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Of this issue of the Street Railway Journal 8000 *copies are printed. Total circulation for* 1905 *to date,* 408,350 *copies, an average of* 8167 *copies per week.*

Quarterly Meetings of the New York State Association

The announcement made elsewhere in this issue that the New York State Street Railway Association intends to hold regular quarterly single-day meetings, in addition to its annual convention, records a step in the right direction. In good work accomplished, this association has always enjoyed an enviable reputation. Its annual meetings have always been well attended, and the papers and discussions form a library of exceedingly valuable information. The institution of single-day meetings or conferences to be held every three months, each conference to be devoted to some departmental topic, will be received with enthusiasm, and gives promise that the educational and research work so skilfully accomplished by this association in the past will be continued in a broader and higher degree.

Not the least welcome part of the announcement is the promise that the entire day selected for the conference will be devoted wholly to serious work. There are to be no exhibits, no supply-men, no entertainments, and nothing to detract from the main issues before the meeting. The elimination of the slightest tendency toward turning the meetings into "junkets" will meet the approval and support of the entire membership. The invitation so cordially extended to non-member companies, located not only in New York State, but outside the State as well, to send representatives to these quarterly conferences is an earnest of the intention and desire of the present officers and executive committee to increase and enhance the valuable educational and research work upon which the association has built so excellent a reputation in the past.

Interurban Railway Building in the East

It is a well-known fact that the center of typical interurban railway construction up to the present time has been in the Central States, especially in Ohio, Indiana and Michigan. Ohio was the first State to build an interurban road and railways of this class, and they were for a long time a practically unique feature of its transportation system. At present, however, Indiana and Michigan have also developed interurban systems which rival those of Ohio in importance, while Wisconsin, Illinois, Missouri and other States in the Mississippi Valley are rapidly following the lead set them by their neighbors. It is a striking fact that the further we travel East the more different do we find conditions. The roads in the States mentioned have in nearly every instance been projected as interurban lines and have been built on their own right of way and intended for high speed. In New England, on the other hand, the interurban lines are of quite a different character from those encountered in the West. High speeds are not attempted, as a rule, the tracks are for the most part built on the highway, and nearly all of the lines are the outgrowth of local systems, and simply link together the tramways in neighboring towns and villages. Following along this line of thought, we note that the rolling stock of the Western roads is, on an average, far heavier and higher powered than the cars found on Eastern systems. In other words, if a score of typical electric railway systems of the Middle West be compared with a similar number in the East, it will be found that the average schedule speed of the Western trains is far above that prevailing in the East.

This difference is undoubtedly largely due to two advantages almost universally enjoyed by the Western properties. The initial cost of the private right of way and of track construction has been less, and the cars have been able to make long runs between stops. It is not altogether reasonable to believe that these are dominant sectional factors, although the level prairie land has undoubtedly stimulated railroad construction, both steam and electric, in the district mentioned. In fact, a perusal of the leading article in this issue will indicate the possibilities of constructing and operating high-speed

electric railways through a country much more rugged than is found in the Middle West. The road here described connects two of the important cities of New York State, and is said to be one of the heaviest and most substantial electric railways in the United States. To carry through this work in the time allotted, it was necessary to gather together a plant such as would be used in the construction of a heavy steam railroad, and the article above referred to has been prepared with a view to bringing to the surface, pictorially, as far as possible, the methods followed. The builders of this road are credited with having constructed the first high-speed electric road in the United States, that between Buffalo and Niagara Falls, and as they have been engaged in work of this character for the past fifteen years, the methods in force on this contract may safely be said to represent the most advanced means of bringing about the results depicted.

A Little More Single-Phase

We are very glad to present this week an account of the new single-phase road at Glen Cove, L. I. As the only single-phase road in the vicinity of New York and a typical installation of its kind, it should be inspected with interest by every one interested in the subject. As an example, it possesses the advantage of being a pure single-phase equipment, uncomplicated by the requirements of connections with direct-current lines. The wiring diagram shows the simplicity of the connections admirably. Considering the gradations of voltage secured, the result is really remarkable, and bears out the promise of the system from a theoretical standpoint. The fact that the whole equipment goes easily upon an ordinary single-truck car is very gratifying, as showing the ease with which the change can be made. Although the efficiency of the equipment is not given, the nature of the voltage control is such as to bespeak small losses up to the motor. In the motor itself the losses are doubtless larger than in a d. c. motor, but if the facilities for cooling are good, as is quite certainly the case, the added loss need not be a source of much worry, since the distribution efficiency is far greater than could be hoped for on any d. c. system. We note that the same device in primary distribution used in various other cases is here employed, the transmission proper being three-phase to save copper and generator capacity, while the phases are utilized independently in the feeding system. This is not uncommon in three-phase systems used for lighting, and there is no reason why it should not work sufficiently well here. The construction is also of interest as using the now well-known catenary form for both cross and longitudinal spans.

The operative qualities of this new system will be watched very attentively. At the present time, however, enough experience has accumulated on the foreign single-phase roads to justify considerable confidence in the performance of this one. In fact, since frequencies up to 40 cycles have been used on Continental roads, apparently with entire success, an installation at 25 cycles may be assumed to be on a pretty safe basis. Of course, the questions of first cost and depreciation cannot be left out of account. As with every new thing, costs are apt to run high at first, and upkeep is likely to be greater than after the details have been worked over, in the light of practical experience. Nevertheless, there seems to be no good reason to apprehend anything serious as regards a straightforward proposition like the present. We are glad that this road has been put through on the single-phase basis, for it is an exhibit that cannot fail to be of value and interest. There are many lines without any connections that may hamper them in the choice of a system, and it is on these that single-phase working gives its greatest immediate prospect of usefulness. When the single-phase locomotives of the New York, New Haven & Hartford Railroad go into service we shall, of course, have a demonstration on a far larger scale. The importance of alternate-current working does not, however, turn upon the success or failure of this great work. There is, especially on roads of considerable length and light traffic, an acute need for improvement in the distributing system. If the single-phase system fulfils the promise it has thus far given, it will have a very wide sphere of usefulness in the propagation of light electric roads of the kind which we have often indicated as useful. For such work even a single motor equipment would often be sufficient, thus still further simplifying the car wiring.

There are not a few rather extensive electric road systems now in existence that are distributing current over a large and lightly loaded network in a highly inefficient manner. They have fully appreciated the impracticability of using a complete direct-current distribution, but have not felt justified in jumping into a complete alternating-current system. The result is that they are to-day generating and transmitting current long distances, and, in addition, supporting a series of sub-stations and feeding systems, with a very heavy loss of energy. To these the Glen Cove road may prove a very useful object lesson. In cases where one has to deal with large urban systems, the situation is different, since these stand committed to direct-current apparatus upon a large scale, to replace which would cost a very considerable amount. But such cases are really in a minority. The average road, if one may use the term, has only a moderate number of cars, and as time goes on it is likely to require the transmission of power. For such, the change to alternating current is not so difficult a matter, and whenever a transmission system has already been inaugurated a change is still easier. These single-phase roads have not yet been in operation long enough to permit a judicial opinion of their merits, but enough is now evident to show that they are very promising, certainly within a fairly wide field of usefulness. Railway engineers have been very conservative in their view of the situation, but things have now reached a point where they are no longer justified in turning down alternating-current traction as impracticable. Experimental it is, to be sure, although not in the offensive sense of the word. They are experimental as series-parallel control was experimental in the earlier days of its use, and it seems hardly possible, in face of what has already been accomplished, that there should be any retrogression. Alternating-current traction we certainly have with us in spite of all dubious opinions, and we hope that this nearby road will receive the attention it deserves from Eastern engineers. They must take the matter seriously now, however strongly they may favor standard apparatus.

Car Lighting

We have often wished that some ingenious person would turn his efforts toward providing suitable lamps and fixtures for street car lighting. As lighting is at present conducted it affords opportunity for very great improvements, both in amount and in distribution. Most artificial lighting is faulty, not from bad judgment, but from no judgment at all. It has just merely happened without any responsibility on the part of anyone. Now, in street car lighting the energy usually spent is by no means negligible, being a very perceptible per-

centage of that required to operate the car, and if there is not to be considerable actual loss, that energy must be spent very judiciously indeed. A street car considered merely as a room is small with, say, 200 sq. ft. to 250 sq. ft. of space only, and an unusually low ceiling. As to the walls, they are not particularly favorable, being, as a whole, rather poor reflecting surfaces. All in all, it is apparent that while no very great amount of energy is required for lighting, it must be very wisely distributed if good results are to be obtained. The fundamental principle in a case like this is to use rather small units carefully placed. One does not want an effect of brilliancy in a car so much as the ability to see easily. As to the unit to be employed, we incline to the opinion that the 8-cp lamp is the thing made for a modest voltage, so as to secure a sturdy filament. Such lamps with ground globes give a light easy to distribute and never so bright as to be painful.

The matter of suitable fixtures for such lights is also a neglected matter. A socket stuck somewhere and a lamp screwed into it does not settle the question. For a space like a street car the lamp with a reflector behind it, either silvered on the bulb or added to the socket, is emphatically the thing to use. For the walls are poor reflectors and about half the light is wasted if no reflectors are used. A small unobtrusive diffusing reflector just behind a small lamp bulb will work wonders either in street car or any other case of lighting. It gives much light and consumes little energy. And the main point is that it directs the light where it is needed, down into the car. A line of compact reflector fixtures would meet a widely felt want in general illumination as well as in street car service. It is in street car lighting, however, that a wise combination of lamp and reflector will do admirable work. To put it mildly, it is possible to light the average street car better than it is lighted now at an expenditure of about one-half the energy customarily used. Some progress has already been made, we have been pleased to note, but there is still plenty of room for improvement, particularly in the complete abolition of clear globes within the car. Used as they must be in the contracted space, they are abominations, and what is even worse, ineffective abominations.

Designing the Bottom Framing and Brake Apparatus Together

Only a few years ago the draftsman, when designing a car body, often made no provisions at all for the wiring of the motor circuits. The car body was completed in the factory before any thought was given the wiring. Then the electrician was compelled to run his wires wherever possible, and considerations of appearance could be given very little thought. We are glad that methods of car construction in this particular have changed somewhat, and now a little thought on the part of the draftsman enables him to make proper provisions for the motor wiring without in any way interfering with the strength or appearance of the design. The result is that the cables under the car are put up in a more permanent and better appearing manner than heretofore.

But the draftsman could to advantage give consideration to other features of the bottom framing that would materially increase the appearance of the car and often decrease the expenses of maintenance. We refer particularly to the design of the framing with regard to the brake and other apparatus to be hung to it. Were the dimensions of the air tanks, brake levers and parts of the controller equipment, if a multiple-unit system is employed, taken into account when the longitudinal sills and bridgings are spaced, many intermediate hangers, usually of very awkward design, would be avoided in securing the different pieces of apparatus in position. The avoidance of these would not only give a better and more workmanlike appearance to the under portion of the car, but the apparatus would be bolted in position more securely, there being fewer nuts and bolts to work loose.

We do not mean to recommend that in order to conform to the dimensions of the apparatus that the sills or bridgings be placed so far out of their proper position as to weaken the design in any manner. The primary object of the designer should always be to obtain the greatest strength with the material used, and the accommodation of the apparatus ought in all cases to be secondary. But we believe there are many times when it is immaterial, so far as the strength of the design is concerned, whether a sill or bridging is placed 1 in. or 2 ins. on either side of a specified position, and in such a case a consideration of the dimensions of the apparatus to be hung, and a consequent placing of the timbers to conform with these dimensions, would result in such improvement in the design of the car as a whole as to many times compensate for the extra time spent.

We have personally had occasion to examine cars where the bottom framing and the apparatus were designed in harmony, and to our minds the appearance alone of the underside of the car, when contrasted with that of a car where the apparatus has been hung in any way and by any means possible, is in itself a sufficient incentive to give considerable attention to this one point.

Pilots on Interurban Cars

In designing interurban cars a question which is sometimes difficult to decide upon is the proper design of a pilot. When a car is to be operated always at the front end of train and in one direction only, the problem is much simplified. The pilot may extend out as far beyond the bumper as desired. Moreover, no provisions need be made for the train line of the air-brake system passing from one car to the other, or for coupling the cars. A good form of pilot to be used in this case is one built much on the style of those employed on steam locomotives.

