transit Railway.

The first step is for the Mohawk Valley Company to reduce its capital stock, such reduction to be accomplished by distributing railroad stocks, owned by it to the amount of \$17,065,800, par value, pro rata among the stockholders. The New York Central & Hudson River Railroad being a stockholder to the amount of \$12,000,000, this stock would be reduced by the proposed operation, and it will receive in lieu thereof the stock of the various companies held by the Mohawk Valley Company to the amount of \$10,239,480. This step the commission decides to be unobjectionable, and not an infringement upon any law of the State, either in letter or in spirit, and this portion of the application is granted. It in effect transfers to the applicant the absolute ownership of property to which it is entitled through its ownership of stocks in the Mohawk Valley Company.

The second step is that the New York Central & Hudson River Railroad shall purchase 29,987 shares of common stock of the Rochester Railway, having a total capitalization of \$6,000,000, of which \$3,000,000 is common stock. All of this common stock, except 13 shares, is owned by the Rochester Railway & Light Company.

The par value of the 29,987 shares of the common stock of the Rochester Railway proposed to be acquired is \$2,998,700. It is proposed to pay for such stock the sum of \$4,500,000 or substantially \$150 per share. It is provided that the purchase price shall not be paid until the stock is free from the lien of the mortgage of the Rochester Railway & Light Company by which it is covered, but that such purchase price shall be placed in escrow ready to be delivered whenever the proper arrangements can be made freeing the stock from its present lien.

The net result of the changes involved is that instead of owning the surrendered capital stock of the Mohawk Valley Company the New York Central & Hudson River Railroad will be the owner of stocks to the amount of \$10,239,480, and that instead of holding the indebtedness against the Mohawk Valley Company of \$4,500,000, it would be the owner of the capital stock of the Rochester Railway Company of the par value of \$2,998,700 and of the assumed value of \$4,500,000. This action is approved, the commission insisting that it must, "however, be clearly understood that this action of the commission is not to be construed as an unqualified approval of the results to which it assents. The commission finds itself confronted with a situation arising out of a change of law. That change of law compels a change of corporate relations. To some change it must assent in order to preserve properties under its supervision in a condition to meet the public requirements which they were created to serve. The new restrictions upon corporate dealings should be applied to existing investments with sense and judgment, and that has been the endeavor in this case."

The application of the Rochester & Eastern Railway is for the consent of the commission to increase its capital stock from \$1,500,000 to \$15,290,200.

The commission holds that there is nothing in the present condition of this company, if it be considered by itself, which demands for the purposes of its successful operation as a railroad that its capital stock be increased. For reasons it has been selected, however, as a company which shall become the owner and holder of certain other railroad stocks which must be placed somewhere under the proposed scheme relative to the holdings of the Mohawk Valley Company. This application is granted.

The next step is to be as follows: The consolidating company succeeding to the Rochester & Eastern Rapid Railway would be the owner of the total capital stock of the Oneida Railway and the Utica & Mohawk Valley Railroad, except the amount of \$300 stock of the Oneida Railway, which it is proposed to acquire. Upon the acquisition of this stock by the consolidated company, it then being the owner of the total capital stock of the two companies, it is proposed to merge the same with the consolidation, pursuant to the provisions of the statute in that behalf and thus extinguish the two companies and reduce the number of companies to three, namely, Schenectady, Syracuse Rapid Transit and the Consolidated.

This completes the series of operations definitely projected, although it is clearly understood, the commission states, that these applications are granted upon the express understanding that it is contemplated by the applicants to consolidate and merge the companies and to place a general refunding mortgage upon the property of the consolidated company, and that these applications are granted for the express purpose of bringing about the final results as indicated. The decision continues:

"The commission grants these applications in view of all the reasons presented to it in connection with the entire series of transactions. It might hesitate seriously to grant these applications were the proceedings to stop with them and nothing further be done. It realizes that it has no powers to compel the consolidation or the merger, and that these acts will take place depends upon the good faith of the parties which is pledged to the same, and of which pledge these remarks are to remain as the evidence." Upon the theory that this is the proper way in which to handle the financial operations of all the consolidated companies, it is believed that a better market can be found for bonds which are secured by all of the properties than for bonds which have a security upon the property of one company alone.

The opinion, written by Chairman F. W. Stevens, holds:

"1. That the situation of all the companies involved justified and required a change in the stock holdings.

"2. That the change in the law compelled a change in the corporate relations.

"3. That wise policy and a just regard for both the public and private interests affected required the commission to authorize such reorganization as within the law best meets the exigencies of the situation, although the results may be such that as an original proposition disconnected from existing investments, legal at the time they were made, it would unhesitatingly stamp them with its disapproval.

"4. In any inquiry into the rates and charges of a public service corporation that portion of its capital stock issued for the purpose of owning and holding the stocks of other corporations is not a factor to be considered. Upon such an inquiry if the capital stock of the corporation is an ele-

ment to be considered, only that portion of the capital stock which may be said to represent the property operated is entitled to be regarded.

"5. Capital stock will not be permitted to issue for the purchase of the stock of other corporations unless the stock to be purchased has a value substantially equal to the par value of the stock to be issued. The protection of ignorant or improvident persons against stock issues representing fictitious values requires this rule.

"The character of corporated stocks discussed.—They are considered to be evidence of right to an aliquot part of the corporate assets upon final dissolution and division and of the right to the same part of any dividend which may be declared. The so-called par value furnishes no indication of the true value of the property to which the stocks are mere evidences of title or of the dividend-earning power of the same."

Transit Affairs in New York

At a hearing on Aug. 20 the New York Public Service Commission, First District, considered the application of the Brooklyn Rapid Transit Company for a franchise to build an elevated railroad structure along the line of the Flatbush Avenue extension, connecting with the Manhattan Bridge. The civic organizations represented at the hearing generally indorsed the application.

An order has been issued on Mayor McClellan and Comptroller Metz, of New York, and the members of the Public Service Commission directing them to appear in court. This order, which has been promulgated by Adolph Gutner through an attorney, is a notice that a motion will be made before Justice Bischoff in Part II of the Supreme Court on Aug. 31 why an injunction should not be granted pending the determination of the suit. The injunction is sought to prevent the further payment from the city treasury of the expenses of the Public Service Commission of the First District. The plaintiff and his attorney, Mr. Leary, propose to put the commissions to the test of a judicial scrutiny, and Mr. Leary thinks he has an unanswerable argument against the constitutionality of one of the chief sections of the act which establishes the commissions and prescribes their powers and duties. He attacks the provision in the act that makes an appropriation for the expenses and salaries. Mr. Leary's principal claim against the constitutionality of the act providing for the two commissions is that it makes obligatory upon the city the payment of the expenses of a purely State and not a local official body. Granting that the two commissions are composed of State officers, he asserts that the imposition upon the City of New York of several hundred thousand dollars each year of expenses for one of them is clearly unconstitutional; that the city can incur no indebtedness except for city purposes.

Claims aggregating \$28,114.55 have been filed by the Brooklyn Heights Railroad against New York City for damages to the property of the former corporation alleged to have been incurred as a result of the construction of the subway to Flatbush Avenue.

No Free Transportation in Georgia.—Governor Smith, of Georgia, has vetoed the bill allowing firemen and policemen to accept free transportation from street railway companies.

Strike in Texas.—The employees of the Denton Interurban Railway & Power Company are on strike. It is understood that they took exception to a rule of the superintendent enforcing stricter discipline.

Elevated Trains Over the Williamsburg Bridge.—The Brooklyn Rapid Transit Company expects to begin the operation of elevated trains over the Williamsburg Bridge to the Delancey Street terminal on Sept. 15.

Bids Wanted for Constructing Spanish Road.—Bids will be received until Sept. 25, 1908, by the Dirección de Obras Públicas, Madrid, Spain, for constructing and operating an electric tramway in Madrid. A deposit of \$1,037 must accompany all bids.

Committee of Philadelphia Council Investigates Conditions in Brooklyn.—A committee of the Council of Philadelphia visited Brooklyn on Aug. 19 on a tour of investigation into fare conditions on street railroad systems throughout the country. The committee has already been to Chicago, Milwaukee, Detroit, Cleveland, Buffalo and Boston.

South Chicago City Railway Employees Accept Scale.—The employees of the South Chicago City Railway have decided to renew an agreement under which they worked last year. The agreement gives them 23 cents an hour for the first six months, 25 cents for the second six months and 27 cents an hour for the remainder of the time they are in the employ of the road.

Indiana Company to Transport Troops.—The Adjutant General of the Indiana National Guard has arranged with the Fort Wayne & Wabash Valley Traction Company for routing all the militia companies to Fort Benjamin Harrison over the electric railway. The soldiers will begin moving to the fort for the annual camp about Sept. 11 and they will be taken by way of Bluffton.

Baltimore Accident Faker Sentenced.—Frederick A. Taffen, who on July 21 was arrested in Baltimore charged with attempting to obtain money from the United Railways & Electric Company of that city under false pretences, as noted in the issue of the ELECTRIC RAILWAY JOURNAL for Aug. 15, pleaded guilty in the Criminal Court on Aug. 7 and was sentenced to six months in the Baltimore County jail.

New Scale of Wages on Virginia Line.—The Newport News & Old Point Comfort Railway & Electric Company has just put into effect a new schedule of wages for its employees. Under the new scale the men will receive: One to two years' service, 15 cents an hour; two to three years' service, 16 cents an hour; three to four years' service, 17 cents an hour; five years' service and over, 18 cents an hour.

Concession for a Foreign Tramway System.—An American consular officer in Roumania reports that the Mayor of Craiova has published in the local papers an offer of a concession for the construction of a tramway system for the city. Bids will be received up to Oct. 14, 1908, and must be accompanied by a surety of \$1,000. For further direct information, correspondence should be addressed in French or German to Monsieur le Maire, Craiova, Roumania.

Indiana Lines to Increase Limited Service.—Officials of the Indianapolis & Louisville and the Indianapolis, Columbus & Southern Traction Companies met in Indianapolis, Ind., on Aug. 20 to consider the advisability of installing additional cars on the limited service between Indianapolis and Louisville. The limited service has proved so popular and profitable that it is deemed advisable to enlarge the service and make the time a little faster. General Manager A. A. Anderson has planned 14 different schedules by which additional limited cars can be put into service. The one most satisfactory to each end of the line will be adopted.

