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## The Tendency Toward Steel Cars

A remarkable feature of electric railway practice at the present time is the diversity of car designs found, not only in different parts of the country, but in different parts of the same system. No one can tell how long it will be before more uniform standards become common. It is surprising that the comparatively straightforward proposition of carrying people from point to point in city, suburban or interurban service should exhibit such wide variations in rolling stock. The peculiar tastes of the public in different cities and the dissimilarity of the climate in one place as compared with another doubtless account for a considerable part of the difference in detailed design. Another reason is the fact that the development of the car is undoubtedly not yet complete and that during this evolution a variety of types is being produced from which the best forms for different kinds of service will result. This condition is particularly true with cars for city "rapid transit" or elevated and subway service, but holds broadly true for all classes of cars.

There is one particular in which practice in car building is becoming more and more uniform, and that is with respect to fire risk prevention. No progressive electric railway manager would now consider buying other than fireproof cars for operation in a subway or tunnel system, and the tendency to install wiring in armored conduit is spreading even to surface cars. Steel underframe cars have been improved upon to the extent of building cars almost entirely of steel, with absolutely no inflammable contents except the cushions or rattan seats, the grab handles and straps. These all-steel cars have so far been operated mainly in tunnel or subway service, though a few have found their way into heavy suburban traffic. Of greater importance in interurban service on single track than their incombustibility will be the collision-proof qualities of the steel car. We may find that the steel car is to conquer the field of high-grade interurban service sooner or later, just as it is about to take possession of the urban subway and tunnel line. The steam railroads are fast awakening to the value of the steel car, and electric roads will not be behind in appreciation of it.

## Routeing Cars for Night Service

The operation of cars during the small hours of the night is a necessity upon every street railway system occupying urban territory, costly though such service is in comparison with the expense of handling day traffic. The demand for night service grows more insistent with the increasing complexity of modern civilization, and as cities become larger the class of night workers constantly broadens in occupations and numbers. Transportation between home and place of business is quite as essential in the case of this class of patrons as with the larger number of day riders.

The conditions which determine the routeing of night cars are, however, decidedly different from those which bear upon the running of cars in the daytime.

Although the local conditions in every large city vary as to the character of night service needed, it is generally the case that travel is in the main between down-town and residence districts during the night hours. In the daytime there is a large volume of traffic between different points in the business district, or between different suburbs, quite apart from the great ebb and flow of the rush hours between home and office. It is safe to say that the bulk of the night travel is for purely business reasons, though in the very largest cities belated pleasure seekers are frequently found on the cars without definite homeward or office-bound aims. In laying out a night service, therefore, it is safe to count on the fundamental fact that the great majority of night travelers, say between 1 and 5 a. m., are en route between their homes and their places of business. Newspaper men, actors, police officers, telegraph operators, writers, janitors, employees of hotels, markets, restaurants and power plant operators, railroad men and teamsters—in short, all those employees who are concerned with the production of twenty-four-hour public service of one kind or another, have to be considered in establishing night car routes. To lay out such service properly a company should have a pretty definite idea as to the number and location of business establishments which are open all night, and the character of the residence districts with respect to nocturnal labor.

The fitting of car routes to the needs of night traffic generally results in longer and less direct runs in cities where routeing is not held to hard and fast lines of geographical limitations. Desirable as it is for the night patron to be able to make quick and direct journeys between points, it is such a costly service to operate that a company may well run its cars somewhat circuitously if a broader territory can thereby be served with a given number of cars and crews. Usually a suburban resident is so glad to be given night service between the city and his home that the routeing is far less important to him than it is in the daytime. There are plenty of instances, of course, where direct runs can be made to advantage over the regular lines operated in the daytime, but there need not be much hesitation in diverting the cars when necessary.

It is doubtless a fact that the existence of night service tends to build up residential districts and increase their day travel. The cost of operating night cars should be compensated for in this way, even though it probably will not pay to run them on the basis of night receipts except in very large systems. In some cases it is an advantage to terminate all the night car routes at a common point in the business district. Transfers can then be easily made between all the important points on the system, and even on hourly intervals the waits for cars will frequently be short.

## Liability for Overcrowded Stations

A singular decision was handed down by the Supreme Court of Massachusetts a few days ago in connection with a damage suit against the Boston & Northern Street Railway Company. The plaintiff was a woman who was injured in attempting to board a car in one of the subway stations in Boston by being thrown down by a pushing and jostling crowd. The Court held the company responsible to the extent of $2,000, and charged it with the duty of protecting passengers at stations from injury in consequence of jostling and struggling of other passengers attempting to board cars or trains.

It is certainly going to be a difficult proposition to operate a modern city system of trolley cars successfully if companies are to be held financially responsible for the behavior of both actual and prospective passengers under conditions like the above. The vagaries of human nature cannot thus be capitalized in fairness to the company which is straining every nerve to handle the traffic which pours in upon it during the rush hours of the morning and afternoon. Every practical street railway man knows that it is a physical impossibility to move the business offered in the rush hours fast enough to avoid congestion, unless every condition upon the streets is favorable. The desire of everybody to go home or down town practically at once is the old trouble at the bottom of congested conditions, and a street railway company can control this no more than it can alter the temperature of the polar regions.

The efforts which are made in the principal stations on both the New York and Boston subways to handle the traffic in safety are evident upon the most casual inspection at the Grand Central or Brooklyn Bridge stations of the former or the Park Street station of the latter. Platform men are at work all through the rush hours to prevent persons from being injured in boarding and leaving cars; conductors and motormen are careful not to open vestibule doors until the cars have come to a full stop, and trains do not start until a signal announces the closing of all doors. In Boston a further device is used which the New York conditions render unnecessary. At the Park Street station two illuminated bulletin boards above the platform of maximum traffic are operated to give about a minute's warning of the arrival of cars for specific destinations at numbered berths, so that congestion may be decreased as much as possible.

Overcrowding at stations is, of course, aggravated by anything which interrupts the regular movement of cars. The rush hour stream must be continuously carried away. Accidents to equipment will occur on the best managed roads at times, and blockades due to teams and other causes of street congestion beyond a company's control are certain to increase the discomfort of the traveling public on station platforms as well as among passengers on board the cars. The remedy for overcrowding lies with the public itself in the vast majority of cases. The practice of the ordinary decencies of personal restraint, patience and courtesy on the part of the patrons of the modern urban system will do more to ameliorate the dangers of overcrowding than fines enough upon the operating street railways to swell the surplus of the Bank of England. By and by street railways will be mulcted damages in proportion to the microbes brought into their cars by the great unwashed! The public itself should have been forced to compensate the accidental victim of its own act in the case cited.

## Hydraulic Progress in Transmission Plants

The improvement of the mechanical equipment of engineering has been one of the most interesting results of electrical development. Progress in steam and gas engine building during the past few years has been largely stimulated by the exacting requirements of the electric power situation, and with the development of hydraulic transmission plants has come a remarkable improvement in the design of water wheels, pipe lines and penstocks, which would scarcely have been attained without the incentive of electric power utilization in lighting, railway and motor service.

Significant hydraulic progress is outlined in a paper of Messrs. F. S. Pearson and F. O. Blackwell upon the Necaxa plant of the Mexican Light & Power Company, presented before the American Society of Civil Engineers on Jan. 2. The increase of drainage area by the diversion of neighboring streams into the general power basin which serves the plant marks a bold adaptation of means to ends which is typical of modern engineering projects, and the utilization of the entire run-off of the streams during any year will doubtless go a long way toward insuring absolutely continuous service. The use of pipes with flanges forged from a single piece of sheet steel and their connection by clamping rings results in a stronger and more reliable form of pipe than one built up of plates riveted together, and the smooth interior will materially reduce the loss of head due to friction, especially at the higher velocities occurring at times of overload.

In the Necaxa plant there are six impulse wheels, each rated at 7000 hp, with a maximum capacity of 9000 hp, operating under an effective head of about 1300 ft. Large impulse wheels have been previously built with horizontal shafts and single deflecting nozzles, but in this installation each wheel has two 4½-in. square regulating nozzles fixed on opposite sides of the wheel but joined together so that they are opened and closed simultaneously; and a vertical shaft 14 ins. in diameter and flanged at the bottom to take the water-wheel disc, carries the revolving parts of both the generator and water wheel. The weight is supported by a thrust bearing under which oil is forced at a pressure of 150 lbs. per sq. in. This construction has many advantages. The double nozzle reduces the size of both the jet and the bucket and permits the use of a water wheel of smaller diameter and higher speed of rotation without loss in efficiency. The mechanism is more easily operated than a deflecting nozzle, and as the two nozzles are set in opposition to each other there is no thrust on the steady bearings, and all the parts can be made smaller than would be the case for a horizontal shaft unit for this head and capacity. The authors state that under actual running conditions the speed regulation is very close, practically no water being wasted except when the circuit breakers throw the full load off the plant instantly. These improvements in the prime movers were also supplemented by the use of exciter sets taking power from the main units, for the reason that with small wheels the nozzles give trouble by getting obstructed by materials floating in the water. Each year that passes brings a closer control and wider knowledge of high-pressure hydraulics in relation to electric transmissions, and every step in advance is a cause for congratulation by all users of hydro-electric power.

## Trestle Preservation

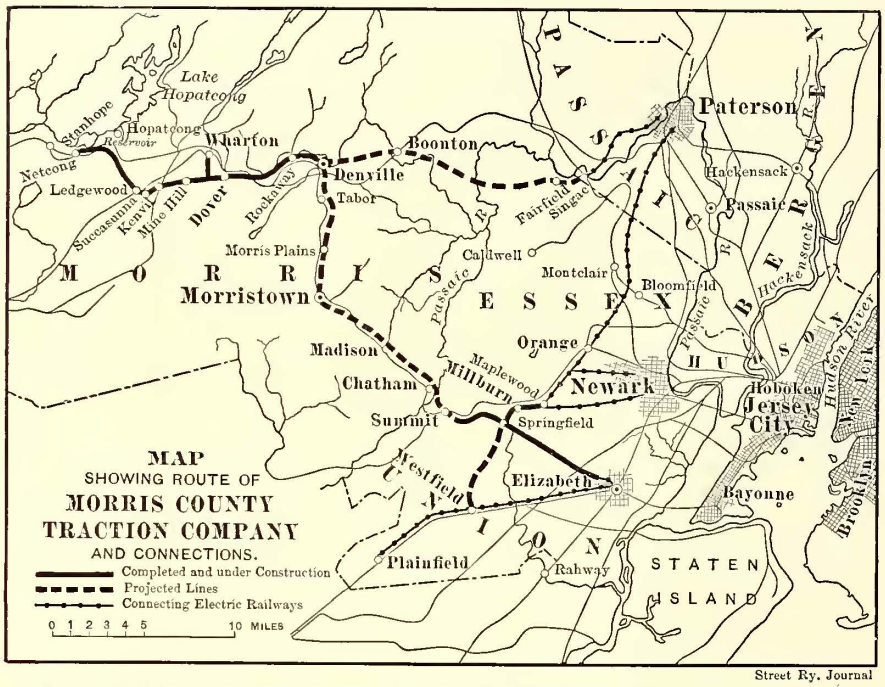
The importance of preserving the life of timber when used in large quantities in railway structures is coming to be widely recognized by transportation companies, and although the average electric road uses a comparatively small amount of this material as contrasted with the larger steam systems, the subject is worth bearing in mind in these times of close operating economy. At the recent convention in Boston of the Association of Railway Bridge and Building Superintendents the subject of trestle preservation was discussed at some length, and the application of the points brought out to electric railway trestles is certainly worth making.

Trestles on electric roads are fortunately not exposed to anything like the serious fire hazard which obtains on steam railways, thanks to the difference in motive power. At the same time we believe it is the part of wisdom to equip every long trestle with at least one water barrel or its equivalent, for the reason that a serious fire on a car, or possibly a broken trolley or high-tension wire might cause the destruction of the trestle in addition to the other damage done, even though there is no cinder problem to deal with. The cost of doing this is nominal, and if the barrel is kept filled with a saline solution in the winter season, with a pail handy, the protection will certainly be adequate in the majority of cases. Where a special hazard exists, as in the case of a wooden trestle located near enough to a steam railroad line to be in danger of being struck by locomotive sparks, it may pay to cover the tops and sides of the ties and stringers with sheet iron on the exposed surfaces nearest the railroad. The gist of the whole matter is that this kind of protection costs so little that the serious expense of interrupted service should never be incurred through the lack of a little foresight. In these extra hazardous locations it is a good plan for the track department to keep weeds and all inflammable rubbish at least five or six feet away from the trestle bents, and to remove all bark, dry shavings and slivers once or twice a month on inspection trips, if any such refuse be found. Red cedar trestles are particularly liable to ignite under favorable conditions, and should be watched with extra care.

As for the application of chemical preservatives, it is too early to determine the best method of procedure in any general way. Creosoted ties and stringers are finding much favor in some localities, while the use of special paints is practiced in other quarters with success. As far as we are aware electric railways have done little as yet in the preservation of timber, but the increasing scarcity of this material and the steady tendency of its price to advance will certainly lead to protective measures in time. The cost of creosoting may be perhaps 50 per cent or 75 per cent in addition to the cost of the timber, but the indications are that the life is greatly extended, especially where the timber comes in contact with earth or other timber in such a way as to be liable to cause decay. Doubtless it does not pay at present to attempt specially to preserve or protect a trestle only a few feet in length, but the matter is worth looking into in the case of trestles, say from 50 ft. upward. It costs little to experiment with timber preservatives, and experience in this direction would be of general interest if made public.

## THE MORRIS COUNTY TRACTION COMPANY'S INTER-SUBURBAN SYSTEM IN NEW JERSEY

There is now under construction in the northern and eastern portions of New Jersey contiguous to New York City an electric railway system rather novel in scope but nevertheless well adapted for the proper development of the territory it will serve. It is natural that at first the railways of a metropolitan district should be of distinctly radial character with the business center forming the origin of all the lines running to the suburban towns; but as the latter grow in importance the demand for satisfactory inter-suburban transportation can only be satisfied by cross-connecting lines which make it possible to reach the outlying towns without going to a common terminal.

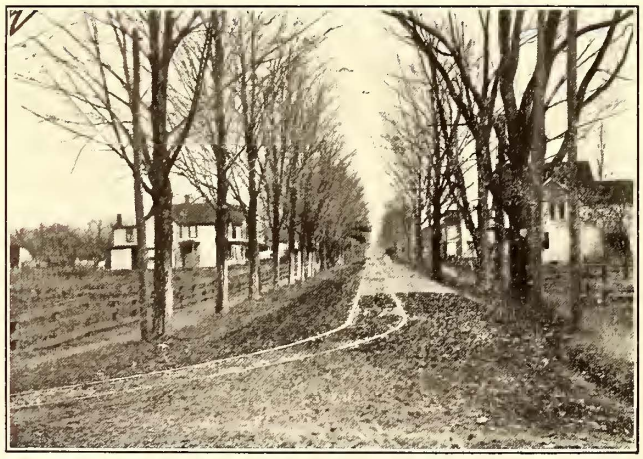



MAP SHOWING ROUTES OF THE MORRIS COUNTY TRACTION COMPANY'S LINES AND CONNECTIONS

An examination of the accompanying map will show how common the radial type of railway construction is in the district under consideration. While such large towns adjacent to New York, like Hoboken, Jersey City, Newark, the Oranges, Elizabeth, Plainfield, have excellent means of inter-communication via the lines of the Public Service Corporation, most of the towns and villages to the north and west have no service aside from the infrequent headway and roundabout routes of the steam railroads. For this reason the present population of these more distant localities is not as dense as the suburbs of a large city should be, but with the opening of the several Hudson River tunnels nearing completion, this most attractive territory will be within easy access from the metropolis. Hence the possibilities of a railway system in this district, bright as they are now with reference to present conditions, are not to be compared to the great development due within the next five years.

The electric railway system which is now being built to bring these outlying places within closer touch to each other and to the numerous lines of the Public Service Corporation is known as the Morris County Traction Company, with headquarters at Morristown, N. J., located about the center of the line. As shown on the map, the towns to be served directly lie wholly within the counties of Morris, Essex and Union. There are to be four eastern terminal connections with the lines of the Public Service Corporation at the following points: Singac, for Paterson; Maplewood, for the lines to Newark, the Oranges, Bloomfield and Montclair; Elizabeth, where trackage rights to operate into the heart of the city have been secured; and Westfield, for connection with the line between Elizabeth and Plainfield. The western terminal will be at Stanhope, N. J., where connection will be made with the Washington & Easton Railway, now under construction, running via Washington, N. J., and Easton, Pa., to Reading, Pa. The values of the eastern connections can be realized when it is stated that they tap a district containing over half a million people. The western connection will also prove of value, as will appear in the later paragraphs discussing the traffic possibilities of the different parts of the system.

The principal communities to be served directly by the Morris County Traction Company may be classified as residential and industrial. Those of the first type are on the



A CURVE ON THE ROUTE TO SUCCASUNNA

DOUBLE-TRACK PART OF THE LINE IN DOVER

northwest to southeast and southern divisions, while those of the other are on the line running from the west to the east. This condition is shown in detail by the following table giving the names of the towns and the population:

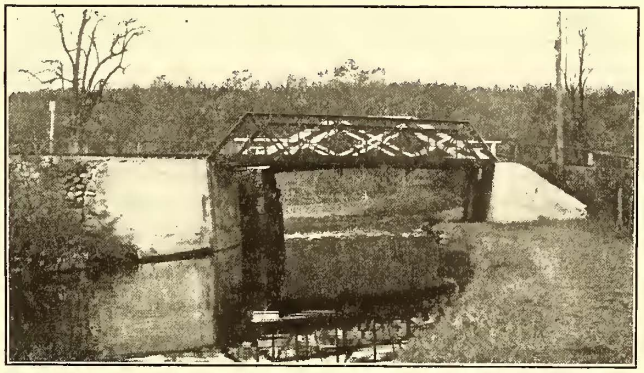
| Residential | Population | Industrial | Population |
|---|---|---|---|
| Morristown | 11,267 | Rockaway | 1,483 |
| Morris Plains | 445 | Little Falls | 1,500 |
| Madison | 3,754 | Dover | 5,938 |
| Chatham | 1,361 | Netcong | 941 |
| Summit | 5,302 | Stanhope | 682 |
| Springfield | 1,073 | Boonton | 3,901 |
| Milburn | 2,837 | | |
| Westfield | 4,328 | | 14,445 |
| | 30,367 | | |

In addition to the foregoing it is estimated that with the inclusion of the minor villages the total population is 65,000, or over 1000 persons per mile for the 64.5 miles of route. These figures by no means give a proper insight into the probable amount of travel, as they leave out of account the greater riding tendencies in a prosperous territory and the extra income from pleasure traffic in the summer months. Indeed, the latter factor will be a very important one on this system, as the new line will offer a splendid route to Lake Hopatcong. This lake is one of the most popular summer resorts in the East, particularly with residents of the metropolitan district, to whom it will soon be made more accessible by the lines of the Morris County Traction Company. The upper route connecting at Singac with the Public Service System will also have a good all-the-year business in transporting the large numbers of workers employed at the mines, iron furnaces and mills in this territory.

At present only 11 miles of single track are in operation, but an excellent traffic has already been developed on this still isolated part of the system which serves Rockaway, Wharton, Dover, Mine Hill and Kenvil. Four cars are operated on these lines at intervals of thirty minutes.

The 2½-mile extension from Kenvil through Succasunna toward Ledgewood which was opened about Dec. 15, was marked by comparatively heavy travel, especially so when the comparatively small population is considered. On this division cars are run every hour, so that there is no competition between the steam (High Bridge Branch of Central Railroad of New Jersey) and electric cars, as the former go north at 10:21 a. m. and 7:23 p. m., returning from Dover at 6:29 a. m., 4:10 p. m. and 5:30 p. m., making the run in from eighteen to twenty-three minutes, or about the same as the electric cars. Succasunna and Kenvil had the advantage of six trains on the Chester Branch of the Delaware, Lackawanna & Western Railroad, also, but as they were run only at wide intervals, and neither very early nor very late, there was but little additional inducement for travel.

The next section of the system to be placed in operation is at the other end of the line, comprising about 8 miles of single track between Summit and Elizabeth, with a branch from Springfield on the main road to Milburn (for Newark) to connect with the Public Service tracks at that point. Two cars have been running on this division, but the service will be increased in the early spring when connections are made at Newark and Elizabeth.

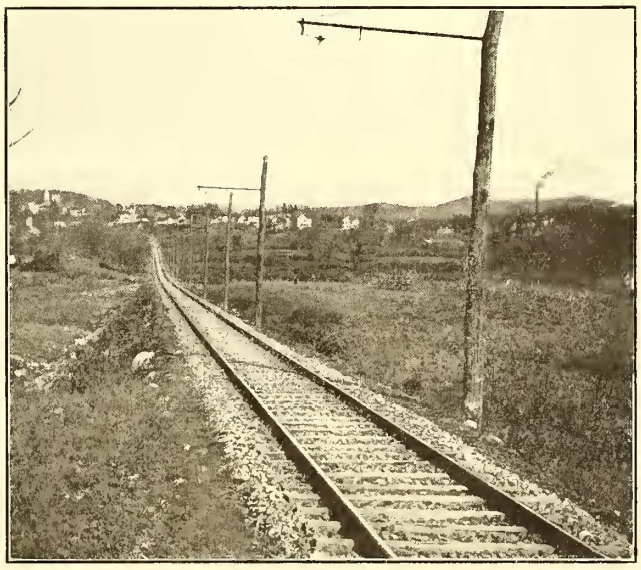


BRIDGE ACROSS THE MORRIS CANAL

In all, the system will be 64½ miles long between the terminals, with a total of 78½ miles of track, of which 8½ are double. All of the franchises granted are perpetual except in Morristown, where the franchise is limited to forty years. This town is composed largely of wealthy people who for a long time were opposed to the introduction of electric traction, but who are now enthusiastic for it.

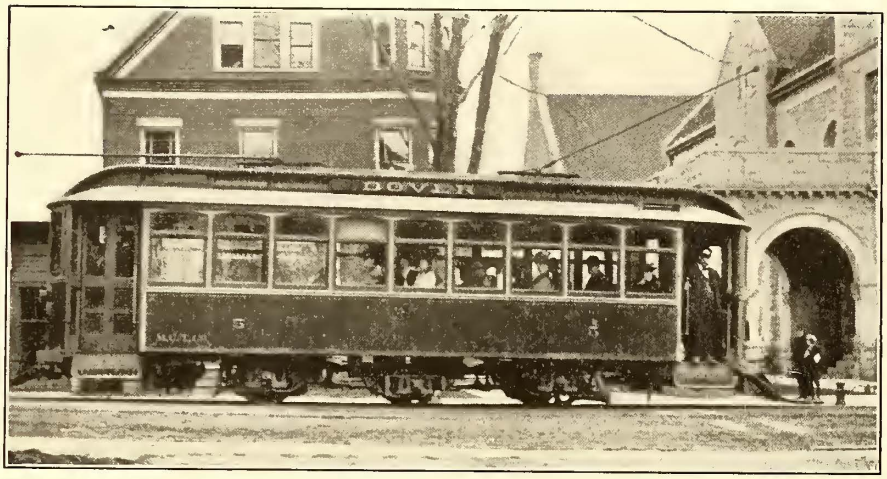
The rolling stock now consists of twelve 35-ft. single-truck motor cars, each carrying two 68-C Westinghouse motors and six 48-ft. double-truck cars with four No. 101-B

A VIEW ALONG THE ROUTE FROM SUCCASSUNNA TO KENVIL



THE ROCK BALLASTED LINE ON RIGHT OF WAY FROM DOVER TO ROCKAWAY

Westinghouse motors each. The air brakes are also of the same manufacture. The cars, which were built by the American Car & Foundry Company, are furnished with rattan cross seats and short longitudinal seats at the ends. There are also six old passenger cars equipped as motor work cars, in addition to a number of regular construction cars. The company owns a frame car house on the outskirts of Dover to provide for the cars on the Dover-




ONE OF THE SMALLER CARS LEAVING DOVER FOR WHARTON

Wharton section, and another at Millburn for the cars on the Elizabeth division. These quarters are only temporary, however, as concrete car houses are to be built in connection with the sub-stations when the locations of the latter have been determined.

Although a large part of the mileage is on the public highway, the company has not hesitated to locate portions on purchased right of way where such action would avoid severe grades and curves, and in one instance onerous franchise conditions. The system, therefore, will be capable of giving high-speed service, even in the vicinity of the larger towns, without interference from the authorities or running the risk of accident to travel on narrow and crooked roads.

The character of the territory, like that of the towns, may also be divided in two classes, the northern section being rather hilly and the southern rather level. In following the highway from Dover to Stanhope it was necessary entirely to reconstruct portions of the road to minimize the grades. At Stanhope the public highway runs over a hill with a 7 per cent grade. To avoid this the line will be built along the edge of the lake on the company's right of way.