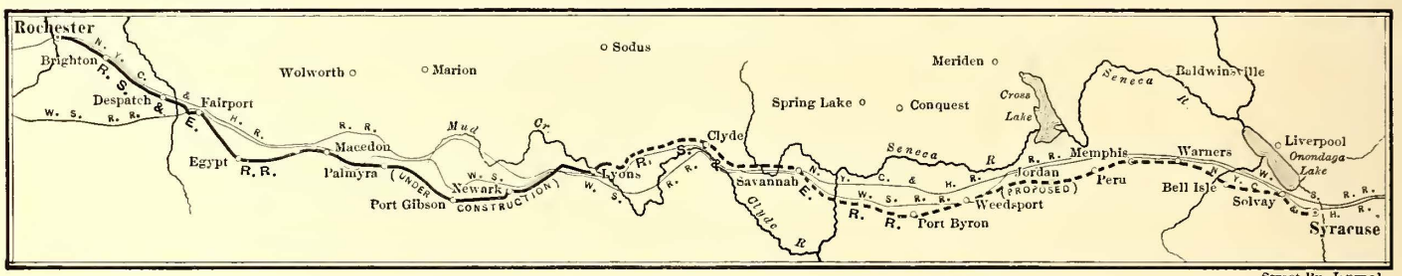
The lower portion should drop to within 10 ins. or 12 ins. of the rail, and even lower if there is no danger of the extending end striking obstacles when rounding curves. The nose should protrude well forward of the bumper in order to give a good angle along each side. Such a pilot not only adds a businesslike appearance to the car, but if built strong enough it may remove many obstructions from the rail that might otherwise cause derailment.

Where cars are to be operated in trains, as, for example, multiple-unit equipments, much of the usefulness of the pilot must be sacrificed in a design that will meet several added requirements. The nose cannot extend beyond the bumper, for otherwise the noses of two pilots would come in contact with each other when two cars were coupled up. Setting the pilot back under the bumper in this manner necessarily limits the slope of its sides, and consequently curtails to a great extent its usefulness.

Another requirement to be met in the design of pilots for such cars is that provision shall be made through the middle of the pilot for the hose connections of the air pipes. This usually takes away the nose and leaves an almost flat face across the front. Such a form is of more service in meeting the requirements of the law than for actually removing obstructions.

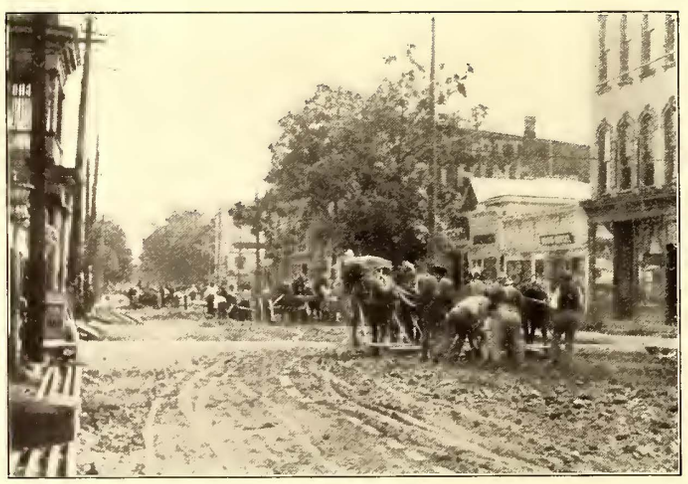
CONSTRUCTION WORK ON THE ROCHESTER, SYRACUSE & EASTERN RAILROAD

The Rochester, Syracuse & Eastern Railroad is designed ultimately to provide a double-track, high-speed, interurban electric road between Syracuse and Rochester, a distance of 80 miles, following in a general way the main line of the West Shore Railroad through this territory, but located to furnish better service to the towns and villages lying between the termini. The section now under construction is from Lyons, west to Rochester, a distance of approximately 36 miles. Leaving Lyons, the road proceeds westerly and crosses the New York Central and West Shore Railroad tracks at a point 2 miles east of Newark over a bridge approximately 630 ft. long. From this bridge the line runs practically due west through the towns of Newark, Port Gibson, Palmyra, Macedon, Egypt, Fairport, Despatch, Brighton and into the city of Rochester, where connection will be made with the local street railway system of that city.



MAP OF ROCHESTER, SYRACUSE & EASTERN RAILROAD

The plans provide for a heavier type of construction than has been previously attempted in the East, and the road, when finished, will approach more nearly in general design and construction the later examples of modern high-speed electric railway construction work which have been carried out to an advanced degree in the Middle West.



TEARING UP STREET SURFACE WITH ROOTER PLOWS

Between Lyons and Rochester the grading has been extremely heavy for an electric road, involving the moving on an average of nearly 25,000 cu. yds. of material per mile (exclusive of the work in cities). This is a considerably heavier grading than was involved in building many of the steam roads east of the Mississippi, consequently the plant and methods employed in grading and track laying represent a new departure in electric railroad construction in this part of the country.

For the main part, the road is very free from grades. The sharpest curves in villages are 50 ft. radius, and outside of villages the maximum degree of curvature is 6 degs. The majority of curves are under 4 degs. The track is laid with 70-lb. A. S. C. E. section T-rail, with continuous joints, in the country, and on village streets with 90-lb. A. S. C. E. section T-rail. The line is located entirely on private right of way, except in villages, and for the entire distance double track is laid on 12-ft. centers. On top of the finished grade a minimum of 6 ins. of gravel or stone ballast is spread. The ties are 6-in. x 8-in. x 8-ft. long leaf Southern pine.

In view of the unusually heavy construction and the modern methods followed in building the road, many of the details of construction are of interest. J. G. White & Company, of New York, are carrying out the contract for grading, track laying and overhead work, and in so doing have employed many ideas original in engineering practice.

On the lighter sections of the line grading was done with wheel scrapers and wagons, but on the heavier sections four steam shovels were utilized. Gravel for ballast was obtained from pits along the line of the railway, but in some cases it was found necessary to utilize gravel from pits several miles from the right of way. This necessitated the construction of several temporary construction tracks a mile or two in length. The heavy cuts having been worked out with steam shovels, the shovels were transferred to the gravel pits and used for loading gravel cars, which were run in trains of four to six cars, as shown by one of the illustrations on page 1049. With a steam shovel the average time for loading a 10-yd. car was 3 minutes, making 15 to 20 minutes to load the entire train, this being sufficient ballast for approximately ¼ mile of single track.

In following up the construction work, the idea has been to lay one track on the graded bed at the earliest possible moment, half-tieing—that is, omitting every other tie. This makes it possible to utilize steam-propelled construction trains for all of the subsequent work, including ballasting, surfacing, aligning, and for all-tieing.

EXCAVATING ON MAIN STREET, PALMYRA, N. Y.

In this work there have been employed two 19-ton saddle-tank American locomotives, one 30-ton American locomotive, one 30-ton American switching locomotive, and three 35-ton locomotives of the New York, New Haven & Hartford type. The car equipment for construction work comprises ten 10-yd. center-dump ballast cars, twenty-one 6-yd. side-dump ballast cars, and in addition there are eight 30-ton flat cars used for distributing ties, rails, poles and other material.

The construction plant also includes a miscellaneous collection of boilers, pumps, concrete mixers, etc. A very essential part of

the equipment has been the Sheffield gasoline motor car, made by Fairbanks, Morse & Company. This car will seat four persons, and can cover 25 m.p.h. It has been of the utmost convenience and value in general supervision and inspection work and in general affording facilities for getting about over the different sections of track. This problem of rapid transportation for superintendents on railway work covering a large territory, has always been a perplexing one, and the development of satisfactory forms of self-contained power cars is being watched with interest by those having to do with the building of long lines. In this same connection, J. G. White & Company, in some of their other contracts, are making use of automobiles for accomplishing the same results. On the Lyons and Rochester contract, timekeepers have been supplied with saddle horses, and make their daily rounds from gang to gang on horseback. The engravings, reproduced from recent photographs, convey a good idea not only of the details of construction that are being followed, but also show the various portions of the plant and construction force at work. One of the pictures on this page shows a steam shovel working in the ballast pit at Palmyra. As there is a grade running each way from this pit but five cars can be used at once. With the steam shovel the time of loading averages 3 minutes to each car, and the economy of using steam-driven loading apparatus in this connection is very apparent.

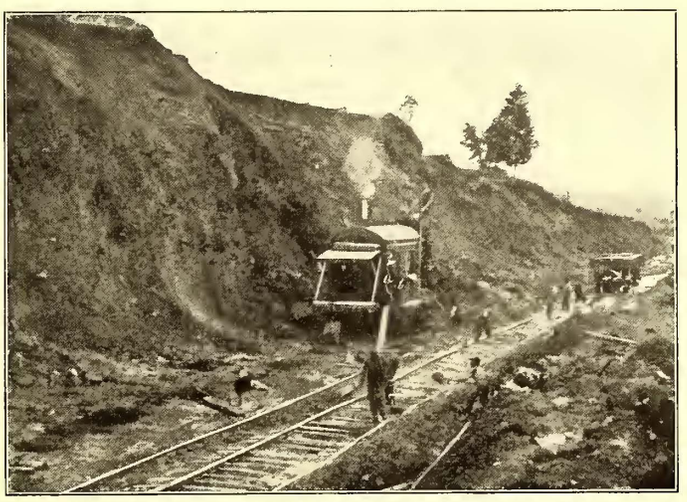
Another of the pictures represents the track force at work back-tieing. As before stated, it is the practice to lay the first track in skeleton form on the rough grade. The second track

WORKING OUT 13,000-YD. CUT WITH TEAMS

is then laid in full from material and construction trains operated on the first track, after which the balance of the ties for the first track are distributed and placed. The ties are hauled from the Palmyra yard on flat cars, as indicated, and are distributed while the train is in motion, a man throwing off the ties under the direction of the foreman, who walks and counts the number of ties required. Ties are distributed at the rate of about 100 per minute, or sufficient for 3 miles or 4 miles of track per hour. This method of distributing material introduces many economies in time and labor. The illustration on page 1051 shows a track gang back-tieing and spiking down the rails. This gang consists of about forty-five men and can lay from 3500 ft. to 4500 ft. of the first track per day. A back tieing gang of forty men, filling in the same track, averages

METHOD OF LOADING AND HAULING GRAVEL FOR BALLAST

3000 ft. per day, and with fifty-five men over 7000 ft. per day have been laid. The method of procedure is as follows: A double car load of rails—that is, two flat cars coupled together, carrying from sixty to eighty 60-ft. 70-lb. rails, is pushed by



EXCAVATING IN 54,000-CU. YD. CUT NEAR PALMYRA

the locomotive. To the rear of the locomotive are coupled three or four cars loaded with about 900 ties. In laying the first track at the front, two teams are used to snake the rails ahead, and two teams with three wagons distribute the ties. In this way the gang is kept continually loading ties on two

GRADING WITH TEAMS. THE TIMEKEEPERS ARE MOUNTED ON HORSEBACK

wagons, which are ready for the team when it returns from distributing the previous load.

BONDING

In village streets the track is bonded at each joint with one protected compressed terminal 300,000-circ.-mil copper bond

10 ins. long. On work outside the villages each joint is bonded with the short type C bond of the Lord Electric Company's manufacture, soldered to the head of the rail. The track is cross bonded every 600 ft. with No. 0000 B. & S. solid copper wire, fastened with channel pins; the cross bonds extend across both tracks.

STRUCTURES

On the line between Rochester and Lyons there are several concrete arch culverts, ranging from 6-ft. to 20-ft. span, and several steel structures. In designing all culverts and bridges the live load has been assumed as a train of cars, each car weighing 60 tons, and measuring 60 ft. in length, with 45 ft. between centers of trucks.

UNLOADING TIES FROM CONSTRUCTION TRAIN

The more important steel structures are as follows:

Crossing of New York Central & Hudson River Railroad (Auburn branch) at Brighton, consisting of 100-ft. through flat girder span, with 400-ft. steel trestle approach on each side, with spans 30 ft. center to center. The total length of this bridge is 900 ft.

The 55-ft. plate girder deck structure over Irondequoit Creek.

The 60-ft. plate girder through span bridge over Penfield Road and Thomas Creek.