Western Society of Engineers.—The secretary of the Western Society of Engineers, Monadnock Block, Chicago, announces the following program for the winter meetings: Sept. 2, "The Analysis of an Hydro-Electric Project," H. Von Schon; Sept. 25, "Notes on the St. Clair Tunnel Electrification," F. A. Sager; Oct. 7, "Methods of Studying the Heat Absorbing Properties of Steam Boilers," L. R. Stowe; Oct. 9, "Distribution for Light and Power," H. B. Gear; Oct. 21, "Notes on Macadam Road Construction," A. N. Johnson; Nov. 4, "Retaining Walls," I. F. Stern; Nov. 13, "Electrolytic Corrosion of Boiler Tubes," C. F. Burgess; Nov. 18, "The Work of the Engineering Staff of the Wisconsin Tax and Rate Commission," W. D. Pense; Dec. 2, "The Reconstruction of the Street Car Tracks in Chicago," George Weston; Dec. 11, "Some Phases of Hydro-Electric Development in the Northwest," C. E. Freeman; Dec. 16, "The Improvements in the Upper Mississippi River Between St. Paul and St. Louis—the Work of the National Government," Col. C. McD. Townsend; Jan. 2, annual meeting; Jan. 8, traction meeting; Jan. 29, "Steel Castings," R. P. Lamont; Feb. 3, "A New Form of Concrete and Steel Construction," J. W. Schaub; Feb. 12, "Multiple Cable Distribution in Telephony," B. C. Groh.

Finding on Dedham & Franklin Street Railway Collision.—The Massachusetts Railroad Commission has issued the following finding in regard to the collision which occurred on the Dedham & Franklin Street Railway at Westwood on July 14: "On July 14 two cars of the Dedham & Franklin Street Railway collided on Main Street, Westwood. Fortunately no serious injury resulted. The statutes provide that this board shall investigate the cause of any accident on a railroad or railway which results in the loss of life, and of other accidents which in its judgment require investigation. In view of the circumstances of the collision the board gave a public hearing. It appeared that the collision was caused by reason of an order of the superintendent instructing the crew of one of the colliding cars to undertake to reach a siding before the opposing car should have passed it. At the time the order was given the superintendent knew that he was instructing a car to proceed over a single track, upon which a car was approaching in an opposite direction with a right of way secured to it by his order, for the purpose of making up lost time. If this collision had been due to the action of employees it would have merited reprehension; but when the order that caused it was issued by the official of the company in charge of operation, censure of such conduct cannot be too severe."

Financial and Corporate

New York Stock and Money Markets

AUG. 26, 1908.

The professional manipulation of the stock market, which has been a prominent feature recently, has finally resulted in a crash. For days, after the recent advance and subsequent reaction, the market seemed uncertain. The contest between the element which has been laboring for lower prices and those who have been pushing quotations higher was waged with varying results. Small advances and small reactions constituted the course of the market. When the bears forced down prices plenty of buyers were to be found, and when the bulls pushed prices upward profit takers began to sell.

Then the bear element undertook an attack. In the two-hour session on Saturday, Aug. 22, the manipulators swelled transactions to more than 1,000,000 shares. So much evidence of matched sales for manipulative purposes was seen that the Stock Exchange authorities started an investigation. The firm of A. O. Brown & Company, in the two-hour session, handled almost 800,000 shares. The market, however, advanced, and when the time for delivery of the securities arrived on Monday the bears found themselves unable to produce the stocks at the regular hour. An extension until Aug. 25 was obtained, but as the firm was unable to get the necessary shares by that time a suspension was forced. The failure, while involving a large amount, was minimized by the fact that the firm asserts its solvency.

In the meantime the general tone of the stock market is strong and optimistic. There is no adverse news in any quarter and the great interests of the country are determined to sustain prices. The crop news is satisfactory, money is cheap and plentiful and there are generally encouraging reports from commercial and industrial centers. The public, however, seems slow to trade. There is some investment buying of the dividend-paying stocks, but little speculative trading that is not attributed to the professionals.

Money on Aug. 25 was quoted at $\frac{3}{4}$ to $1\frac{1}{4}$ per cent for call funds and $2\frac{1}{2}$ to $2\frac{3}{4}$ per cent for 90 days' loans.

Other Markets

Trading in traction securities on the Boston market has been merely nominal during the past week, only broken lots changing hands. Massachusetts Electric preferred sold at 48, an advance of one point, on limited transactions. Other prices were practically unchanged.

Philadelphia Rapid Transit continues to be the most active traction issue in the Philadelphia market, some trading being recorded every day. The downward movement seems to have been checked at about $13\frac{1}{2}$, but there is little disposition toward higher prices. Union Traction is totally neglected and but few shares of Philadelphia Traction were in the market.

In Chicago the principal attention paid tractions was in bonds, Chicago Railways 5s selling for $99\frac{3}{4}$, a slight advance. A few shares of Chicago Subway stock changed hands at 21 to $21\frac{1}{8}$ and a small block of Chicago & Oak Park Elevated was sold at 3. Other issues were neglected.

United Railways income bonds continue to be the only traction security that displays any activity in Baltimore. The bonds are selling about $52\frac{3}{4}$. The United Railways funding 5s are selling for 80, but few appear in the market. Traction stocks are quiet.

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

	Aug. 18.	Aug. 25.
American Railways Company, Philadelphia.....	45½	45½
Boston Elevated Railway.....	135	133
Brooklyn Rapid Transit Company.....	53	51½
Chicago City Railway.....	a180	a180
Cleveland Railway.....	—	—
Consolidated Traction Company of New Jersey.....	a70	a69
Consolidated Traction Company of New Jersey, 5 per cent bonds.....	a105	a104
Detroit United Railway.....	a42	a40
Interborough-Metropolitan Company.....	12½	11½
Interborough-Metropolitan Company (preferred).....	34½	32½
Manhattan Railway.....	137	137
Massachusetts Electric Companies (common).....	10	9½
Massachusetts Electric Companies (preferred).....	48	47
Metropolitan West Side Elevated Railway, Chicago (common).....	a17	a15
Metropolitan West Side Elevated Railway, Chicago (preferred).....	a45	a43½
Metropolitan Street Railway.....	33	28
North American Company.....	62½	62
Philadelphia Company, Pittsburg (common).....	39	39
Philadelphia Company, Pittsburg (preferred).....	40	40
Philadelphia Rapid Transit Company.....	13½	13½
Philadelphia Traction Company.....	*89	88½
Public Service Corporation, 5 per cent collateral notes.....	a97	a97
Public Service Corporation, certificates.....	a70½	a70¾
Twin City Rapid Transit Company, Minneapolis (common).....	a90	a90
Union Traction Company, Philadelphia.....	49	48½
a Asked.		

Control of Portchester Road by New Haven Company

The following statement has been made to the New York Public Service Commission, First District, by the New York, New Haven & Hartford Railroad regarding its control of the New York & Portchester Railroad:

"The New York, New Haven & Hartford Railroad owns 990 shares of the capital stock of the Millbrook Company out of the authorized issue of 1,000 shares, par value \$100.

"The Millbrook Company owns (1) 91,581 shares of capital stock of the New York & Portchester Railroad, par \$100. Total issued, 91,590 (nine shares held by directors), and (2) one temporary 5 per cent first mortgage gold bond of the New York & Portchester Railroad for \$100,000.

"The New York & Portchester Railroad owns (1) 7,260 shares of capital stock of the New York, Westchester & Boston Railway, par \$100; (2) 23,614½ shares of capital stock of the New York, Westchester & Boston Railway (voting trust certificates); (3) 5 shares of capital stock of the City & County Contract Company; 6,895 shares of capital stock of the City & County Contract Company (voting trust certificates); total number of shares issued of City & County Contract Company capital stock is 6,890; and (4) an underwriting agreement to the amount of \$13,490,000 cash to bonds and stock of the New York, Westchester & Boston Railway. On this underwriting has been paid \$4,819,120. Upon payment of the balance, New York & Portchester Railway will be entitled to receive 13,490-13,500 of \$15,000,000 par 5 per cent Westchester bonds and 45,000 shares of Westchester capital stock. These securities now being held under the syndicate agreement by the Knickerbocker Trust Company, New York, depository for the syndicate managers.

"The total amount of cash advanced by the New York, New Haven & Hartford Railroad is \$11,265,000. Of this amount \$10,873,169.04 was expended in acquiring the securities of the several companies as detailed above and the remainder, \$391,830.96, is represented by demand notes or open account of the several companies. What securities will be issued against this amount cannot as yet be determined."

Fairmont & Clarksburg Traction Company, Fairmont, W. Va.—It is announced that Chandler Brothers & Company, of Philadelphia, and the Fidelity Trust Company, of Philadelphia, have formed a syndicate which has agreed to purchase the remainder (about \$400,000) of the authorized issue of \$2,500,000 of first-mortgage 5 per cent bonds of the company.

Louisville (Ky.) Railway.—Following the action of a meeting of the stockholders of the Louisville Railway, several months ago, authorizing an increase in the capital stock of the company, amended articles of incorporation were filed by the company on Aug. 21 increasing the capital stock \$500,000. The increase in the capital stock is for the purpose of reimbursing the Louisville Traction Company for funds advanced to the Louisville Railway several months ago. The new capitalization will be in 5000 shares of common stock at the par value of \$100 each.

Municipal Traction Company, Cleveland, Ohio.—The following statement has been made public by this company:

	—May, 1908—		—June, 1908—		—July, 1908—	
	Amount	Cts. per car mile	Amount	Cts. per car mile	Amount	Cts. per car mile
Gross earnings from oper.....	\$356,380.26	21.80	\$409,279.54	21.41	\$437,174.15	22.81
Oper. exp.....						
Maint.	83,787.40	5.13	97,790.62	5.11	91,531.01	4.78
Transp.	147,040.70	8.99	167,525.39	8.76	163,806.72	8.55
General	27,827.03	1.70	30,337.30	1.59	27,313.83	1.42
Strike acc.....	18,265.04	1.12	3,393.53	0.18	10.91	....
Total	\$276,920.17	16.94	\$299,046.84	15.64	\$282,662.47	14.75
Net earnings	79,460.09	4.86	110,232.70	5.77	154,511.68	8.06
Taxes 21,808.43	1.33	22,343.11	1.17	22,601.01	1.18	
Int. rent..... 39,190.40	2.40	38,341.66	2.00	38,836.35	2.02	
Div. rent..... 73,378.00	4.49	73,378.00	3.84	73,378.00	3.85	
Total	\$134,376.83	8.22	\$134,061.77	7.01	\$134,815.36	7.03
Surplus .....	.....	.....	.....	.....	19,696.32	1.03
Deficit	54,916.74	3.56	23,829.07	1.34	.....	.....

Ogden (Utah) Rapid Transit Company.—This company has filed an amendment to its articles of incorporation, increasing its capital stock from \$100,000 to \$500,000.