In purchasing land at various points along the railway, the Morris County Traction Company had in mind not only leaving room for double tracking in the future, but also to develop the property along real estate lines. Thus the water front property at Stanhope is wide enough between the public highway and the edge of the lake to permit the construction of a row of cottages along the right of way. The private route to Elizabeth will also offer the means of opening up a new line of settlements within a very short distance of that city.

The track and overhead construction of this system is not elaborate, but is the best suited to the conditions. In the cities an 80-lb. girder rail is used, and in the country a 70-lb. T-rail laid on wooden ties. All joints are bonded with two No. 0000 bonds. The northern portions of the line are being splendidly ballasted with the heavy ore-bearing rock common in the district, and the same ballast will replace the sand and gravel used on the southern portions of the line when the through connections are made. The company crushes its own rock at a cost of 50 cents per cubic yard.

The overhead system is generally of the span type in cities and villages and bracket construction in the city. The northern portion of the line is carrying one 500,000-circ.-mil feeder and one No. 00 trolley wire. Power is purchased on very reasonable terms from neighboring lighting companies, but it is proposed ultimately to install a central power station at Morristown with the usual a. c. transmission to d. c. sub-stations. The northern end of the line is now operated by power from the Dover Electric Light Company's station, where the traction company has a generator and switchboard equipment. In this station a Harrisburg "Ideal" engine with 300-kw Westinghouse generator will soon be installed to meet the increasing power demands on the Stanhope and Lake Hopatcong extensions to be operated the coming summer. The southern end of the line receives power from the Milburn Electric Light Company, where the traction company also owns the generating apparatus.

Herbert Barnum Seeley, formerly of Bridgeport, Conn., a brother of Clinton Barnum Seeley, is organizing two circuses, which will be transported by trolley, and ex-


ONE OF THE LARGER CARS NOW OPERATED ON THE DOVER-ROCKAWAY LINE

hibit in the parks maintained by the trolley companies throughout New England, New Jersey and Pennsylvania. The rolling stock of the enterprise will consist exclusively of trolley chariots, trolley baggage wagons, trolley stock cars, trolley sleeping cars and trolley cages. According to the New York "Herald," Mr. Seeley's outfit will consist of less than twenty cars, but he is ready to compete in merit with his larger competitors. Side shows by the dozen will accompany the circus proper.

# THERMIT RAIL-WELDING—EXPERIENCES OF THE UTICA & MOHAWK VALLEY RAILWAY COMPANY

BY M. J. FRENCH
Engineer Maintenance of Way, Utica & Mohawk Valley Railway Co.

In all branches of electric railway work there are knotty problems to be solved, and in the track construction department surely no subject has called for more careful study and received more serious consideration than that of the maintenance of rail joints. Manufacturers and track engineers alike have put forth their best efforts in the endeavor to solve this problem.

The hardest proposition with which manufacturers of improved rail joint fastenings have to contend is to secure fair play for their devices. Many fastenings have features that mark a material advance over the old-style of joint plates, but their application requires such care that its neglect would make the joints appear less desirable than those of older date, especially when the extra cost and consequent additional loss through failure is given due weight. All track engineers and superintendents concede the great advantage of a continuous rail, but the attempts to secure it have in some cases been so expensive and unsatisfactory that others have hesitated to recommend to their superiors the use of the latest and most scientific appliances.

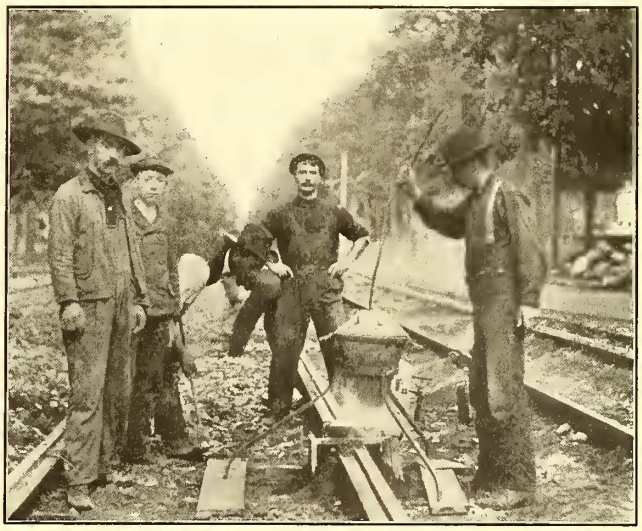
Thermit, electric and cast-welded joints all have their partisans among track engineers, who have given study and especial care in the application of one particular type of weld. No one disputes the statement that all three methods have been successfully employed, but it likewise must be admitted that there have been some failures, and in some instances that money loss has resulted in the abandonment rather than in a more careful mechanical application of the process.

On the Utica & Mohawk Valley Railway Company's system we have used only the thermit process of welding, but know that others have had such marked success with electric and cast welding that we cannot take exception to their practice. Granted that we have had failures, we must also admit that, save in one particular, the fault is attributable either to carelessness in application or to lack of knowledge of requirements. This is proven by results obtained this year in applying the knowledge gained through failure last year.

Although the details of the thermit welding process are familiar to track engineers generally, a brief description may help others to appreciate its advantages more fully. The process consists in pouring molten iron, or more correctly mild steel, from a crucible into sand and flour molds placed around the rails at the joint. The rails having first been lined and surfaced, the joint is thoroughly cleaned with a sand blash or wire brush. Then the rails are heated by gasoline or oil blow torch to expel all moisture, and by heating the rails to a dull red better results are insured, as the temperature of the molten steel is not reduced as much when coming into contact with the rails.

A pair of molds made of an equal mixture of common clay and sand, or more preferably of sand and 10 per cent of cheap rye flour, is then clamped firmly to the rails. The material of the molds is held by wrought-iron framework provided with handles to facilitate carrying. The rail head is then painted with a watery solution of common red clay which the heated rail immediately dries up to a thin coating. This is to prevent the molten slag or steel from uniting with or burning the rail-head. After thoroughly luting all joints of the molds with clay of the consistency of putty, common earth is packed around the outside of the molds. The molds and rails are then given a final warming with the blow torch, the flame being directed inside the molds to expel any remaining moisture. The crucible on its tripod is placed with pouring hole directly over and about 2 ins. above the gate in the mold. After placing the tapping pin, iron disc, asbestos disc and refractory sand in the bottom of the crucible to act as a plug for the opening, the thermit compound is poured in and in the center of the top is placed about one-third of a teaspoon of ignition powder. A storm match starts the chemical process.

The chemical reaction is a great mystery to the curious bystanders, and a foreman might spend all of his time answering questions. The thermit compound is composed of aluminum and iron oxide, both in granular or flake form; the ignition powder is composed of aluminum and barium peroxide in much finer form. When the match is applied the barium peroxide ignites and releases its oxygen to the aluminum very quickly. The heat produced is so intense that it causes the iron oxide to release its oxygen, which in turn is seized by the aluminum and



TRACK GANG TAPPING THE CUPOLA

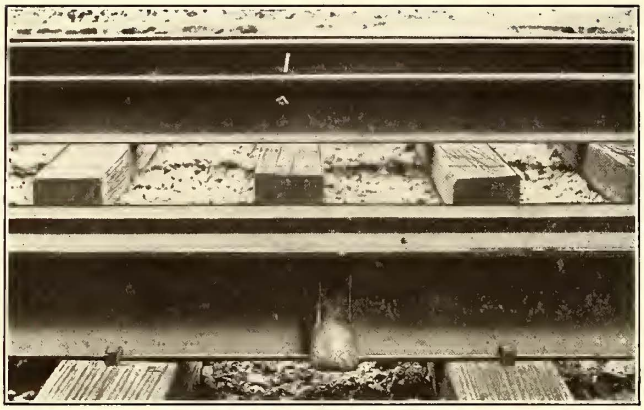
almost instantly the entire contents of the crucible is a boiling and seething mass. By this reaction the pure steel is liberated and settles immediately to the bottom of the crucible. This wonderful chemical action is concluded within thirty seconds, the crucible is tapped by striking the tapping pin with a special iron spade, and the incandescent steel runs smoothly into the mold, the aluminum oxide or corundum slag following. In five minutes the mold can be removed for the passage of cars.

To go back to the beginning of operations, our attempts to make molds of half proportions of clay and sand resulted unsatisfactorily in that they shrunk and checked badly in baking and required a great amount of careful luting to fill all irregularities at the joints. Also the clay was baked like a brick from the great heat of the welded joint and was quite hard to remove, adding somewhat to the expense.

An old foundryman suggested to our foreman that he should try a mixture of clean, sharp sand with 10 per cent of coarse rye flour, moistening the mixture sufficiently to retain its form when pressed in the hand. This mixture came away from the model without adhering, baked without shrinking a particle, and was hard enough to stand ordinary handling. I believe we were the first users of thermit to employ this

mixture that has now become general. For baking the molds we have found that a moderate heat of about the temperature required in baking bread proved most satisfactory, as a higher temperature burned the rye flour and destroyed its cementing property.

By adding a teaspoon of turpentine for each pair of molds the material was made as hard as concrete—unnecessarily hard for ordinary use but most desirable for special molds for broken or combination joints. These special molds we make solid and then with cold chisel and file hollow out the space to form a welt of iron.



COMPLETED JOINT

We first tried baking the molds in a furnace with banked fire under a boiler, but the heat could not be regulated sufficiently and we lost many molds through burning. Our foreman then built an oven out at our Utica Park storeyard, using old bricks and building in a flat plate of iron above the firebox to baffle the heat. Above that two racks were placed to hold the molds. This oven has a capacity of twelve sets of molds, one man receiving 15 cents an hour making and baking twelve sets in five hours. Thus we have a capacity of twenty-four sets per day at a cost of 6¼ cents a set for labor. Our molds actually cost about 10 cents a set, as the workman was not constantly employed and we did not require the full output each day.

Our oven is constructed with but one door for the molds and fuel, but it is more desirable to have a separate door on the side of the baking chamber, as the oven is not then cooled off when fuel is placed in the firebox. We use old ties for fuel.

We have made our crucibles since using up the first six furnished by the Goldschmidt Thermit Company. We buy the magnesia tar and mix with it 25 per cent of old crucible material finely powdered. These crucibles are very durable and last on an average for about thirty joints. We bake these in our oven with a higher temperature than that required for the molds.

We have welded about 900 joints during the years 1905 and 1906. Of these 600 were made in 1905 on Lorain 95-lb.-297 9-in. tram-head rail. This work was subsequently paved in with vitrified blocks on concrete extending from the bottom of ties. The ties were 6-in. x 8-in. hewed Southern pine, 8 ft. long, spaced 24 ins. center to center on 8 ins. of crushed stone. Ten of these joints proved faulty during the year, the break being generally elliptical in shape and extending from the end of the rail just underneath the head and above the weld, to the upper bolt hole; thence to the lower bolt hole and back to the base of rail near its end. This break is supposed to follow closely the line defining the extreme limit of re-crystallization of the rail that is produced as a result of the heat radiated from the weld itself. These rails had been drilled with 1¼-in. holes, spaced 2½ ins.—6 ins.—6 ins. in upper row and 3½ ins.—6 ins.—6 ins. in lower row, for regular ribbed girder joint-plates, and the line of re-crystallization passed through the first holes in most instances. I understand that this re-crystallization is the cause of most of the breaks in both cast and electrically-welded rails. Nearly all of these joints that failed broke through contraction of the rails due to failure to protect them properly after welding continuously 500 ft. to 600 ft. of rail. Later we omitted the weld at every sixth joint until after the paving was finished on all joints but those left for contraction, when the latter were welded and the concreting and paving around them was finished. Thin sections sawed from the upper half of a rail were placed in the openings before welding.

Another kind of joint failure developed in the form of a slip joint, due to the iron of the weld failing to unite properly with the rail itself. We had about four of these slip joints during 1905. Later on we tested all welds immediately after cooling by striking them on both sides of the rail with a heavy spike maul, the laborer being instructed to break off the weld if possible. These defective joints were all repaired by making a special mold to enclose the old weld and by running another weld close against and at one side of the old one, over the break in the rail. This year we have had seven breaks in this total of 600 joints, all of them breaking through the bolt holes.

During 1906 we welded 200 joints on the same section of rail laid in 1902, where the twelve-bolt, ribbed plates had begun to show failure through working loose or the rail head had mashed down at the receiving end. In the latter case the receiving rail was shimmed up and after welding the head was ground true to a straight edge by means of a hand-power emery wheel grinder. Thus far but one of these joints has proven defective, as there was no expansion or contraction noticeable, the pavement being removed only at the joints.

JOINT WELD WITH CABLE BOND

We have also welded during 1906 about one hundred joints on Pennsylvania Steel Company's section 95-272, a T-rail 7 ins. high with 6-in. base and head 3 ins. wide. We ordered this rail with the first bolt hole omitted. Thus the distance from end of rail to nearest bolt hole is 6 ins., and as the line change of crystallization fell several inches short of the holes we have experienced no trouble from the brakes except in two instances where long sections were left uncovered along the outside rail, awaiting paving. After this

we banked earth against the rail on long sections without expansion joints.

When we began welding this 7-in. rail we found that we could sledge off the welds and that the iron from the thermit compound had not united with the rail; also that the iron came up to the top of the rail head. We subsequently found that the mold models had become mixed, and we had used one of too small horizontal cross section, and consequently the rail chilled the small volume of molten iron coming in contact with it. Upon enlarging the mold model so that the thermit portion furnished only enough iron to come up under the rail head, we obtained welds that resisted the most vigorous sledging that could be given with a 10-lb. hammer. We were able to batter the weld out of shape, but could not separate it from the rail. This sledging test is now applied to all welds.

We found when welding in the morning with rising temperature that tightly-closed joints often humped up when welded. This proved to be due to the latent compression in the rails that did not manifest itself until the rail ends became soft. These humped joints were ground down with an emery wheel grinder. We had only a few of these joints when we realized the cause, and readily prevented such action by welding on cooler days or when the temperature was falling. We obtained the best results with joints open about 1-16 in. to 1-32 in., the expansion in welding closing tightly such an opening. We have made excellent combination welds between 80-lb. T-rail, 7-in. 70-lb. and 95-lb. T-rails and 9-in. girder rails. In making combination welds we found that it was essential to get a good body of metal between the upper side of the base of the deeper rail and the under side of the shallower section in order to secure the strongest type of weld. This form is shown clearly in one of the accompanying illustrations.

Thus far there has been no appreciable excess wear in the head of the rails at the welds and the heated portion seems to take the original temper, as it cools down slowly in about the same way as when coming from the rolls.

A few portions of thermit, not over six, have been lost through failure of the workman to tap the crucible properly, or lack of luting around the joints of the molds. We have had but one explosion during our entire experience. That occurred after using the process eighteen months, and was caused through carelessness in welding on a rainy day and in not thoroughly luting the molds near the top. The slag came in contact with the wet earth around the mold, but aside from the scare occasioned by the report and a slight burn on the foreman's arm from flying slag no harm was done, and the weld turned out to be a good one.

The total cost per joint to weld the 9-in. girder rail on the 1905 construction, including all labor, materials, tools and patterns incident to the work, experimenting with mold materials and cost of oven, was $5.86. The total cost of welding old 9-in. girder work, including the removal of brick pavement and concrete at the joints and replacing the same, was $7.44 per joint. The total cost of welding the 7-in. T-rail during 1906 was $5.81 per joint.

Our track construction work has not been of such magnitude as to require continuous welding day after day, and we have used three men from a regular track gang for this work. In consequence the cost has not been so low as would have been the case under continuous operation. We have never exceeded twenty welds in any on day.

We tried welding at night for a short time, but on account of increased expense and liability of accident gave it up, as there was no real necessity for doing it at night so far as the operation of cars was concerned. The comparative simplicity and small cost of the outfit required, the facility of manipulation and the flexibleness of the process in its application to various sections of rails and to other welding purposes serves in our opinion to make it altogether desirable.

Besides the regular rail welding we have successfully welded a broken side frame of a Brill 27-F truck at a cost of $6.85. This new part would have cost $30, and the master mechanic considers the frame as serviceable as a new one. As the truck was not taken apart to do the welding, the advantages and economy of the thermit for this kind of work must appeal strongly to the economical mechanical engineer.

COMBINATION WELD

We have made a practice of welding in 500,000-circ. mil copper cable cross-bonds spaced about 1000 ft. apart, and have met with signal success. As a matter of economy we have used a joint weld at one end of the cross-bond by boring a hole through the mold and inserting the cable opened to receive the projection of the rail base. The other end of the cable was welded opposite the joint by using a regular mold and one-fifth of a portion of thermit at a cost of about $1.25. A joint weld with cable bond is shown in one of the accompanying engravings.

We feel that our experience and the signal improvement of 1906 over the welding done in 1905 warrants us in continuing the use of the process. If our breakage does not exceed 2 per cent a year, assuming the life of the rail to be fifteen years, we shall have expended about $2.25 per joint in paved streets in maintaining perfect stability and practically full electrical conductivity of the rails. Moreover we have every reason to expect that the failures will materially decrease, as the weak joints should show themselves within the first year of service. We are also confident of reducing the breakage and loss of welding portions at the time of welding because of the experience gained by our men.

## SUGGESTIONS ON RAPID TRANSIT WITH PARTICULAR REFERENCE TO ROLLING STOCK—II

BY JOHN P. FOX

In his previous article the writer compared the carrying capacity and length of station stops under New York subway conditions for a variety of different types of cars. As several of these were side-door cars, it might be well to consider the objections which have been raised in the past to side-entrance cars and see if they are valid in view of the latest evidence on the subject.

(1) Can side-door cars be used with curved platforms? The idea that they cannot is very widespread, but really erroneous, as shown by the writer in his previous article. The remedy for the difficulty is simply a matter of car construction, as constantly seen in Europe, where the gap between car and platform is filled up either by continuous running boards or by projecting the whole car body beyond the underframe over the platform. Precedents in electric railway practice may be found in the projecting car platforms of the Mersey Railway, the running boards of the Metropolitan Railway of London, and the overhanging car bodies of the Lancashire & Yorkshire and Paris Metropolitan cars. The writer has the designs of some French railroad cars which project 19 ins. each side over the steel underframe. A further answer will be given next week, in connection with Fig. 20.

(2) Can a low car be framed strong enough to admit doors in the side? The 47-ft. motor car of the Waterloo & City Railway illustrated in Fig. 13 is only 9 ft. 8 ins. from rail to roof, and has two doors each side, while the floor is only 22 ins. above the rail. The Budapest subway cars, also with two doors each side, are only 8 ft. 4 ins. from rail to roof, and 15¾ ins. from rail to floor. The Central London underframes are as low as those of the Waterloo & City cars, or about 20 ins. lower than a New York underframe would have to be, so that this quesion seems easily answered.

(3) Can a continuous stream of people entering a train be cut off easily and safely with so many doors? Open street cars have had to be started without any way to check the stream, so that the presence of doors would improve this present practice. The Manhattan Elevated open cars have been operated for several years now with side gates, but are said to cause more accidents than all the other cars put together, and to be a constant source of delay. But is not the delay due partly to their popularity and partly to their lack of longitudinal aisle? And as to the accidents, the openings are narrow, the gates low, and the guards have two cars to look after instead of one, and from their position between two cars they cannot look along the platform as well as with a side-door type. Of course the ideal way to deal with a stream of people is to shut them off from a train entirely by gates when the train is ready to start, as is common at steam railroad terminals, and on some European electric lines, but this would hardly be feasible with such crowds as at the Brooklyn Bridge, where the slightest checking of the unbroken throngs on the stairways is dangerous, though sliding gates, simply diverting the stream from one platform to another, would appear perfectly feasible. But as people must be shut off from a starting train in one way or another, the real question is, which is easiest, to shut off at two, three, or ten points? With many side doors, obviously there is time for more deliberate and careful closing, giving the same length of stop, five times as long as in the case of the New York subway. This might often make any shutting off of persons wishing to board wholly unnecessary when required by other types of cars. Suppose, for example, ten people wish to get on a present subway car at the last minute, and that there are already 110 passengers on board. With such a degree of congestion, judging by the data gathered, it might take 15 seconds or more to allow five on at each door; and if this time could not be allowed, and the persons were insistent about getting on, the closing of the doors in their faces might have to be slow to avoid hurting any one. With a side-door car, the ten persons could all get on in one second, if they were scattered along the platforms, so that side-door cars offer more leeway in dealing with crowds than other types. The utilization possible of more floor space than in other types gives a total holding capacity that would not easily be swamped. A capacity per car of 188 or 217 seems ample for the New York subway, and it might be well to point out here how easy it would be to get out of a side door even when crowded, for the average distance to the nearest door is only about 4 ft., and the greatest distance 8 ft.; while for any one getting in, a door is never more than 2 ft. 6 ins. away.

It must be remembered that side-door cars in Europe have to handle even larger crowds than ever found in this country. The Great Eastern Railway in England has to carry as many as 1500 passengers on one of its fifteen-car suburban trains, with seventy-five doors each side, and swinging doors at that. The Berlin Stadt and Ringbahn, which carried 124,000,000 passengers last year, runs ten-car local trains with forty-seven doors each side, and its rush hour stops, as timed by the writer last year, appear to be about 20 seconds, which is not bad for such a heavy service with steam. But the continued success of the Illinois Central car is the best argument for the side-door type. A recent letter from Mr. Renshaw says: "I wish to state that the cars first built have given entire satisfaction both from a transportation standpoint and cost of maintenance. We have received absolutely no reports of failures in connection with the operation of the cars or door mechanism. The decrease in personal injuries in the use of the new car with side doors as compared with the old car with end doors is most gratifying. The time consumed in delivering and receiving passengers at stations has not been materially decreased since the report made on this by Mr. Sullivan; if my memory serves me correctly, the average standing time at stations is 7.65 seconds. You must take into consideration that this is about as quick as a steam locomotive will stop and start, regardless of all passengers having been received and delivered at the platform."

(4) Can side-door cars be kept warm in winter? This question was so fully answered in the article of April 1, 1905, that it is only necessary to recall that the Illinois Central found the type better heated than end-door cars, because there were no drafts sweeping down the cars, and all entering air currents were quickly broken up by the seats and warmed by the effective position of the heating coils.

(5) Can side doors be used throughout cars with very low floor and roof, as on the London tube railways? The Waterloo & City car, as shown in Fig. 13, and the Budapest subway cars have side doors only at two points between the trucks. But with the possible exception of the City & South London Railway, the writer knows of no cars too low for side doors at any point except over some of the motor trucks. Doors are possible even between the wheels of the trailer trucks of the London tube cars. A Central London or a Baker Street & Waterloo train, for example, could have side doors the whole length of every car, except over

the first and last trucks of the train, where the motors are, and where there is no need for doors, as the space is occupied by the motorman's cab and apparatus. To get the desired headroom at the top of the doors, it would be necessary to slant in the top of the car, and to make a bend also in the door, but this is already done with the side doors of the Waterloo & City cars as seen in Fig. 13, and the Great Northern & City cars. The writer hopes soon to make a drawing of a London tube car showing just how this surprising result can be obtained. While side-door cars and their large increase of seats may not be needed in London to reduce the length of stops, they would be valuable in economizing rolling stock. Thus on one tube line, while the saving in time would only be about 12½ per cent, and the same saving for the number of trains, the number of cars on a train could be cut down from six to four with a gain of 6 per cent in the seats, while there would be a total saving of 41 per cent in the number of cars needed, 12½ per cent less motor cars, and 56 per cent less trailers. The latter would each seat 90 passengers instead of 52, and the motor cars 70 instead of 46.

(6) Would the multiplication of doors multiply accidents or at least the number of claims? As we have seen, the Illinois Central Company has found less accidents with the side-door type than with the Manhattan type, while the open elevated cars in New York have more accidents than the Manhattan type. of car. The Illinois Central doors would then seem highly satisfactory, but it would hardly be safe to predict exactly what would happen with New York crowds. The multiplication of doors might cause people to hurry less, as entrances would always be near, and this might lead to more deliberate and careful movement. The filling up of all gaps at curved platforms ought to reduce accidents, also the seating of all the passengers, and addition of more firm posts and handles. As to accident claims, the improved service possible with side door cars, with their shorter stops, and especially their abundance of seats possible at all hours ought to please the public and reduce their inclination to get even with a company for poor service or congestion. The chief thing that irritates the public is certainly the lack of seats; and the superiority of the side-door type for overcoming this serious and expensive cause for complaint seems worthy of careful consideration. Side-door cars would also mean shorter stops, curved platform difficulties done away with, far less power needed, easier braking with less injurious iron dust in the air, less oil thrown about, less noise, and less wear of moving parts in trying to keep up to the schedule speed. In the future far more trains could be run than now, and the final capacity of the New York subway could be put at a figure which the writer hardly dares to mention until the possibilities of side-door cars are fully appreciated.