A 100-ft. span through riveted truss over Ganargua Creek.

The 286-ft. skew span through pin connected truss over the Erie Canal at Fairport.

Crossing over the New York Central & Hudson River Railroad and West Shore Railroad tracks about 2 miles east of Newark, at a place called Blue Cut. This structure consists of one span (245.7 ft. long on the center line) pin connected through truss, one 75-ft. span girder deck and ten spans of 30 ft. each, the latter being steel trestle approaches. The main span is a half skew structure, the two trusses being respectively 234 ft. 1 in. and 257 ft. 4 ins. center to center of end pins. The additional length of one side is accounted for by the insertion of an extra panel, this design having been found necessary to meet requirements imposed by certain property locations. The main abutments are 52 ft. in length and 6 ft. 6 ins. wide at the base, and batters to 44 ft. in length and 5 ft. in width at the top. The pedestals supporting the viaduct spans are 4 ft. square on top and of different heights on account of the variation in the elevation of the ground.

The crossing over Ganargua Creek and the Erie Canal at Lyons, consisting of a 400-ft. steel trestle approach, 170-ft. span and 150-ft. span through pin connected trusses.

The concrete for all bridge piers, culverts and abutments is mixed by hand, as this was found to be more economical than machine mixing, on account of the comparatively small masses of concrete required at each location. However, in village streets, where concrete was used for paving and foundations, McKelvey mixers driven by gasoline engines were used. Concrete was used as a floor in some of the bridge spans up to 25 ft. The Owego Bridge Company manufactured and erected three of the smaller bridges, and the American Bridge Company supplied the balance of the structures. The illustrations show a few of the typical culverts, spans and bridges.

VITRIFIED BRICK PAVEMENT

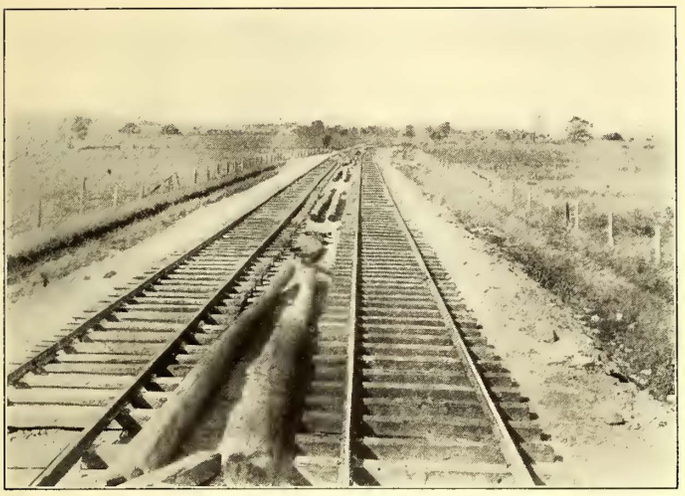
In city and village streets where paving is required, the company has adopted vitrified brick as standard, some of the details of which are unique. The bricks are required to be of the best quality, sound, hard-burned paving brick. All bricks except in special cases to be square and straight, with sharp or slightly beveled edges. Their specific gravity must not be less than 2.0, and they must not absorb more than 3 per cent of their weight of water after an immersion of two days. The bricks are laid (see section) upon a cushion of sand resting upon concrete foundation. This foundation is formed of concrete composed of one part Portland cement, four parts sand and eight parts crushed stone or clean screened gravel. The foundation is 5 ins. in depth, extending from the under to the upper surface of the ties. In placing this concrete, the following method was adopted: Concrete was mixed by hand, a gang of sixteen men being employed, of which six wheeled the material to the mixing board, where four gave it a preliminary mixing. It was then thrown into a McKelvey mixer, where water was added to the proper consistency. The mixer, driven by a gasoline engine and mounted upon wheels, could be moved along the track, so that the concrete was deposited practically

ONE TRACK GIVEN FIRST LIFT, OTHER UNBALLASTED

where wanted and spread with hoes. Upon this bed is spread 1 in. of mortar, consisting of one part Portland cement and four parts sand. Four men were used to mix and spread the neat cement. The mortar was applied before the concrete was set, so as to form a perfect bond. The cushion bed is laid on the concrete foundation after the concrete has become thor-

oughly set and dried, and consists of a ½-in. layer of clean, coarse, sharp sand. Along the inside of each rail there is placed a brick of special design, which forms a groove or flangeway for the wheels of the cars.

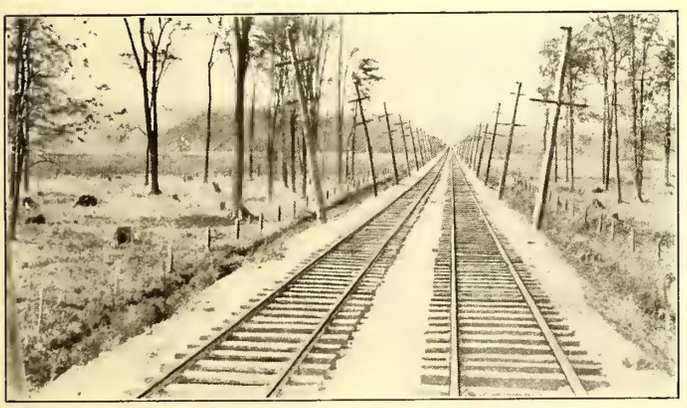
The construction on sharp curves around street corners consists of the center rail laid without groove and the inner rail with machine-fitted guard rail. The rail is 90-lb. A. S. C. E.



DISTRIBUTING POLES, CROSS-ARMS AND PINS ALONG ROUTE

standard section; the T-rail and the special work was supplied by the Pennsylvania Steel Company.

After the foundation and cushion have been prepared as described, the paving bricks are laid in the following manner: The pavement is constructed of a single layer of bricks laid on edge, end to end at right angles to the lines of rail on tangents. The courses are kept true and parallel in laying with the backs of the bricks close together, sides and ends touching and breaking joints at least 3 ins. with the bricks in the adjoining course. The bricks are set perpendicular to the grade of the



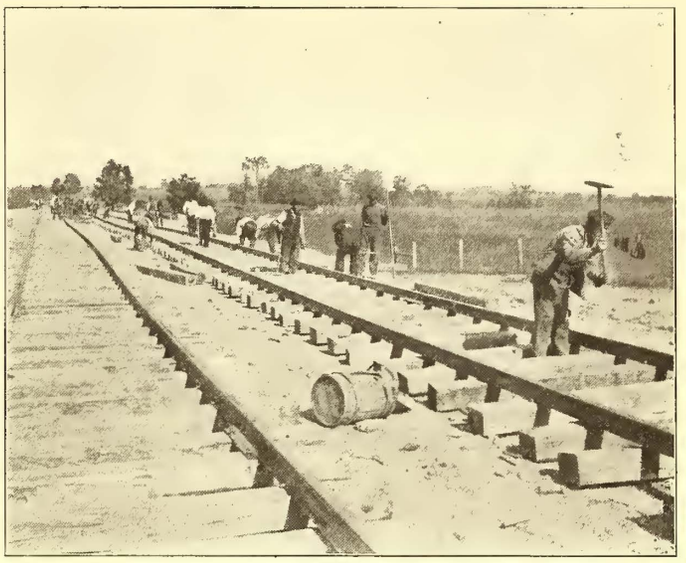
TYPICAL TANGENT BEFORE BALLASTING

street and to a height of ¼ in. to ½ in. above the top of the rail to allow for settlement when tamped.

The space between the head and the base of all track rails next the pavement is filled with mortar, composed of one part Portland cement and four parts sand. After the bricks have been laid, the pavement is thoroughly rammed with a 90-lb. paver rammer. After ramming, the joints are filled with a Portland cement or grout, composed of one part sand and one part cement, together with a sufficient quantity of water. The grout is pounded and swept to and fro upon the pavement until each joint is filled flush with the surface. Wet sand is then spread over the entire pavement to a depth of ½ in., and kept wet until the pavement is thoroughly seasoned, after which it is removed. Brick pavement of this character has been laid in Palmyra, Newark, Lyons and Macedon, aggregating about 22,500 yds.

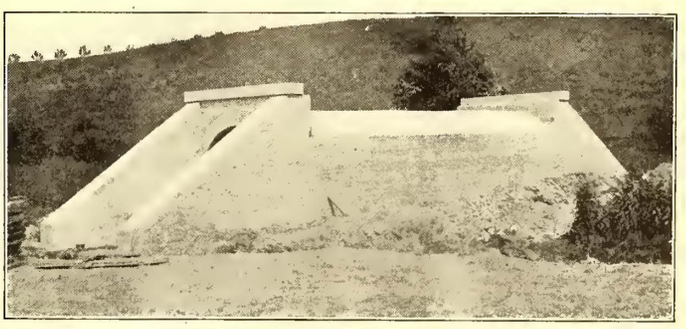
OVERHEAD CONSTRUCTION

In view of the heavy and permanent standards adopted in the overhead work, it is believed that a somewhat detailed description is justified. Span construction is used throughout. The poles are of juniper wood, and are from 35 ft. to 50 ft.



TRACK GANG SPIKING DOWN RAILS ON SECOND TRACK

long, with 8-in. tops. On tangents poles are spaced 80 ft., and on curves they are placed with consideration to the radius of the curve, but in no case closer than 50 ft. on any curve, except in villages, where they are located at such points as not to interfere with driveways, entrances to properties and intersecting streets. Poles are set 6 ft. in the ground, and are thoroughly tamped with the most suitable of the excavated material. The poles are set approximately 8 ft. from the center of the nearest track, with sufficient rake away from the track to properly resist the pull of the span wires. In villages the poles are set back of the gutter line or curb. Poles are back-guyed to fluke anchors at frequent intervals, and on many sections at every third pole. The head guys consist of ⅜-in. galvanized



A 10-FT. CONCRETE CULVERT NEAR NEWARK, N. Y.

mild Siemens-Martin steel wrapped around the top of the pole and around the butt of the adjoining pole, or are attached to Crouse-Hinds Electric Company's guy anchors 5 ft. long with a ⅞-in. shank. The cross spans are ⅜-in. mild Siemens-Martin steel strand wire attached to pole by ⅝-in. x 16-in. galvanized eye-bolts with square nut and washers. Each trolley wire is anchored every half mile, using the Mayer & Englund, J. G. White type, three-way swivel tap to strain yoke, attached to the trolley wire midway between poles. The swivel taps are guyed with 5-16-in. galvanized mild Siemens-Martin strand wire wrapped around the top of the pole nearest the strain yoke; a strain insulator is cut in at the trolley end of each anchor wire. The poles to which the trolley anchors are attached are head-guyed with the butts of the adjoining poles.

Straight line hangers of the West End type, and curved cap and cone hangers with ¾-in. stud are used. All trolley ears

are the Detroit trolley clamp type, galvanized; the clamps are hammered in place before screws are finally tightened, and the screw threads are indented with a prick punch to prevent them from loosening after the final tightening.

A No. 0000 B. & S. grooved copper trolley wire is strung over each track; adjoining lengths are connected with copper

20-FT. SPAN CONCRETE STRUCTURE. DECK OF I-BEAMS IN CONCRETE. SIDE WINGS ARE ARRANGED TO AVOID FORMING A BLIND CURVE

connections. The trolley wire is erected at a height of 19 ft. above the tops of the rails at the hangers, and the sag between hangers, 80 ft. apart, does not exceed the equivalent of 6 ins. at 60 degs. F. at the time of erection. The feeder system is strung on one set of poles, and consists of two 500,000-circ.-mil bare copper cables, except through villages, where insulated feeders have been used. The feeder cross-arms are of long leaf yellow pine, 3¼ ins. x 4½ ins. x 5 ft., painted with carbolinium, and bored for 4½-in. pins. They are fastened to the pole with a ⅝-in. x 15-in. galvanized bolt having 4-in. thread, square nut and two galvanized washers. The arms are braced with standard galvanized iron braces, 1¼ ins. x ¼ in. x 26 ins., which are attached to the cross-arm by a ⅜-in. x 4-in. galvanized iron carriage bolt, and to the pole by a ½-in. x 3½-in. galvanized lag screw. The pins on straight line work and on slight curves are of locust, dipped in carbolinium, and on sharp curves, where under unusual strain, they are of dropped-forged iron.