Santa Clara Interurban Railroad, San Jose, Cal.—The Southern Pacific Company has purchased from L. E. Hanchett the Santa Clara Interurban Railroad, including private rights of way between Santa Clara and San Mateo, franchises in Palo Alto and some rolling stock. The Santa Clara Interurban Railroad now has 3 miles of line in operation in Palo Alto and this will be used in the continued route which the Southern Pacific Company proposes to construct between San Francisco and Santa Clara.

Traffic and Transportation

No Agreement Reached for Exchange of Transfers in New York

The Metropolitan Street Railway and the Central Park, North & East River Railroad, of New York, have notified the Public Service Commission for the First District of their inability to reach any agreement for the exchange of transfers between the Fifty-ninth Street crosstown cars and that part of the Metropolitan system which is between Thirty-fourth Street and 116th Street. The receivers of the Metropolitan company, Adrian H. Joline and Douglas Robinson, say in their letter to the commission:

"We acknowledge receipt of your final order No. 673, requiring us and the Central Park, North & East River Railroad to establish on or before Aug. 24, 1908, a through route for the transportation of passengers between the points and upon the lines specified in a schedule attached to your order and to establish and put in force a joint rate of fare for each passenger by the use of a transfer slip or otherwise.

"In reply we have to advise you that we have been in conference with the officers of the Central Park, North & East River Railroad, but have not established such through route or joint rate, and are unable to do so. We accordingly notify you that we cannot comply with the terms of your order.

"In thus advising you, we wish to call your attention to certain matters that are pertinent to the subject of your order. In the first place, we may point out that in operating the roads under our charge we have under the direction of the court by which we were appointed conformed to all State laws, ordinances and regulations. Suggestions to the effect that because we are appointed by a federal court we consider ourselves not amenable to State control are wholly unwarranted. We are unwilling to believe that newspaper statements to that effect accredited to members of your board were made with your authority in view of our past attitude toward the commission as shown by the record of our correspondence, and the instructions of court referred to therein. The fact that under the judiciary act of 1888 the operations of federal receivers are made subject to the regulation of State statutes does not, however, preclude us from expressing our views as to the wisdom of action proposed to be taken by virtue of such statutes. Nor does it deprive us of the right as custodians of the property committed to our charge of contesting by such proceedings as we may be advised, any acts of State officials that seem to us injuriously to affect the rights of those interested as creditors or otherwise in the property.

"Referring now to your order we may remark that the proposed zone method of transfer, which appears fair on the surface, is not practicable under present conditions in this city. The members of your board know, as well as does every intelligent man who rides on the street cars in New York City, that it is not possible to segregate the people with Fifty-ninth Street transfers who may board a north-bound car on (for instance) Eighth Avenue at a rush hour. Without segregation it is physically impossible for a conductor to identify, out of a car full of people insisting on transportation beyond 116th Street, the particular individuals who should pay an extra fare for the privilege. Each effort to enforce the right to the extra fare, which your suggested regulation contemplates, would result in physical controversies and suits for damages. The verdict would always be against the road, which could rely only on a conductor's recollection of the personal appearance of individual passengers. But this is a matter of detail; the fundamental objection is found in existing financial conditions.

"We have recently filed a statement showing the financial operations for about 10 months of receivership of the New York City Railway. It appears that the total income of the various roads composing the system fell short of the necessary expenditures to an amount exceeding \$1,000,000. Among these expenditures is not included the very large sum expended on construction account which has been provided from the issue of receivers' certificates. Nor do these expenditures represent anything paid to stockholders or bondholders of the Metropolitan Street Railway with the single exception of an item of interest paid during the first week before we had ascertained the extent of the financial disaster which precipitated the receivership.

"Examination of this statement will show that the only items in it representing payments (not already defaulted) to investors, i. e., bondholders and stockholders of all roads, including all underlying securities, are set down as 'rent of leased lines' and 'interest on funded debts,' aggregating \$2,235,810.41. If these items were wholly thrown out, thus

eliminating all question of capitalization or over-capitalization, the net income would be (\$2,235,810.41, less \$1,047,682.38) \$1,188,128.03. The State and city authorities assess this property for purposes of taxation at about \$92,000,000. Therefore the net income on the State's and city's valuation of the actual property to-day is but little in excess of 1 per cent.

"While it is true that the expenditures made by the receivers for repairs and rehabilitation have materially increased the cost of operation for the period of the receivership, it must not be supposed that for some years to come there can be any substantial reduction of such expenses. There has never been any allowance in the accounts for depreciation and there is no such allowance in our statement. The conduit electric system is far more expensive to operate and maintain than is the overhead trolley system, and further heavy expenses must be incurred in order to put the property in satisfactory working condition.

"It being manifest that the property cannot continue operating with a deficit, we have been and are still confronted with the problem how to make both ends meet. Since income cannot under existing statutes be increased on the lines we operate the only way to do this is by changes on the expense side of the account. Reduction might be effected by starving the property, which was the method employed by the New York City Railway during the last few years of its operation. Car service might be reduced in non-rush hours, the road and its equipment being given only mere makeshift repairs. We have never for a single moment entertained the idea of such economies. The court at the outset instructed us that the roads were instruments of public service and must be run to give the public efficient service.

"No one should know better than yourselves how, under the severe handicap of repeated fires destroying workshops, cars and repair materials, we have labored to improve the property, and how changed is the condition of things from what it was when we took charge. In connection with this matter permit us to say that your own efforts in the same direction have been superfluous. We should have done all we have done had you not issued us a single order, because we realize, as all sensible men must, that no roads can be made to show a balance permanently on the right side of the account unless they render the service which the public reasonably requires and are maintained in a proper condition of repair. That was the first thing to be done when we took charge, and to the utmost limit of our physical resources we have done it.

"Economies might have been secured by some curtailment of expenditures for labor. This also we have rejected. When we took charge there was a rule in force as to the amount of overtime to be charged against the men when cars failed to return to the barns as expected. Some overtime must be thus charged to secure discipline to ensure the prompt service in which the public is most interested. But the time allowance then in force was so grossly and manifestly unjust to the men that we at once modified it by cutting it down two-thirds. The cost of that change is over \$100,000 a year, no longer sweated off the labor pay-rolls.

"In one way only did it seem possible to effect the economies essential to restore the property to solvency, not the solvency which would pay dividends on stock or interest on bonds, but the solvency which would make continued operation possible. Much of the system consisted of leased lines and some of these leases stipulated for rentals which were high. An exhaustive investigation has been made, and is still in progress, to determine which lines earned their rent and which did not. It is a slow process. Many figures have to be marshaled, tabulated and studied so that no injustice may be done anywhere. As soon as it was ascertained that any particular lease showed a rental which the leased property did not earn enough to pay, all things considered, it has been eliminated.

"We first ascertained that the Third Avenue Railroad, however successful might be its future if operated independently in association only with the natural allies whose stock it owned, was under the existing lease an unprofitable road for the New York City or Metropolitan railways to operate, and it was severed from the system. Seventy days after its independent operation began the receivers of both systems agreed to discontinue the exchange of transfers between their respective lines, except at a few points. Seventy days after that change was made we had a tabulation prepared showing the number of passengers of both classes carried during the entire periods on the whole Metropolitan system in order that we might study the results of the change and thus obtain some light for our future guidance. We enclose a copy of such tabulation showing a reduction in the ratio of 'transfer' to 'revenue' from 61.6 per cent to 51.5 per cent.

"The Fulton Street Railroad was also a losing enterprise

and it has been thrown out. The same action was taken with the Twenty-eighth and Twenty-ninth Street Crosstown Railroad, although under an arrangement with its bondholders we are temporarily running it until Oct. 1 to enable them to determine whether they will try to handle it themselves or will let the franchise lapse and accept their loss. We found that the Belt Line was also operated at a loss to us, if the stipulated rent were paid, and notified owners that we could not continue to pay. Naturally they objected to our using and occupying their property without paying for it, and they took back their road. We also found the rent of the Central Crosstown Railroad too high and would have cut it out, but the owners, with your assent, agreed to such a reduction of the rent as would make it a paying factor, so that it is still in the system and covered by the provisions of the transfer statute.

"We know no way to keep the Metropolitan system capable of rendering efficient public service except by throwing off all lines which require the payment of rentals that, in view of present conditions, are improvident and excessive. If, however, as soon as every such unprofitable road is thrown out we are to be required to operate with it on some joint rate, the problems become much more difficult of solution.

"If the latter clauses of Section 49 of the Public Service Commission's act with their provisions as to switch connections, through routes and the 'transportation of passengers, freight and property' apply to these two roads they apply equally to the entire intricate network of lines which make up the street railroad system of this city, already regulated as to single fare by former statutes, and presenting practical difficulties which do not exist in the case of the ordinary railroad.

"The sooner it is ascertained whether or not under the Public Service act these conditions must be dealt with, the sooner we shall all know, the public, your commission and ourselves and the mortgagee and other creditors of this property, just what may be expected as to its future."