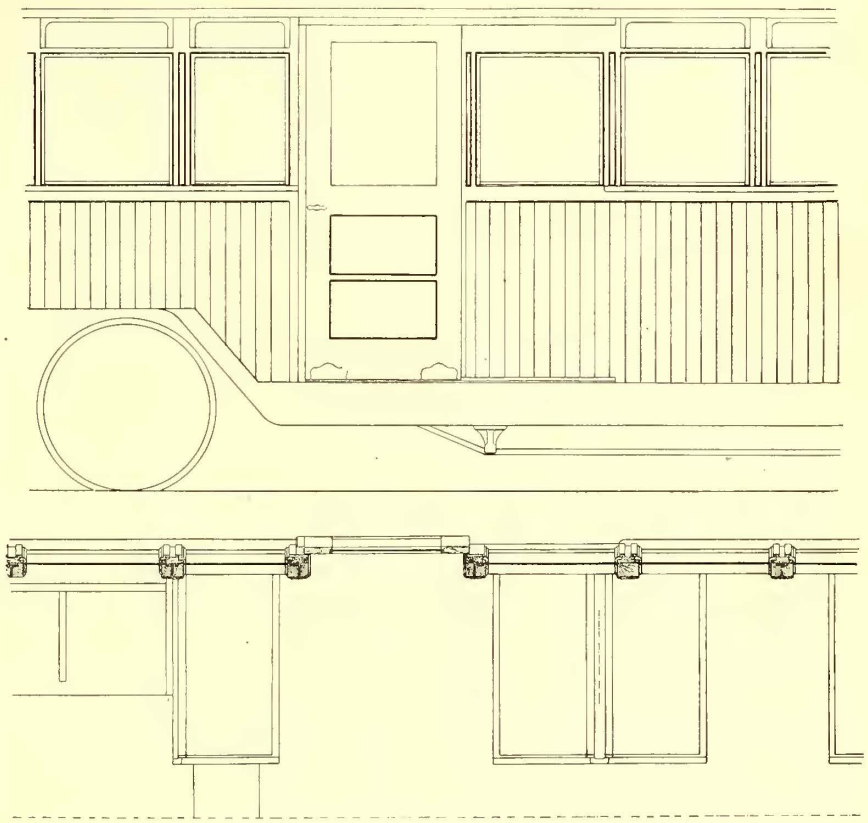


FIG. 13.—MOTOR CAR WITH SIDE DOORS, WATERLOO & CITY RAILWAY

### THE SIDE-DOOR CAR IN ENGLAND

While in England the American end-door car has been usually adopted for electric service, there is growing dissatisfaction with it, and there is a tendency to return to side doors. The electrification of the old rolling stock of the Metropolitan Railway of London has recently been described in the JOURNAL, and in commenting on this action one of the London electrical papers makes some statements which are worth quoting: "It is stated that some of the [Metropolitan] officials are inclined to think that an error was made in adopting the American saloon car, as the cost of the extra train staff is higher than was realized at the time. To cut down expenses, the directors of the District Railway have been experimenting with a train having only two men, one in front and one behind, these two to have control over the whole of the doors on the train. Among the most popular trains on the Underground are the luxurious compartment trains provided by the London & North Railway for their Broad Street-Mansion House traffic." The Manhattan type of car has given great satisfaction on the Central London Railway, but has been subjected to much criticism on the District Railway. The Englishman for one thing did not like to see nearly a quarter of his seats done away with, and straps furnished instead. Then the pneumatic operation of the end and center doors gave much trouble at first, and the use of the center doors was finally abandoned. The better class of English suburban compartment cars, with their luxurious seats and electric lights over one's shoulder, are certainly more comfortable and pleasant in many ways than some of the hard-riding and hard-seated end-door cars. So it is not surprising to find Mr. Philip Dawson, in the STREET RAILWAY JOURNAL for April 7, 1906, advocating as the most satisfactory type of rapid-transit car a compartment type with side aisle and side doors as used in Germany. Mr. Dawson prefers swinging doors to sliding ones, because he thinks the latter are more difficult to keep air tight and require an expensive use of air to operate them. But the experience of the Illinois Central appears

to answer both these objections, as the cars are warm enough in a Northwest winter, and are operated easily by hand. Swinging doors, of course, have their advantages in Europe, where passengers are already used to them, and where their details have been worked out to make them very safe, especially in Germany. They can have a connecting mechanism for opening and closing as with sliding doors,

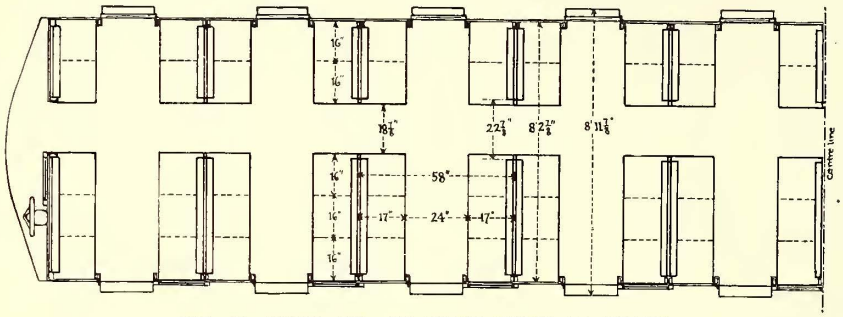



FIG. 14.—TYPE 4000. TRAILER WITH 100 SEATS

but there is always a chance of some one's being struck or caught by the open door of a starting or passing train, and the possible widths of cars are reduced by the need of allowing clearance space everywhere for open doors.

PROPOSED DESIGN OF RAPID TRANSIT CAR

In submitting designs for New York subway cars, the writer hopes that the results will meet the severest demands of the technical critic of side-door cars as well as the most rigid requirements of the public in the way of convenience, comfort, good lighting, ventilation, and other matters. The first point was to get the largest number of seats and side doors in a car with the present dimensions, viz: 51 ft. 2 ins. over the buffers, 8 ft. 8 ins. wide over the eaves, and 9 ft. ½ in. wide over all. The final side-door type submitted in

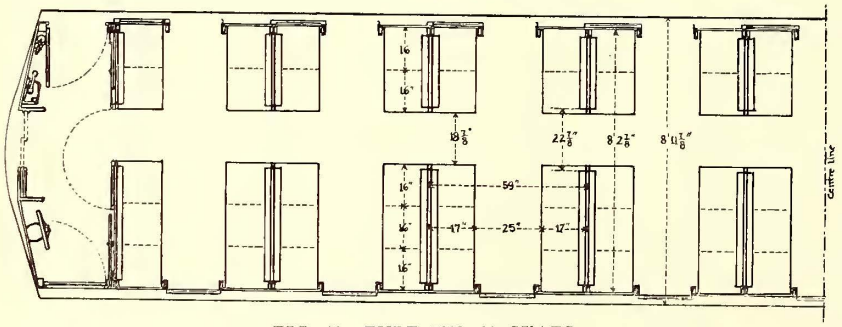



FIG. 16.—TYPE 5000, 90 SEATS

the Journal for April 1, 1905, was a shorter car with 80 seats, but at the eaves it was about 12 ins. too wide for the desired clearances. While it will be seen later that a wider car than the present could be run in the subway without even changing the station platforms, it is interesting to see just how many seats could be got without exceeding present limits. The reduction in width was obtained, first, by allowing 16 ins. of seat room to each passenger, which is a common allowance both in this country and in England in narrow city cars. The open cars in Boston furnish, for example, about 15½ ins. While a 32-in seat for two passengers is very uncomfortable if made of rattan, the writer proposes a flat cushion on springs after the best European practice, which would avoid any sliding off the end of the seat. With 100 or more seats in a car, if there were not more than 60 persons to occupy them, as in the slack hours, then each passenger could have 24 ins. or 32 ins. apiece, and it would only be in the rush hours that the minimum space would be found.

A second way of reducing the car width is to omit any wall outside of the sliding doors. This was suggested by the practice found on the Waterloo & City cars as seen in Fig. 13. The hangers and operating mechanism of the doors are of course carefully closed at the top.

Thirdly, the car walls are reduced in thickness to a minimum between the posts, somewhat as in semi-convertible car construction and recent English wide suburban car practice. The posts are angles and tees, with outside panels and finish of sheet steel, and inside panels fastened to the inside of the flanges, with an insulating material between the two panels. This allows a wall only one-half inch thick at the seat level. The glass of the lower windows can be set in rubber and brass, or brass and wood.

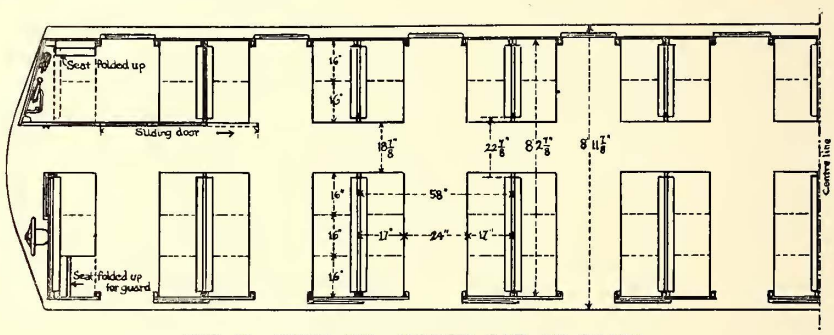
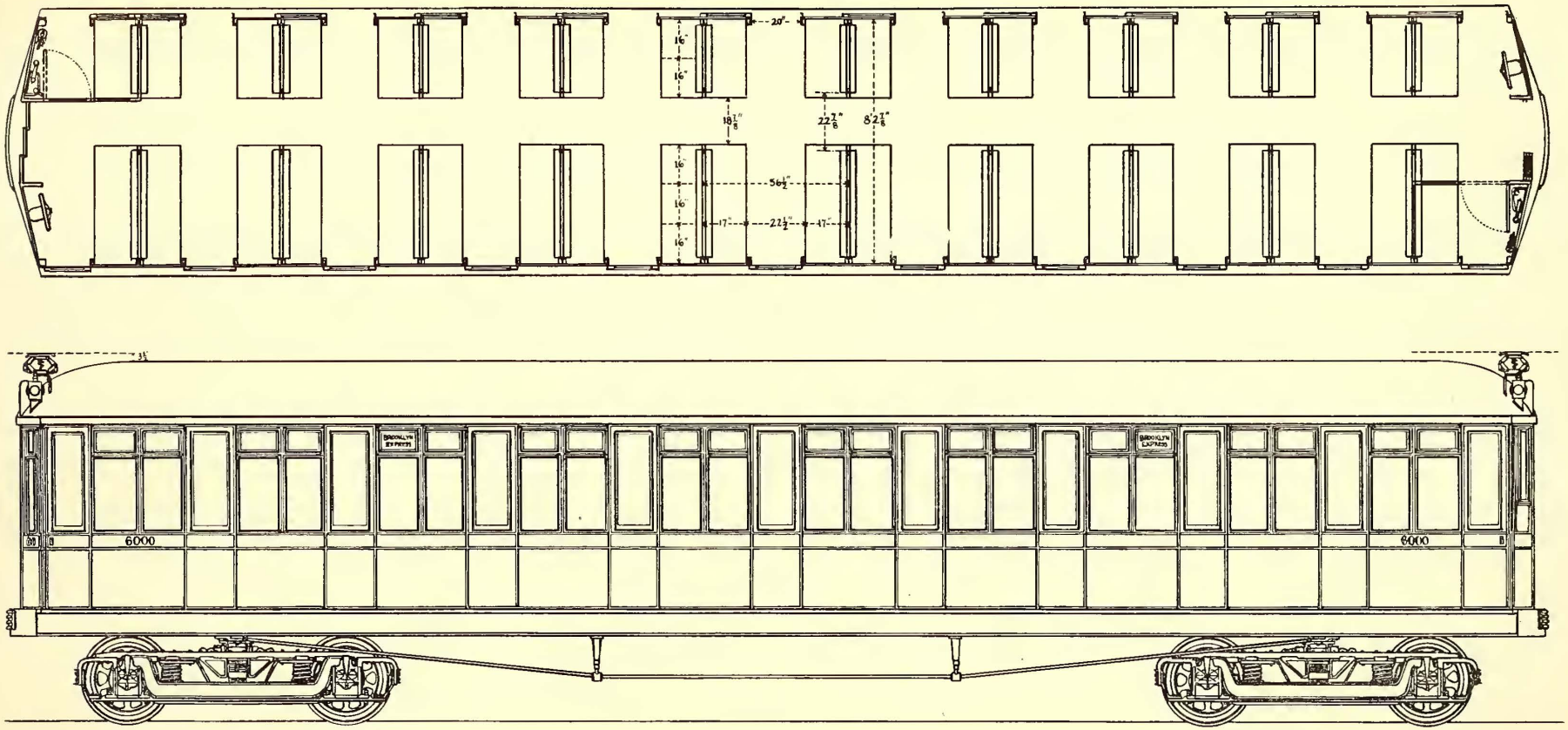



FIG. 15.—TYPE 4500. MOTOR CAR, 100 SEATS

Having reduced the car width to within the limits, car plans may be considered. Fig. 14, Type 4000, illustrates a 100-seat trailer, but with features that need improving. The guard operates the doors from a narrow end platform, which is the worst place to see from, but would have the economical advantage of allowing one man to look after two cars if sufficient time were given. The projecting step at each door ought preferably to be level with the car floor; and, as shown, would not fill up all the space between edge and car at a curved platform. Fig. 15, Type 4500, is a 100-seat motor car of better design. Here the guard stands inside the car on either side, in the space made by folding up one or two seats The cab by preference should extend across the whole front of the car, but that would shut off six more seats, of course, at the head of train. The brake wheel would be handier inside the car, but the end seats hinder this location. The position of the cab door when open can be seen in Fig. 12, in the issue for last week. The car floor merges at the doors into a continuous running board as on the London Metropolitan cars.

Fig. 16, Type 5000, has vestibules more like the present subway cars, for use by the motorman and guard. The latter can drop a window in the swinging outside door, and so easily look out along the platform as a train starts. This arrangement is the most satisfactory, but it only allows 90 seats to a car. In this type the doors can be operated by




**STUDY FOR**
**NEW YORK SUBWAY CAR**
100 SEATS

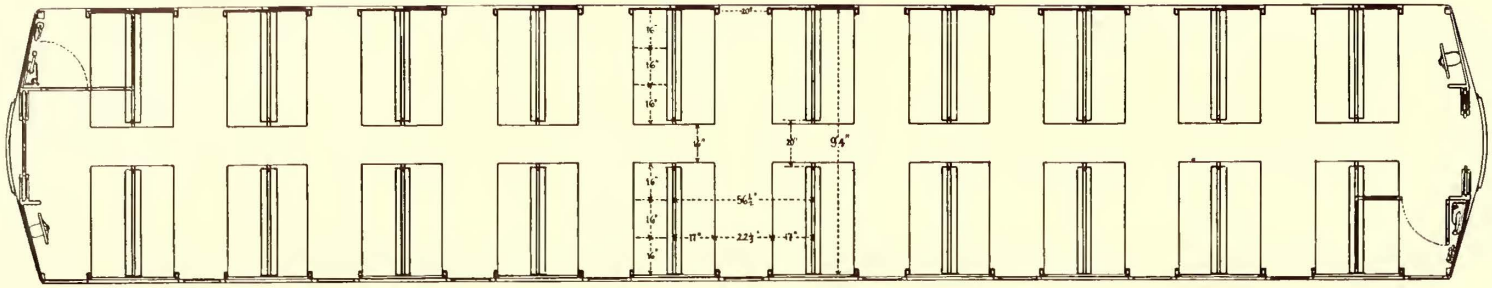
| | NEW CAR | PRESENT CAR |
|---|---|---|
| LENGTH OVER BUFFERS | 51′ 2″ | 51′ 2″ |
| WIDTH OVER UNDERFRAME | 7′ $\frac{7}{8}$″ | 8′ 6$\frac{3}{4}$″ |
| " " FLOOR AT DOORS | 8′ 11$\frac{7}{8}$″ | 8′ 10″ |
| " " POSTS | 8′ 3$\frac{7}{8}$″ | 8′ 6$\frac{3}{4}$″ |
| " " DOORS | 8′ 6$\frac{7}{8}$″ | 8′ $\frac{1}{2}$″ |
| " " WATER TABLES | | 9′ $\frac{1}{2}$″ |
| " " EAVES | 8′ 8″ | 8′ 8″ |
| " INSIDE PANELS | 8′ 2$\frac{7}{8}$″ | (7′ 9$\frac{1}{2}$″) |
| HEIGHT, RAIL TO ROOF | 12′ | 12′ |
| TOTAL WIDTH OF DOORS, ONE SIDE | 18′ 4″ | 6′ |

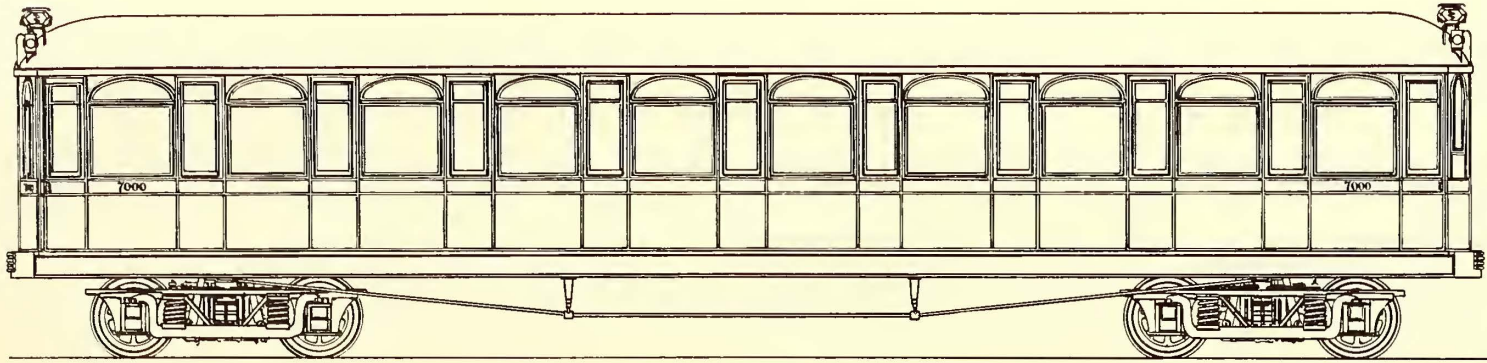
FIG. 17.—CAR TYPE 6000 WITH 100 SEATS

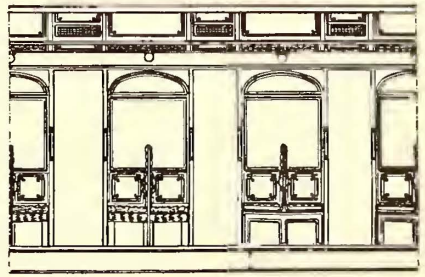
## STUDIES FOR NEW YORK SUBWAY CAR

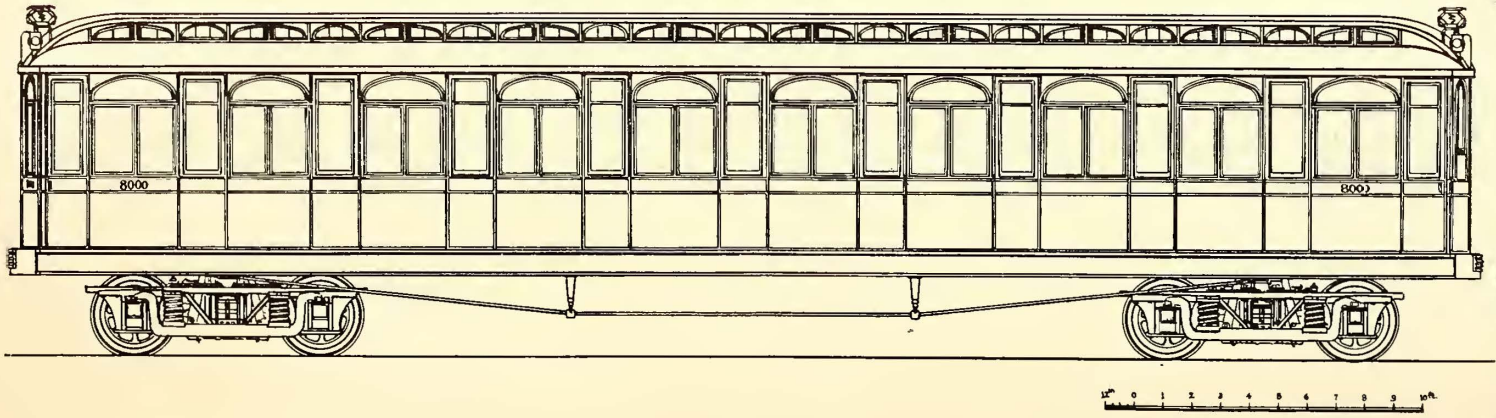
120 SEATS

| | NEW CAR | PRESENT CAR |
|---|---|---|
| LENGTH OVER BUFFERS | 51′ 2″ | 51′ 2″ |
| WIDTH OVER UNDERFRAME | 8′ 1⅝″ | 8′ 6¾″ |
| " " FLOOR AT DOORS | 9′ 7¼″ | 8′10″ |
| " " POSTS | 9′ 4⅜″ | 8′ 6¾″ |
| " " DOORS | 9′ 7¼″ | 8′ ½″ |
| " " WATER TABLES | | 9′ ½″ |
| " " EAVES | 9′ 7⅜″ | 8′8″ |
| " INSIDE PANELS | 9′ 4″ | (7′ 9½″) |
| HEIGHT, RAIL TO ROOF | 12′ | 12′ |
| TOTAL WIDTH OF DOORS, ONE SIDE | 18′ 4″ | 6′ |







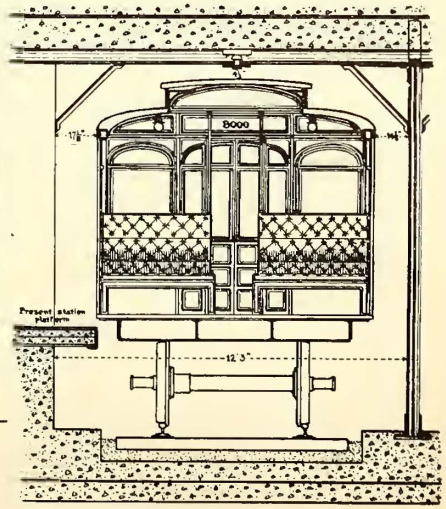




FIG. 18.—CAR TYPES 7000 AND 8000, WITH 120 SEATS

simple hand levers, as the levers are on the outside of each end partition. Of course all partitions inside any of these cars must be glazed so as to allow the guard to see through to operate the doors from either end and either side of the car.

The plan in Fig. 17, Type 6000, provides for eleven doors, instead of the previous ten, but makes the space between seats slightly less. Ten of the doors would be fastened to one operating rod, the other being opened by hand when needed, as it must move opposite to the others. The guard can stand at the end where this eleventh door is and open it or lower the window to see better along the station platform.

Fig. 18 follows the same general plan as Fig. 17, but widens the car out so as to get six seats and an aisle. The construction is lightened by omitting posts between the seats so as to give larger windows. This size of car seems the best for any new lines. An attempt has been made in Types 7000 and 8000 to give a more attractive appearance than with Type 6000, which follows the somewhat severe lines of the Midland cars of England. While it is customary to round the upper corners of doors on the most ornate cars now, it does not seem to look well with this side-door type, so square-topped doors are shown.

In the next and concluding installment of this article the author will take up the constructional features of this car, together with other facts to be considered in rapid transit work.

*(To be continued.)*

## RECTIFIER FOR ELECTRIC LOCOMOTIVES

On page 1052 of the STREET RAILWAY JOURNAL for Dec. 1 a brief account was given of a system of electric traction proposed by MM. Auvert and Ferrand, engineers of the Paris-Lyons-Mediterranean Railway, in which the current supplied is alternating, while direct-current motors are used

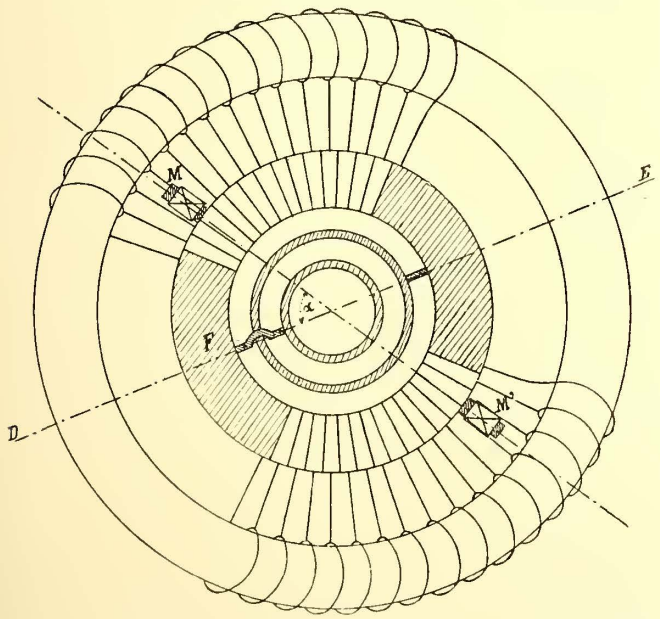



FIG. 1.—SCHEMATIC DIAGRAM OF AUVERT-FERRAND RECTIFIER

for driving the locomotive. The locomotive is equipped with a special form of "regulating rectifier," which receives alternating current at constant voltage and delivers direct current at a voltage which can be varied at will according to the demands of the driving motors. The novel feature of the system resides in the "regulating rectifier," the mechanical construction and electrical characteristics of which are discussed below.