The feeder wire insulators on straight line work and on

GASOLINE ENGINE-DRIVEN PORTABLE MIXER USED IN WORK IN VILLAGE STREETS

slight curves are standard glass cable top for 500,000 circ. mil to fit 1½-in. pins. On sharp curves, where iron pins are used, they are of composition side grooved design. The feed-wire splicer joints are of solid cast type, soldered.

Feed taps are made every 1000 ft., using No. 000 B. & S. stranded copper wire. Feed taps are wrapped and soldered to the feeder and passed through the eye of the strain insulator, taking the place of a regular span wire at the point where the feed taps are put in. The feed taps are attached to the trolley wire by a Syracuse type feed-in yoke.

HIGH-TENSION LINE

The high-tension lines have been built for 33,000 volts. Duplicate transmission circuits have been installed throughout, one on each line of poles. The regular surface circuits consist of three No. 2 B. & S. bare copper wires arranged in a triangle, the two base wires being 60 ins. apart; the apex wire is mounted on a short auxiliary cross-arm at the top of the pole and set off center to give the insulator ample clearance from the pole. This method of mounting the apex insulator was

A 35-FT. SPAN NEAR NEWARK, N. Y.

adopted after due consideration to the more usual methods of carrying the top wire was given.

The chief objection to placing the insulator directly on top of the pole was considered to be the likelihood of water working down around the insulator pin and causing premature decay in the pole top. The duplicate circuit for emergency service is mounted on the other line of poles, and in this case the wires are spaced 36 ins. instead of 60 ins.

The high-tension wires forming each circuit are transposed at long intervals, it being considered that a certain amount of transposition was desirable on account of the unequal sided triangle, caused by the offset of the top wire. The high-tension circuits are shunted around all towns and villages on separate pole lines; the high-tension cross-arms are of long leaf yellow pine, painted with carbolinium, and fitted with two 14-in. locust pins with 2-in. shanks. The pins are boiled in linseed oil before using. The arms are fastened to the poles by a ⅝-in. x 13-in. galvanized bolt with square nut and two galvanized washers, and the circuit having the 36-in. spacing between wires; the cross-arms are 4 ins. x 5 ins. x 4 ft. x 4 ft., braced with two 1¼-in. x 3-6-in. x 20-in. standard galvanized iron bracers.

On the circuit having 60-in. spacing, the cross-arms are 4 ins. x 5 ins. x 6 ft., braced with two 1½-in. x 1¼-in. x 26-in. standard galvanized iron braces. The braces are fastened to the cross-arms by ⅜-in. x 5-in. galvanized iron carriage bolts, and to the pole by a ½-in. x 3½-in. galvanized iron lag screw. A sketch of the pole tops is given in this connection.

The insulators are of the umbrella type, consisting of two pieces of brown glazed porcelain cemented together. The insulators were required to be capable of withstanding without injury, when mounted on suitable iron or wooden pins, a tension of 100 lbs., applied along the line of conductor at right angles to the axis of the pin. The insulators were also to stand a tension of not less than 500 lbs., applied axially between the pin and top of insulator. The specifications require that the insulator shall stand for five minutes without injury or arcing over, a high potential test of 60,000 volts, this puncture test to be applied by inverting the insulator in a conducting liquid extending to the center of the groove, filling the pin hole with the liquid up to the depth of the thread, and applying the pressure between the liquids.

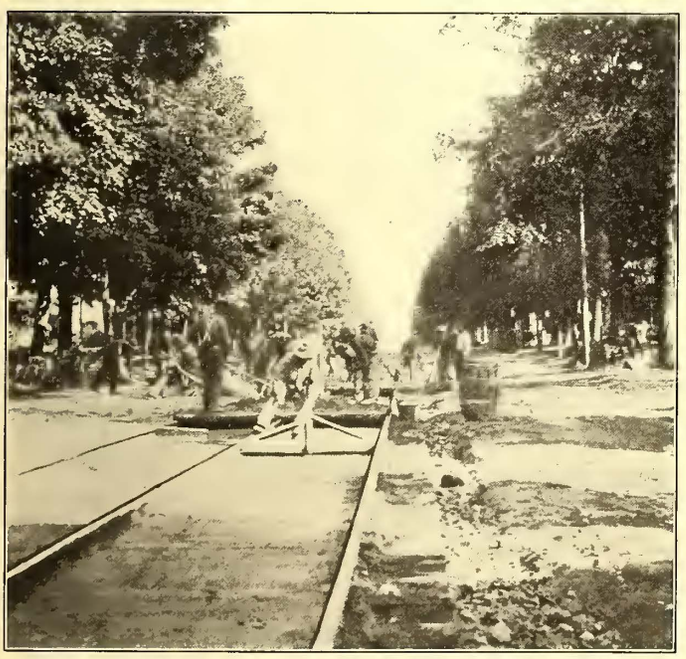
TELEPHONE AND SIGNAL LINES.

The telephone and signal wires are carried on a line of poles on the opposite side of the track from that on which the feeder wires are strung. They consist of six No. 10 bare copper wires carried on cross-arms, similar in all respects to the feeder cross-arms, except that they are 8 ft. long and braced with two 1½-in. x ¼-in. x 36-in. galvanized iron braces. Standard pony glass insulators are used in erecting telephone and signal wires, except that every 500 ft. transposition glass insulators are used. Transpositions are made on the telephone lines only. The telephone and signal wires are tied to the insulators by No. 10 copper wire. All splices in telephone and signal wires are made with McIntyre sleeves.

STRINGING WIRES

The feeder, trolley and transmission wires are being strung from a flat car drawn by a steam locomotive. The car is provided with three reels, and in the case of the high-tension lines the three wires are strung simultaneously. It is the practice to run out about six pole lengths of the wires at a time. The wire is run out on the ground and a man is then sent up each pole, and by means of small hand block tackle the wires are drawn up and laid temporarily on the cross-arms. This part of the work is done at night, on account of the fact that the track must be kept clear during the day for the use of construction and work trains. During the day the gang goes back over the section that has been strung during the previous night and places the insulators on the arms. The wires are then drawn tight by a steam locomotive and attached to the insulators.

The wire gang consists of fourteen men and a foreman, and with this force about 3 miles of high-tension line is strung per day; the same distance of feeder and about 2½ miles of trolley can be placed in position in a day. The same car is used to string trolley wires and feeders. In stringing trolley wires, the wire over each track is run out at the same time.

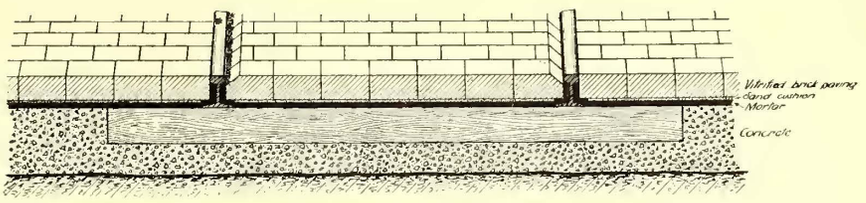


CONCRETING TRACK FOR BRICK PAVEMENT; MIXING MORTAR BY HAND AND SURFACING

POWER HOUSE AND SUB-STATIONS

The central power generating station is located at Lyons, which will be virtually the half-way point when the entire system between Rochester and Syracuse has been completed. Power will be generated by Westinghouse-Parsons turbines at 3300 volts, two-phase, and will be stepped up to 33,000 volts, 25 cycles, three-phase for transmission purposes. The system has been laid out as a three-phase transmission with transforming and converting sub-stations to supply direct current to direct-current motors on the cars. The entire arrangement has been designed, however, with the idea in view that eventually the road will be operated with single-phase motors on the cars and the sub-stations will be abondoned.

The transformers during direct-current operation will, of course, be connected two-phase on the primary and three-phase on the secondary side. At first the primary installation at Lyons will consist of two 1500-kw Westinghouse-Parsons turbo-generating units. The boiler equipment includes six 360-hp Heine boilers fitted with Heine superheaters, but double-connected, so that superheated steam or saturated steam at 150 degs. F. can be supplied to the turbines. The power station was designed by Sheaf & Jaastad, of Boston.

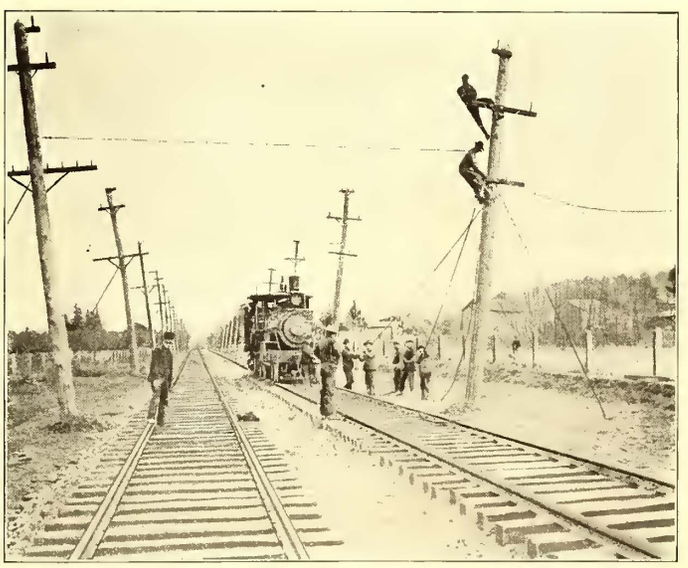


SECTION OF RAIL IN PAVED STREET

There will be three sub-stations on the line from Lyons to Rochester. These will be located respectively at Port Gibson, Macedon and Despatch. The sub-station at Port Gibson will contain two 400-kw rotaries; at Despatch, two 500-kw rotaries, and at Macedon, two 400-kw rotaries.

ROLLING STOCK

It is expected that the schedules will call for a speed of 50 m.p.h. on levels, and each car will be equipped with four Westinghouse No. 119 motors, rated at 110-hp each, giving a total of 440-hp per car. At the present writing ten cars have been ordered, eight from the Niles Car Company and two from the Kuhlman Car Company. The cars will be 53 ft. over all and will be equipped with Westinghouse multiple-unit control and Westinghouse air brakes.



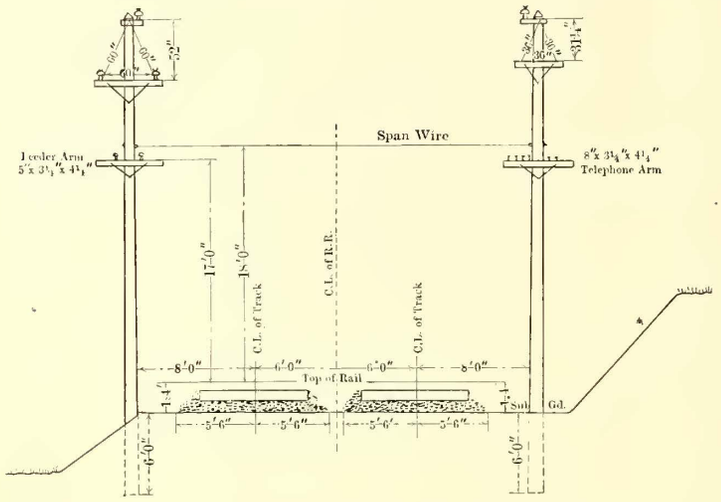
PULLING FEEDERS UP TAUT BY LOCOMOTIVE

CONTRACTS

The Syracuse Railroad Construction Company was awarded the contract for the entire work of building the Rochester, Syracuse & Eastern Railroad. Contracts for the grading were

sub-let to Fred T. Ley & Company, of Springfield, Mass.; John Shields Construction Company, of New York, and J. G. White & Company, of New York.