The financial statement submitted by the receivers showed that during the period from Sept. 25, 1907, to June 30, 1908, default had been made of rent of lines operated under leases and agreements to an amount of \$4,720,113.90. The statement of income account submitted by the receivers was published in the *ELECTRIC RAILWAY JOURNAL* of Aug. 22, 1908, page 521. The following statement shows the cash receipts and disbursements of the New York City Railway from the date of the appointment of receivers to June 30, 1908:

CASH RECEIPTS

New York City Railway, September 24, 1907.....	\$607,291.33
Passengers	11,273,441.14
Advertising	181,250.00
Express	23,448.69
Mail	1,957.47
Rental of property.....	239,397.97
Sale of old material.....	87,100.95
Dividends on stock.....	101,500.00
Other companies, for power, use of tracks and miscellaneous Receiver, Third Avenue Railroad, for labor and material furnished, etc.....	539,446.37
Receiver, Forty-second St., Manhattanville & St. Nicholas Avenue Railway, for services, etc.....	53,809.86
Receiver, Union Railway, for services, etc.....	4,725.65
Receiver, Dry Dock, East Bway. and Battery Railroad, for services, etc.....	13,888.54
Receivers, Met. Street Railway, reimbursement for expendi- tures on 146th Street car house.....	9,121.90
Reimbursement for expenditures on Ninety-ninth Street & Lexington Avenue car house.....	290,102.04
Reimbursement for cars.....	164,232.13
Receiver's certificate account; reimbursement for improve- ments and betterments, etc.....	74,849.46
Miscellaneous sources	640,743.77
	51,708.01
Total	\$13,741,723.93
Total cash receipts.....	\$14,349,015.26

CASH DISBURSEMENTS

Pay rolls—operating, administration and clerical, claim and law departments	\$5,465,001.37
Payments to State and city, account of taxes and water rates	785,606.67
Materials and supplies required for operation, etc.....	2,657,831.30
Rent of lines operated under leases and agreements.....	3,067,412.49
Replacement of property destroyed by fire—power houses, cars, etc., in advance of receipt of insurance from under- writers	651,951.99
Sprinkler equipment, etc., required to prevent cancellation of insurance	101,447.90
Completion of First Avenue line construction to put line in condition for electric operation.....	115,029.36
Miscellaneous track work, including modification of track for operation of pay-as-you-enter cars.....	270,428.02
Miscellaneous construction work, necessary to operation..	264,418.26
Horses purchased	108,875.00
Insurance premiums, rent of offices and yards, settlements of claims for injuries and damages, expenses of litigation and receivership	718,206.69
Total cash disbursements	\$14,206,209.05
Cash on hand, June 30, 1908.....	142,806.21
Total	\$14,349,015.26

The statement showing the passengers carried during the 70 days prior and the 70 days subsequent to April 11, 1908, being the date of the abolition of exchange of transfers between the Metropolitan and the Third Avenue systems, was as follows:

	Revenue	Transfer	Total	Ratio Transfer to Average Revenue Fare
Seventy days prior.....	50,686,419	31,240,303	81,926,722	61.6% 0.0309
Seventy days subsequent	56,530,295	29,125,744	85,656,039	51.5% 0.0329
Average day prior.....	724,092	446,290	1,170,382	
Average day subsequent	807,575	416,082	1,223,657	

The Central Park, North & East River Railroad made a brief statement to the commission, recording the failure of their negotiations.

At a meeting of the commission on Aug. 25 the situation was considered and a resolution was passed providing that the commission investigate on Aug. 27 "what rate, fare or charge is just and reasonable to be charged by the common carriers for through transportation upon each of the routes named in its order and what portion of such rate, fare or charge should be apportioned to each such carrier and the manner in which the same should be paid or secured."

Freight Franchise Granted in Leicester, Mass.—The Worcester (Mass.) Consolidated Railway has been granted a franchise to carry freight on its line in Leicester.

Brooklyn Rapid Transit Company Seek to Reduce Suburban Service.—The Brooklyn Rapid Transit Company has filed an application with the Public Service Commission for permission to reduce the service on the surface lines between Jamaica and East New York.

Increase in Fares Approved in Virginia.—After hearing the evidence submitted by the objectors to the petition of the Newport News & Old Point Railway & Electric Company, of Newport News, Va., for the right to increase its rate between Newport News and Hampton from 5 cents to 10 cents, the State Corporation Commission of Virginia has entered an order allowing the company to make the increase. The commission, however, called for the books of the company covering its business between certain periods, and reserved the right to enter a different order if an examination shall warrant another conclusion.

Proposed Package Service in Philadelphia.—It is reported that several conferences have been held between representatives of the Philadelphia Rapid Transit Company and connecting suburban electric lines for the installation of an express package service from Philadelphia to outlying towns. Such a system would be particularly valuable to the department stores, enabling them to eliminate long wagon hauls to suburban territory. The project has not yet taken definite outline, but a conclusion will probably be reached at an early meeting of directors of the Philadelphia Rapid Transit Company. The company has been operating a milk car on one of its suburban routes for some time and also holds a contract for refuse disposal.

NEW PUBLICATIONS

Railway Signaling. Pittsburg; *The Electric Journal*; 1908; 108 pages (9 in. x 5¾ in.); cloth; illustrated. Price, \$0.75.

This book is a reprint of a series of articles on railway signaling written by a staff of engineers connected with the Union Switch & Signal Company and published during the year 1907 in *The Electric Journal*. The articles in their original form attracted considerable attention and now that they have been revised and bound should find a wider circulation, for authoritative books on signaling are far from numerous. The contents include descriptions of the various forms of interlocking, the train staff system, automatic block signaling with d.c. or a.c. and a chapter on the language of fixed signals.

Telephone Construction, Installation, Wiring, Operation and Maintenance. By W. H. Radcliffe and H. C. Cushing, Jr. New York: The Norman W. Henley Publishing Company; 1908; 165 pages (6¾ in. x 4¼ in.); illustrated. Price, \$1.

This work is intended as a handbook for amateurs, contractors and others who may desire to install telephone systems on a small scale. As the book is elementary, the authors have not hesitated to include descriptions of apparatus now practically unknown in installations of importance. Many of the illustrations also look as if they had seen service before. However, the book would appear of value to those who contemplate putting in inter-department telephone systems, as the pointers given should enable them to make some comparison of cost between privately installed telephones and the local telephone company's service.

Personal Mention

Mr. Charles H. Clark has resigned as engineer of way of the International Railway of Buffalo, N. Y.

Mr. Harry McColgin, auditor of the Indianapolis & Louisville Traction Company, of Scottsburg, Ind., has been transferred to Pittsburg, Pa., where he will hold the same position as at Scottsburg.

Mr. F. D. Hunt has been appointed traffic manager of the Portland Railway, Light & Power Company, Portland, Ore. Mr. Hunt was formerly local agent of the Kansas City Southern Railroad, at Kansas City, Mo.

Mr. David Young, Jr., whose resignation as general manager of the York (Pa.) Railways was noted in the last issue of the *ELECTRIC RAILWAY JOURNAL*, has purchased the Pomeroy Ink Company, of Newark, N. J., and will devote his time to the management of that concern.

Mr. K. Takatsu, of Tokio, Japan, electrical engineer of the Department of Communication of the Japanese Government, recently visited Spokane, where he made an inspection of the equipment and method of electric distribution employed on the Spokane & Inland Empire Railroad.

Mr. Leavenworth Wheeler, who has been general manager of the Berkshire Street Railway, Pittsfield, Mass., for several years, is to be engineer of maintenance for the New England Investment & Securities Company and will be a member of the general executive staff, with offices in Springfield.

Mr. Thos. Linnenbrink, Rochester, Pa., has been appointed auditor of the Chattanooga (Tenn.) Railways with headquarters at Chattanooga, Tenn. Mr. Linnenbrink accepted the position of cashier with the company on April 1, 1908. For four years prior to that time he was with the financial department of the Beaver Valley Traction Company, Beaver Falls, Pa.

Mr. Alba H. Warren, formerly manager of the Brockton & Plymouth Street Railway, of Plymouth, Mass., has been appointed manager of the Pensacola Electric Company and Escambia County Electric Light & Power Company, vice Mr. John W. Leadley, who is now on an extended vacation prior to taking up other work with the Stone & Webster interests.

Mr. Albert L. Remington, Philadelphia, has resigned as president of the Lowell & Fitchburg Railroad, Lowell, Mass., and Mr. James W. Green, Gloversville, N. Y., has been elected to succeed him. Mr. J. Rea Patterson, New York, has resigned as treasurer of the company, and Mr. Jeremiah Wood, Gloversville, N. Y., has been elected treasurer.

Mr. Howard E. Huntington has been elected president of the Redlands (Cal.) Central Railroad, vice Mr. A. G. Hubbard, resigned; Mr. George C. Ward was chosen as vice-president, in place of Mr. J. H. Fisher, also resigned, and Mr. E. T. Cook was selected as secretary and treasurer, vice Mr. F. E. Sanford, secretary, and Mr. C. S. McWhorter, treasurer.

Mr. N. P. Baker, superintendent of the International Railway Company's lines centering at Niagara Falls, N. Y., has been transferred to Buffalo, where he will occupy the position of assistant general manager. Mr. Martin Sheehan, of the Lockport division, has been appointed superintendent of the Niagara Falls and Lockport divisions, the two having been combined.

Mr. James J. McGriskin, master mechanic of the Peekskill Lighting & Railroad Company, Peekskill, N. Y., has resigned his position, effective Sept. 1, to go with the Frictionless Metal Company, of Chattanooga, Tenn., manufacturer of special metal for electric railway service. Mr. McGriskin will have charge of the electric railway department of this company.

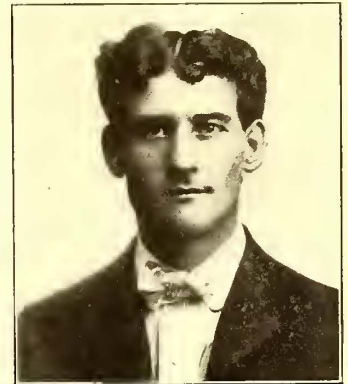
Mr. W. S. Whitney, as general passenger agent of the Ohio Electric Railway, will move his office from Columbus to Cincinnati. Mr. John C. Forester, division superintendent of the company, with headquarters at Lima, Ohio, has been made general freight agent and will move his office to Cincinnati. This change places the traffic departments of the company in the same city as the general offices.

Mr. J. C. Gillette has resigned as electrical engineer of the Washington, Baltimore & Annapolis Electric Railway, as the work of construction on this line has been completed. Mr. Gillette had charge of the erection of the overhead line for this company for the Roberts & Abbott Engineering Company, of Cleveland, and since April 1 has been associated directly with the company itself. Previous to his connection with the Roberts & Abbott Company, Mr. Gillette was for three years master mechanic of the Columbus, Delaware & Marion Electric Railway. He has also an

electric lighting experience as manager of the Marion Railway, Light & Power Company, of Marion, Ohio, and as superintendent of the Evansville Gas & Electric Company, of Evansville, Ind. The position of electrical engineer of the Washington, Baltimore & Annapolis Electric Railway has been abolished and the duties formerly performed by Mr. Gillette have now been divided between Mr. J. J. Doyle, superintendent of the company, who has charge of the track and overhead equipment and the transportation department, and Mr. Childs, in charge of rolling stock and substations.

Mr. C. Q. Richmond has been appointed general manager of the Berkshire Street Railway Company, of Pittsfield, Mass., commencing Sept. 1. Mr. Richmond was born in Hoosick, N. Y., but has been a life-long resident of North Adams, Mass. He was graduated from Amherst College in 1881, and during the next six years was engaged in the manufacture of electric light carbons. In 1898 he became president of the Hoosac Valley Street Railway Company, and spent the following year in converting the line to one of the first electric railways in Massachusetts and New England. Mr. Richmond remained in charge of the Hoosac Valley Street Railway until 1902, in which period many extensions were built. Aside from his manufacturing and street railway interests, Mr. Richmond has been actively identified with political affairs. He was a member of the Massachusetts House of Representatives in 1896 and 1898, and recently was elected to the Massachusetts Senate.