Fig. 1 gives a schematic representation of the circuits of the "rectifier" reduced to a two-pole model. The commutator is made up of two large conducting segments which are connected directly to the alternating-current slip rings and between which are joined the two parts of the rectifier

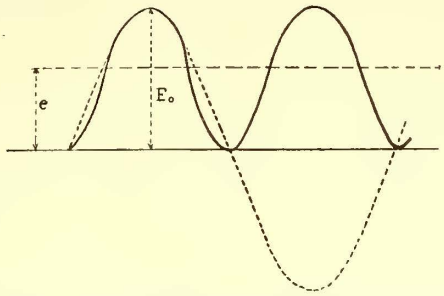



FIG. 2.—RELATION OF IMPRESSED AND DELIVERED ELECTROMOTIVE FORCES

winding, in addition to numerous small conducting segments tapped to the rectifier windings at regular intervals. The two pairs of the rectifier winding surround a continuous magnetic circuit, shown in the illustrations as being similar to a Gramme ring, but the parts are so arranged that current which passes from one large commutator segment to the other flows in such a way as to produce two magnetomotive forces in series in the magnetic ring. Thus when an alternating e. m. f. is impressed between the two slip rings, the windings and the magnetic circuit act in every respect like the primary winding and core of an alternating-current transformer, or, as the equipment is used, as the single winding of an auto-transformer. The small commutator segments serve as the contact devices for taps from the auto-transformer. Two brushes are arranged to bear continuously upon the commutator, which as noted above is formed of the two terminal pieces and the intermediate contacts of the auto-transformer. The addition of means for driving the commutator and auto-transformer in synchronism with the alternations of the supply current completes the essential details of the rectifier.

It will be apparent from a study of Fig. 1 that with the two brushes placed diametrically opposite each other the instantaneous value of the e. m. f between them will depend upon their mechanical position with reference to the terminal pieces of the auto-transformer, and upon the value of the e. m. f. impressed between them. If when the alternating e. m. f. has its maximum value the synchronously rotating element is in the position to cause each brush to be in the center of a terminal piece, then the time-value of the e. m. f. between the brushes will be similar to the heavy curve of Fig. 2, provided the alternating e. m. f. has a time-value similar to the dotted curve. Thus the delivered e. m. f. is unidirectional but fluctuates in value from a certain maximum to zero twice during each cycle of the alternating e. m. f. A little further consideration will show that the delivered e. m. f. can be given any value desired from the maximum to zero, by decreasing the arc of separation between the brushes from 180 degs. to zero. In practical operation the voltage impressed upon the direct-current motors is varied throughout the required range by shifting the brushes on the rectifier; on account of this characteristic of the machine it has been given the name "regulating rectifier."

As intended for railway use the machine differs in minor

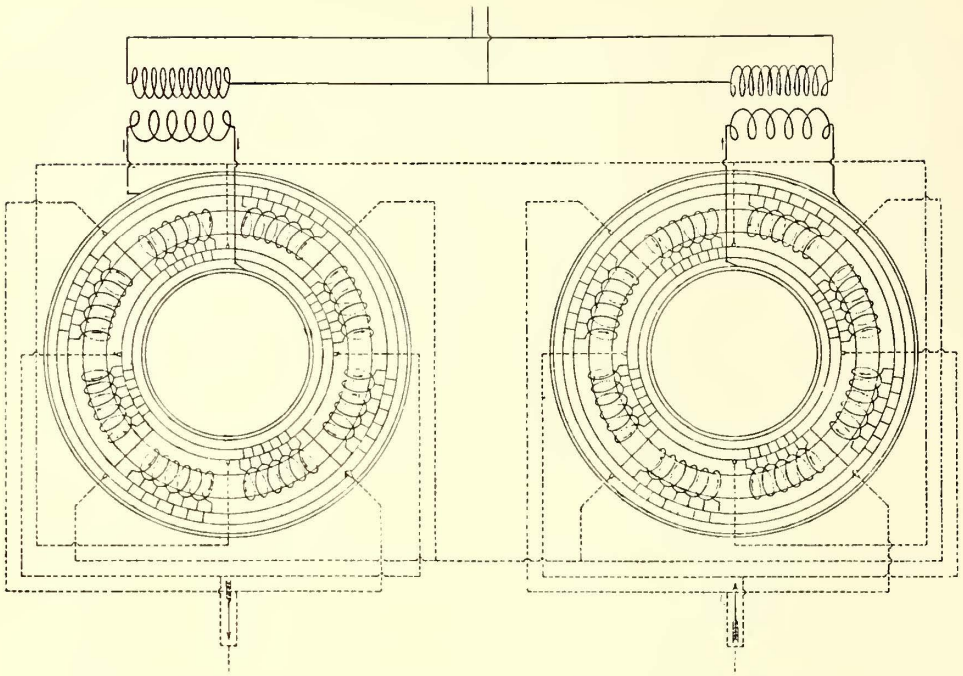


FIG. 3.—DIAGRAM OF CONNECTIONS OF A GROUP OF TWO RECTIFIERS

details from the simple bipolar model described above. Fig. 3, which is a diagram of the electric circuits of a rectifier equipment designed for railway work, shows that the high potential alternating current is fed in parallel to two step-down transformers whose secondaries are connected to the slip rings of two distinct rectifiers, the delivery circuits of which are joined in series. The series connection of the delivery sides of the rectifiers is desirable on account of the fact that each machine operates better at a lower than at a higher e. m. f., and the e. m. f. necessary for traction is greater than the value that can conveniently be obtained from one rectifier. It will be seen from Fig. 3 that each rectifier is provided with two commutators and two distinct sets of auto-transformer windings. This construction has been adopted for mechanical symmetry, and in order that the core material may be economically utilized. The two auto-transformer windings can be arranged for series connection, although the arrangement is somewhat simpler when they are connected in parallel, as shown in Fig. 3.

A plan view of two "regulating rectifiers" directly geared to a synchronous motor is given in Fig. 4, while a longitudinal sectional elevation of one of the rectifiers is shown in Fig. 5. It will be noted that the revolving element of each rectifier resembles somewhat the armature of a rotary converter except that it is provided with two commutators. A striking difference in mechanical details is found, however, in the fact that there is no part to correspond to the field structure of the rotary, and the machines are essentially different electrically in that there is no transformation of electrical into mechanical power and the rectifier proper is incapable of maintaining itself in motion. The synchronous motor serves merely to revolve the rectifier at synchronous speed, and it is relatively small in size.

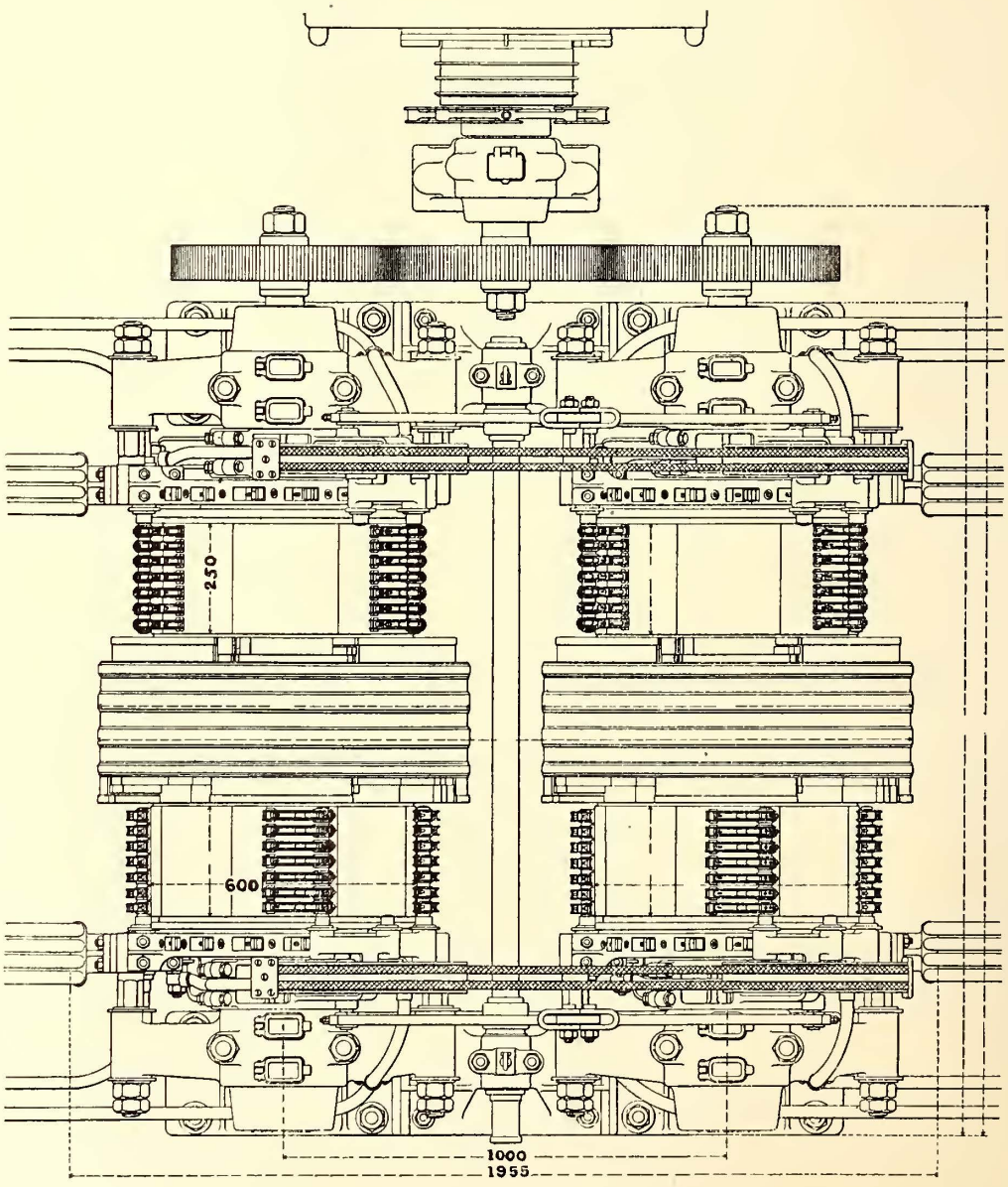



FIG. 4.—PLAN OF RECTIFIER

The rectifiers shown in Fig. 4 have a combined direct-current capacity of 400 kw at 235 volts, the alternating e. m. f. impressed upon each rectifier being 155 volts, the efficiency at full load being 91 per rcent. By shifting the brushes the e. m. f. can be varied from 20 to 280 volts with a constant supply pressure of 165 volts. It is stated that the commutation is excellent at 1500 amps., and that loads of 2100 amps. have been carried without difficulty. The locomotive to utilize this rectifier is now being built for the Paris-Lyons-Mediterranean Railway by the Alioth Electric Company, of Paris.

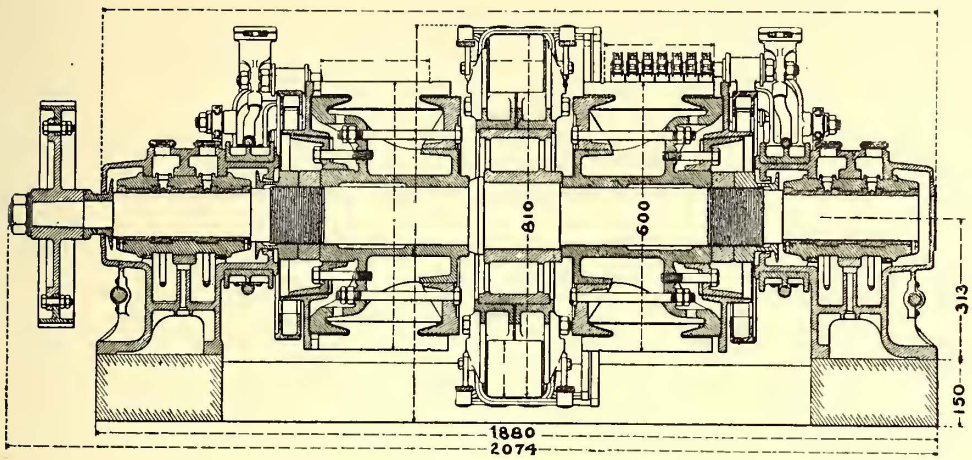



FIG. 5.—LONGITUDINAL SECTION OF RECTIFIER

## IMPROVED TRACK CONSTRUCTION IN WASHINGTON STREET, BOSTON

In connection with a paper upon "Wood Block Pavements," recently presented by F. A. Kummer before the Boston Society of Civil Engineers, a brief discussion of the new track construction of the surface lines on Washington Street was given by Arthur L. Plimpton, civil engineer of the Boston Elevated Railway Company. The rails are supported on the usual 6-in. x 7-ft. tie construction, the ties being 30 ins. on centers. These in turn are supported in and on a continuous concrete beam extending 6 ins. below the bottom of the ties, and about 5.5 ins. above them, giving a total thickness of about 17.5 ins. These beams are connected by an arch of concrete, which gives about 5.5 ins. of concrete base in the middle of the wooden block pavement.

The wooden blocks recently laid on Washington Street are black gum of the South, which is a very tough, hard wood, with an irregular grain. If used in the shape of planks it is badly subject to warping, but if used in the shape of blocks it seems to have many advantages even over pine in some respects. It is a swamp wood and if untreated decays rapidly, but when thoroughly treated with a creosote oil mixture it resists decay and wears excellently. On account of its close and irregular grain it does not split as readily as pine, and the waste in handling on the street is less. It exists in large quantities in the South, and as it is not very useful for general lumber purposes the chances are good for getting it in large quantities and at reasonable prices for a considerable period. The foregoing points in this paragraph were brought out by Mr. Kummer. Mr. Plimpton stated also that previous experience on Beacon Street, where there were laid wooden blocks in 1901, showed the importance of doing the work in such a manner as to prevent water from working down at the side of the rail, so that when done there were no voids left in which the water could accumulate. In the work recently done of relaying the tracks on Beacon Street with wooden block pavement, the blocks themselves were laid on a layer of cement mortar and the joints filled with cement grout. Cement mortar was also filled in around the girder rails in the Washington Street track.

Cars were not run on the tracks on either Washington Street or Beacon Street until the concrete had been in place for ten days. The whole aim in this form of track construction is to eliminate all movement of the rail under passing cars as far as possible, and in some recent work in connection with brick pavement a form of screw has been used instead of the usual track spike, which, with its vastly greater holding power, will certainly help a great deal to prevent movement of the rails, and if the results justify the added cost it will probably be adopted instead of the spike in future work in connection with expensive forms of pavement.

## PROGRESS ON THE WASHINGTON, BALTIMORE & ANNAPOLIS LINE

President George T. Bishop, of the Washington, Baltimore & Annapolis Electric Railway Company, says that there is little doubt that the road will be completed and in operation by the date originally set, July 1, 1907. Mr. Bishop is quoted as follows:

"Much of the track has been laid east and west of Odenton, about half way between Baltimore and Washington, and the bridge work is well under way. There will be no grade crossings on the line. We will not erect a power house at this time, deeming it best to wait a few years until we see what the electrical plants being erected along the Susquehanna River will mean in the electric power field. We have closed a contract with the Potomac Power Company, of Washington, and this company will furnish us all our current. There will be sub-stations erected along the line, contracts for their equipment having already been let.

"Our cars will be capable of a speed of 65 miles an hour, but we figure now that it will take 75 minutes to make the trip from the center of Baltimore to the treasury in Washington. We will give both express and local service and will also arrange for the handling of freight."

Arrangements have been made for an entrance into Baltimore over the tracks of the United Railways & Electric Company of that city. The Washington, Baltimore & Annapolis Electric Railway Company will lay a third rail in Baltimore on account of the difference in gage between its tracks and the city tracks in Baltimore.

The Indiana Union Traction Company has established limited service between Anderson and Wabash, Ind.

## STANDARD CAR CONNECTIONS

BY H. SCHLEGEL

By standard car connections are meant connections such that a glance at any wire on a car will identify that wire whether it be tagged or not—in fact with recognized standard connections no tags or other identification marks are needed because a wire becomes identified by its position.

On small roads with uniform equipment the adoption of standard connections is a simple matter not likely to cause any confusion; on large systems representing absorbed roads of various equipments and methods, many obstacles are to be overcome. In any case if all devices—heaters, compressors, governors, headlights, car lights, switches, breakers, starting coils, arc light resistances, air tanks, sand riggings, brake riggings, car cables, etc., are located according to drawing, the task of running wires in stranded paths is much simplified. Where such standard location of devices is not observed, the task is more difficult, but satisfactory results can still be obtained, as far as the wires themselves are concerned, by running the wires in certain fixed relations to each other. To illustrate the advantages of being able to identify active wires, wheresoever they may be exposed, consider the proposition of standard motor circuit connections.

The first step toward standardization is an agreement as to the No. 1 end of the car. On a single-end car this is naturally the operating end and no further fixing condition is needed. Ordinarily, on double-end cars the No. 1 end is arbitrarily taken as the fuse box, register, resistance or wall-wire end; but on modern cars where these devices are or are likely to be duplicated such a rule is useless, for the "fuse box end" means nothing if there is one on both ends. Probably as good a plan as any is to take the cash register end, as it covers the possibility of two registers. If the registers are installed first, the electrical equipment must be installed accordingly and vice versa. In general, change the one that costs the least to change. An incidental advantage of having a fixed, recognized No. 1 end is that a motorman can readily tell the number of a faulty motor and avoid the hit-and-miss method of cutting it out.

Motors of different makes and even types of motor of the same make may rotate in opposite directions for apparently the same connections owing to the relations in which their field coils are connected. For example, the GE-57 and 67 rotate in opposite directions, so do the Westinghouse 68 and 101. The motor internal connections should be such that when the terminals are brought out of the frame according to a standard rule, the same polarity of field and armature terminals will produce on all motors the same direction of rotation; otherwise the wiremen cannot tell how to connect the motors of the car wires so as to move the car as indicated by the controller reverse handle. When no rule is observed in bringing out the terminals, the final results are a loss of time in connecting the motors, especially on a four-motor car, delay in locating the affected part in times of trouble and confusion in reconnecting after replacing a controller, motor or equipped truck.

Where the kinds of motor in use are too numerous to make the changes necessary to have all rotate in the same direction for given connections, the motor leads can be brought out according to rule; then the motors will be recognized as divided into two classes—those that rotate clockwise and those that rotate counter-clockwise for given connections, facing the commutator end. Suppose that experiment shows the rotation of an armature to be clockwise for certain connections; for example, the long B. H. lead being made T or +, the short B. H. lead being connected to the top field terminal and the bottom field terminal being grounded. Having thus determined the field and armature polarity that produce clockwise rotation, the wiremen know how to connect the motor to turn, hence move the car, in a certain direction, because: (1) All No. 1 controller A wires and F wires are + and all AA and E wires are —. Then to make the armature rotate clockwise it is only necessary to make the left-hand B.H. or long lead A, the right hand B.H. AA, the top field terminal F and the bottom field terminal E or G. With a standard observed rule for bringing the terminals out of the motor it is unnecessary for the wiremen to look into the motor to identify the wires, for he knows that the long B.H. lead, say the one to be made A to secure clockwise rotation, comes out of the top bushing, the short one out of the next, the F field terminal out of the next and the bottom or E field terminal out of the bottom bushing.

Having the leads of both motors brought out in absolutely the same manner, the next step is to select an invariable order for bringing them through the spreader that separates and supports the terminals where they issue from the bushings. This order is arbitrary to a certain extent, but should be suited to that observed in connecting the controller car wires to the junction boxes. Assuming the junction boxes to be in place on the car, suppose that the rule adopted for connecting the No. 1 controller wires to them be as follows: facing the junction box the order of connecting controller car wires to it, counting from the right is A, AA, F, E, G. Irrespective of the position or angle in which the junction box is supported, the wireman then knows that when facing it single A lies to the right and G to the left, the other wires lying in regular order between them. If the order of bringing the motor terminals through the spreader, facing the spreader, be made just the reverse of this, the spreader wires can be brought to the junction box in the same order as they leave the spreader and car wires and motor wires of the same name thereby connected together, because since the spreader and junction box face each other what is to the right when facing one will be to the left when facing the other. When a wireman is ready to connect the motors after the trucks are run under the car, he knows that facing the junction box the single A is to the right, and that facing the spreader, the single A is to the left, G being at the opposite end in both cases. Furthermore, he knows when facing the commutator end which armature terminal and which field terminal must be made + to have the armature rotate clockwise. As the top of the armature moves in the direction opposite to that in which the car moves, owing to the gearing between the armature and axle, it is an easy matter to tell in which direction the armature should rotate.

If the car is to move to the right, then, facing the commutator end, with the motor occupying relatively the same position that it will hang on the car, the top of the armature must move to the left, which means that the armature must turn counter-clockwise. If the car is to move to the left, then the top of the armature must move to the right and the armature must turn clockwise. Knowing the rotation for given connections, and knowing that all motor connections and controller-junction box connections are the same, a wireman can connect a motor up right the first time irrespective of its position on the car.

Suppose that on connecting up a car in the accepted standard manner one of the motors turns in the wrong direction. If ringing out the connections of the No. 1 controller to the junction boxes shows them to be right (the armature connec-

tions are always reversed in the No. 2 controller) and inspection shows the motor terminals are brought out of the bushings, through the spreader to the junction box in regular order, then the reversed rotation must be due to an irregularity in the controller or in the motor itself. If ringing out proves the controller internal connections correct, then the probabilities are that the motor has a so-called "left-hand armature."

In actual service on a road employing four-motor equipments of 57, 67, 80, 52, 58, 1000 and 800 (G. E.) and 56, 12A, 68, 49 and 101 Westinghouse, the 57, 1000 and 101 motors were in one similarly rotating class and the rotation of other motors was opposite. The standard features on all were those indicated. The instructions given the wiremen were: "On 57, 1000 and 101 equipments run motor wires straight from spreader to junction box on motors 1 and 3. Cross armatures on motors 2 and 4. On all other equipments cross armature terminals on motors 1 and 3 and run all wires straight on motors 2 and 4."

Standard starting coil connections greatly lessen the probability of getting the resistance wires confused and minimize the time of connecting or reconnecting after disconnecting for testing or equipment changes.

Standard disposal of the frames composing the starting coil may have to be limited to always placing the No. 1 frame toward the No. 1 end of the car, this limitation being imposed by the fact that the manner of placing the frames must be suited to the available room under the car—a very variable factor. However, if the R1 end of the No. 1 frame is so placed, the No. 2 frame being placed next, and so on, and the resistance wires out of the cable are brought through a spreader in the same order, the resistance wires will connect consecutively, and any confusion in the connection will be readily noticed.

The ideal starting coil connection is realized when the frames have their terminals on one side and the available floor space is such that the frames can be installed in a row. When the frames must be installed in a row along the short center line of the car, a very desirable way to install them, the No. 1 frame can be so placed that it is to the right or left of a person standing in the center of the car and facing the No. 1 end.

The preceding are merely suggestions adapted from actual experience in standardizing connections on a system employing ten kinds of motor equipments. The method to be pursued and the extent to which the standardizing idea can be carried depends on the complications existing in particular cases. In all cases, however, time, labor and material can be saved by the adoption of standard connections, the positions of the wires being fixed with the guiding object of keeping the most positive wires at one extreme position and the most negative at the other. Such connections rigidly enforced have proven an efficient check on the connections of field, and armatures from the winding room and on repair controllers. They have decreased air governor troubles incident to confusion of the governor wires, and have emphasized the desirability of having apparatus installed according to a layout adapted to the greatest possible percentage of the total number of cars maintained.

The through run between Dayton and Toledo over the Dayton & Troy, Western Ohio and Toledo Urban & Interurban lines has proved so successful that the companies have united in an agreement to purchase ten new cars at once to be used exclusively in this service.