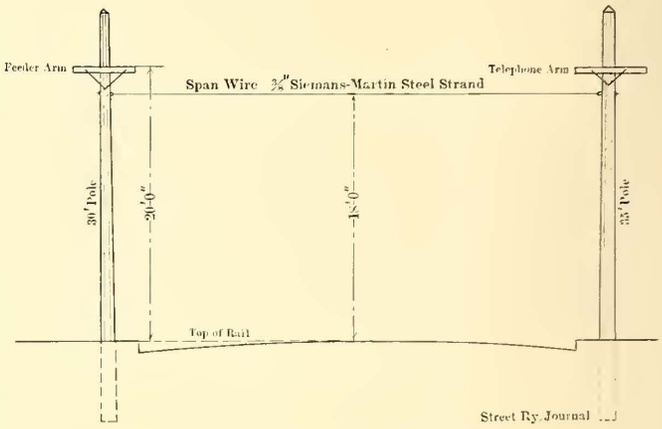
J. G. White & Company was also awarded the entire contract for track laying and overhead work from Rochester to Lyons. The engineering was done by the Syracuse Railroad Construction Company's engineers. For the photographs and much of the data used in the foregoing article acknowledgment is made to J. G. White & Company and to Thomas H. Mather, chief engineer of the Syracuse Railroad Construction Company.



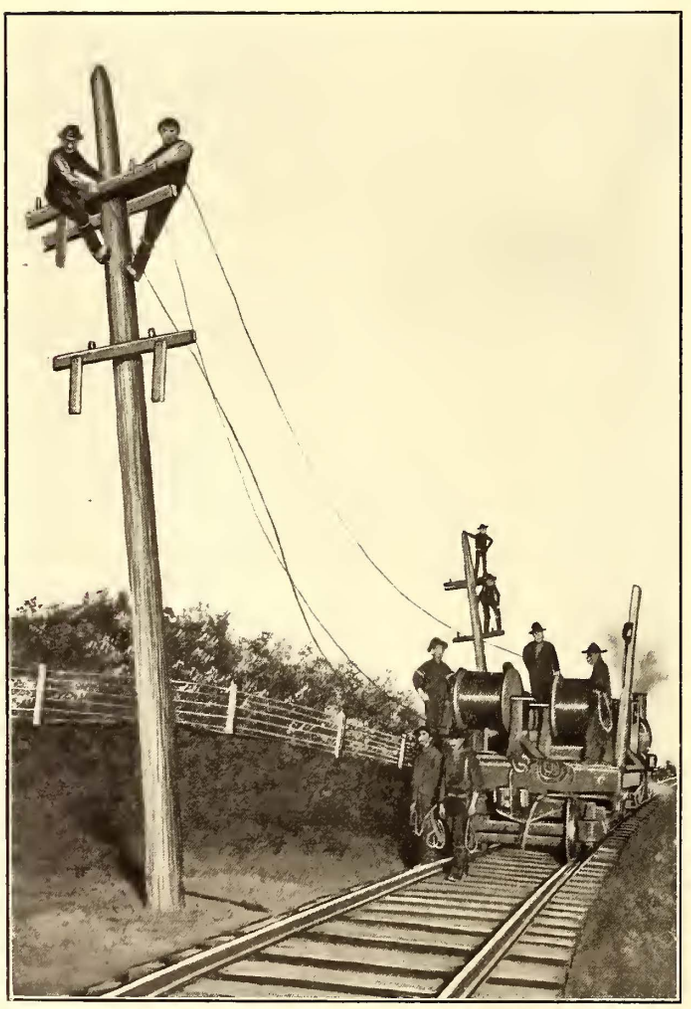
SECTION OF OVERHEAD LINE ON RIGHT OF WAY

IMPROVED NEW BEDFORD-FALL RIVER SERVICE

The Union Street Railway Company, of New Bedford, Mass., is double-tracking its line between New Bedford and Fall River. The new work involves the construction of 14 miles of track, of which 9 miles is already completed. The old single-track line between the two cities permitted only a 15-minute headway, but upon the completion of the double-tracking this will be cut down to 10 minutes. The line runs alongside of the State highway and gives a local service. It is expected that the running time also will be reduced from 75 mins. to 55 mins.



STANDARD OVERHEAD CONSTRUCTION IN CITY STREETS



STRINGING HIGH-TENSION TRANSMISSION WIRES BY LOCOMOTIVE

FASTENING GUY ANCHORS AND PULLING UP SPAN WIRE

A SHORT SINGLE-PHASE RAILWAY ON LONG ISLAND

An urban railway system which has recently been installed by the Long Island Railroad Company at Glen Cove, L. I., possesses many points of more than passing interest when considered in connection with present developments in the electric railway field. The railway is intended to convey passengers from Sea Cliff and Glen Cove stations on the Long Island Railroad to the neighboring steamboat landings on Long Island Sound.

The principal interest in the railway system resides not in the magnitude of the undertaking, since the total length of track now completed and under construction is only about 5 miles, but in the means employed for supplying power to the rolling stock. The present system had its beginning in a small direct-current railway which was owned by the Long Island Railroad Company, which purchased the necessary power for operation from a local electric company. When the Long Island Railroad Company established a generating station at Long Island City it was ascertained that power could be transmitted from this station over the intervening distance of about 27 miles, and there used by single-phase motors more advantageously than it could be purchased and used by d. c. motors.

A CURVE ALONG THE SEA CLIFF-GLEN COVE SINGLE-PHASE LINE

The power is transmitted directly at the station pressure of 11,000 volts over two No. 1 bare copper wires placed on a wooden pole line extending from the Belmont Park sub-station of the Long Island electric railway system to a transforming sub-station located adjacent to the passenger station of the Long Island Railroad at Glen Cove. The transforming sub-station equipment consists of two 200-kw, oil-cooled, 11,000-volt to 2200-volt, 25-cycle transformers, and the necessary switching and protecting devices. The high-potential lines enter through the center of double-glass windows and, passing through spiral choke coils, terminate in oil switches which are connected in the primary circuit of the transformers. The oil switches are enclosed in separate cement compartments and are operated by a system of levers, the handle for which is placed on a separate panel adjacent to the 2200-volt switchboard. The 11,000-volt circuits are in no wise connected to the switchboard, and the 2200-volt circuits are represented in the front of the board only after having passed through current and potential transformers. A bank of low-equivalent lightning arresters serves to protect each line entering the building.

No attendants are required at the sub-station. In the event of the primary switches being opened from any cause, an electric bell in the adjacent passenger station notifies the agent, who can conveniently close the switch. Although only one of the phases of the three-phase generating system at present supplies power to the railway, the sub-station equipment is designed for three-phase operation. All switches, lightning arresters and switchboards are of the three-phase type, two-thirds of the equipment being used at present. With future extensions, a third transmission wire will be erected and a third transformer will be installed, so that power can be obtained from all three of the phases.

SINGLE-PHASE CAR RUNNING THROUGH GLEN COVE

At the present time four cars have been equipped. Two of these cars are of the single-truck type, and each weighs 14 tons; while each of the other cars is supplied with double trucks, and weighs 17 tons. The single-truck cars are of the semi-convertible type, were supplied by the J. G. Brill Company and are mounted on that company's No. 21-E truck. One of the double-truck cars is also of the semi-convertible type, similar to the ones just described, while the other is of the open type.

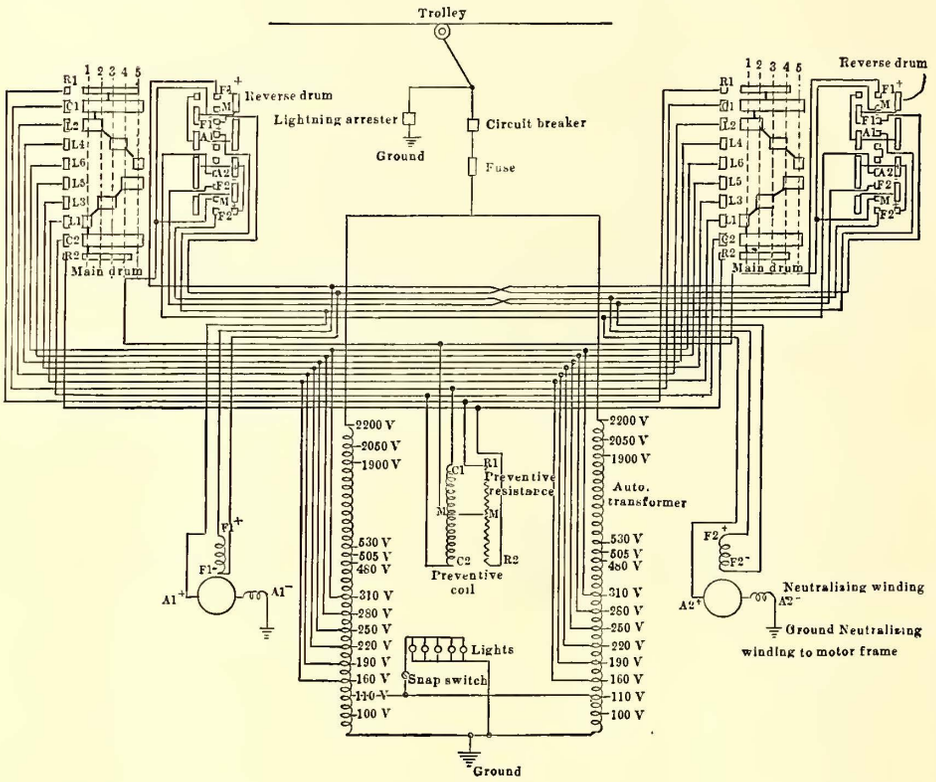
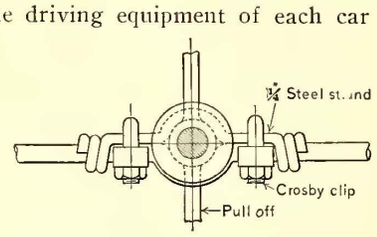
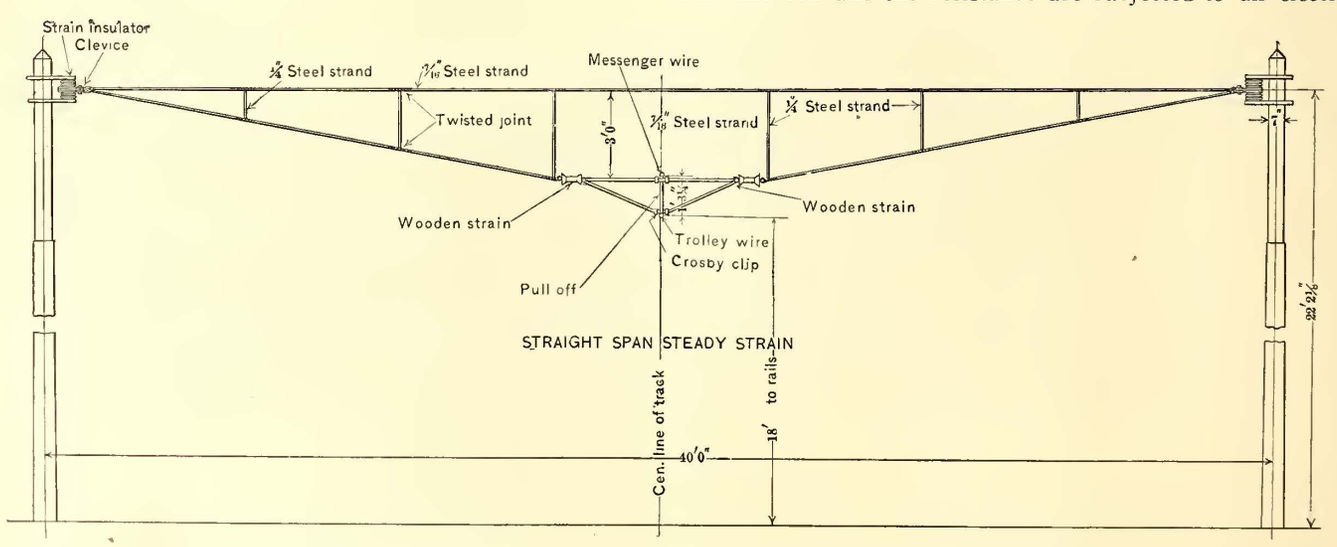


DIAGRAM OF CIRCUITS OF EQUIPMENT USING TWO-PART AUTO-TRANSFORMERS

The driving equipment of each car consists of two 50-hp 300-volt, 25-cycle Westinghouse single-phase, compensated series motors, operated always in parallel and subjected to potential control. Very little sparking is produced even under the severest starting conditions, and the arcing is not destructive in nature. The four brush studs are mounted on an annular ring, which is arranged to be rotated through 360 degs. when desirable, so that all brushes can be inspected from the top opening in the frame of the motor. The brush studs are connected in two pairs to two copper bus rings which are joined to flexible leads, which pass through the frame by way of substantial insulating bushings, after the compensating stator winding has been included in the armature circuit. All of the bearings of the motor are provided with boxes in which waste is placed, and lubrication is obtained by the use of heavy machine oil.