Mr. E. H. Raupp, whose appointment as general manager of the Youngstown & Southern Railway Company, Youngstown, Ohio, was noted in the *ELECTRIC RAILWAY JOURNAL* of Aug. 22, has been connected with electric railways about 13 years. During this time he has filled many different positions with the Rapid Railway, Detroit; Lake Shore Electric Railway, Cleveland, and the Detroit, Monroe & Toledo Short Line, now part of the Detroit United Railway. Mr. Raupp has been connected with the Youngstown & Southern Railway as superintendent for two years. Mr. Raupp succeeds in his new position Mr. S. J. Dill, who has been made general manager of the Elmira (N. Y.) Water, Light & Railroad.



E. H. Raupp

OBITUARY

William Kemp, formerly Mayor of Troy, N. Y., and prominent for years in its affairs, is dead. Mr. Kemp was for some years president of the Troy & Lansingburg Railroad and later of the Troy City Railway.

W. H. Cordell, one of the pioneers in the construction of electric railways in this country, died on Aug. 2 as the result of falling from an overturned plank while inspecting some work for the New York Edison Company. Although the fall was not over 12 ft., he fractured his spine and died a few hours later. Mr. Cordell was born 45 years ago in St. Louis, where he was educated in the public schools and the Jesuit college. In 1890 he began work with the Thomson-Houston Company, of Lynn, Mass. After several years' service with that company he went to Philadelphia to electrify several of the horse lines in that city, and afterward was associated with Mr. F. H. Lincoln in the operation of the People's Traction Company, of Philadelphia. About 1900 Mr. Cordell joined the General Electric Company in New York, where he took a prominent part in the installation of General Electric substation apparatus for the Metropolitan Street Railway and Manhattan Railway Companies. Four years later he resigned to carry on similar work for the New York Edison Company, for which organization he was assistant superintendent of construction. Mr. Cordell was of a most genial disposition and widely popular, and particularly in New York electrical circles for his successful management of entertainments for the benefit of the New York Edison Company's employees' organization. The deceased left a widow. Mr. Cordell was buried in St. Louis, his birthplace.

A reduction of \$8,557,534 has been made in the personal property assessment against the Chicago City Railway by the board of review. Following the cut, William H. Weber, secretary of the board of assessors, declared the figure of \$19,000,000 placed by the assessors was correct and said the board would stand by those figures.

Construction News

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

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

FRANCHISES

Huntsville, Ala.—Ed. L. Pulley and associates have been given franchises by the City Council to construct and operate an electric railway on Madison Street or Oak Avenue, Gallatin, Holmes and Church Streets, and establish and operate an electric light and power plant in the city. Ed. L. Pulley is in New York to finance the new enterprise, the franchise for which has been pending in the City Council several weeks, and it is stated that he will have an electric railway in operation between the city and the fair grounds before Oct. 1. A long stretch of the right of way has already been graded, and most of the material for the line is on the ground. [E. R. J., July 18, '08.]

Argenta, Ark.—The City Council has passed an ordinance repealing the former ordinance granting the Argenta Street Railway its franchise and granting it a new franchise in which the time for the completion of the line and putting it in operation was extended until Nov. 2, 1908.

Ansonia, Conn.—The Connecticut Company has asked the city to grant an extension of time till November, 1909, to double track in Ansonia. In return for this grant the company agrees to repair the covered bridge so that the cars will be operated on it and the company will pay to the city \$4,000.

Converse, Ind.—The Town Board has granted a franchise which permits the Marion & Logansport Traction Company to project its road through that town. The road will parallel the Panhandle tracks on the north side through the place, instead of crossing the steam road twice, as was insisted upon by the opponents of the road officials.

Terre Haute, Ind.—The Grand Central Traction Company has been granted a 40-year franchise for entrance to the city with a time limit of 60 days in which \$15,000 is to be deposited. The company proposes to build an electric railway from Indianapolis to Evansville, with a branch from Bloomington to Terre Haute.

Eldora, Ia.—As the result of a special election which was recently held in Eldora, the Iowa Railroad was granted a 5 per cent tax on all of the Eldora property and a 25-year franchise, granting the free use of all the streets in Eldora on which the company may desire to lay its tracks. On Sept. 8 there will be special elections held in the cities of Hubbard, Radcliffe and Story City, Ia., at which time a proposition to grant a franchise and a 5 per cent tax to this company will be voted upon.

Wyandotte, Mich.—Henry A. Everett has applied to the City Council for a street railway franchise in Wyandotte.

Great Falls, Mont.—The County Commissioners have granted a franchise to operate an electric railway on the roads of the county to G. Calvin Bower and A. F. Longeway. The surveys on nearly 100 miles of this line have been made. The road will run west from Great Falls to Augusta, 60 miles, passing through the Sun River valley and the Fort Shaw reservation.

Salisbury, N. C.—The Piedmont Electric Railway has been granted an extension of a franchise to build an electric railway skirting Salisbury on the north and west, the work to begin within six months. The same company, which is headed by T. H. Vanderford, T. J. Jerome, M. L. Jackson, of Salisbury, proposes to belt Spencer and East Spencer with an electric railway. [S. R. J., May 18, '07.]

Youngstown, Ohio.—The City Council has passed a street railway ordinance extending the Mahoning & Shenango Railway & Light Company's franchise about 13 years, making the life of the grant 25 years from the passage of the same. It gives the company the right to extend its tracks to the Ohio works and fireproofing plant, as well as build new tracks in Woodland Avenue, double track portions of Elm and Market Streets and connect the Youngstown & Sharon and Park & Falls lines. In exchange the city is to get universal transfers with East Youngstown and Idora Park in the one-fare zone; 25 tickets will be sold for \$1; 33 school tickets for \$1; the company will have to pave or repave its tracks whenever the city sees fit; the company will bear one-half the city's portion of building bridges over which the company expects to have tracks, and tickets must be sold on the cars.

Hamilton, Ont.—The Dominion Power & Transmission Company has accepted the street railway by-law and it will be submitted to the ratepayers to vote upon Sept. 16. The

by-law provides for a reduction of from 8 per cent to 5 per cent on the gross earnings of the company up to \$316,000. In return the company will have to put on 30 new cars within five years, and to build extensions and to renew the existing lines.

***Albany, Ore.**—Messrs. Rhodes, Ritchie and McDonald, of Albany, have applied for a franchise for a street railway system in Albany. Mr. Rhodes states that besides taking in the fair grounds, a city park will also be established along the line.

***Duquesne, Pa.**—The Duquesne & Dravosburg Street Railway has applied for a franchise in the borough, beginning at the intersection of Hamilton Avenue and Plum Alley; thence along Hamilton Avenue to First Street; thence along First Street to Kennedy Avenue and thence westwardly along Kennedy Avenue to the borough line and returning to Kennedy Avenue, First Street and Hamilton Avenue to Plum Alley, making one complete circuit to the place of beginning. It is proposed to build to Dravosburg and to West Elizabeth.

Chattanooga, Tenn.—The Chattanooga Railways Company has applied to the City Council for a new franchise which provides for a new track on Georgia Avenue from Ninth Street to Eleventh, with a curve around the Southern Express Building into the east track on Market Street. It also provides for a curve from the east track on Market into Seventh with a single track eastward on Seventh to Georgia Avenue and a curve into the east track near the Calumet Club Building. In exchange for these franchises the company offers to abandon the Hill City line from Ninth and Broad along Broad Street, Eighth Street, Walnut and Sixth Streets as far as the corner of Lookout. At this corner the ordinance provides for connection of the Hill City line with the spur now on Sixth Street. Curves and tracks on Fourth Street westward into Market are to be connected up and used in routing the Hill City cars.

NEW INCORPORATIONS

***Seymour & Brownstown Construction Company, Seymour, Ind.**—This company has been organized to construct an electric railway between Seymour and Brownstown, a distance of 12 miles. Indianapolis and Marion men are interested with local men in the enterprise. The company has asked for right of way through this city. The proposed line will connect with the Indianapolis & Louisville traction lines in this city.

***Electric Underground Trolley Railway, Boston, Mass.**—This company has been incorporated with a capital stock of \$500,000. G. N. G. Holman, Boston, president; C. B. Ayling, treasurer, Malden.

***Electric Short Line Railroad, Minneapolis, Minn.**—This company has been incorporated in Minnesota and it is stated that the purpose is to put in good form the properties of an organization which has been in existence for five years, and that the incorporation has no significance as to any immediate activity of the company in railroad building. Headquarters, Minneapolis. Incorporators: Severen Solverson, president; E. C. Hinde, Sioux Falls, S. D., vice-president; Frank E. Reed, Glencoe, secretary.

Billings & Cooke City Electric Railway, Billings, Mont.—This company has been incorporated in Montana to build and equip an electric railroad which will extend from Billings to Cooke City, passing through Laurel, Park City and possibly Columbus, up the Stillwater Valley, to the mining camp. Headquarters, Billings. Capital stock, \$5,000,000. Those interested in the company are: J. B. Clayberg, Helena; M. E. Estep, Chicago, Ill.; E. M. Hosky, Helena; George E. Savage, Butte; Thomas Harney, Galena, Ill., and A. L. Babcock, B. G. Shorey and Theodore Martin, Billings. [E. R. J., July 25, '08.]

***Interurban Electric Company, Ltd., Toronto, Ont.**—This company has been incorporated to operate electric railways in the municipalities of West Toronto and Toronto. Capital stock, \$400,000. Headquarters, Toronto. Provisional directors: Eli Smith Edmondson, Fred Grundy, Alfred Neville Morine, Mervil McDonald, Charles Herbert Porter, George Deleno Lewis and George Turnbull Turnbull.

Central Texas Traction Company, Corsicana, Tex.—This company has been incorporated under the laws of Delaware to build an electric railway from Corsicana to Palestine, Tex. Capital stock, \$300,000. Incorporators: J. J. Sears, Aledo, Tex.; Dr. J. O. Howard, Houston, Tex.; W. W. Clopton and J. V. Watkins, Corsicana, Tex., and Henry W. Davis. [S. R. J., June 15, '08.]

Wisconsin Electric Railway, Oshkosh, Wis.—This company has been incorporated to hold and purchase property of the Winnebago Traction Company. Incorporators: O. C. Fuller, Fred Best and Russell L. Smith.

TRACK AND ROADWAY

***Lookout Mountain Park Land & Water Company, Los Angeles, Cal.**—It is stated that this company will be incorporated at once to build a scenic railway up Laurel Cañon and along the mountain rim of Lookout Mountain Park. A. B. Salisbury is interested in this project.