## NEW TYPE OF INSULATORS FOR HIGH TENSION RAILWAYS

The Vereinigte Isolatorenwerke Actiengesellschaft, of Berlin-Pankow, Germany, whose pioneer work in high-tenson insulation was described in the Aug. 11, 1906, issue of this paper, has just brought out a line of insulators for high-potential railway service. They are made under the Kleinsteuber patents. The metal cap in these insulators is distinct from the bell which is made of insulating material and is molded into a threaded ring which screws into the cap. This gives a long distance between the cap and the insulated bolt

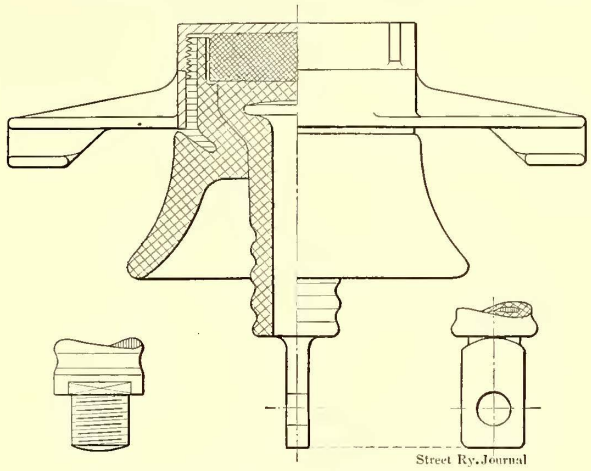



FIG. 1.—STRAIGHT LINE HANGER

and reduces surface leakage. Between the head of the insulator bolt and the metal cap there is a disc of insulating material. The lower end of the bolt varies in form according to the type of suspension adopted for the wire. Fig. 1 shows an insulator used on tangents, and Fig. 2 one for curves. The insulation of the trolley wire from the line insulator suspension is really double, first, because the insulator bolt is molded in insulating material, and second, because the bolt is also surrounded by a housing of insulating material.

During a dry test of the insulator shown in Fig. 1, no arc between the trolley wire and suspension took place until

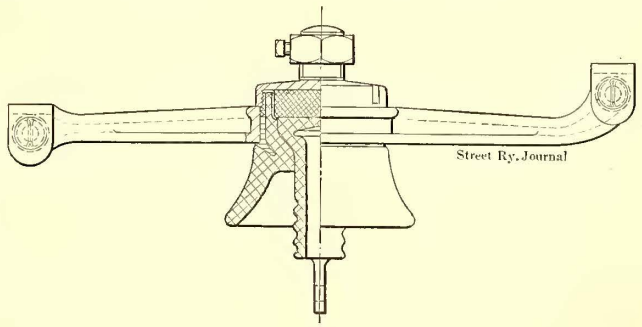



FIG. 2.—DOUBLE-CURVE HANGER

reaching the potential of 48,000 to 50,000 volts at 50 cycles; and in an artificial rain there was no arc until the potential exceeded 20,000 volts. When tested for mechanical strength, the insulators showed that they were capable of standing a vertical strain of 2500 kg (5500 lbs.) without any other deformation than a light bending of the suspension arms. After this test the insulator was subjected to 20,000 volts for half an hour, yet no electrical defects were discovered.

When these insulators are to be used with 12,000 to 15,000 volts supporting insulators are bolted to the bracket arm 1

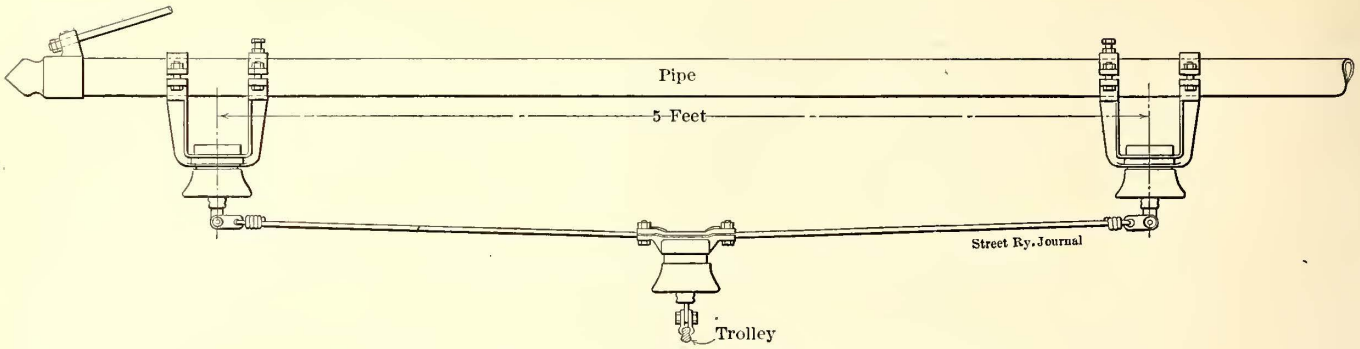



FIG. 3.—BRACKET CONSTRUCTION FOR TROLLEY LINES USING 10,000 VOLTS OR OVER

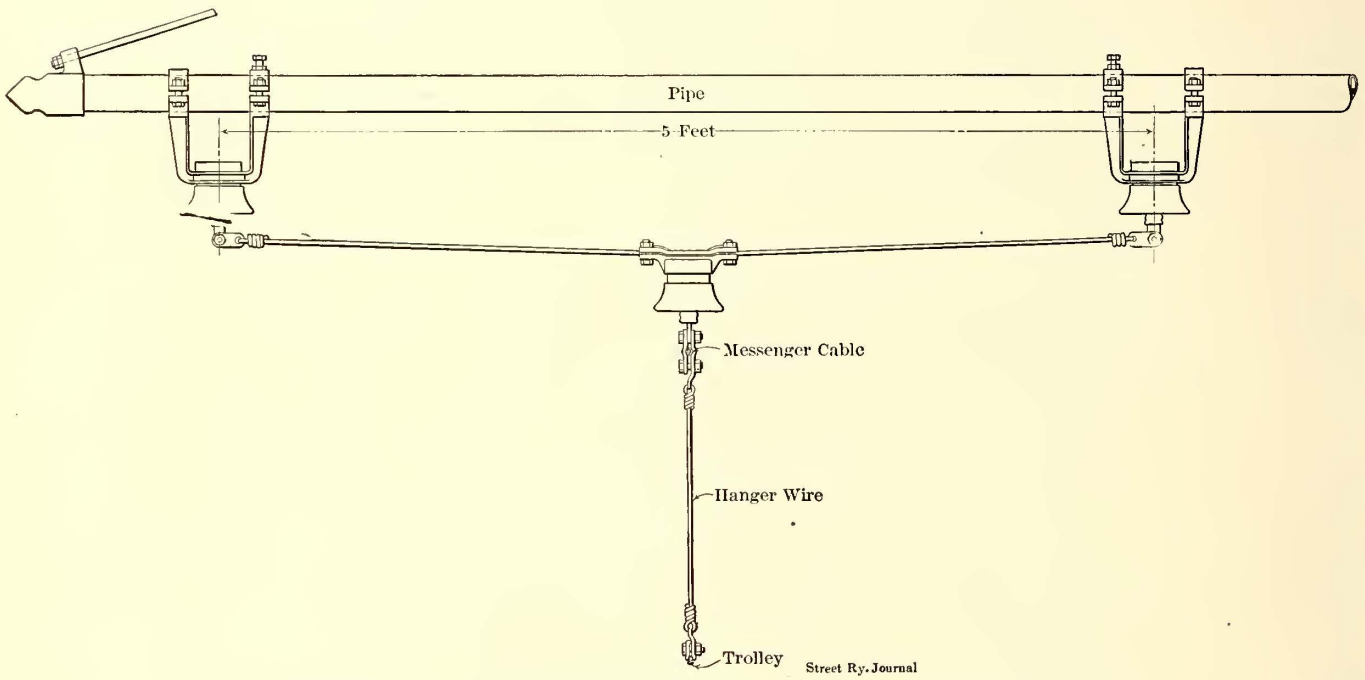



FIG. 4.—CATENARY CONSTRUCTION FOR STRAIGHT TRACK AND HIGH POTENTIALS

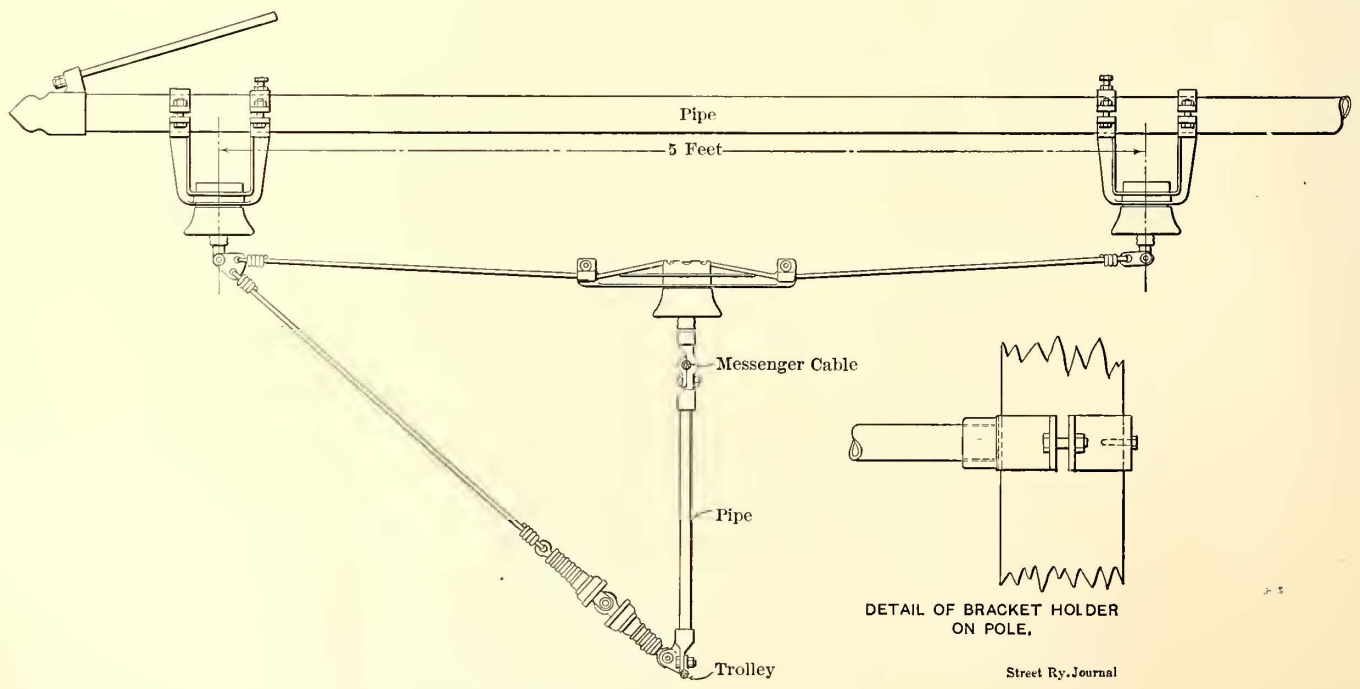



FIG. 5.—CATENARY CONSTRUCTION FOR CURVES AND HIGH POTENTIALS

meter to 1½ meters (3 ft. 3 ins. to 5 ft.) apart. As shown in Fig. 3, a span wire is then connected to the lower end of the bolts of the side insulators and the trolley insulator hung from its center. The suspension is therefore flexible, but the insulation is quadruple, since each insulator in itself is doubly insulated. Mechanical injury to the bolt would still leave

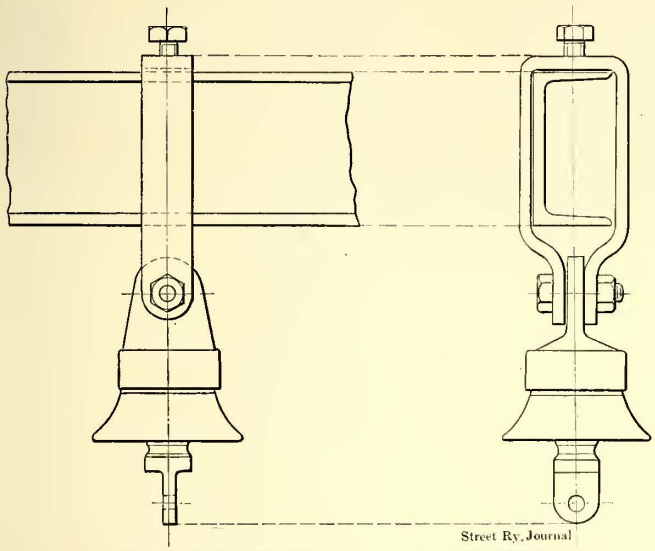



FIG. 6.—HINGED SUPPORT FOR HANGER

the insulating bell unimpaired, and vice versa. For potentials under 10,000 volts, a less elaborate arrangement than this is sufficient.

Similar construction is used for curves, except that the insulator to hold the curve is so constructed that it can not slide on the span wire. This method may also be used for catenary construction, in which event the lower end of the trolley insulator bolt is furnished with a clamp for the messenger cable, and the trolley wire is then suspended in the usual manner as shown in Fig. 4. To prevent the trolley wire from getting out of position at curves, the hanger wire is replaced by a piece of pipe the lower end of which is connected by a guy wire and strain insulators to the insulator on the outer side of the curve. This arrangement is shown in Fig. 5.

Fig. 7 shows a construction for catenary lines having a trolley voltage of 1000 to 5000 volts, where but one insulator is needed. In this case the insulator can be attached directly to the bracket or cross-arm. The clamp for the messenger wire is on the lower end of the insulator bolt. In this instance it is not necessary to have a flexible suspension for the trolley wire, as the connection of the latter to the catenary is such that bow-type current collectors will have no difficulty in maintaining contact. For these lower potentials a somewhat smaller insulator is used. The construction differs from the others only in the manner of hanging, which allows a double movement of the trolley wire. For instance, as shown in Fig. 6, the bell may be so made that the insulator can swing toward the trolley pole, and the flat construction of the insulator bolt allows movement in the direction of the trolley wire. This turning power of the insulators reduces the strains on the overhead line at high speeds.

Insulators of this type are now in use on the experimental high-tension direct-current line of the Vienna City Railway, which was described in the STREET RAILWAY JOURNAL of Nov. 3, 1906.

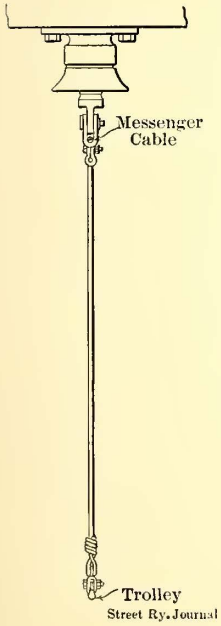
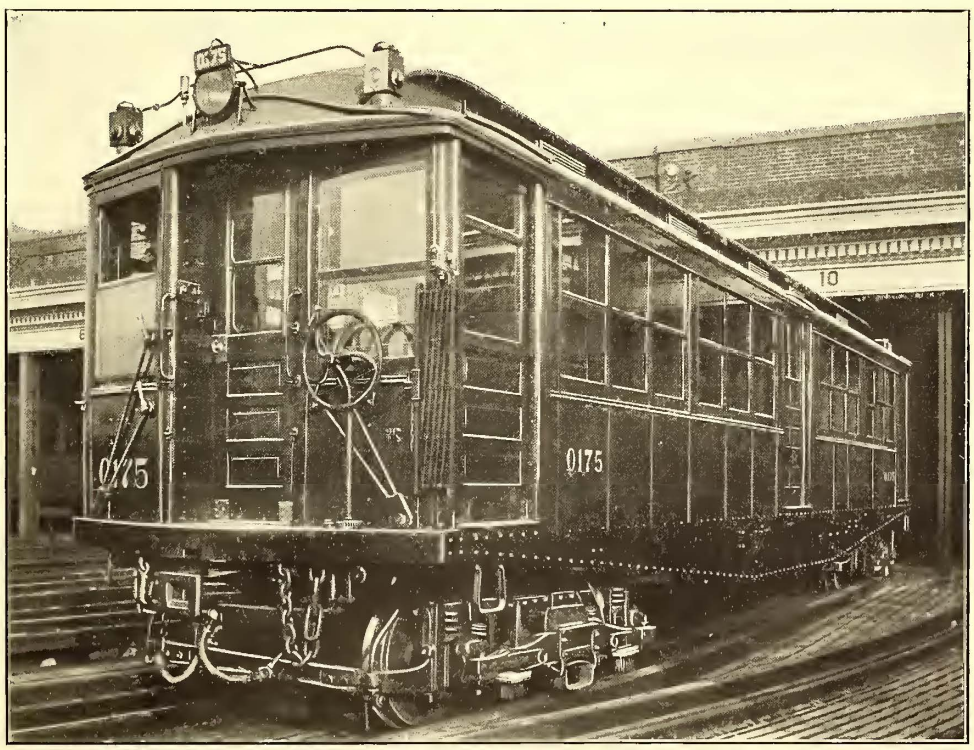



FIG. 7.—CATENARY CONSTRUCTION FOR VOLTAGES BETWEEN 1000 AND 5000

## NEW CAR EQUIPMENT FOR THE BOSTON ELEVATED RAILWAY COMPANY

Forty-five new elevated cars, embodying the latest developments in the construction of steel passenger coaches, will shortly be placed in service on the lines of the Boston Elevated Railway Company. The new cars are being built by the Pressed Steel Car Company, and each is to have pneumatically-operated doors, one door being at each end with one in the middle of each side; a motorman's cab in the right-hand corner of each end, made of a combination of swinging doors, separate from the car doors; pantagraph gates, fire-




EXTERIOR VIEW OF STEEL CAR FOR BOSTON ELEVATED

proof floors, sides and vestibules. Each car is to be equipped with two General Electric "68" motors, two Brill trucks, General Electric type M automatic control, and Westinghouse electro-pneumatic brakes with graduated release and quick recharge features. One of these cars was exhibited at the Columbus Convention, but technical details will be of interest.

The new cars are of the "easy access" type, 46 ft. 7¼ ins. long over platforms, 8 ft. 7 ins. wide over the sheathing and 9 ft. 5 ins. high from the bottom of the sill to the top of the roof. The middle side doors are 3 ft. 4 ins. wide and the end side doors are 33 ins. wide. The seating capacity is forty-eight passengers.

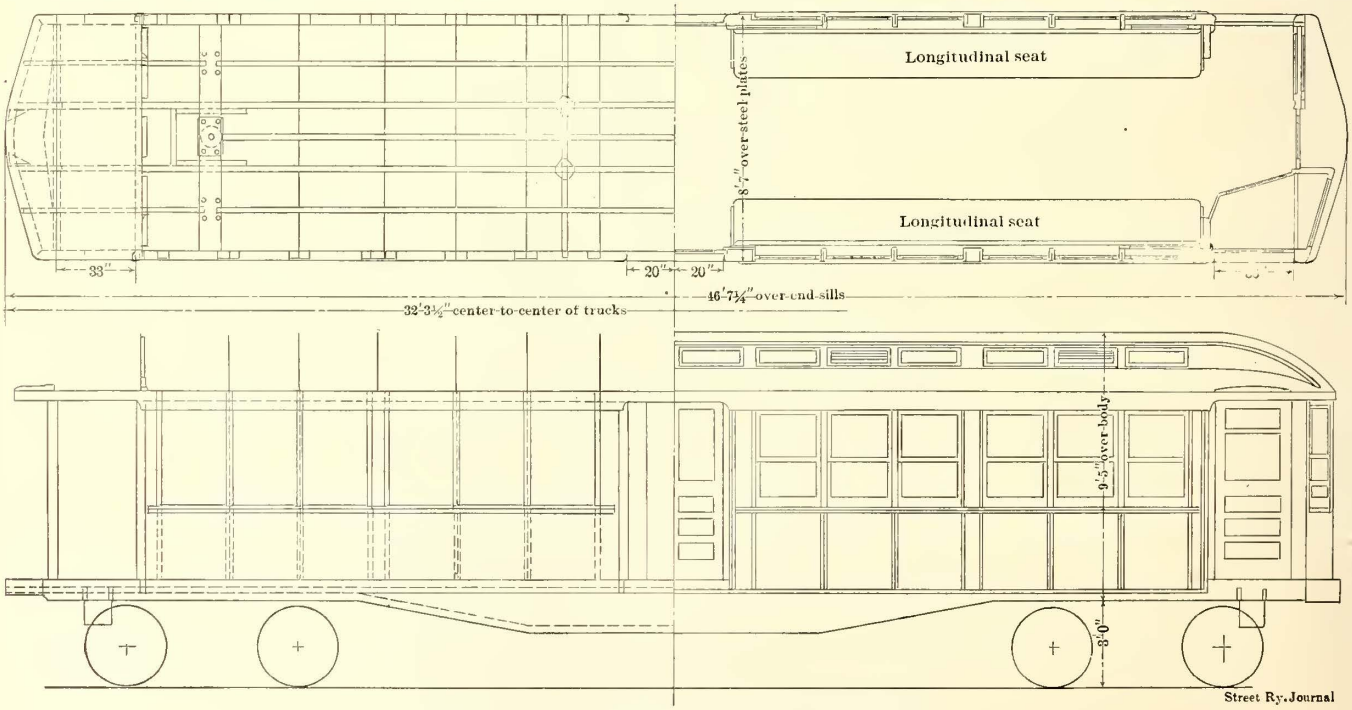
The approximate weight of each car body is 26,000 lbs. The underframes are built entirely of steel, with side sills of special design. The center sills are built of 9-in. channels and the end sills are of steel. Each end of each car is provided with anti-telescoping plates on the top and bottom of the platform supports. All the posts are of steel and the double post section is made of T's, while corner and door posts are made of special shapes of pressed steel. A place is provided in the window posts in the rear end and side door pockets to receive an air cylinder for the operation of side doors.

The window sills are made of steel of special shapes, and the bracings and panelings of the double posts are of steel.


INTERIOR VIEW OF BOSTON ELEVATED CAR

diate rafters are built of wood. The roof covering consists of ½-in. tongued and grooved whitewood, covered with cotton duck laid in a thick paste of white lead and linseed oil. There are eight copper gutters, one at each end over the hood, one over each side door and one over each side of each end platform, strengthened by a steel wire running the full length of the top of the gutter. Vestibules are constructed in the same manner as the car body, all uprights and cross material being of structural and pressed steel. The vestibule ceilings are made of steel, with an overhead pocket lined with transite, for the reception of switches. Each car is equipped with Perry copper ventilators. Vertical hand brake wheels are provided on the end of each car.

The pantagraph gates are constructed of 1-in. channel iron,




GENERAL ARRANGEMENT OF ELEVATED CAR

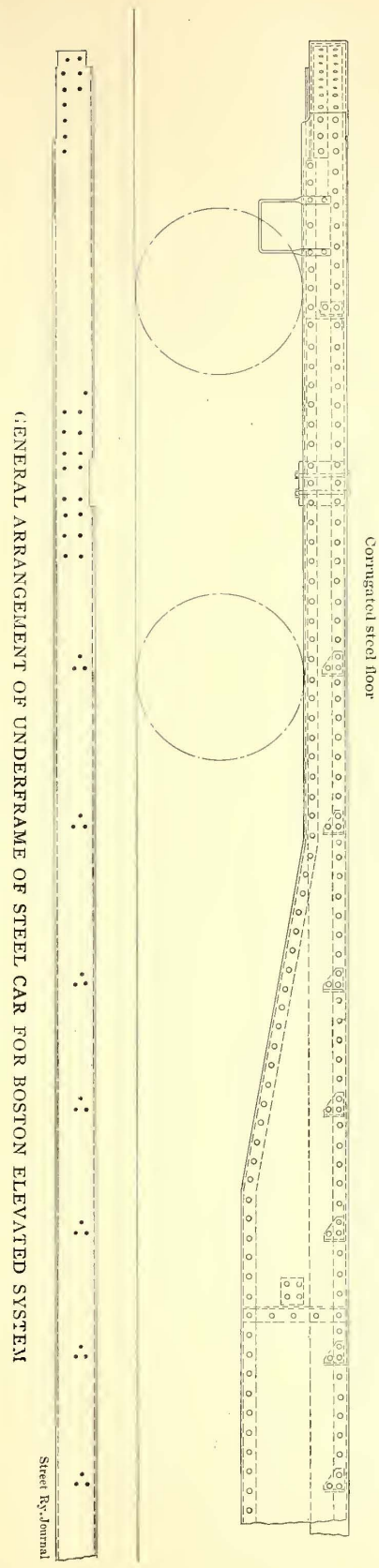
The main panels are made of steel ⅛ in. thick riveted to the structural framing, the joints being painted before the panels were placed. All steel paneling is made in cold rolled sheets, and the top plates are made of steel, each plate running the full length of the car. Roof supports are also of steel, rafters being shaped to form a camber in the roof. Interme-

and the gates are of sufficient height and length to permit easy opening when the car platforms swing on a reverse curve of 82 ft. minimum radius, and also under changes of grade. Draw-bars and couplers are of the Van Dorn pattern, the sector bar being curved and made of ½-in. x 4-in. x 3-in. angle-iron, according to the Boston Elevated standards, and the draw-bars are of sufficient length to permit of full swing on 82-ft radius curves. The center plates are similar to the center plates of the company's standard, except where they fit the steel underframe, with a 1 13-16-in. hole drilled to receive the 1¾-in. king bolt.