As stated previously, the variation of the speed of the motor is obtained by subjecting the motor circuits to different voltages. For this purpose there is provided on each car a variable-ratio transformer having a single coil, which acts simultaneously as a primary and a secondary. This so-called auto-transformer is connected directly across between the trolley and the rail circuits, and voltages of different values are obtained by connecting the receiver apparatus between the rail circuit and intermediate taps on the transformer winding. Six of the intermediate taps, giving effective electromotive forces of 160 volts, 190 volts, 220 volts, 250 volts, 288 volts and 310 volts, respectively, are devoted to the use of the propelling motors. There are on the controller, however, only five running points, corresponding to voltages 175, 205, 235, 265 and 295, respectively. It will be observed that the electromotive force impressed upon the motor circuits is in each case intermediate between the voltages available at the transformer taps. This intermediate voltage is obtained through the use of so-called preventive resistance and preventive reactance, the prime object of which is to eliminate sparking at the controller. The motor circuits receive current from the middle points of the preventive reactance coil and the preventive resistance. When the controller is on any one of the first four accelerating points, both the coil and the resistance are subjected to an electromotive force of 30 volts. This voltage forces a certain current through the preventive resistance independent of the operation of the motors, and it causes a certain exciting current to flow





DOUBLE CATENARY WIRE TROLLEY SUSPENSION USING IRON SIDE POLES

through the preventive coil. In addition to its exciting current, there flows through each half of the preventive coil one-half of the current to the motor circuits, the two components of the motor current flowing in opposite directions in the two sections of the coil. In changing the controller from a running position to the one next higher in voltage, the lower electromotive force terminals of the preventive coil and resistance are disconnected from the corresponding tap on the auto-transformer and transferred to another tap 60 volts higher in electromotive force. At the intermediate position of the controller, only the necessary exciting current flows through the preventive coil, while one-half of the preventive resistance carries the whole of the current to the motor circuit. It is evident, therefore, that the windings on the transformer are never short-circuited and the circuit to the motors is never opened during the accelerating period. When the controller is placed on the running position giving the highest voltage, the preventive resistance is excluded from the circuit and only the preventive coil is in use, thus eliminating that loss in the preventive resistance due to the 30 volts across its terminals. Experience shows that there is no perceptible arcing at the contacts when the controller is changed from one running position to another, and that when the controller is thrown to the "off" position the arcing is very slight.

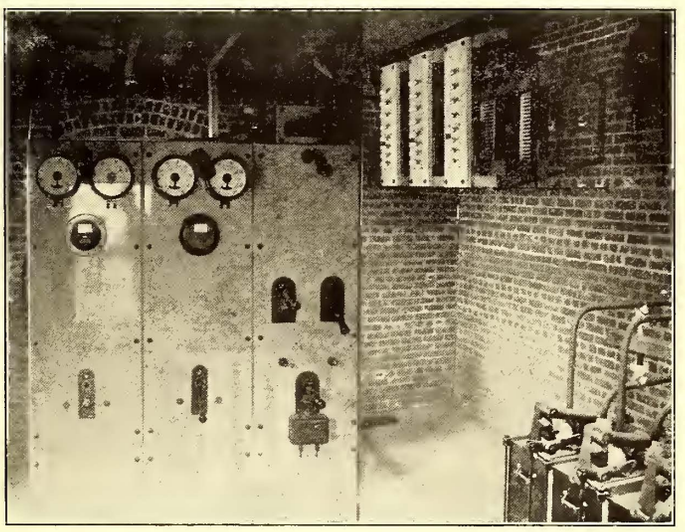
The auto-transformer of each of the double-truck cars is rated at 50 kw, and is of the air-cooled type. Special pains have been taken to eliminate all unnecessary weight of this transformer and to render it as compact as possible. Although each single-truck car is provided with two 25-kw auto-transformers; they are electrically so interconnected as to form virtually a single 50-kw transformer. The object in thus dividing the transformer was to allow of a proper distribution of the weight, since sufficient space was not available for placing it under the center of the car, and it was not considered advisable to concentrate the weight at one end.

The lamps of the car, including those for the two headlights, are connected in parallel and receive current from the 110-volt tap of the main auto-transformer. From the same tap is taken current for operating the rheostatic heaters of the car.

Each car is provided with a plain mechanical hand brake. Although no air-brake equipment is supplied, and the controller has not been designed especially for electric braking, it is worthy of note that there is available an emergency braking arrangement in event of the simultaneous failure of the hand brakes and the interruption of the supply of power. When the controller is in any running position the two motors are joined directly in parallel. It is found that if, when the car is traveling in a certain direction, the reverse lever be thrown over and the controller handle be placed in any running position, the motors will act as opposed direct-current series generators and rapidly limit the speed of the car, in the manner well known with direct-current equipments.

The most prominent feature of the high-potential circuits of the car resides in the extreme simplicity. The trolley pole differs in no wise from the standard construction used in street car work, and it is provided with the usual grooved wheel. The socket in which the base of the pole is placed is rigidly attached to a special platform which is mounted on four substantial porcelain insulators immediately over the center of the car. The conducting circuit from the pole passes across a Wurts lightning arrester equipment suspended beneath the special platform, and is then led through grounded protecting tubing to an oil circuit breaker and switch placed in the canopy of the vestibule. All metallic parts of the car are thoroughly grounded, even the lower end of the trolley rope being joined to the frame work. Two wooden strain insulators are inserted in the trolley rope for the purpose of preventing the passage of leakage current when the rope is damp.

The overhead trolley work throughout is of an exceedingly substantial nature. The conducting wire has an area equivalent to a B. & S. No. 000. It is of a grooved section, and is held in place by means of clamping ears which are suspended from a 7-16-in. steel cable catenary. The method of supporting the catenary varies with the curvature of the track and the nature of the locality. Since very little of the road length is laid on tangents and the route covers village streets, country roads and steam road beds, almost all types of suspensions are in use. Along the track which is laid on the bed of the steam road—that is, for a distance of ½ mile between Sea Cliff and Glen Cove stations, and along a portion of the country roads, the catenary is held in place by means of a bracket arm construction employing wooden poles spaced 120 ft. apart. Along the route of the old direct-current railway, the original side brackets were used without alteration. Each bracket arm is an iron pipe 2 ins. in diameter, which serves to hold the trolley wire about 21 ft. above the rails. Along the line adjacent to the steam road, the brackets are made of substantial T-irons. Within the towns, the catenary is held in place by means of side-pole and double span-wire construction. In the town of Glen Cove, the side poles are built up of iron piping of three sizes, having diameters of 6 ins., 7 ins. and 8 ins., respectively. Each pole is 30 ft. in length and is set 6 ft. in the ground on a bed of concrete, the hole being filled with concrete to the level of the ground. The span wires, which are made of 7-16-in. steel cable, are supported and insulated from the iron poles by means of substantial porcelain sleeves. Each sleeve is cemented around a short length of iron piping, the two ends of which are secured to the iron pole by clamps and retaining bolts. The span wires are fastened to a malleable-iron collar, which surrounds the porcelain sleeve, a separating lead collar serving to insure that the mechanical pressure of the iron collar is properly distributed over the porcelain sleeve. In all cases, the major insulation of the line is provided by these porcelain sleeves. The catenary is connected directly to a center porcelain sleeve insulator which is supported from the lower of two span wires. This lower span wire is itself supported from the upper span wire, and in it are inserted two hickory strain insulators, one on each side of the center porcelain sleeve. Owing to the fact that the trolley collector is of the wheel type, guard loops are provided for those porcelain sleeves from which the catenary is directly suspended, in order to protect the insulator in event of the trolley wheel leaving the wire.



SWITCHBOARD LIGHTNING ARRESTERS AND OIL SWITCHES IN SUB-STATION

Over certain sections of the railway, where electric light and telephone wires are numerous, guard wires have been erected in order to prevent fallen wires from coming in contact with the catenary or the trolley wire. For this purpose, 30 ins.

above the central trolley wire and catenary have been placed two galvanized iron wires, which are separated from each other by 18 ins. These guard wires are thoroughly insulated from, and supported by, a system of span wires, which are grounded to the side poles. The two wires are transposed at frequent intervals, and it is expected that they can be utilized as a telephone circuit in spite of their proximity to the trolley wire carrying alternating current.

In the town of Glen Cove the street over which the cars operate is paved with brick. Throughout this section of the railway the track is formed of 130-lb. girder rails, electrically-connected through protected ribbon bonds. The terminals of these bonds are placed in holes freshly drilled in the rails, and excellent and continued conductivity is assured by the use of a wedge-shaped steel core, which is driven in a hole in the terminal, and forces the copper of the terminal into intimate contact with the unoxidized surface of the iron web. The bond is then covered by the fish-plate. The track, which is laid parallel to the steam road and on the same roadbed, is formed of 70-lb. T-rails, which were previously used on the steam road. These rails are interconnected by means of protected ribbon bonds, similar to those used on the girder rails.

This road has been in service for the past two months with thoroughly satisfactory results. While the original rolling stock is now idle, and the cars at present in use are throughout of new construction, it is the intention to substitute alternating-current motors for the direct-current machines on he older cars, and to place all cars in service during the next summer season.

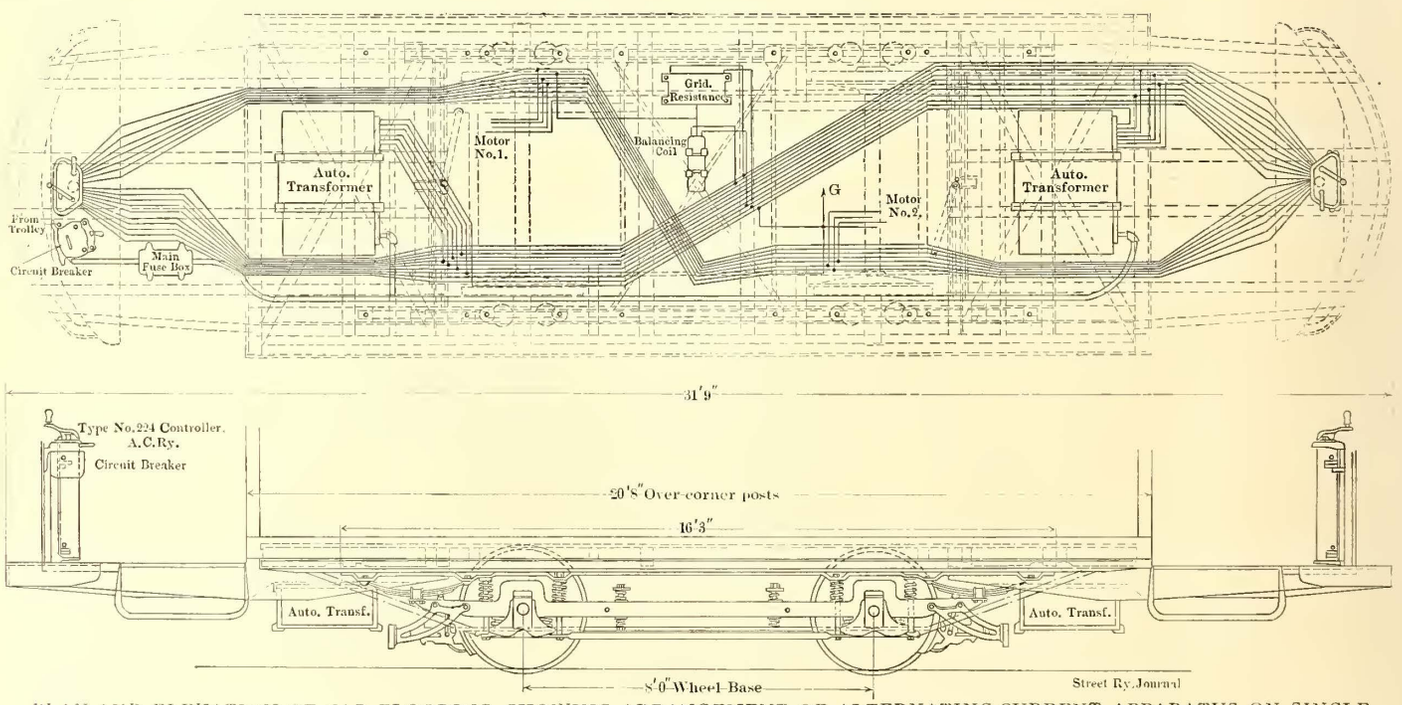
Acknowledgments are due for courtesies extended in the preparation of this article to L. S. Wells, electrical superintendent of the Long Island Railroad; to George Gibbs, chief engineer of the Pennsylvania, New York & Long Island Railroad, and to R. G. Slack, of the Long Island Railroad. The work was carried out under the direct supervision of Mr. Wells,

OPENING OF NEW ELECTRIC RAILWAY IN THE WESTFIELD VALLEY OF MASSACHUSETTS

The Western Massachusetts Street Railway Company has recently completed and placed in operation an electric railway

A DEEP CUT ALONG THE RIGHT OF WAY OF THE WESTERN MASSACHUSETTS STREET RAILWAY COMPANY

to serve the towns of Woronoco, Russell and Huntington, all of which are located in the beautiful Berkshire district of Western Massachusetts. The new line will therefore afford a splendid opportunity for pleasure travel, aside from its convenience to the citizens of the connected communities. It is about 12 miles long, extending from the terminus of the Woronoco Street Railway Company at Woronoco Park to the center of Huntington, but when the proposed extension to Lee is completed the company will have 38 miles of track to form the link which will give Berkshire towns and villages a clear electric way to the eastern section of the State.