Pacific Electric Company, Los Angeles, Cal.—This company expects to build an elevated railroad out of its building to run east between and parallel to Sixth and Seventh Streets from the Huntington Building to Central Avenue.

Oakland-Antioch Railway, Oakland, Cal.—A conference was held recently between officials of the Western Pacific road and A. W. Maltby and Joseph Naphtaly of the projected line from Oakland to Antioch in Contra Costa County to arrange for a traffic arrangement by which the new electric railway may use the tracks of the Western Pacific road from a point near Fruitvale to the new Western Pacific pier. The new road has already been surveyed and it is estimated will be 40 miles in length. The new line is capitalized at \$2,000,000, and this money, it is stated, has already been subscribed. [E. R. J., Aug. 22, '08.]

St. John's Light & Power Company, St. Augustine, Fla.—Manager T. R. Osmond, of this company, is making arrangements to build an extension over the river into New Augustine in the near future.

Atlanta & Carolina Railway, Atlanta, Ga.—Work on the electric railway that this company intends building from here to Augusta, will be begun by the first of next month. The work will commence on Confederate Avenue at the West Point Belt Railway and will extend back to Atlanta. From Atlanta the line will first touch at Lithonia and Conyers, then at Athens, then at Munroe, then at Washington and lastly at Augusta. It will be 220 miles long. [S. R. J., April 18, '08.]

Northern Indiana Railway, South Bend, Ind.—This company is preparing to extend its lines 3 miles north of Elkhart to the west end and south side of Simonton Lake for the purpose of making it a summer and winter resort. After this is accomplished the company will extend its lines to Eagle and Christian lakes, 4 miles north of Simonton Lake.

Illinois Traction System, Champaign, Ill.—General Manager Fischer is quoted as authority for the statement that in two years' time the traction system will be connected with Terre Haute and extended on into Indiana, connecting with Indiana interurban lines.

***Western Illinois Traction Company, Nauvoo, Ill.**—J. A. Bortz writes that this company proposes to start construction work about March 1, 1909, on its standard-gage line which is to connect Nauvoo and East Fort Madison, a distance of 11 miles. The road will be equipped with gasoline motor cars. Capital stock will be \$100,000. The company has not yet been incorporated. R. Anton, Nauvoo, secretary and treasurer, and J. A. Bortz, manager.

Red Oak & Northeastern Railway, Red Oak, Ia.—This company has engaged a corps of engineers to make a survey of the route of the projected interurban railroad to run from Red Oak to Des Moines. The corps of assistants is now being organized and next week the start will be made from Red Oak. The company is considering the use of gasoline motor cars for passenger service and steam for freight service. [E. R. J., Aug. 1, '08.]

St. Tammany & New Orleans Railway & Ferry Company, Covington, La.—H. Clay Riggs states that orders have been placed for the rails and cars, and that the road will be in operation in 90 days. The company has also completed the construction of a number of bridges. Preston Herndon, the chief engineer of the road, is busy just now with a force of men establishing track centers preparatory to beginning the laying of rails.

Bangor (Maine) Railway & Electric Company.—This company has been granted permission by the city to extend its tracks a distance of 1500 ft. out Hammond Street.

Boston & Providence Interurban Electric Railroad, Boston, Mass.—This company has filed a petition with the State Board of Railroad Commissioners asking for the approval of a route through the town of Attleboro. Similar petitions have been filed for every town along the whole route in Massachusetts.

Fitchburg & Leominster Street Railway, Fitchburg, Mass.—The Railroad Commissioners have granted this company permission to relay its tracks in Main Street from Depot Square to the foot of the street. This petition was originally presented to the Board of Aldermen in the shape of an order.

Newton & Boston Street Railway, Newton, Mass.—This company has asked the Massachusetts Railroad Commission

for the right to build an extension of its tracks in the town of Needham, Mass., from the New York, New Haven & Hartford bridge through Chestnut Street to Great Plains Avenue. Junction may be made with the tracks of the Old Colony Street Railway.

Houghton County Traction Company, Houghton, Mich.—This company has contracted with the Stone & Webster Engineering Corporation for the extension of its lines from Wolverine, Mich., to Mohawk, Mich. The contract includes the construction of the track, bridges, overhead work, a car house, a small substation and the purchase of some new cars. The work as planned will cost about \$125,000.

***Great Falls, Mont.**—The preliminary steps toward the organization of a company to construct and operate an electric railway between Great Falls and Chateau have been taken, the principal promoter being Dr. A. F. Longeway, of this city. Others who are interested are principally Great Falls business men. It is estimated that the line will cost between \$15,000 and \$20,000 per mile, and its purpose will be to tap the Sun River irrigation project and the adjoining irrigated lands. The people of Chateau have agreed to raise a bonus of \$150,000 to help. The promoters have secured a franchise from the county permitting them to use the county roads.

Omaha, Neb.—It is reported that a company is being organized to build an interurban electric railway from the city limits of South Omaha at Q Street west to Ralston. The company is now said to be ready for incorporation, with these directors: Mel Uhl, C. M. Wilhelm, Frank J. Moriarity, J. Emmert, N. P. Dodge, Jr., F. A. Howard and W. Crist. The company has given a bond to Shimer & Chase, holders of the franchise, that it will at once proceed to the building of the railway and have it completed within a specified time. The line will be about 4 miles in length. [E. R. J., July 11, '08.]

Buffalo Southern Railway, Gardenville, N. Y.—This company proposes to build a 5-mile extension from the Union road in the towns of Cheektowaga and West Seneca to the city line of Buffalo. The company will also build a line from the junction of the Buffalo and Aurora plank road and Union road, in West Seneca, to East Aurora, a distance of 11½ miles. Wm. H. Cummings, president.

Richmond Light & Railroad Company, New Brighton, N. Y.—Following conferences between members of the Public Service Commission and Superintendent T. J. Mullen, of this company, the tracks of the Castleton Avenue & Brighton Heights line are to be extended to meet the main line running to Port Richmond.

***Riverhead, N. Y.**—Harry B. Howell, of Riverhead, and G. Frank Tuthill, of Greenport, are said to be interested in a plan to have an electric railway built between the county seat and Orient Point, with feeders from South Jamesport, New Suffolk and other towns off the main highway.

Massillon, Wooster & Mansfield Traction Company, Cleveland, Ohio.—G. A. Bartholomew writes that this company is engaged in building an electric railway from Mansfield to Massillon via Wooster, with branches to Ashland, Turkey Foot Lake and Barberton. It will connect 18 cities and towns and will have 79 miles of track and will be equipped to handle passengers, express and freight. The company has finished a considerable amount of grading. Capital stock, \$1,000,000. Headquarters: 1433 Williamson Building, Cleveland, Ohio. Officers: G. A. Bartholomew, president and general manager, Cleveland; J. W. Buchanan, vice-president, Smithville, Ohio; R. I. Guthman, secretary, Youngstown; H. G. Bye, treasurer, Youngstown. [S. R. J., Aug. 24, '07.]

Portland (Ore.) Railway, Light & Power Company.—It is announced that this company will substitute single tracks for double wherever possible. The company is now preparing to tear up the double tracks on Fifth Street south from Jefferson and lay a single track south on that thoroughfare and west on Sherman Street to Sixth Street; thence north on Sixth Street back to Jefferson Street. The company will also lay a single track out Broadway as far east as East Twenty-fourth Street and back on Knott Street to East Twenty-second Street. Permission has been granted the company to lay tracks connecting with its main line to the Country Club in order to handle the traffic incidental to the fair to be held soon.

Bloomsburg & Millville Street Railway, Bloomsburg, Pa.—Work will be started at once on the construction of a line to connect Bloomsburg and Millville, Pa., a contract having been awarded to Lawrence & Company, of Chicago. The road is to be in operation by the middle of November. C. W. Miller, president.

York (Pa.) Railways.—It is said that this company in-

tends to begin the building of its line over Broad and Wallace Streets and through Windsor Park in a few days.

***West Chester, Uxchland & Pottstown Street Railway, West Chester, Pa.**—Charles F. Goldstrohm, of Pittsburg, Pa., has been awarded the contract to build this electric railway, which is to connect West Chester and Pottstown. The road is to be completed within two years. Construction work will be started Oct. 1. Officers: C. W. Talbot, president; H. A. Feters, vice-president, and Horace A. Feters, treasurer. Headquarters, West Chester.

Montreal Park & Island Railway, Montreal, Que.—This company, which is operated by the Montreal Street Railway, has recently completed and put into operation a 2-mile extension through the town of Notre Dame de Grace.

Chattanooga, Tenn.—It is reported that an application for a charter will be filed in a few days for a company which proposes to construct a line from Chattanooga to Fairmount, a distance of about 10 miles. As soon as the Walden's Ridge line is put in operation it is proposed to build a line to Chickamauga Park, and then run a line to all principal points throughout the park. D. J. Duncan, of Chattanooga, is the promoter.

Ogden (Utah) Rapid Transit Company.—It is stated that this company expects to begin within the next few weeks the construction of its Ogden canyon line. This extension will necessitate building several bridges and a great amount of stone work will be required.

Seattle (Wash.) Electric Company.—During the past 30 days this company has let the following paving work: Paving of the University line on Eastlake Avenue as follows: 3700 lin. ft. of double-track brick construction; 4850 lin. ft. of double-track asphalt and brick toothing construction. Paving of the Nineteenth Avenue line on Nineteenth Avenue and Nineteenth Avenue north as follows: 5900 lin. ft. of double-track asphalt and brick toothing construction. Paving of the Kinnear Park line in the West Roy Street et al. paving district as follows: 800 lin. ft. double-track sandstone construction; 1400 lin. ft. double-track asphalt and brick toothing construction. Paving of the Madrona Park line on Twenty-first Street as follows: 750 lin. ft. of double-track asphalt and brick toothing construction. The paving of Eastlake Avenue and the West Roy Street et al., paving was let to F. McLellan & Company, Seattle, Wash. The Twenty-first Avenue and the Nineteenth Avenue paving was let to P. J. McHugh, Seattle, Wash. George P. James, chief engineer.

Morgantown & Dunkard Valley Traction Company, Morgantown, W. Va.—It is reported that this company will build a line 5 miles long from Morgantown to Wadestown. Amri Martin is superintendent of construction.

POWER HOUSES AND SUBSTATIONS

British Columbia Electric Railway, Vancouver, B. C.—This company has been awarded the contract for the diking of the Fraser River and the drainage of the Sumas Prairie and Sumas Lake flooded districts. The Hill Brothers Engineering Company, of Seattle, Wash., has charge of all engineering work on the project.