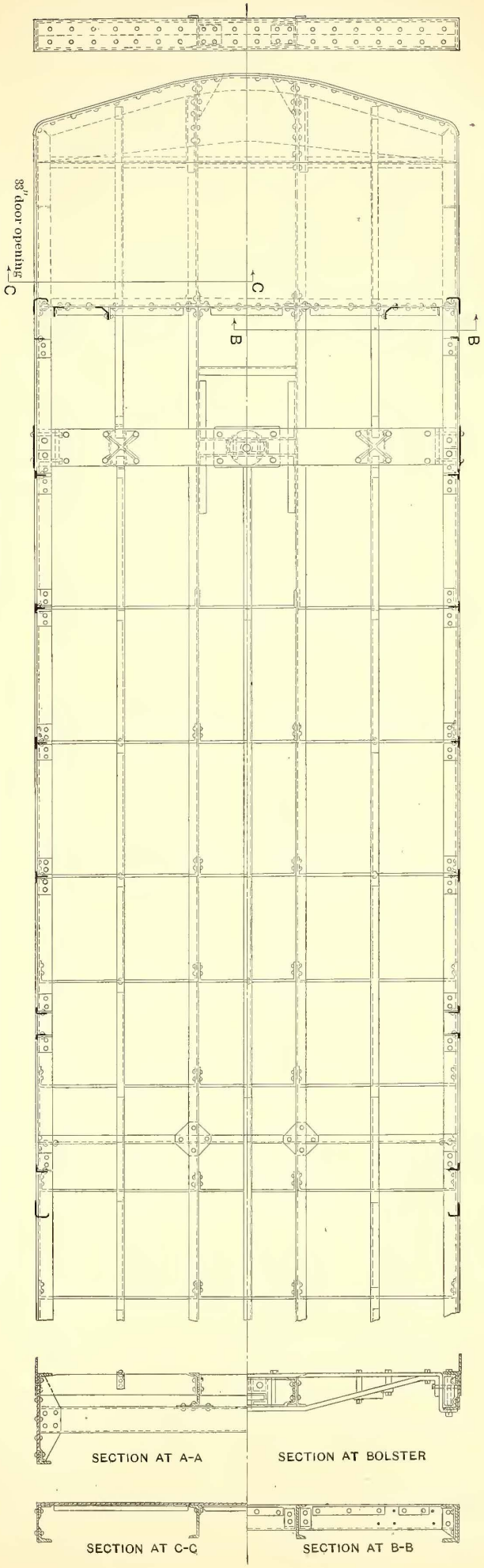
The doors are made of mahogany and are equipped with rubber stop blocks to prevent the breakage of glass and elastic strikers to prevent injury to passengers in case any part of the person should be caught between the door and the casing. The interior paneling under the windows, and the window casing and sashes are of steel, as are all the principal moldings and head linings. The only wood in the car, outside of the doors, is the floor mat. The doors are hung with Coburn's anti-friction door sheaves and fitted with bronze anti-rattlers at the bottom. There are no bulkhead doors in these cars, but there is a steel finish at each end of the longitudinal seats. The advertising moldings are steel, rabbitted to take care of 11-in. cards. Trimmings are, in the main, of solid bronze. Curtains are of double-faced Pantasote, mounted on 1-in. Hartshorn rollers. The aisle and seat widths are of the standard Boston Elevated dimensions.

The principal data and truck dimensions are:

Wheel base, 6 ft.; diameter of motor-truck wheel, 34 ins.; diameter of trailing-truck wheel, 31 ins.; height, top of center plate above rail, car not loaded, 34 ins.; above with car loaded, 31 ins.; weight of car body, complete with electrical and air-brake apparatus, 34,000 lbs.; weight on motor-truck end, 52 per cent; weight of load, 18,750 lbs.; journal dimensions, 4¼ ins. x 8 ins.; wheels, M. C. B. standard, with steel tires.




GENERAL ARRANGEMENT OF UNDERFRAME OF STEEL CAR FOR BOSTON ELEVATED SYSTEM



## EXECUTIVE COMMITTEE OF ENGINEERING ASSOCIATION MEETS IN NEW YORK

A meeting of the executive committee of the American Street & Interurban Railway Engineering Association was held this week to draw up plans for the work of the association during the coming year and select subjects for the next convention. A comprehensive plan, covering all branches of the service, was decided upon.

The committee met at the Transportation Club in New York on Monday, Jan. 7, and the following members of the executive committee of the association were in attendance: President H. H. Adams, of Baltimore; Vice-President F. G. Simmons, of Milwaukee; F. H. Lincoln, of Philadelphia; F. N. Bushnell, of Providence; W. T. Dougan, of New York, and Secretary S. W. Mower, of London, Ont. By invitation Secretary B. V. Swenson, of the American Street and Interurban Railway Association; H. W. Blake, C. B. Fairchild, Jr., and F. W. Lane were also present.

President Adams referred to the excellent work accomplished by the committees last year, and said that he expected that a great deal could be accomplished in the same manner this year, and that he hoped for even better results. He also said that all legitimate expenses incurred by committees or their members in the future would be defrayed by the association. He then remarked that one very forceful suggestion in regard to the work of the coming year was contained in the address delivered by President Rhoades, of the Claim Agents' Association, before that body in Columbus. President Rhoades had referred to accidents which occur from different defects in car equipment, and it had been suggested that the Engineering Association might work in conjunction with the Claim Agents' Association, so that the latter would suggest points to be remedied and the former take up the actual methods of overcoming the troubles. The question of a joint meeting with the Claim Agents' Association during the 1907 convention was considered and the following resolution, introduced by Mr. Simmons, of Milwaukee, was passed:

> Whereas, there are many mechanical details in connection with the construction and operation of electric railways, which are of great importance to the claim agents of the various companies and regarding which they may desire to suggest alterations and improvements in present practice:
>
> Therefore, be it resolved, that the executive committee of the Engineering Association hereby expresses to the Claim Agents' Association its desire that this matter be given consideration at their discretion, and such suggestions made and such action taken as may seem desirable;
>
> And, be it further resolved, that in the opinion of the executive committee of the Engineering Association this matter should come up for comprehensive consideration at a joint meeting of the associations during the 1907 convention.

Mr. Lincoln, of Philadelphia, was appointed by President Adams a committee of one to take up this subject with Mr. Rhoades, and to report at the next meeting of the executive committee of the Engineering Association the best method of accomplishing the end in view.

Returning to the subject of papers, it was decided to ask Mr. Winsor, of Boston, to present a paper on gas engines in continuation of that read by him at the Columbus meeting. Such a paper could describe the experience of the present year with the gas-engine installation of the Boston Elevated Railway Company. Secretary Swenson announced that in the printed proceedings of the Columbus convention there would be an addendum, contributed by the author, to Mr. Winsor's paper on gas engines, giving the results of extended tests on the economy of the gas engines of the Boston Elevated Railway Company. The committee also voted to request W. W. Cole, general manager of the Elmira Water, Light & Railroad Company, to present a paper on the experience of that company with gas engines. Subsequent to the meeting Mr. Cole, who has made a very thorough study of the subject, consented to present this paper. Two papers on the subject of steam turbines were also decided upon. One of these will be presented by one of the engineers connected with the Philadelphia Rapid Transit Company, and F. H. Lincoln of that company was appointed a committee of one to arrange with his engineering department for its preparation. This paper will take up the subject of the practical operation of steam turbines, of which a great many types are in use by the Philadelphia Rapid Transit Company, including high and low-pressure, vertical and horizontal. It was also decided advisable to endeavor to secure a paper on the theory of the steam turbine, and Messrs. Swenson and Simmons were appointed a committee to secure such a report if possible from some high engineering authority on the subject.

The next subject of discussion was the question of standardization. The following were appointed the committee for the coming year: H. H. Wallerstedt, chairman; H. A. Benedict, of Albany; W. H. Evans, of the Indiana Union Traction Company; H. B. Fleming, of Chicago; J. M. Larned, of Pittsburg; H. W. Blake, of New York, and C. B. Fairchild, Jr., of Cleveland. The president stated that it was the earnest wish of the association that the committee on standardization should prosecute its work very diligently during the coming year and should arrive, if possible, at definite recommendations at least in regard to certain parts of car equipment.

The next subject discussed was that of track construction, and President Adams announced the appointment of the following committee, which was ratified by the executive committee: F. G. Simmons, of Milwaukee, chairman; Thomas K. Bell, of Philadelphia, and C. A. Alderman, of Cincinnati. Mr. Simmons, chairman of the committee, was asked to outline his views on the work of the way committee for the coming year. In reply he stated that he expected to be able to secure a paper which would cover the care of roadbeds and right of way for both urban and interurban lines. This paper would consider such branches of the subject as sprinkling, removing weeds, painting poles and other questions relating to the up-keep and general appearance of the roadbed. W. T. Dougan, engineer of maintenance of way of the New York City Railway Company, agreed to prepare a paper on "Rails and Rail Joints in New York City." It was also decided to commence an investigation of the subject of rail corrugation. Mr. Simmons reported that in Milwaukee the corrugations would appear in certain sections of track for a distance of two or three blocks and would not occur in other sections of track used under apparently similar conditions and laid with rails which were procured from the manufacturers at the same time and which were presumably rolled on the same day. Mr. Dougan reported that the corrugations in New York appeared principally on rails adjoining track intersections. Secretary Swenson was requested to secure information from the different railway companies in the association which had experienced trouble with corrugation, and the chairman of the way committee agreed to prepare for Secretary Swenson a list of questions on this subject to be included in a data sheet to be sent to the members. The way committee was also requested to secure data for presentation at the 1907 convention in regard to concrete ties, and to

investigate the extent to which these ties were being used or tested by steam railroad companies.

The following committees were then appointed: Committee on Control—J. S. Doyle, chairman; G. J. Smith, of Kansas City, and P. N. Jones, of Pittsburg. Committee on Maintenance and Inspection of Electrical Equipment—E. T. Munger, of the West Side Elevated Railway, Chicago, chairman; John Lindall, of Boston; W. D. Wright, of Providence, and L. L. Smith, of Schenectady.

R. B. Stearns, general manager of the Chicago & Milwaukee Electric Railway Company, of Highwood, Ill, was appointed the nominee of the association for the insurance committee.

The next, and final, subject for discussion at the 1907 convention was that of rolling stock. The first topic considered was the question of car cleaning, but as this duty related so closely to the operating department the association requested Secretary Swenson to inquire of the executive committee of the American Street and Interurban Railway Association whether in its opinion the subject lay within the province of the Engineering Association. Two other subjects were then selected for consideration at the next convention and committees were appointed to take up a study of them. The first related to the storage of cars in the open or under roof, and the committee appointed was: E. W. Olds, of Milwaukee, chairman; Martin Schreiber, of Newark, N. J.; John Hanf, of Buffalo. The second related to the design of operating and storage houses, and the committee appointed to study this subject was: F. N. Bushnell, of Providence, chairman; R. C. Taylor, of the Indiana Union Traction Company, and Nelson W. Graburn, of Montreal. It was decided to ask the technical press to co-operate with this latter committee in the preparation and publication of a series of plates illustrating the latest designs in car-house construction.

The final subject considered was that of the date of meeting. It was the consensus of opinion of the committee that the first meeting should be held on Monday afternoon of the convention week and that succeeding sessions should be held on the following mornings and afternoons until the convention was over. It was agreed with Secretary Swenson, of the American Association, that all the papers should be in his hands for printing by July 1.

The meeting then adjourned.

## CREATING WINTER PLEASURE TRAFFIC ON THE WORCESTER & HOLDEN STREET RAILWAY

How a management can develop a successful business on its line during the dull winter season has been demonstrated by the Worcester & Holden Street Railway, running from Worcester out through Holden to Jefferson, Mass. Two winters ago the superintendent of the road, Albion B. Clapp, decided to try the experiment of a real winter toboggan slide made from snow and ice as an attraction for traffic during the months when traffic is usually lowest. Mr. Clapp was confident of the financial value of the slide, and built it as a private affair. Its success was immediate, and it has since proved extremely popular, drawing a large patronage to the road on the very coldest winter days and nights. The normal traffic of the road has been more than doubled, and besides adding to the profits of the company does much good in the form of advertising.

The slide is located in Jefferson near the end of the road on the side of a steep hill which descends at an average grade of 20 per cent for 500 ft., then for a distance of 300 ft. runs up grade to the banks of Eagle Lake, where the slide drops very abruptly to the lake and the toboggan glides out over the ice for several hundred feet. It is a thrilling sport and its popularity was assured from the start. The railway company supplies the power for numerous lights. As many go to look on as to participate in the fun.

After the trenches are put in condition, the expense of maintenance is not large. Car men are ready to put in a little extra time at the starting platform and can always be secured at short notice. One man on each slide is needed

AT THE HEAD OF THE DOUBLE TOBOGGAN SLIDE

to load up and send away the toboggans—they being started not nearer than fifteen seconds apart.

The toboggans are rented out at a small charge per hour, and in spite of the opportunity for deception no trouble is experienced in getting in all the money. A large rough building at the head of the slide was built as a storeroom for toboggans and is used also as a lunch room. The slide is about 1600 ft. in length and very fast, but no serious accidents have occurred.

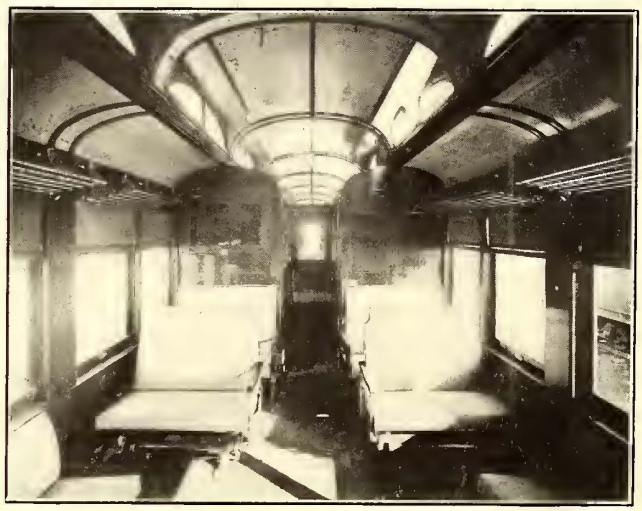
As a drawing card for traffic nothing better has been offered, for on the coldest nights, with the thermometer below zero, hundreds come out to try the sport. It is of

IN FULL CAREER DOWN THE ROUTE

course only in the cold countries that a sport like this can be maintained, but where a trolley road can take advantage of the climatic conditions, the severity of the northern winter can be made a source of profit. The toboggan slide idea was originated by Mr. Clapp, to whom thanks are due for the information contained in this article. The illustrations are reproduced from two of the different styles of souvenir post cards sold by the company.

## SOME UNUSUALLY WIDE INTERURBAN CARS FOR A SOUTHERN ROAD

Some cars recently completed by the St. Louis Car Company for the Richmond & Chesapeake Bay Railway Company have several features which are radical departures from those usually encountered in interurban cars. The road upon which the cars will be operated at present extends from Richmond, Va., to Ashland, a distance of about 15 miles. Probably the most remarkable feature in the



INTERIOR OF RICHMOND & CHESAPEAKE BAY CAR, SHOWING ARRANGEMENT OF PARTITIONS

design of the cars is their extreme width. In fact, they measure 9 ft. 8 ins. over sills and 9 ft. 10 ins. over all. The over-all length is 54 ft. 1 in.

The cars are intended to be operated in trains and are provided with M. C. B. couplers and spring buffers. The passageway between the cars is protected by extension diaphragms similar to those employed on vestibule steam coaches. Half of the cars constructed were built with bag-


EXTERIOR OF RICHMOND & CHESAPEAKE BAY CAR

gage and passenger compartments and the remainder are straight passenger cars. The fact that the State laws of Virginia compel railway companies to provide separate compartments for white and colored passengers necessitated quite an unusual arrangement of the compartments of the passenger car. The car contains four compartments, two large ones and two smoking rooms. The smoking compartments are arranged opposite each other on either side of a narrow passageway near the center of the car. Entrance to each of them is gained through double swinging doors opening out into opposite ends of the narrow passageway. Each contains one long seat so placed that the passengers face the side windows of the car. A swinging door at the middle of the passageway separates the two sections of the car.

Another point in which a departure is made from ordinary practice is that the roofs of the cars are of tin instead of canvas as is usually found on interurban cars. The tin is laid on tongued and grooved poplar ceiling which is well leaded and the under side of the tin was painted before being soldered in place. The interiors are finished in inlay mahogany with semi-empire ceilings. The seats in the large compartments are the St. Louis Car Company reversible type with high backs and head rolls. The trimmings are of solid bronze.

## PROGRAM OF THE MEETING OF THE STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK HELD IN BUFFALO ON JANUARY 11

The quarterly meeting of the Street Railway Association of the State of New York, which was held at the Iroquois Hotel, Buffalo, on Jan. 11, as this issue was sent to press, was distinguished by the attention given to the subjects of track work and overhead construction. The papers on the program for the morning session were the following:

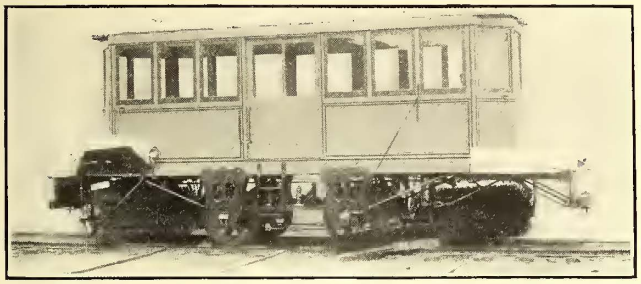
"Track Construction in Paved Streets," by I. E. Matthews, engineer maintenance of way of the Rochester Railway Company; "Concrete Stringers and Concrete Stringers with Ties and Steel Ties," by F. D. Jackson, superintendent of track of the International Traction Company, Buffalo, N. Y.; "Tie Plates, Braced Tie Plates and Tie Rods," by E. P. Roundey, superintendent of tracks of the Syracuse Rapid Transit Company; "Standard Rail Sections for Paved Streets," by C. Gordon Reel, vice-president and general manager of the Kingston Consolidated Railroad Company; "Thermit Welding of Rail Joints," by M. J. French, engineer maintenance of way of Utica & Mohawk Valley Railway Company; "Electric Welding of Rail Joints," by an engineer connected with the maintenance of way department of the Rochester Railway Company. These papers were to be followed by a general discussion on "Derailing Devices."

It was planned to take up the following papers during the afternoon session: "Rail Bonds," by H. L. Mack, superintendent of line of the International Traction Company; "Center-Pole Construction," by F. A. Bagg, chief engineer of the Fonda, Johnstown & Gloversville Railroad, and "Span and Catenary Construction," by B. Penoyer, engineer of track and roadway of the Schenectady Railway Company. A full report of the convention, including the papers read, will be published in the next issue of the Street Railway Journal.

The Oakland Traction Company is constructing twenty new 50-ft. electric cars which will be modeled after the California type of car, with cross seats such as are used on the Ellis Street lines in San Francisco. Work will also soon be commenced on twenty new 55-ft. cars with steel frame for the Haywards main line. Altogether seventy new cars were built for the company last year.

## AN AMERICAN SWEEPER FOR BELGIUM

Among the shipments for export made last month by the J. G. Brill Company was one of its sweepers for operation over the underground section of the Brussels Tramways, Belgium. This type of sweeper has met the conditions abroad equally as well as in this country, and the car in the present instance is the second of its kind to go to Brussels,

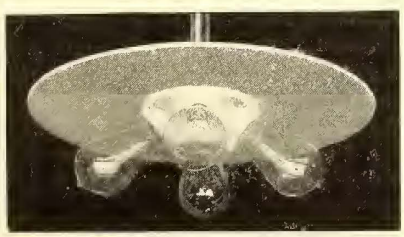


EXTERIOR OF THE SWEEPER FOR BELGIUM

its predecessor having been given a very thorough trial. The short brooms peculiar to this sweeper, which are set at an angle to throw the snow clear of the rails, and are capable of being set a little lower at the outer ends; the brush board and leveler clear away most of the snow in front of the wheels at the side opposite the front broom and also brush the snow still further away from the rails; the rear broom completes the work on that side of the car and leaves a clean track. It will be seen that the windows on all sides of the car enable the crew to keep a sharp lookout on all sides. The chief dimensions of the sweeper are as follows: Length over body, 21 ft., and over bumpers, 27 ft. 6 ins.; width over the side sills, 6 ft. 10¼ ins.; height over trolley board, 11 ft. 6 ins.; height to sills, 3 ft. 6 ins.; length of brush shear board, 3 ft. 2 ins.; length of wings, 2 ft.; weight without motors, 13,800 lbs. The regular truck for this class of service is employed, having a wheel base of 6 ft.

## FEW PART WIRELESS CLUSTER

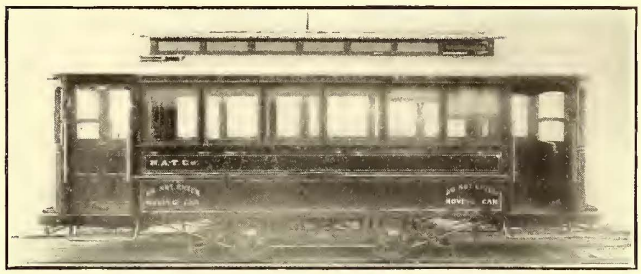
The few separate parts composing the Harter wireless cluster, manufactured by G. H. Harter, Chicago, are a strong recommendation for its use in electric car lighting. The body of this cluster consists of one piece. The sockets for the lamps and a short length of pipe for attaching the cluster to the ceiling are solidly embedded in an opal glass base by having these parts placed in the proper positions and then casting the glass around them. This construction assures against parts working loose from the jolting and jarring of the car. The only additional part composing the cluster is a bottom cap held in place by two screws. One of the terminal wires is soldered to the brass shells or lamp sockets while the other is carried around in a circle over the center of the bases of the sockets so as to form the center contact pieces. Aside from the advantages resulting from the one-piece construction this cluster has the added advantage that there are no exposed parts to tarnish. The opal glass, moreover, serves as an excellent reflector. The cluster is made in sizes varying from two to six lamps, and is furnished either with or without a shade.



WIRELESS CLUSTER

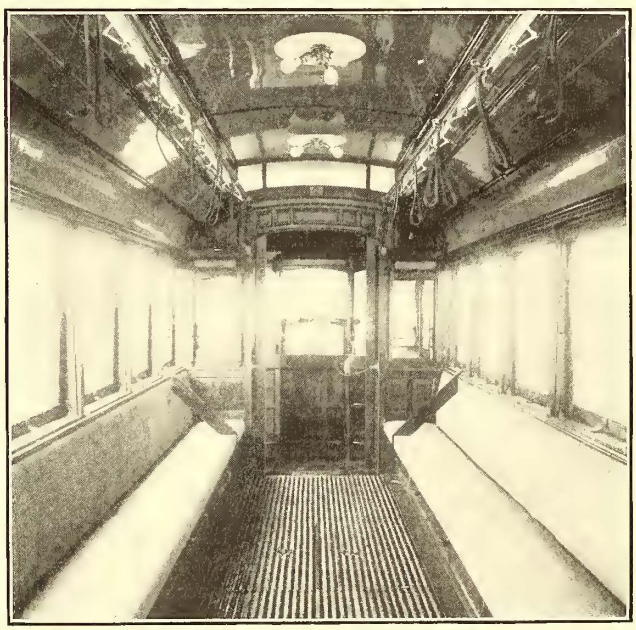
## NEW CARS FOR NORTHERN ALABAMA

A shipment of closed cars has been made from the works of the American Car Company for operation on the lines of the North Alabama Traction Company, of North Decatur, Ala. The conditions governing the distribution of traffic at Decatur are peculiar, the city being practically di-



EXTERIOR OF NORTH ALABAMA CAR

vided into five towns with a combined population of about 16,000. The point of transfer is in Central New Decatur at the new car house which has been completed recently; the main building is 90 ft. x 140 ft., with a 50-ft. x 140-ft. addition conforming to the street. At South New Decatur is located the company's amusement park, and the amusements are free. The new cars are of the drop-sash variety and are mounted on the No. 21-E single trucks with a wheel



INTERIOR OF NORTH ALABAMA CAR, SHOWING METHOD OF SEPARATING THE RACES

base of 7 ft. Two partitions are provided for the purpose of separating colored passengers from white. These partitions can be placed at any location desired, eyes being placed at each post and in a corresponding place under the seat for their reception. The interiors are finished in cherry. The chief dimensions are: Length over the end panels, 18 ft., and over the vestibules 28 ft.; width over the sills, 7 ft., and over the posts at belt, 7 ft. 8 ins.; the side sills are 3¾ ins. x 7 ins., and there is a sub-sill reinforced with 3½-in. x 6-in. angle iron; the end sills are 3½ ins. x 6 ins.; center sills, 3¾ ins. x 5¼ ins.