PLAN AND ELEVATION OF CAR FLOORING, SHOWING ARRANGEMENT OF ALTERNATING-CURRENT APPARATUS ON SINGLE-TRUCK CAR FOR THE GLEN COVE-SEA CLIFF LINE

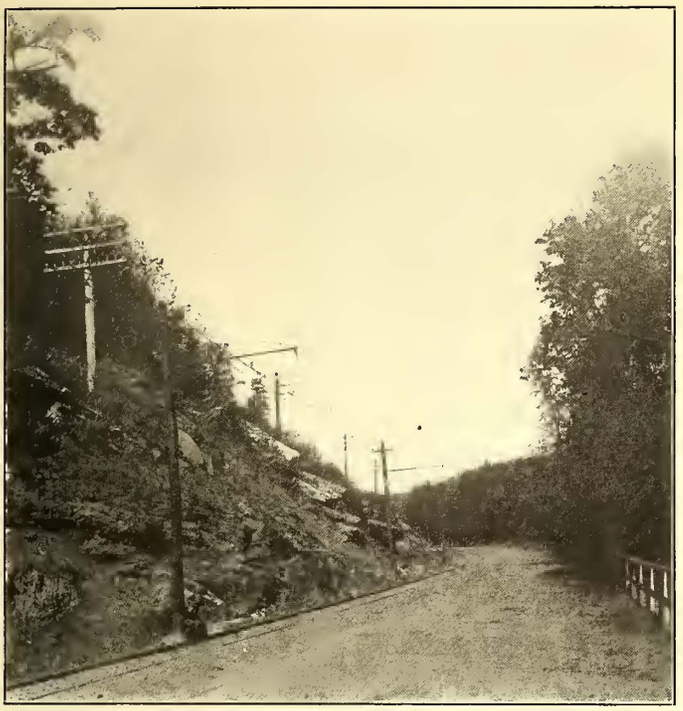
SCENERY AND PARKS

Attention has already been called to the fact that the new

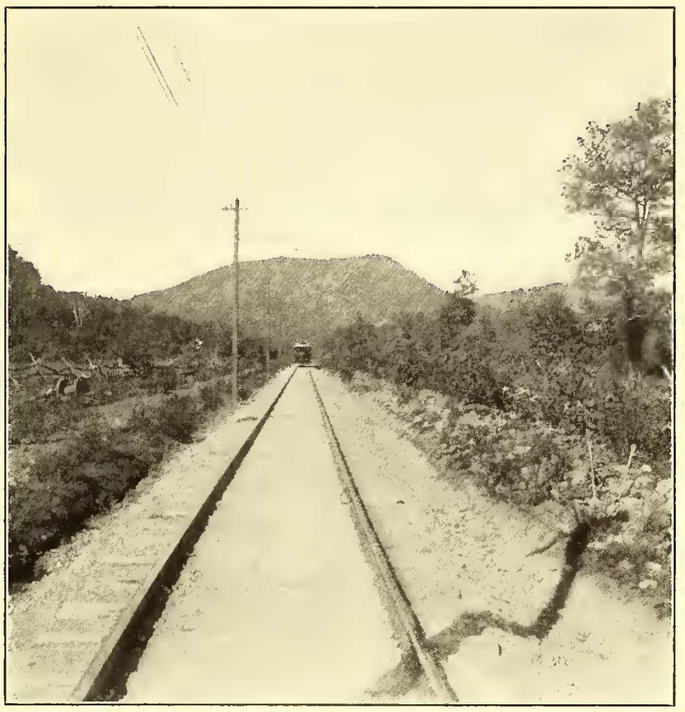
and the equipment of the road with the single-phase system was due largely to his advocacy of it.

A despatch from West Chester, Pa., says that passengers on the electric railway lines running from this place to Downingtown and Kennett Square are amusing themselves shooting rabbits from the cars as they run through the country districts. Nearly every day a number of the "cotton tails" are killed along the track in large numbers at many isolated points.

line will derive a large share of its patronage from pleasure travel. The combination of mountain and river, relieved here and there by stretches of moor and meadow, present scenic effects of great beauty. Soon after leaving Westfield the traveler can look over the plains below, across the Westfield River, and thence toward distant Mt. Tom, at the head of Hampton Plains. Mt. Tekoa and the Blandford Hills are also included in this view.



VIEW OF A PART OF THE PUBLIC HIGHWAY WHICH WAS WIDENED BY BLASTING THE ROCK ALONGSIDE



RUNNING ALONGSIDE THE STATE HIGHWAY. PART OF THE BERKSHIRE FOOTHILLS ARE SHOWN IN BACKGROUND

Upon reaching the State highway, the railway follows the turns of the river, keeping in touch with it all the way to Huntington. Through a wooded avenue the line passes into Woronoco, where may be seen the famous Salmon Falls and the mills of the Woronoco Paper Company. The next place on the line is Russell, a typical New England village, which is already known as an ideal summer place. Shortly after leaving Russell, Mt. Tuttle comes in view. This eminence is about 800 ft. above the sea. It is to be made the objective point of a burro trail by the Western Massachusetts Street Railway Company, which has already purchased over twenty burros or diminutive donkeys. The company proposes to lay out, as soon as possible, a burro trail from Riverbend Park to the top of Mt. Tuttle.

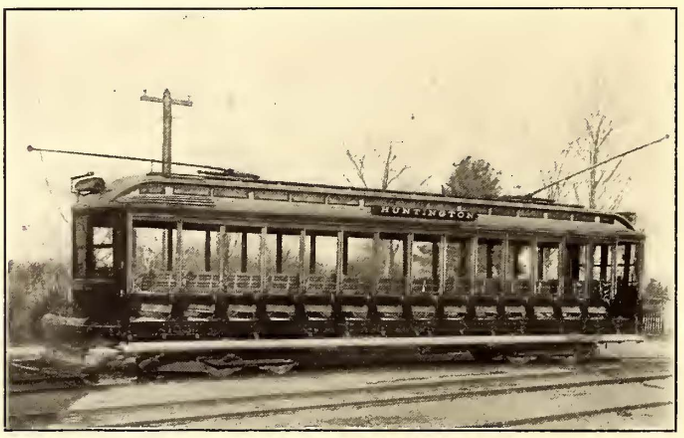
Riverbend Park is the name of the new 10-acre pleasure ground which the company is laying out at a point about 1½ miles above Russell. It is located within a few feet of the river bank, and consists of a grove of chestnut and pine. Riverbend Park will not be a gathering place for crowds who come to be entertained by variety acts, music, dancing, etc., but it is the intention of the projectors to provide an attractive resort where their patrons may picnic, finding enough in the natural beauties of the park and the lunching conveniences provided to have a quiet and pleasant time without the annoyance of large crowds. The park is a series of table lands, the first of which is about 50 ft. above the river. Throughout the park artistic seats and benches have been provided, many of them being placed to give a fine view of the river. Tables are also

ROAD AND RAILWAY BRIDGES ACROSS THE WESTFIELD RIVER, ON THE LINE OF THE WESTERN MASSACHUSETTS RAILWAY, BETWEEN WORONOCO PARK AND HUNTINGTON

scattered throughout the grounds for the convenience of picnic parties.

ROAD CONSTRUCTION

Owing to the enormous cuts and fills, the 10 miles of line now in service probably cost more than any like distance



STANDARD OPEN CAR USED BY THE WESTERN MASSACHUSETTS STREET RAILWAY COMPANY

throughout New England. One reason for the high cost of construction is the fact that the railway was obliged to follow the State highway the entire distance, and as the highway already occupied all of the available space between the bank of the Westfield River and the hill or mountain side opposite, it was necessary for the company to construct a right of way under the most adverse conditions. Owing to the rule of the State Highway Commission that the rails must be 14½ ft. from the center of the highway, it was necessary to widen the highway in many places to secure the required clearance. All of this work had to be done on the mountain side of the road, as the commission would not permit any work on the river side except the dumping of the excavated material. An instance of the unusual amount of rock blasting required on this line is the ledge encountered between Russell and Crescent Mills, which averaged 10 ft. to 15 ft. in height, and was ¼ mile long.

Among the many cuts were two between Woronoco Park and the Four-Mile House, each being about 1000 ft. long through 20 ft. of coarse gravel, hard pan and clay. The maximum grade is 5 per cent.

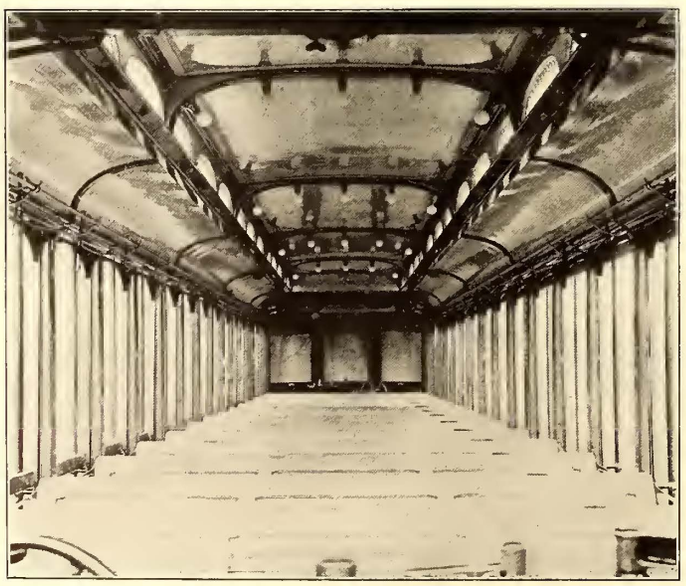
The track is made up of 70-lb. A. S. C. E. T-rail, laid on rock ballast 2 ft. or more in depth, and bolted to chestnut ties either 6 ft. x 6 ins. x 8 ins. or 7 ft. x 8 ins. x 8 ins. It is bonded with 0000 flexible protected bonds of the pin expanded type. Most of the special work consists of split switches, switch stands and targets.

ROLLING STOCK

A glance at the accompanying illustrations of the company's closed and open cars is sufficient to show that the rolling stock adopted is of the most up-to-date character. The present equipment consists of five open and three closed cars, furnished by the Wason Manufacturing Company, of Brighton, Mass., and the Laconia Car Works, of Laconia, N. H.

The open cars are 45 ft. long over all, have a width of 10 ft. and are mounted on extra heavy double trucks. They are equipped with both hand and air brakes, whistles and gongs. Arc headlight and illuminated signs are mounted on the outside of the car, while incandescent lamps are used to illuminate the interior. The roof and ceiling are of the semi-empire type, and the interior finish is mahogany. The cars are painted a rich royal blue, bearing on the sides the words "Western Massachusetts." The seating capacity of these cars, which contain fourteen benches, is seventy-eight. The vestibules are protected by brass railings, and these also serve to form a compartment for carrying small baggage.