Winnipeg (Man.) Electric Railway.—This company has a large force of men at work enlarging the channel at Lac du Bonnet to increase the water power of its electrical development plant. This power is used to operate the company's cars and also supply Winnipeg with light and power.

Elkins (W. Va.) Electric Railway.—The power station of this company, it is announced, will be built by Oct. 1, at Roaring Creek Junction, by which time it is stated cars will be running. President J. C. McSpadden states that the line will be completed to Harding this fall.

Milwaukee, Wis.—E. P. Sherry, Wells Building, Milwaukee, is interested in the development of the 4000-hp water development plan in northern Wisconsin. He is anxious to get in touch with any manufacturers or current consumers desirous of considering the purchase of this power.

SHOPS AND BUILDINGS

Washington (D. C.) Railway & Electric Company.—This company has purchased four acres of unimproved land on the west side of the Georgetown and Rockville tracks, about 200 yd. south of the District line, on which it proposes to erect a new car house to replace its old barn on the right side of the line a short distance above Georgetown.

Oregon Electric Railway, Portland, Ore.—This company has completed a new depot at the corner of High and Mill streets, Salem, Ore. The dimensions of the building are 60 ft. x 30 ft., with a platform on the north side 8 ft. x 60 ft., and a second platform on the west side 38 ft. x 30 ft. The interior consists of a baggage room, waiting room, ticket office and freight room.

Manufactures & Supplies

ROLLING STOCK

Pacific Traction Company, Tacoma, Wash., is reported to be in the market for one double-truck car.

Chicago, Lake Shore & South Bend Railway, South Bend, Ind., has placed an order with the J. G. Brill Company for 10 double-truck cars.

Rio de Janeiro Tramway, Light & Power Company has purchased from the United Electric Car Company, of Preston, England, 50 new cars to be delivered in September and October. Fifty additional cars are being built for the same company in Rio de Janeiro.

Indiana Union Traction Company, Anderson, Ind., has recently turned out of its Central shops an electric locomotive which will be used in moving steam railroad cars of coal and other heavy loads about the power station and the repair shops. The locomotive is equipped with automatic brakes, M.C.B. couplers, double pneumatic sanders, locomotive bell, double headlights, pantagraph trolley and all the devices for switching purposes. The dimensions of the locomotive are: Length over all, 30 ft.; width, 7½ ft.; height, 12 ft.; length of wheel base, 24 ft.; weight of drivers, 80,000 lb.; electric horse-power applied to drivers, 800.

Ottumwa (Ia.) Railway & Light Company has placed an order for three semi-convertible cars with the American Car Company for Oct. 1 delivery. Details of the cars follow:

Seating capacity.....	32	Width inside.....	7 ft. 9½ in.
Weight	13,000 lb.	Over all	8 ft. 2 in.
Wheel base.....	8 ft.	Body, wood or metal..	Wood
Length of body.....		Underframe, wood or	
Over vestibule.....	20 ft. 8 in.	metal	Both
Length over all.....	30 ft. 8 in.		

Special Equipment

Air brakes	None	Gongs,	
Axles	None	American Car Company	
Brake rigging	Hand	Hand brakes,	
Brakeshoes	Regular	American Car Company	
Car trimmings,		Heating system,	
American Car Company		Consolidated	
Couplers,		Headlights	Stationary
American Car Company		Interior finish.....	Cherry
Curtain fixtures,		Motors, type and number,	
American Car Company		2, General Electric,	54
Curtain material,		Paint.....	Green and yellow
American Car Company		Sanders	Brill
Destination signs....	Hunter	Seats	Brill, cross
Dust guards,		Steps.....	Safety tread
American Car Company		Trolley poles and attach-	
Fenders,		ments	12 ft. 6 in.
American Car Company		Trucks, type and make,	
Gears and pinions,		Brill,	21-E
General Electric Company		Varnish	Murphy

TRADE NOTES

Winnipeg Electric Railway has adopted the Jenkins protruding fender for its cars in this city.

Hayes Track Appliance Company, Geneva, N. Y., has established a factory at Hamilton, Ont., to supply the demand in Canada for Hayes derails.

Railway Equipment Company, Portland, Ore., has moved its offices from the Chamber of Commerce Building to 72 and 74 First Street, where it will carry a larger and more complete line of railroad supplies. Although in business only four years, this firm's trade extends throughout the entire Pacific Coast country, and with its additional facilities the company expects to add many new lines, and to this end would be glad to receive catalogs from manufacturers wishing to extend their trade to the Pacific.

Will M. Dixon, with the electrical department, Pan American Exposition, Buffalo, N. Y.; electrical engineer, Louisiana Purchase Exposition, St. Louis, Mo.; chief department of electricity, Jamestown Ter-Centennial Exposition, Norfolk, Va., and Howard F. Smith, with the New York Heat, Light & Power Company, New York; mechanical engineer, Louisiana Purchase Exposition, St. Louis, Mo.; associated with H. H. Humphrey, consulting engineer, St. Louis, Mo., announce that they will conduct a general engineering business under the firm name of Dixon & Smith, engineers, 818-19-20 Wright Building, St. Louis, Mo.

J. Frank Case, assistant secretary of the Norfolk & Southern Railway, resigned from that office on Aug. 1 to accept a position in the railroad sales department of the National Paint Works, of Williamsport, Pa. He will make his headquarters at their main sales office, 100 William Street, New York. In addition to his work as assistant secretary of the Norfolk & Southern, Mr. Case was also

private secretary to President Frank S. Gannon, where his duties were of a general nature in connection with all departments. Prior to his connection with the Norfolk & Southern, he was in the service of various other railroads.

Wisconsin Engine Company, Corliss, Wis., announces that it is engaged in the manufacture of gas engines for all purposes in addition to high duty Corliss engines and pumping engines and that Chas. E. Sargent, the inventor of the horizontal tandem double-acting gas engine, is connected with the company. The Wisconsin Engine Company controls Mr. Sargent's patents on internal combustion engines, in reference to which the Franklin Institute, Philadelphia, has awarded him the John Scott medal. The company says that the engines have been built in several sizes and have been in successful operation from one to four years and are by no means experimental.

American Safety Tread Company, Boston, Mass., reports that the United Railways, St. Louis, has placed in one of its cars for trial purposes a solid floor made of Karbolith supplied by the American Safety Tread Company. On top of the usual $\frac{7}{8}$ -in. yellow pine floor poultry netting was spread to serve as reinforcement for the flooring and the mixture of Karbolith, which is placed like cement, was then laid on to a depth of 1 in. At the sides of the car the Karbolith was brought up about 3 in. with round fillets at the corners about 3 in. high. These fillets assist materially in preventing the collection of dust in corners where it cannot conveniently be reached by the cleaners. The solid floor covering is sloped from both sides and ends toward the center of the car where a drain is provided. The seat pedestals are placed in the ordinary way, the screws being driven through the solid floor to the yellow pine below. It is stated that the cost for such a floor in a car body 34 ft. long and 9 ft. wide is about \$50. The United Railways has had the car in which this floor is laid in use for about six months on one of the busiest lines and reports that the results have been very satisfactory.

Stuart-Howland Company, Boston, Mass.—This company has recently leased new quarters for its business and is preparing to move. The company will still be located at Winthrop Square on Devonshire Street in the same building as formerly, but the new quarters are much larger and more convenient than the old. The entire basement and the first floor have been leased, comprising a floor area of 24,000 sq. ft. The basement is light and high, making an excellent storeroom for heavy equipment and supplies, and is being fitted up with aisles and tiers of shelves, systematically arranged so that an order can be filled and sent up the elevator for shipment at a moment's notice. The first floor is being fitted up for general offices of the executive officers and salesforce of the company and the main store, where a large stock of general electrical supplies will be conveniently arranged for sale over the counters. When this company was organized about 10 years ago by G. M. Stuart, its present executive head, a small store was leased on Devonshire Street in the same building where the new quarters are located. Three years after the company started the business had outgrown its quarters and half of the building facing Winthrop Square was leased. At the present time this is found inadequate, so that the company has been compelled to seek larger and better quarters to accommodate its increasing business.

ADVERTISING LITERATURE

Westinghouse Air Brake Company, Pittsburg, Pa.—This company has issued instruction pamphlet 5034 on the type L triple valve.

Allis-Chalmers Company, Milwaukee, Wis.—This company has issued as a supplement to its instruction Book 5007 pamphlets giving the supply parts of Potential Starter Type A1, Potential Starter Type C1, Potential Starter Type A2, Potential Starter Type B1.

Niles-Bement-Pond Company, New York, has just issued a very fine publication on boring and turning mills, ranging from 30 in. to 30 ft., and extension boring and turning mills from 10 ft. to 24 ft. The illustrations are of the highest character and are accompanied by detail descriptions and dimensions.

Rockwell Furnace Company, New York, is distributing two new catalogs, one on "Portable Heaters" and the other on "Melting Furnaces." The portable heaters made by this company include one especially designed for electric railway work, as mentioned on page 517 of the *ELECTRIC RAILWAY JOURNAL* for Aug. 22. It would be well, however, to have this catalog in addition to get a better idea of the adaptability of this heater for other purposes than that shown in the article. The publication on melting furnaces should also prove of interest to those railways which now have a foundry or are contemplating the installation of one in a convenient manner.

Templeton, Kenly & Company, Ltd., Chicago, Ill.—This company has issued a very attractive booklet which has for its subject its Simplex Car Track Jacks. Different types of jacks are shown in detail together with their mechanism. The capacity of the lift, height, weight, the number of pieces and the list price of each jack is given. The pamphlet is concluded with the quotation "Machines, like men, can be judged by what they accomplish." The company states that on request its jacks will be shipped, freight prepaid, to any railroad official or reputable concern for 30 days' use. Those securing the jacks for trial, however, will be made responsible for their loss or damage.

Machinenfabrik Augsburg-Nürnberg, Nürnberg, Germany, has published a very interesting catalog on its wide line of manufactures which include boilers, superheaters, automatic stokers, steam engines, steam turbines, producer plants, gas engines, water turbines, hydraulic plants, testing machines, hoisting and conveying plants, rolling stock and bridges. The book is liberally illustrated and has all its text in English. In addition to this part of the catalog a brief history of the company and its position in Bavarian industries are presented, as well as a description of the shops and employees' welfare work. The latter includes the construction of homes for the men.