## FINANCIAL INTELLIGENCE

### The Money Market

Wall Street, Jan. 9, 1907.

There has been a decided change for the better in the local money market during the past week. The return to the banks of the moneys disbursed for interest and dividends on Jan. 1, the influx of funds from all parts of the country, and the substantial gain in cash by the banks on their operations with the Sub-Treasury, have been reflected in a freer offering of money by the local institutions, and a general lowering of interest charges on both call and time accommodations. As a result of these developments rates for day to day money fell sharply, while the premiums recently demanded for money for fixed periods have entirely disappeared. The easing off in rates for money at this time is perfectly natural, as the return flow of funds from the country usually assume large proportions after the first week in January, and the opinion prevails that the situation will continue to improve from now on. Flurries in call loan rates may be expected, but indications point to a further relaxation in the charge for time loans. The demand for the latter class of accommodation is extremely light, and there is a general disposition on the part of borrowers to hold off in the hope of getting better terms in the near future. Money for thirty days to four months is rather freely offered at 6 per cent, and while banks and other lenders offer six months' maturities at the same rate, they experience considerable difficulty in placing their funds on that basis. The sterling exchange market, after a period of extreme weakness, has recovered sharply, rates advancing to a point which prohibits the importation of gold from abroad. The European situation has been rather uncertain during the week. At the opening open market discounts at London receded sharply, and at times the quotation was fully 1 per cent below the official rate. Later, however, the market hardened perceptibly, owing to the shipment of gold to Brazil, and the indications of further heavy consignments of the yellow metal to Argentine and to Egypt.

The bank statement published on last Saturday was a disappointment. Instead of a handsome gain in cash, as predicted by the preliminary figures of the movement of currency, the banks actually sustained a loss of $402,100, and as the reserve required was $5,119,300 greater than in the preceding week, the surplus reserve was reduced to $147,825, which compares with a surplus of $571,000 in the corresponding week of 1906, and a surplus of $11,608,250 in 1905.

### The Stock Market

The stock market experienced considerable improvement immediately after the turn of the year, which was stimulated chiefly by the better monetary conditions. The great majority of bankers had not expected call money rates to approach anything like ease until about the middle of January at least, and consequently when toward the end of last week rates fell to around 6 per cent, the stock market took on an appearance of decided strength. The rate for fixed date accommodations likewise experienced pronounced relaxation, falling to 6 per cent for all periods by the middle of the current week, or from 1 to 1½ per cent under the rates prevailing a week previously. Such developments of an unexpectedly favorable nature in the money market gave rise to a moderate bull campaign in stocks, which lasted several days. At the outset of the current week, however, monetary conditions again became unsettled, call rates running up to 10 and 15 per cent, and this induced a material reduction in the commitments of the bull contingent, and a consequent pronounced reaction in security prices.

The investigation of the Harriman lines by the Interstate Commerce Commission, which is now under way, is also beginning to create some uneasiness in financial quarters. Anticipation of further revelations not altogether of a nature calculated to inspire confidence, has made many large speculators timid about committing themselves heavily on the long side of the stock market, while investors are inclined to wait for further developments before purchasing. The renewed tension which developed in the money market this week, particularly in call funds, was not regarded by leading banking interests as indicative of a continuation of such rates for a prolonged period. As pointed out above, time money has fallen to 6 per cent, and currency is finding its way back to New York in large volume from the interior. Within another week it seems entirely probable that the bulk of the money disbursed in connection with the Jan. 1 settlements will have found its way back to the regular money market channels, and rates become consequently easier.

The most important development in the local traction situation was the decision of the Court of Appeals, handed down Tuesday, confirming the right of the Brooklyn Rapid Transit Company to charge a 10-cent fare on its lines to Coney Island. This decision settles a dispute which arose last summer and which caused no end of annoyance, both to the company and the traveling public. Needless to say the stockholders of the Brooklyn Rapid Transit Company are much gratified at the ruling of the Court of Appeals. In connection with pronounced strength which developed in Brooklyn Rapid Transit stock recently the old rumors were revived that a dividend would soon be declared upon this issue, but were not generally credited. Marketwise the stock of the Interborough-Metropolitan Company has been rather more active than usual on intimations from representatives of the company that the earnings are of a very satisfactory nature. The plans for new subway connections are also maturing slowly.

### Philadelphia

Trading in the local traction issues was only moderately active during the past week, and although prices moved with more or less irregularity the net changes for the week were confined to the small fractions. Philadelphia Rapid Transit continued to lead the group both in points of activity and price fluctuations. In the early dealings the stock was pressed for sale, which resulted in a decline to 20¼, but later on buying by commission houses brought about an advance to 22½. At the close, however, the selling was resumed, and the price yielded to 21. About 10,000 shares changed hands. Union Traction was fairly active, but the stock moved in sympathy with Philadelphia Rapid Transit. From 59 at the opening there was a gradual rise to 60, but at the close transactions were made at 59¼. Upwards of 1000 shares were dealt in. Norfolk & Portsmouth Traction was an exceptionally strong feature, the price advancing from 27½ to 30, on light transactions. Consolidated Traction of New Jersey, after selling at 74, ex the dividend, rose to 75. Other sales included American Railways at 51, Philadelphia Company common at 48¼ and 48, preferred at 48, Railways General at 6½, United Companies of New Jersey at 252¼ and 252, United Traction of Pittsburg preferred at 49, and Lehigh Valley Transportation preferred at 24.

### Baltimore

There was a decided improvement in the traction issues in the Baltimore market. United Traction securities were in better demand, and consequently prices moved up fractionally. The 4 per cent bonds sold to the extent of about $70,000 at 90 and 90¼, and upwards of $75,000 of the incomes changed hands at from 58½ to 59¼. The funding 5s were quiet but firm, about $8,000 selling at 86¾ and 86½. United Traction free stock brought 13½, and the certificates sold at 14. Other transactions were: Augusta Railway & Electric 5s at 101¼, City & Suburban 5s at 108¼, North Baltimore 5s at 115, Norfolk Railway & Light 5s at 97 and 97½, and Charleston Consolidated Electric 5s at 94. Hambleton & Company, in their letter of Jan. 5, say that as prices are very low it is to be hoped and almost anticipated that there will soon be a better market with greater activities and an improvement in values.

### Other Traction Securities

The Chicago traction issues were extremely quiet during the week, but prices generally improved fractionally. Chicago Union Traction common sold at 5¼ and 5½ for a few hundred shares, and North Chicago moved up from 38 to 40 on the exchange of about 500 shares. Metropolitan Elevated common advanced from 26¼ to 27, and the preferred stock sold at 69½. Northwest Elevated brought 25¼ and 25, and South Side sold at 90. In the Boston market more or less irregularity accompanied the dealings. Boston Elevated, after selling at 152, dropped to 151 on light trading. Massachusetts Electric common, after an early decline to 17, advanced to 19, and then reacted again to 17½, and closed at 18. The preferred sold at prices ranging from 67 to 68½. Other sales were: Boston & Suburban at 12½, Boston & Worcester at 28¾ and 28½, preferred at 78; West End common at 92, and the preferred at 109 and 108.

Owing to the decision of the United States Supreme Court on the Central and Quincy Avenue franchises, it was expected that there would be a break in the stock market on Cleveland Electric securities, but in this all were mistaken. The bids were a little lower, but offerings held steady at 66. For some time owners have asked from 66 to 67 for this stock, and the fact that these franchise decisions have gone against the company seems to make little difference. Altogether, there has been but little trading in tractions the past week.

### Security Quotations

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

| | Jan. 2 | Jan. 9 |
|---|---|---|
| American Railways | 51 | 51 |
| Boston Elevated | 150 | 150 |
| Brooklyn Rapid Transit | 78¼ | 81⅞ |
| Chicago City | 150 | 160 |
| Chicago Union Traction (common) | 5½ | 5¼ |
| Chicago Union Traction (preferred) | 18 | 17½ |
| Cleveland Electric | — | 61⅝ |
| Consolidated Traction of New Jersey | 76 | *75½ |
| Detroit United | — | 80 |
| Interborough-Metropolitan | 35¼ | 36½ |
| Interborough-Metropolitan (preferred) | 73½ | 73¾ |
| International Traction (common) | — | a63 |
| International Traction (preferred), 4s | — | 82½ |
| Manhattan Railway | 140¾ | 143¼ |
| Massachusetts Electric Cos. (common) | 17¾ | 19 |
| Massachusetts Electric Cos. (preferred) | 68 | 68½ |
| Metropolitan Elevated, Chicago (common) | 26 | 27½ |
| Metropolitan Elevatcd, Chicago (preferred) | 69½ | 69½ |
| Metropolitan Street | — | 105 |
| North American | 87¼ | 87¾ |
| North Jersey Street Railway | 40 | 40 |
| Philadelphia Company (common) | 47¾ | 47¾ |
| Philadelphia Rapid Transit | 20⅛ | 20⅛ |
| Philadelphia Traction | 96¼ | 95¾ |
| Public Service Corporation certificates | 67 | 67 |
| Public Service Corporation 5 per cent notes | 96 | 96 |
| South Side Elevated (Chicago) | 89 | 89 |
| Third Avenue | — | 120 |
| Twin City, Minneapolis (common) | 102½ | 107 |
| Union Traction (Philadelphia) | 59 | 59⅛ |

* Ex-dividend. a Asked.

### Metals

Statistics collected by the "Iron Age" show that the output of coke and anthracite furnaces was 2,236,153 tons in December, as compared with 2,187,665 tons in November. The production of the steel works furnaces has broken all records, having reached 1,463,035 tons in December. Scarcity of spot iron is still a marked feature in all of the leading pig iron markets, and promises to continue so for some time unless transportation facilities improve very materially.

Copper metal continues strong, with Lake quoted at 24 and 24½c., electrolytic at 23¾ and 24¼c., and castings at 23½ and 24c.

## DECISION IN DENVER FRANCHISE CASES

The case of the franchises granted at last spring's election to the Denver Gas & Electric Light Company, the Denver City Tramway Company and the Northwestern Terminal Company were practically settled finally in favor of the companies when the Supreme Court of Colorado handed down a decision Jan. 7, to the effect that the County Court had no jurisdiction to try cases in which validity of franchises is contested. The court held that no charter of the city and county of Denver could confer such jurisdiction.

## IMPROVEMENTS AT OMAHA

From 6 to 10 extensions in Omaha with a total of from 10 to 20 miles of new rails and two new interurban lines, one of which is to be 25 miles long, is the work decided by the board of directors of the Omaha & Council Bluffs Street Railway Company at its annual meeting held recently in New York. This announcement was made by C. W. Wattles, vice-president of the company, upon his return from New York. At this meeting the directors decided to make an application for the contemplated work, which will also include $250,000 for the increase in the power plant and the building of the four substations, one at Benson, one at Florence, one at Bellevue and a portable one at Lake Manawa. The matter of deciding the routes for the new lines is left to a committee of the local directors who, with engineers, will go over the ground. The company also will enlarge its car shops so it will in time be able to build its own cars.

## CHICAGO "L" FIGURES

All the Chicago elevated railroads made traffic records in the year 1906. The Metropolitan led. The Northwestern had a big year, with an increase of 7.33 per cent. The South Side elevated did not do so well, owing to increased competition from the Chicago City Railway.

METROPOLITAN ELEVATED

| | 1906 | 1905 | Increase | Per Cent |
|---|---|---|---|---|
| January | 129,730 | 116,013 | 13,717 | 11.28 |
| February | 135,570 | 121,177 | 14,393 | 11.90 |
| March | 138,169 | 124,853 | 13,316 | 10.66 |
| April | 137,477 | 124,946 | 12,481 | 9.98 |
| May | 136,735 | 125,164 | 11,571 | 9.24 |
| June | 133,974 | 124,569 | 9,415 | 7.55 |
| July | 123,370 | 113,578 | 9,792 | 8.69 |
| August | 123,512 | 116,395 | 7,117 | 6.11 |
| September | 126,975 | 124,427 | 2,548 | 2.05 |
| October | 142,671 | 131,990 | 10,681 | 8.09 |
| November | 152,471 | 132,276 | 20,195 | 15.26 |
| December | 155,790 | 136,789 | 19,001 | 13.89 |

NORTHWESTERN ELEVATED

| | 1906 | 1905 | Increase | Per Cent |
|---|---|---|---|---|
| January | 81,191 | 73,728 | 7,463 | 10.12 |
| February | 83,572 | 78,773 | 4,799 | 6.09 |
| March | 85,154 | 80,500 | 4,654 | 5.78 |
| April | 84,224 | 79,779 | 4,465 | 4.98 |
| May | 81,748 | 77,863 | 3,885 | 4.98 |
| June | 80,165 | 75,837 | 4,328 | 5.70 |
| July | 73,308 | 67,488 | 5,820 | 8.62 |
| August | 73,176 | 68,938 | 4,238 | 6.14 |
| September | 77,508 | 74,307 | 3,201 | 4.30 |
| October | 88,384 | 80,642 | 7,702 | 9.55 |
| November | 93,238 | 83,597 | 9,641 | 11.53 |
| December | 94,904 | 87,199 | 7,705 | 8.84 |

SOUTH SIDE ELEVATED

| | 1906 | 1905 | Increase | Per Cent |
|---|---|---|---|---|
| January | 92,406 | 84,659 | 7,747 | 9.03 |
| February | 95,077 | 88,173 | 6,904 | 7.83 |
| March | 95,466 | 91,384 | 4,082 | 4.46 |
| April | 95,756 | 91,901 | 3,855 | 4.19 |
| May | 97,159 | 89,971 | 7,188 | 7.99 |
| June | 101,770 | 93,941 | 7,829 | 8.33 |
| July | 92,976 | 85,272 | 7,704 | 9.03 |
| August | 88,539 | 85,288 | 3,251 | 3.81 |
| September | 89,749 | 89,022 | *727 | *0.81 |
| October | 93,577 | 92,824 | 753 | .07 |
| November | 94,281 | 92,156 | 2,125 | 2.30 |
| December | 95,212 | 97,495 | *2,283 | *2.34 |

* Decrease.

## SUPREME COURT DECISION IN THE CLEVELAND CASE—OTHER MATTERS

The United States Supreme Court rendered a decision on Monday, Jan 7, to the effect that the franchises of the Cleveland Electric Railway Company on Central and Quincy Avenues and a portion of Erie Street, in Cleveland, expired March 22, 1905, affirming the decision of Circuit Judge Tayler, of Cleveland, in an injunction case of the Cleveland Electric against the city and the Forest City Railway Company.

Anticipating that the franchises would expire on March 22, 1905, the City Council gave the Forest City Railway Company a franchise on these streets, in the shape of a renewal of the old franchises. The Cleveland Electric at once brought suit to prevent the city and the new company from interfering with its property on these thoroughfares. Judge Tayler decided that the franchises expired as the city claimed, but that the grant made the Forest City was invalid, since a franchise granted one company cannot be renewed in favor of another. It was also shown that the Cleveland Electric had property rights in the streets and no provision was made in the franchises for taking care of them. In other words, the new company had no right to take possession of the Cleveland Electric's tracks, poles and wires and use them, without proper compensation which must be agreed upon.

The text of the decision of the Supreme Court was not given out. The opinion was delivered by Judge Peckham, and is understood to be unanimous. However, the court held that the language of none of the ordinances presented for examination could be construed as constituting a system of the lines owned by the Cleveland Electric, or that all the lines should be considered as constituent parts of a whole. The Central Avenue line is held to be an independent line and not a portion of the Euclid Avenue line. Its franchise expired on March 22, 1905, and not at the date of the expiration of the Euclid Avenue line. It is also held that the obligation of the company to maintain transfer relations with the Wilson Avenue line ends with the expiration of the franchise of the Central Avenue line. The decision indicates that the court meant to convey the idea that, whatever the language of the various ordinances, they could not be construed to mean that all the franchises of the company were extended to terminate on the same date, July 1, 1914. Where two constructions of the language of an ordinance are possible, the court holds, that the one which does not extend or enlarge the grant to corporations must be adhered to.

The court said that, whatever the language of the various ordinances, the city never intended to unite the lines owned by the Cleveland Electric Railway Company into a system, nor did the clauses that might have been added to them in the way of sleepers have that effect. Such things as may have been overlooked by the members of the City Council in franchises that have been granted must not be taken as opposed to the interests of the people.

The Cleveland Electric, however, cannot be compelled to surrender its property on these streets, nor be made to accept what the Council may fix as a value. It will be fully protected in this matter and possibly have plenty of time to take care of the property.

President Horace E. Andrews, of the Cleveland Electric, when asked for a statement on the situation by the Street Railway Journal correspondent, said that not much could be said at this time, as he had not received a copy of the court decision and knew what it contained only from what the daily press had printed. The course to be pursued by the company in the future, Mr. Andrews said, must yet be decided upon, after the officers know the full text of the decision. Mr. Andrews said further, that he had implicit faith in the people of Cleveland to give the company fair consideration, and he believed the question would yet be settled to the satisfaction of all. As to the reduced fare that had been offered, seven tickets for a quarter, he said it is as low as can be given and maintain any kind of service. According to a hasty comparison between the Cleveland system and that at Columbus, where the same rate obtains, it was found that in length of lines the Columbus system is about 60 per cent of that of the Cleveland system. He said that any addition to the lines there would greatly increase the cost of operation and make the possible profits less.

Since the suit was filed by the Cleveland Electric and taken to the Supreme Court, the Forest City Railway Company has received a second grant, covering the same streets. Owing to the fact that a suit is now pending in the local courts attacking the validity of all the grants the low-fare companies have received, charging that Mayor Johnson is financially interested in them, there may be little done in the way of attempted possession of the streets until this case is decided. It is before Judge Phillips this week, and the decision in the demurrer filed by the Forest City some time ago seemed to indicate that the final decision will be against the new companies. If these cases are carried up, it will be some time before a decision is reached.

A public meeting of the City Council has been called for Thursday afternoon, to which representatives of the Cleveland Electric have been asked to discuss the question of possession of the street, as well as the compensation that the company will be asked to pay for the use of the streets since the expiration of the franchises. It is said that there was an understanding that the company would be willing to pay something for this privilege if the case was finally decided against it, but there seems to be a difference of opinion on the matter.

It is said that the Low Fare Railway Company will ask for franchise extensions from the grants made to it two weeks ago that will cover Central and Quincy Avenues, in an endeavor to get around the financial interest question, but the Sumner Avenue injunction, which is being tried this week, will probably have something to do with determining the relation that this company bears to the Forest City and the Municipal Traction Company. Secretary Davies, of the Cleveland Electric, has given notice to the City Council that, as the franchises on Central and Quincy Avenues and East Ninth Street have expired, he desires to bid for them. This would indicate that the old company is not going to give up and it is possible that such a fare will be offered that the new companies will not be able to secure the streets after all. In point of fact, the companies stand now just as they did after Judge Tayler gave his decision. Neither of them has the right to use the streets covered by the decision.

Last week Judge Ford issued a temporary injunction against the Low-Fare Railway Company, to prevent the construction of tracks on Sumner Avenue, on which it had been granted a franchise by the City Council. In the application for this injunction the Cleveland Electric Railway Company made the charge that the franchise was granted through fraud and corruption, and that in acting on the matter, the City Council abused the incorporate powers of the city. The attorneys for the old company went to the City Solicitor's office and asked that suit be brought to annul the franchise granted the company, but this was refused. Then they proceeded to prepare their own suit. The injunction was served after about 500 ft. of single track had been laid on Sumner Avenue. Service was also secured on the city, as a party to the suit. The line on Sumner Avenue is intended to connect the tracks of the Forest City Railway Company on East Ninth Street and East Fourteenth Streets, and the work was begun just south of the Erie Street cemetery at the Fourteenth Street end. The Municipal Traction Company had the contract for doing the work at cost, with a certain percentage of profit added. This arrangement is taken to show the connection the Low Fare Company has with the Municipal Traction Company and the Forest City Railway Company, which the Cleveland Electric looks upon as one and the same thing.

The suit also marks the beginning of the fight against this newest company, which had not before been taken into account, but hereafter will be considered in line with the other two companies and will receive the same careful attention. It brings the company into court where it is probable that its hand must be shown, and if it happens that it was incorporated in order to circumvent court decisions and the effect of the Mayor's connection with the other companies, the effect will be weakening in all the cases that have been brought against them.

The hearing was set for Friday, but the court merely increased the bond of the Cleveland Electric and let it go over until Monday, when a new term of court began. An amended petition was filed by Judge Sanders, asking that depositions be taken to show whether or not the Municipal Traction Company and the Low Fare Railway Company are one.

An answer in the Cooper suit has been filed by the Municipal Traction Company and the Forest City Railway Company, in which it is stated that Mayor Johnson and the Low Fare Company, in which it is stated that Mayor Johnson and the Low Fare Railway Company have no interest in that suit, either direct or indirect, and that they have been improperly enjoined

in connection with the other companies in the Superior Avenue matter.

Judge Beacom's decision in refusing to dissolve the Cooper temporary injunction against the low-fare companies on Superior Avenue is interesting. He said that the Board of Public Service had no right to grant a permit to build temporary tracks, that the resolution of the City Council granting a franchise or permit was not passed under correct procedure, and that an individual taxpayer whose property abuts on the street in question has the right to bring injunction proceedings under the circumstances, whether for the benefit of the public or not. The previous injunction granted by Judge Phillips, he said, does not constitute such an emergency as the companies allege that his court should allow some other action that will offset its effect. The Board of Public Service, he said, has an administrative or supervisory power, but not authority to grant permits such as were granted by it. The City Council must hear the reading of a measure such as it adopted on three different days or must suspend the rules, if read on the same day before vote was taken. Because this procedure was not followed, the resolution, which amounts to an ordinance, is void. This decision strengthens the position of the Cleveland Electric on its contention against the new company using this portion of Superior Avenue, and it is said that it cannot now be used under these decisions.

Altogether, thirty-two injunction suits have been brought against the Forest City Company, and it will necessarily be some time before they will all be decided.

## AN IMPORTANT CONNECTICUT PROJECT

A petition signed by Jeremiah Stark, William H. Geer, Clinton E. Stark and George E. Manning will be presented to the General Assembly of Connecticut asking a charter for the Norwich, Colchester & Hartford Traction Company to construct an electric railway between Norwich and Hartford. The route proposed is from West Main Street along the westerly side of the Yantic River through the villages of Yantic, Fitchville and Bozrahville, the south part of Lebanon, the borough of Colchester and then on through Marlboro and East Glastonbury to East Hartford. The distance by steam railroad from Norwich to Hartford is 49 miles, while by the proposed electric railway it is but 38 miles, thus shortening the distance by 11 miles. The petitioners will ask for a broad charter, embracing passenger, freight and express franchises, together with the right to develop water power, to construct power stations and to buy or sell electric power.

## CAR BUILDING IN LOS ANGELES

It is reported at Los Angeles that the St. Louis Car Company has under consideration a plan to erect in that city a complete plant for filling Pacific Coast car orders. In this suggestion the company is encouraged by the Huntington and Harriman electric railway interests, which are now suffering particularly from delays in receiving much-needed additional equipment.

Said an electric railway official of Los Angeles, recently, to a STREET RAILWAY JOURNAL representative: "Either Pacific Coast orders for electric cars must be filled more promptly through the Eastern plants of the car-building companies—or preferably through a plant located in this territory—or local electric railway interests will be forced to go into the car-building business themselves."

It is known that H. E. Huntington, not long ago, declared that if he could not get cars from Eastern builders promptly, he himself would build car shops in Los Angeles and turn out electric cars for the entire Pacific Coast market. During the past year the Huntington lines have been compelled to construct a number of cars in their own shops. Los Angeles companies use Oregon pine and Northern hardwoods exclusively in the cars they build. According to report, the St. Louis Car Company, or some other large Eastern concern, has secured a site near Los Angeles, in Eagle Rock Valley, for shops, adjoining the site of the proposed car houses of the Los Angeles Railway Company and easily accessible to the tracks of the Southern Pacific Railroad.