Atlas Portland Cement Company, New York, has published a 250-page book entitled "Reinforced Concrete in Factory Construction." This work is really out of the ordinary for a catalog and in fact it is more like a treatise on the subject. The different advantages of concrete construction are discussed thoroughly and mention is made of the most desirable methods of constructing the various parts of a building, such as foundations, walls, roof and floors. The greater part of the book is given up to descriptions of certain reinforced concrete buildings accompanied by drawings and half-tones. The buildings mentioned embrace a wide variety of uses, making the book of value to all those interested in the general subject of reinforced concrete structure.

Joseph Dixon Crucible Company, Jersey City, N. J.—An attractive little booklet of envelope size entitled "Dixon's Ticonderoga Flake Graphite" has been issued by this company. It is printed in two colors, black and red, and this color scheme is carried out on the cover by using a black cover stock and red ink for printing the cover design which shows a title in the form of a seal. The contents is arranged page for page, each page dealing with some particular phase of the graphite subject. At the bottom of the page is given "third party's" testimony, bearing whenever possible on the particular phase treated on that page. The booklet is not lengthy, but some interesting and valuable information is given. A copy of it may be secured by writing direct to the Dixon Crucible Company.

General Electric Company, Schenectady, N. Y.—This company has issued two bulletins describing its improved automatic voltage regulators for the automatic regulation of the voltage of alternating-current and direct-current generators. They are made in various styles for the regulation of the voltage of one generator or of two or more generators in parallel. Bulletins Nos. 4601 and 4602 describe the regulators for alternating and direct current generators, respectively, and contain diagrams showing the various connections and arrangements of the different styles of regulators. A small instrument known as a lamp-testing watt indicator has just been placed on the market by the General Electric Company, Schenectady, N. Y., and is described in Bulletin No. 4609. It was designed to give a practical demonstration of the relative watt consumption of metallic and carbon filament lamps and is intended for use with Edison base lamps, but can be provided with an adapter permitting its use with either Thomson-Houston or Westinghouse socket or lamp base. The instrument is of the portable type and can be carried in the pocket.

ELECTRIC RAILWAY PATENTS

[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 41 Park Row, New York.]

UNITED STATES PATENTS ISSUED AUGUST 11, 1908

Railway Tie, 805,413; Daniel W. Bates, Hillsdale, Mich. App. filed March 13, 1908. A hollow metallic tie of heavy sheet metal reinforced at points where it receives the weight of the rails.

Pleasure Railway, 895,427; Frederick A. Church, Chicago, Ill. App. filed Dec. 27, 1907. A railway track having a spiral course and means movable over said course to advance cars around the same from the center outwardly with accelerating speed.

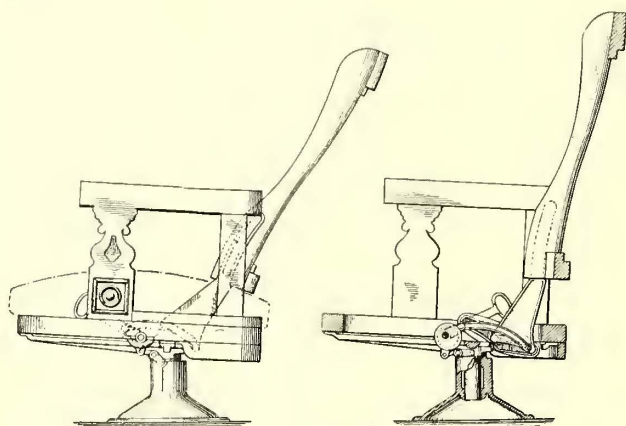
Pleasure Railway Car, 895,428; Frederick A. Church, Chicago, Ill. App. filed Jan. 2, 1908. The car is so constructed

as to adjust itself to curves in the track. The floor frame of the car is made in front and rear sections in contact with each other and united by a longitudinal pivot bolt, the sections having independent trucks.

Vehicle Speed Signal, 895,434; George L. Cooper, Troy, N. Y. App. filed Feb. 20, 1908. A visual signal for cars operating to indicate the actual rate of movement of a car or train, whether under power or carried forward by inertia or gravity.

Seat, 895,453; Henry S. Hale and John B. Kilburn, Philadelphia, Pa. App. filed Sept. 19, 1906. Details of construction of a "walkover" car seat.

Electric Car Recording Block Signal, 895,575; William J. Murray, Leavenworth, Kan. App. filed April 16, 1907. Adapted for use with single-track trolley roads designed to indicate the entrance of a car into a block to cars approaching from the opposite end. Means whereby subsequent cars entering the block behind an advancing car will not effect the signal unless the preceding car has first passed out of the block and restored the signal to normal condition.



Pat. No. 895,453—Car Seat

Rail Bond for Electric Railways, 895,582; William E. Oakley, Millbury, Mass. App. filed Dec. 2, 1904. Comprises a connector and a pair of terminals, welded to said connector, and composed of an alloy, formed before said welding, comprising a metal having a temperature coefficient substantially the same as that of the rail, and a metal having a low electrical resistance.

Electric Signal for Railways, 895,589; John Sherman Sims, Longbeach, Cal. App. filed Sept. 25, 1907. Has sectionally electrified track rails energized by direct current and including specially constructed relays in their circuits, designed to control lamps and semaphore signals.

Railway Car, 895,686; Myron Rounds, Boston, Mass. App. filed March 19, 1906. A semi-convertible car providing for an increased opening in the sides of the car body, whereby the car may more nearly approximate the appearance and advantages of an open car in the summer months.

Railway Tie, 895,687; John Rozine and Charles W. Guthrie, Sheridan, Wyo. App. filed July 11, 1907. A hollow metallic shell constructed of a single sheet of sheet metal having blocks of wood therein to which the rails are secured. The shell is so folded and the meeting edges so secured together as to permit a limited movement of the edges toward and from each other in order to provide resiliency.

Means for Supplying and Controlling Electric Current to Motor Vehicles, 895,785; Alexander Palmros, Columbus, Ohio. App. filed Sept. 12, 1906. A controller for mine locomotives having a slider moving over contacts and impelled by a solenoid.

Metallic Railway Tie, 895,799; Frederick Schell, Milton, Pa. App. filed May 7, 1908. Details of construction of a sheet metal tie.

Trolley, 895,806; Frank L. Sessions, Columbus, Ohio. App. filed May 24, 1904. A current collector for electric locomotives comprising a long cylindrical roller impelled by a bail-shaped harp, in place of the usual grooved roller.

Contact Device, 895,811; Samuel B. Stewart, Schenectady, N. Y. App. filed March 1, 1904. A construction of current collector for electric locomotives having a rod displaced vertically by a parallel link motion supporting a cylindrical roller.

Sand Box for Cars, 895,828; Walter S. Adams, Philadelphia, Pa. App. filed Nov. 8, 1907. Has a hopper, a casing

and a gate, said gate having a bottom entirely below the hopper when in its normal position and provided with laterally extending flanges beyond the lower edges of the hopper and ridges on said flanges.

Electric Brake, 895,830; Edward H. Anderson, Schenectady, N. Y. App. filed July 23, 1901. Provides a form of motor directly connected to the usual brake spindle and adapted to operate conjointly with the actuation of the usual handle.

Trolley, 895,864; Albert S. Janin, New York, N. Y. App. filed Dec. 12, 1906. A parallel motion for the current collectors of electric locomotives designed to provide a fender for the gearing and joints of the frame.

Fare Register, 895,880; John O. Morris, Washington, D. C. App. filed Nov. 12, 1907. Means whereby after a number of fares have been rung up a sign ticket will be displayed by the operation of ringing up the last fare, which sign or ticket will entitle the passenger whose fare has just been rung up to an award of some character, such as a ticket or a free pass on the road. The object of this is to direct the attention of the passengers constantly to the register and thus prevent fraud on the part of the conductor.

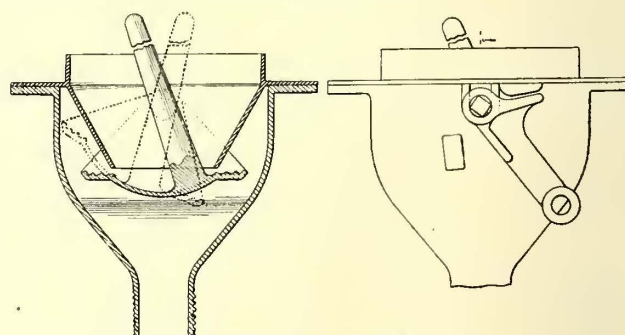
Metallic Railway Tie and Rail Fastening, 895,908; John A. Stoops, Chicora, Pa. App. filed April 14, 1908. The tie is composed of two hollow pipe sections or members which are separated from each other between the track rails, but whose end portions extending underneath and outside of the track rails are abutted and secured to each other.

Rail Bond, 895,928; Montraville M. Wood, Chicago, Ill. App. filed Sept. 9, 1901. A rail bond designed to be expanded into a hollowed out portion in the rail web by the use of a tapered pin.

Device for Handling Amusement Cars, 895,946; Achille F. Biavati, Freeport, N. Y. App. filed April 13, 1908. Details of construction of an elevator for lifting a car from one level to another, so as to bring the support of the car into registry with a railroad track, then tilting the supporting mechanism so as to cause the car to glide downward along the track.

Machine for Tamping Railroad Ties, 895,964; Kostanty Chrusczyk, New Castle, Pa. App. filed March 27, 1908. A machine for tamping ties comprising a rocking means carrying a series of bars or fingers on each side of the same for tamping the ties.

Railway Signal, 895,983; Hoyt A. Dillon, Council Bluffs, Iowa. App. filed Aug. 19, 1907. Details of a semaphore actuating apparatus making use of an arm which drops by an electromagnet trip and which is raised by an electric motor or by an operating cord or chain.



Pat. No. 895,828—Sand Box for Cars

Trolley Support, 895,993; Hiram G. Farr, Melrose Highlands, Mass. App. filed Oct. 22, 1907. The trolley wheel is made hollow and is filled with absorbent material containing lubricant. The spindle is also hollow and contains a similar supply of lubricant.

Rail Joint, 896,040; William Oppelt, Juniata, Pa. App. filed Aug. 11, 1908. The abutting ends of the rails have their webs cut away and a block is inserted. The fish plates are provided with a chair adapted to underlie the meeting ends of the rails and a clamp connects the chairs of the fish plates.

Brake, 896,063; William C. Marsh, Dunkirk, N. Y. App. filed Nov. 29, 1907. Consists in the combination with a brake of a toggle system connecting to said brake and means driven from the car for moving the toggle system to operate the brake.

Electric Railway, 896,071; John A. Garey, Mound City, Mo. App. filed Aug. 12, 1907. A form of plow and conduit structure by which the third-rail is received in a spring-closed conduit which is automatically closed there behind.