## ANNUAL MEETING AND REPORT OF THE BOSTON "L"

The annual meeting of the stockholders of the Boston Elevated Railway Company was held Monday, Jan. 7. The directors were all re-elected with the exception of James Phillips, Jr., who was unable to serve longer. As now constituted the board of directors includes: Frederick Ayer, William A. Bancroft, John J. Bright, Samuel Carr, T. Jefferson Coolidge, Jr., Frank E. Peabody, James M. Pendergast, Nehemiah W. Rice, Quincy A. Shaw, Jr., William S. Spaulding, Walter S. Swan, Robert Winsor. A summary of the annual report follows:

| | 1906 | 1905 |
|---|---|---|
| Gross | $13,527,185 | $12,689,676 |
| Expenses | 9,306,950 | 8,617,653 |
| Net | $4,220,235 | $4,072,032 |
| Other income | 107,426 | 51,893 |
| Total increase | $4,327,661 | $4,123,916 |
| Charges | 3,475,882 | 3,288,831 |
| Surplus | $851,779 | $835,085 |
| Dividend, 6 per cent | 798,000 | 798,000 |
| Surplus | $53,779 | $37,085 |

Traffic statistics:

| | | | | |
|---|---|---|---|---|
| Revenue miles | 50,056,608 | 48,069,404 | 48,317,881 | 47,476,702 |
| Passengers | 262,267,240 | 246,941,776 | 241,681,945 | 233,563,578 |

Besides its ordinary taxes the company's contribution to the public during the last fiscal year amounted to $500,461, made up as follows:

| | |
|---|---|
| Compensation tax for use of streets, act of 1897 | $115,987 |
| Interest at 4 per cent on $4,154,974, cost of paving by the company | 166,199 |
| Cost of maintaining street paving by company | 150,659 |
| Amount of subway rental devoted to sinking fund | 57,617 |
| Removal of snow (estimated) | 10,000 |
| Total extraordinary payments to the public | $500,462 |
| Add taxes assessed on real estate | 244,333 |
| Add taxes assessed on capital stock | 673,694 |
| Total | $1,418,489 |
| To the above add balance of subway | 143,651 |
| Also the rental of East Boston tunnel | 49,709 |
| Total | *$1,611,849 |

* Equal to about 12 per cent of the gross revenue of the company for the year.

Out of 3221 stockholders 2788 live in Massachusetts and own 112,598 shares, or nearly 85 per cent of the 133,000 shares of stock.

The company has made arrangements to increase its power supply by the construction of two gas engine plants, supplying 1675 kw, by the installation of a turbine generator rated at 2000 kw, and by the purchase of about 3600 kw, making a total of upward of 7275 kw, an increase of about 20 per cent.

Forty-five "easy access" elevated cars, and 150 "easy access" semi-convertible surface cars, seating fifty-two persons each, have been bought. There was spent $737,354 in renewals and repairs of surface tracks, exceeding the amount spent the previous year by $114,504, and the year before that by $283,683.

The company controls 441.4 miles of surface track, an increase of 9.4 miles, and owns 16 miles of elevated track, making a total of 457.4 miles of track.

The company has continued its liberal policy toward employees. The aggregate of increased payments to employees under provisions of three years ago amounted to $171,391, made up of these items:

| | |
|---|---|
| Compensation to learners | $31,383 |
| Guaranteed minimum wage | 14,032 |
| Increased wages for long service men | 64,305 |
| Pensions | 9,081 |
| Rewards for "satisfactory service" | 52,590 |

Beginning Jan. 1, 5300 car-service men will receive a further increase of wages. Those who have been in the service more than two years receive an increase of 10 cents a day. Those who have served for less than two years receive an increase of 5 cents a day. All new or extra men, which includes substantially all who have served less than two years, are guaranteed a minimum wage of 25 cents a day more than they are now receiving.

## CHICAGO COUNCIL DECLARES FOR IMMEDIATE SETTLEMENT

During the last few weeks interest in the Chicago traction affairs centered in the question of whether the City Council should take final action on the traction ordinances immediately or first submit the ordinances to the people by means of a referendum. At a meeting of the City Council Jan. 8, that body, by a vote of 26 to 40, and against the wishes of Mayor Dunne, declared itself in favor of immediate settlement. A referendum vote could not be taken until April, and consequently a decision for it would mean a delay of several months in the settlement of the franchise questions and a rehabilitation of the properties. Mayor Dunne has been the strongest supporter of a referendum. His views, however, are probably largely influenced by the pledges made to the people.

The two franchises, one for the Chicago City Railway and one for the Chicago Union Traction Company, have practically been completed and will be submitted within a few days to the Council committee on local transportation. The franchises have been criticised, but this has been against clauses in detail, rather than against the general plan. Ex-Mayor Carter H. Harrison, in a letter to a morning newspaper, made two objections. He thought the compensation to the city should be on a percentage of the gross receipts, rather than a percentage of the net receipts basis, as provided in the draft of the franchises. He also thought the power to control the street car service should be left to the City Council rather than delegated to a newly created board of supervising engineers. In answer to the first criticism, Walter L. Fisher has replied to the effect that the city is not giving franchises of the usual type, but in effect is entering into partnerships with the railway companies. The Chicago City Railway franchise provides that this company may build into the North Side, now occupied by the Union Traction Company, in case this latter company does not fulfill the terms of its contract with the city. Partly for the purpose of getting around the objection of several that the Chicago City Railway could not, by the terms of its charter, build lines into the North Side, the Chicago City Railroad Company has been incorporated. The new company will probably be named in the Chicago City Railway Company's ordinance as the company to build into the North Side.

## ELECTRIC RAILWAY ASSOCIATION FOR OKLAHOMA AND INDIAN TERRITORY

The Oklahoma Electric Railway & Gas Association has been organized by interests connected with the electric railway and gas interests of the territories. The officers elected were: F. H. Tidnam, of Oklahoma City, president; Chas. W. Ford, of Oklahoma City, secretary; F. B. Stearns, of Shawnee, first vice-president; H. C. Stettmund, of Chandler, Okla., second vice-president; E. M. Cooper, of Wilburton, third vice-president; J. H. Merrill, of McAlester, treasurer. Various committees were appointed, among which the important ones are: Executive, J. Crowe, of Guthrie; J. C. Fisher, of Shawnee; C. F. Mercer, of Geary, and H. C. Stettmund, of Chandler. Advisory, F. Benton, of Lawton; R. D. Long, of Muskegee, and W. E. Fertig, of Muskegee. Finance, O. H. Weddle, of Shawnee; J. L. Bowers, of Kingfisher, and J. R. Debbins, of Guthrie. The annual meting will be held in May, at a place to be decided by the executive committee, the members of which are said to favor Oklahoma City.

## TRACTION MATTERS IN NEW YORK

Bridge Commissioner Stevenson, of New York, on Friday, Jan. 4, submitted to the Board of Estimate a new terminal and approach plan for the Brooklyn Bridge. This plan is the result of expert study of the bridge conditions by a special commission appointed about six months ago by the Commissioner at the suggestion of Mayor McClellan. This commission is composed of William A. Burr, professor of civil engineering in Columbia College; William Barclay Parsons, former chief engineer of the Rapid Transit Commission, and Ira A. McCormick, general superintendent of the New York Central Electric Division. The plans contemplate the immediate rearrangement and reconstruction of the Brooklyn Bridge terminals and approaches so that six-car elevated through trains can be run across the bridge under a 45 second headway. The present trolley loop at the Manhattan end of the bridge will be transferred to an underground loop under the "Zeitung" triangle, and reaching to Duane Street, while the space now occupied by this trolley loop would be turned into a free approach to the bridge promenade. The mezzanine floor would then be converted into a special four-pocket terminal, extending over Park Row for elevated six-car trains, and the top floor, which is occupied by the present elevated terminal, will be a practical duplication of the mezzanine terminal, with special provisions, however, for future connection with elevated loop tracks connecting the two bridges, which the commission recommends. The request of the Commissioner of bridges for the issue of $3,250,000 corporate stock for the purpose of reconstructing and enlarging the terminal facilities was laid over for a week by the board. His request for $30,000 to provide means for the reconstruction of the bridge railway track floor of the Brooklyn Bridge was granted.

A large delegation from the citizen's central committee, claiming to represent four-fifths of the property owners of Brooklyn, appeared before the Rapid Transit Commission at their meeting Thursday, Jan. 3, and advocated the immediate construction of an elevated loop to connect the Manhattan ends of the Brooklyn and Williamsburg Bridges. In the course of the hearing some of the speakers in favor of the proposition stated that if something were not done at once to relieve the intolerable conditions on the Brooklyn Bridge, an appeal would be made to the Legislature to abolish the present commission.

President Winter, of the B. R. T., in response to a question by Comptroller Metz, stated that his company was willing to lease and operate an elevated loop, to run from the end of the Williamsburg Bridge, thence through Delancey Street, and down Centre Street to the Brooklyn Bridge, on the same terms as the present subway system is operated by the Interborough, or 4½ per cent on the cost of construction. He also stated that, in his opinion, if the board would give his company permission to connect its elevated lines with the tracks at present on the Williamsburg Bridge, and bring the trains to a terminal at the Manhattan end of that bridge, it would divert a great deal of traffic that now of necessity uses the Brooklyn Bridge, and would relieve the crush at the latter place to a great extent.

Vice-President Bryan, of the Interborough, stated that his company would be willing to enter into an agreement with the B. R. T. for the operation of a loop down the Bowery and Park Row, to be placed over the present elevated road, provided the Interborough be given a franchise for the third-tracking of the Second and Third Avenue elevated lines. While this company is opposed to an elevated loop, it was stated on behalf of Mr. Belmont that he would do all in his power to aid the commission in the solution of this problem, whatever scheme was selected by the commission as the most feasible. Mr. Belmont would recommend a subway connection between the two bridges, and if such a line be finally decided upon, he will bid for it.

Chief Engineer Rice submitted a report upon the proposed plan of John B. McDonald for a subway loop connecting the two boroughs by means of the bridges. His criticisms were that it would take three years to build; that it would seriously interfere with several routes now planned, and that it is vitally defective in not having some connection with Brooklyn at the South Ferry end. If this route should be decided upon, the Third Avenue subway, as at present planned, could not be built.

President Orr and Messrs. Smith, Starin and Metz, of the Rapid Transit Board, held a meeting Tuesday, Jan. 8, to discuss transit relief for Brooklyn. The meeting was specially called as a result of the sharp criticism of the board indulged in by some Brooklynites at a hearing Thursday, Jan. 3. It resulted in a long and somewhat heated discussion, and finally it was decided to inform the Board of Estimate that the board favored the construction of the so-called McDonald loop, with a suggestion that the subway be built first and leased afterward. Then, it was believed, an arrangement could be made whereby the fare for a ride on the loop would be fixed at 3 cents.

The board also suggests that extensions can be made in Brooklyn along Broadway and Fourth Avenue, and declares positively that the loop subway can be completed and the cars put in operation "by the time the Manhattan Bridge is open to travel." It has been variously estimated that the Manhattan Bridge will be completed in from two to three years.

## CONFERENCE ON TAX QUESTION IN WISCONSIN

Considerable difference of opinions developed at the recent conference in Madison, Wis., between the State Tax Commission and seventeen representatives of the principal street and interurban railroad companies of the State, regarding the best method of ascertaining the actual value of the property of such corporations for purpose of taxation under the new ad valorem tax law passed by the last legislature. Under this new law the commission is required to fix the value of a company's road in each county and each town, city, and village within or through which it runs. The commission suggested that perhaps the best method for doing this would be to find the receipts for each such district by counting the passengers at certain points on the road for certain periods of time.

The railroad men declared that such a thing would be practically impossible, as traffic is exceedingly variable and the majority of the men in charge of cars do not have the time or capacity to do such work. Even special agents placed on cars for that work would not be able to do it accurately, and even if they tried the result would not show the average gross received as the periods in which the counts were made would not be long enough to insure approximately correct figures. The best way of determining the receipts for any given length of road, the railroad men said, was to divide the gross receipts of the entire road by its total mileage, making due allowances for density of population of the several districts through which the road passed.

The roads will pay taxes under the new law next year. At present they are paying a license fee based on gross earnings. The railroad men at the conference were: Attorney C. M. Rosecrantz and Controller C. N. Duffy, the Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company; Attorney Roy P. Wilcox and General Manager George B. Wheeler, Chippewa Valley Electric Railroad Company; General Manager Herbert Warren and Director A. M. Robertson, Duluth Street Railway Company; Vice-President N. C. Draper, Eastern Wisconsin Railway & Light Company; Director B. E. Edwards, La Crosse & Onalaska Street Railway; President Thomas Higgins, Manitowoc & Northern Traction Company; President F. W. Montgomery, Madison & Interurban Traction Company; General Manager Edward Daniels and Attorney F. J. Trudell, Menominee & Marinette Light & Traction Company; General Manager Irving P. Lord, Waupaca Electric Light & Railway Company; Vice-President E. B. Kirk and Attorney H. I. Weed, Winnebago Traction Company; Secretary-Treasurer H. D. Smith, Wisconsin Traction, Light, Heat & Power Company.

## SUBWAY PERMITS IN LOS ANGELES TO HARRIMAN

By a unanimous vote the City Council, of Los Angeles, has granted to the Los Angeles-Pacific Railway permits for subways extending from Fourth and Hill Streets to the western city limits, by way of Fourth Street and Vermont Avenue. In their present form, the permits are not affected by the twenty-one-year time limit in the city charter. They are practically perpetual. Discussion of the ordinance granting these permits revealed that the Harriman interests contemplate not a single tunnel, but two tunnels side by side—one to be used by outgoing trains, the other for trains coming to the city. At present the company will build but a single tunnel. This will contain two tracks.

It is announced that the construction of the tunnels will begin before March 1, 1907, and officials of the road say trains will be running over the new thoroughfare by Jan. 1, 1909. Bonds have been given to finish the work within three years.

Simultaneously, with the granting of the subway permits, the City Council instructed the City Clerk to advertise for sale, railway franchises crossing Flower Street, Vermont Avenue and other places in the vicinity of the western city limits.

The Harriman interests also desire subway permits to pierce the Temple Street highlands, to connect First Street with Sunset Boulevard, and in this connection a franchise for an electric railway is now being advertised for sale along Hill Street from Fourth to First Streets. These latter subway permits will be considered by the Council later. The aggregate length of the subways will be about 7 miles.

## B. R. T. UPHELD IN CONEY ISLAND FARE CASE

In a unanimous decision handed down Tuesday, Jan. 7, the Court of Appeals decided that the Brooklyn Rapid Transit Company, as the laws affecting railroads stand to-day, is entitled to charge a double fare to Coney Island. The decision is based on the ground that steam railways cannot be subjected to the rules of street railways. Judge Haight, who wrote the opinion, pointed out that the Brooklyn Rapid Transit Company operates its Coney Island line over roads which were leased by that company, and which, though now operated with electricity, had steam railroad charters, to which the lessee company was entitled.

The suit to determine the right of the Brooklyn Rapid Transit Company to charge a 10-cent fare from Brooklyn Bridge to Coney Island was the outgrowth of the riots of last August, when many passengers refused to pay the double fare and were ejected from the company's cars. The climax of the trouble was reached on Aug. 12, because of a statement by Justice Gaynor that the Brooklyn Rapid Transit Company did not have the legal right to exact more than 5 cents for the trip to Coney Island, and that a person resisting the collection of the extra fare was therefore not liable to arrest.

## STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED JAN. 1, 1907

839,857. Railway Car Frame; William F. Keisel, Jr., Altoona, Pa. App. filed Feb. 28, 1906. Details of construction relating more particularly to the platform and vestibule.

839,874. Railway Tie; Norman J. McLean and Ernest Swanson, Bay City, Mich. App. filed April 30, 1906. A metallic tie in which the portions which are subjected to wear are keyed to the main portion so as to be readily removable.

839,972. Rail-Tie and Fastener; Willis F. Walker, York, Pa. App. filed Sept. 26, 1906. Comprises oppositely-disposed channel irons having in-turned flanges. tie-straps connecting and secured upon the outer faces of the channel irons, end strips connecting the ends of the channel irons, said strips being concave-convex in cross-section, and a plastic filling between the channel irons and end strips.

840,074. Splice Bars; William J. Mattern, Lewistown, Pa. App. filed March 2, 1906. The fish-plates have downwardly projecting members which are inserted in suitable openings in the tie and are secured thereto by a bolt running longitudinally of the tie and embedded therein.

840,087. Contact-Shoe for Electric Railways; Henry C. Pealow, Batavia, Ill. App. filed Nov. 9, 1905. Consists of jaws spring-impelled toward one another which grip the third rail.

840,095. Automatic Signal; Judson Shoecraft, Eskridge, Kan. App. filed April 20, 1906. The track rails are divided into sections and energized by batteries. Only one signal is used at each station, and is adapted to move into different positions for danger and caution signals.

840,135. Signal Apparatus; W. Britton Lane, Evanston, Ill. App. filed July 25, 1906. A pair of special rails or trolleys are laid between the usual track rails and contact with depending shoes on the locomotive for signaling purposes.

840,180. Car Fender; Etta W. Wheelock, Arlington, Mass. App. filed July 14, 1906. Details of construction.

840,197. Air Brake; Lewis E. Black, Nashville, Tenn. App. filed April 27, 1906. A brake cylinder provided with a piston rod, an auxiliary reservoir and triple valve, a brake lever movably secured to the brake piston rod, a cylinder carried by the brake piston rod adapted to shift the lever thereon, said shift cylinder adapted to be operated by exhaust pressure from the triple valve.

840,193. Device for Operating Brakes and Brake Rods; Geo. W. Barlow, Shrewsbury, N. J. App. filed May 24, 1906. Employs a cylinder for the piston of the brake rod which is adapted to actuate a suitable brake device, there being around the rod between one cylinder head and a collar a helical spring adapted to return the piston and rod to an initial position. This cylinder is actuated by a communicating pipe with a vacuum chamber, and in the line of pipe is interposed a two-way valve.

840,219. Rail Fastener; William P. Johnson, Kerrmoor, Pa.

App. filed Aug. 31, 1906. Means for fastening the rail to a metallic tie.

840,239. Rail-Joint; Mathias Nemecek, McKeesport, Pa. App. filed Aug. 8, 1906. The fish-plate on one side is formed integral with the base, and the other fish-plate is moved up against the rail on the other side and is dove-tailed to the base.

840,247. Automatic Car Stop; James S. Pates, Monongahela, Pa. App. filed Sept. 8, 1906. Designed especially for coal-tipples with the locking mechanism connected to the dumping track section or platform and operated by the latter to lock the stop in car obstructing position only when the track section or platform is tilted, thereby preventing the car from running into the tilted dump.

840,258. Sound Deadening Means for Railways; John Schenbeck, Chicago, Ill. App. filed April 30, 1906. Concave-convex plates engage the flange and under side of the head of the rail and are bolted through the web thereof.

840,283. Pleasure Vehicle; Walter T. Adams, Hays Borough, and John R. Divers, McKeesport, Pa. App. filed June 18, 1906. A pleasure railway in which a car is suspended from an inclined cable, the invention residing in the braking apparatus.

840,368. Rail-Joint; Joshua H. Price, Cleveland, Ia. App. filed May 31, 1906. The base of the rail is grooved and provided with recesses in said groove at regular intervals. The tread of the rail is adapted to fit the groove and has lugs engaging the recesses. When one side of the tread is worn it may be reversed.

840,424. Rail-Joint; John E. Beaver, Warwick, Ohio. App. filed March 20, 1906. A rail-joint designed to obviate the use of bolts and similar fastenings embodying parts liable to work loose and allow spreading of the rails.

840,428. Electrical Signaling System; Edward R. Brodton, Atlanta, Ga. App. filed Sept. 3, 1904. Details of a system having a plurality of trolley rails laid between the usual track rails, and which have electrical connections to alarm devices in the locomotive.

## PERSONAL MENTION

MR. D. L. PRENDERGRAST has been appointed secretary of the Boston Elevated Railway Company pro tem in place of Mr. John T. Burnett, resigned.

MR. JAMES J. HUMPHREYS, traveling auditor of the United Gas Improvement Company of Philadelphia, is dead, aged 63 years.

MR. M. E. KAPER has been appointed division passenger and freight agent of the Indianapolis & Eastern Railway, and the Indianapolis & Martinsville Rapid Transit Company. Mr. Kaper will make his headquarters at Greenfield. He succeeds Mr. J. W. Fletcher, resigned.

MR. J. W. W. BRYANT, division superintendent of the Nashville Railway & Light Company, of Nashville, Tenn., is dead. Mr. Bryant has been connected with the street railway company since the time of the mule cars.

MR. J. R. HARRIGAN, formerly general manager of the Columbus, Buckeye Lake & Newark and the Columbus, Newark & Zanesville, and more recently manager of the Canton-Akron lines, has accepted the position of manager of the Buffalo & Erie Traction Company, of Buffalo.

MR. WILLIAM A. HOUSE, second vice-president and general manager of the United Railways & Electric Company, of Baltimore, Md., has been appointed acting president of the company to succeed to the duties of the late Gen. John M. Hood, and Mr. William Early, private secretary to Mr. Hood, has been elected assistant secretary of the company.

MR. EDGAR S. FASSETT, general manager of the United Traction Company, has been appointed to the same position with the Hudson Valley Railway, which is now a subsidiary line of the United Traction Company. Mr. Fassett will continue to have his headquarters in Albany and will also continue to have charge of the United Traction Company.

MR. CHARLES S. MELLEN, president of the New York, New Haven & Hartford Railroad, has announced the appointment of Mr. Lucas S. Storrs as vice-president of the New England Investment & Security Company, the holding company of several Massachusetts street railways, with an office in Boston. Mr. Storrs was formerly at New Haven as expert and engineer of tests.

MR. JAMES SMITH, who retired from the Toronto Railway Company a few years ago, after being prominently connected with the company from the time its inception, is dead. Mr. Smith is survived by a widow and six children, of whom Mr. James G. Smith is superintendent of tracks of the Toronto Company, Mr. John M. Smith is controller of that company, and Mr. Alexander Smith is master mechanic of the York Radial Railway.

MR. E. S. PATTEE, auditor of the Twin City Rapid Transit Company, of Minneapolis, has been appointed secretary and controller of the company, and Mr. D. J. Shouse, formerly assistant to Mr. Pattee, has been appointed auditor of the company. Another appointment recently made by the company is that of Mr. Joseph Mersch to the position of chief inspector, in which office he will perform the duties formerly discharged by the assistant superintendent.

MR. WILLIAM J. CLARK, of New York, general manager of the foreign department of the General Electric Company, has been appointed by Governor Hughes, of New York, as a delegate from that State to the national convention for the extension of the foreign commerce of the United States, which will be held at Washington, D. C., beginning Monday, Jan. 14, 1907. For many years Mr. Clark has been interested in and studied the conditions of foreign commerce. His book, "Commercial Cuba," is recognized as an authority on the subjcet. He has been a delegate to many important commercial conventions, and in 1905 was a member of the United States delegation at the International Railroad Congress, held at Washington.

MR. D. F. CARVER has resigned as general superintendent of the Rochester Railway Company to become assistant general manager of the Aurora, Elgin & Southern Railway Company under Mr. Edwin C. Faber. Mr. Carver before going to Rochester was connected with the Public Service Corporation of New Jersey as chief engineer of the railway department, and before that was connected successively with the Brooklyn Rapid Transit Company and the Cleveland Electric Railway Company. Mr. Carver was tendered a farewell banquet by his associates in the Rochester Railway Company before leaving Rochester, and was presented by them with a handsome dress-suit case as a token of their esteem. Mr. E. J. Wilcoxen, superintendent of the Sodus Bay division, and Mr. J. W. Hicks, superintendent of transportation, will share between them the duties formerly performed by Mr. Carver as general superintendent.

MR. PERRY A. GIBSON, of Erie, Pa., a State Senator from 1897 to 1900, and general manager of the McKeesport, Connellsville & Greensburg Street Railway Company, is dead. Mr. Gibson was born in Washington Township, Erie County, Aug. 25, 1857. He received his education in the public schools and was graduated at the State Normal school at Edinboro and the Iowa State University. He was admitted to practice in the United States Court as an attorney June 15, 1886, and subsequently was also admitted to the Supreme Court of Illinois. He was elected to the State Senate from Erie County November, 1896. Recently Mr. Gibson devoted most of his time to electric railway interests, and at the time of his death was in Pittsburg on traction business. He conceived the idea of establishing an electric railway between Erie and Cambridge Springs. He was also the promoter, and, at the time of his death, prominent in the management of the projected line between Cambridge Springs, Corry, Union City and Erie.

MR. ALBERT H. STANLEY, general superintendent of the Public Service Corporation of New Jersey, controlling more than 300 miles of city and interurban lines, assumed the duties of general manager of that corporation on Jan. 1. Mr. Stanley entered the employ of the company in 1903. Since the resignation of Mr. W. W. Wheatly as general manager of the company, however, there has been no office with this title, although Mr. Stanley's duties have virtually covered the work formerly coming under the jurisdiction of the office of manager, part of the work being shared by Col. Edwin W. Hine, whose title is assistant to the president. Mr. Stanley, before going to New Jersey, was general superintendent of the Detroit United Railway Company. In January, 1906, the personnel of the Public Service Corporation was so reorganized that the position of superintendent of transportation was created, to which office Mr. Newton W. Bolen, up to that time a district superintendent of the company, was appointed, thus permitting Mr. Stanley to devote more of his time to the executive duties of his office as general superintendent, the district superintendents under the new order all reporting to Mr. Bolen.