TYPE OF THE HANDSOME CLOSED CARS ADOPTED BY THE WESTERN MASSACHUSETTS STREET RAILWAY COMPANY



INTERIOR VIEWS OF THE OPEN AND CLOSED CARS OF THE WESTERN MASSACHUSETTS STREET RAILWAY COMPANY, SHOWING THE SEATING ARRANGEMENT AND THE UNUSUAL METHOD OF CAR LIGHTING

The closed cars are 43 ft. long and 10 ft. wide, in the full empire style, with the interior finish of the finest mahogany. The seats are extra wide and are upholstered in royal blue plush. It will be noticed that the windows extend the width of two seats, this arrangement having been adopted to make these cars ideal for sightseers.

All of the cars have a maximum speed of 25 m.p.h. and an average schedule speed of 14 m.p.h. Telephones are installed on all cars so that the crew can talk to headquarters whenever necessary. In addition to the eight cars mentioned, the company owns one Wason snow plow.

The car house is located at Westfield. It is 47 ft. wide x 200 ft. long, and contains three tracks, with a pit under the center track only. It has a concrete floor and is furnished with Kinnear steel rolling doors. All car repairs are made in the Woronoco Street Railway Company's barn, located about 200 ft. from this company's car house.

POWER SUPPLY

Direct current for running the cars of the Western Massachusetts Street Railway Company is obtained from the Woronoco Street Railway Company at Westfield. This station is located 13 miles from the western terminus of the new railway, and power is transmitted through three No. 0000 feeders for 8 miles, two No. 0000 feeders for 10 miles, and one No. 0000 feeder for 12 miles. The trolley wire is No. 00 grooved type, with Creaghead flexible brackets and mechanical and soldered clips. The poles are of chestnut, 30 ft. high and 7 ins. in diameter at the tops.

RATES AND SCHEDULES

Despite the exceptionally heavy construction cost and the scenic advantages of this railway, the management has been very liberal in its fare charges. The first part of the trip to Huntington is on the tracks of the Woronoco Street Railway Company to Woronoco Parks and costs 5 cents; the stage to Woronoco is 10 cents; the section to Russell, 15 cents; and the total distance to Huntington, 20 cents.

A VIEW ALONG THE HIGHWAY FOLLOWED BETWEEN WORONOCO PARK AND HUNTINGTON

The run from Westfield to Huntington is made in 45 minutes. Thus it will take 22½ minutes to Woronoco, which is just half way, and 34 minutes to Russell. The cars are intended to run on a half-hour schedule.

MANAGEMENT

The Western Massachusetts Street Railway Company was organized on Dec. 10, 1904, with the following officers, who are still serving in the same capacities: President, Ralph D. Gillett; treasurer, A. W. Eaton; secretary, J. D. Cadle; and general manager, A. D. Robinson. Exactly one month after organization the contract for the construction work was awarded to C. W. Blakeslee & Sons, of New Haven, Conn. It is reported that both the Western Massachusetts Street Railway Company and the Woronoco Street Railway Company are to be transferred to the Consolidated Street Railway Company, which is controlled by the New York, New Haven & Hartford Railroad.

THE CAR HOUSE OF THE WESTERN MASSACHUSETTS STREET RAILWAY COMPANY

TOBOGGAN SLIDES FOR ELECTRIC RAILWAY PARKS

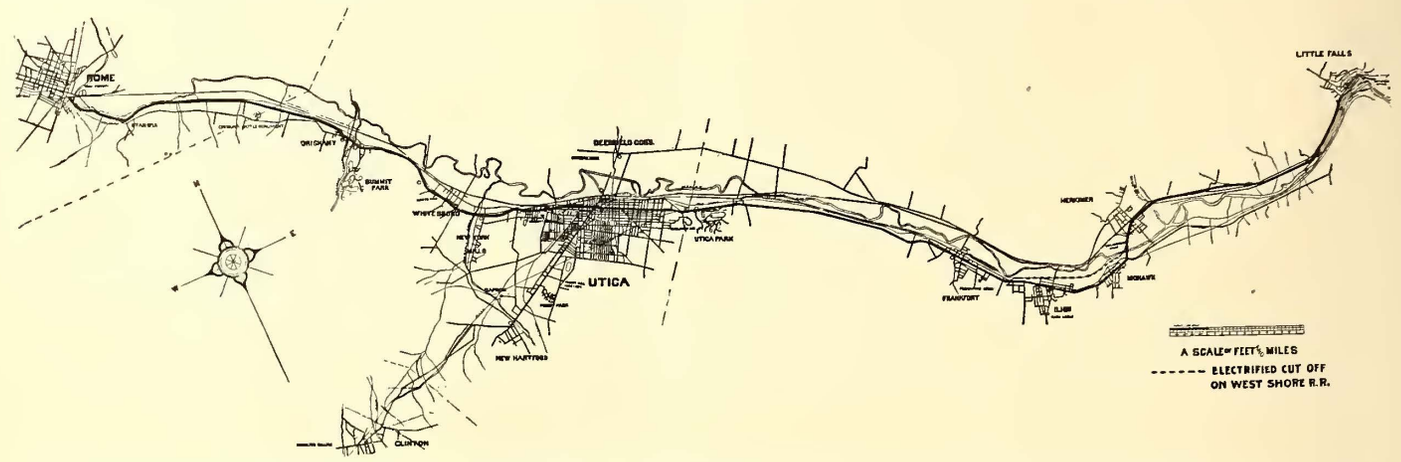
In the STREET RAILWAY JOURNAL for Nov. 25 mention was made of the plans of the Boston & Northern and Old Colony Street Railway Companies, of Boston, for making their pleasure resorts as popular in winter as in summer by building toboggan chutes, ice-skating rinks and other facilities for winter sports. In reply to an inquiry, Robert H. Derrah, general passenger agent for the companies, writes that the electric railway management is building its own toboggan slides at its various parks. The slides vary in detail at the different places, depending upon the contour of the ground. Of the five chutes erected, four are on natural slopes, and some of them are as long as 900 ft. before they reach the level, which is either ground surface, lake or river. The fifth slide, located at Highland Park, near the city of Brockton, is built entirely on trestle work, as the ground is comparatively level. This chute starts from an observation tower 30 ft. high and descends for a distance of some 1500 ft. Rollers have been placed at varying intervals along the slide in order that it may be used even when there is a scarcity of snow. There is also a carrier in the form of an endless chain, to which are attached cradles for carrying the toboggan sleds back to the starting point. The sleds were purchased from the Paris Manufacturing Company, of South Paris, Maine.

In line with the intention of the management to make these resorts as attractive and popular during the winter as possible, large orchestrions have been placed at each of the four principal parks. These will furnish music during the times the toboggan chutes are in use.

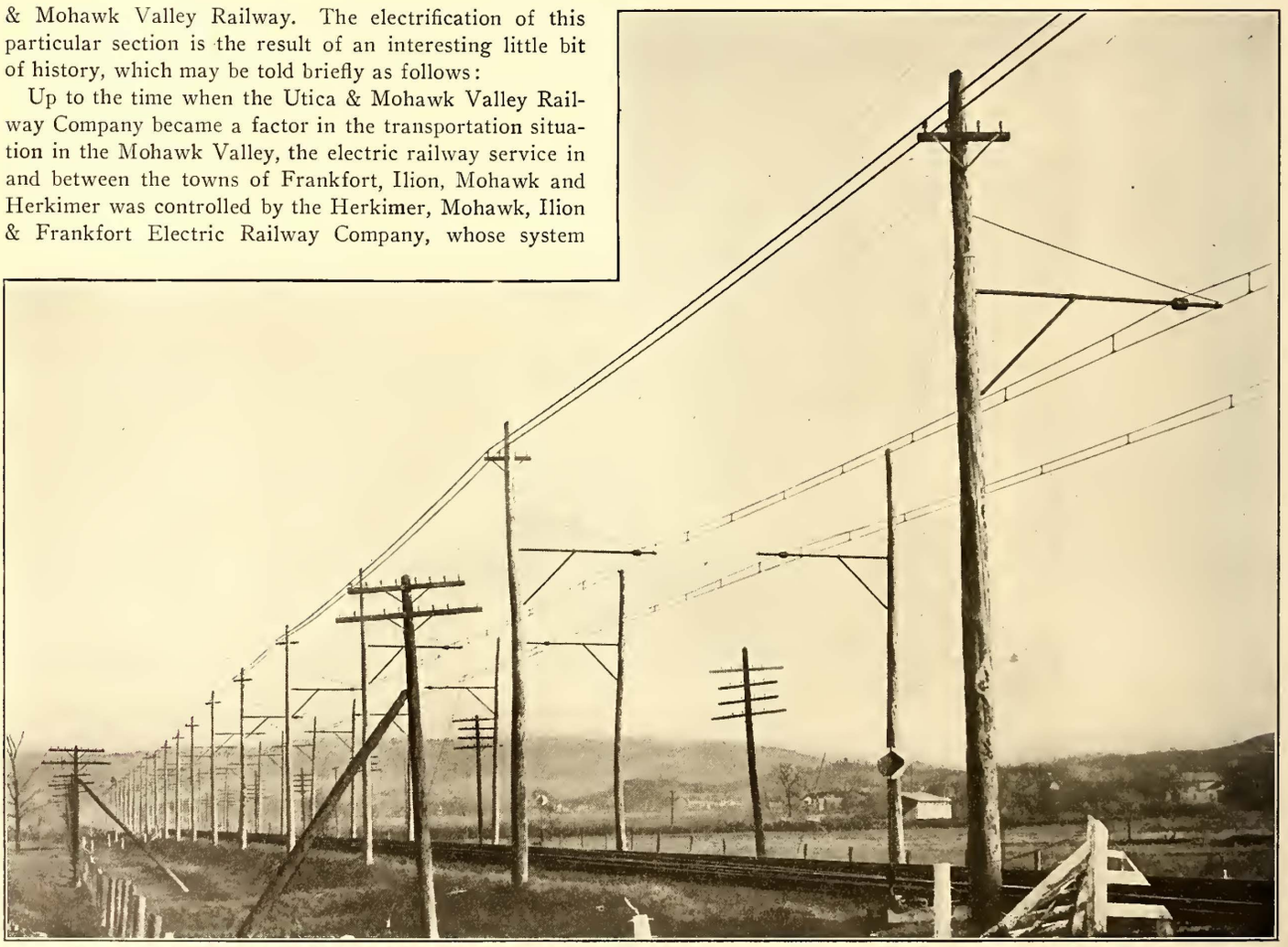
FIRST ELECTRICAL OPERATION ON THE WEST SHORE RAILROAD

A double-track section of the West Shore Railroad, 3.17 miles long, between Frankfort and Herkimer, has been equipped with electricity, and is now used in joint operation by steam trains of the West Shore Railroad and electric cars of the Utica & Mohawk Valley Railway. The electrification of this particular section is the result of an interesting little bit of history, which may be told briefly as follows:

Up to the time when the Utica & Mohawk Valley Railway Company became a factor in the transportation situation in the Mohawk Valley, the electric railway service in and between the towns of Frankfort, Ilion, Mohawk and Herkimer was controlled by the Herkimer, Mohawk, Ilion & Frankfort Electric Railway Company, whose system for the most part comprised a single line of track laid entirely in the highway. The Utica & Mohawk Valley Railway Company came into possession of this property and began at once to reconstruct the line as a double-track road on private right of way in the best manner possible, having in mind the ultimate intention of organizing a thoroughly modern high-speed, double-track electric railway system through the Mohawk Valley from Rome on the west to Little Falls on the east. In carrying out this work a serious obstacle was encountered in the attitude taken by the municipalities of Ilion and Mohawk, as these towns refused to give double-track rights except under conditions so burdensome that the company did not feel justified in accepting them. The company, therefore, opened negotiations with the West Shore interests, the result of which has been the electrification of that section of the steam load lying between Frankfort and Herkimer and running through the outskirts of Ilion and Mohawk. Connecting tracks have been built from the steam road to the electric line at both ends of the electrified section, and



MAP OF INTERURBAN SYSTEM OPERATED BY UTICA & MOHAWK VALLEY RAILWAY COMPANY, SHOWING ELECTRIFIED SECTION ON WEST SHORE RAILROAD, BETWEEN FRANKFORT AND HERKIMER

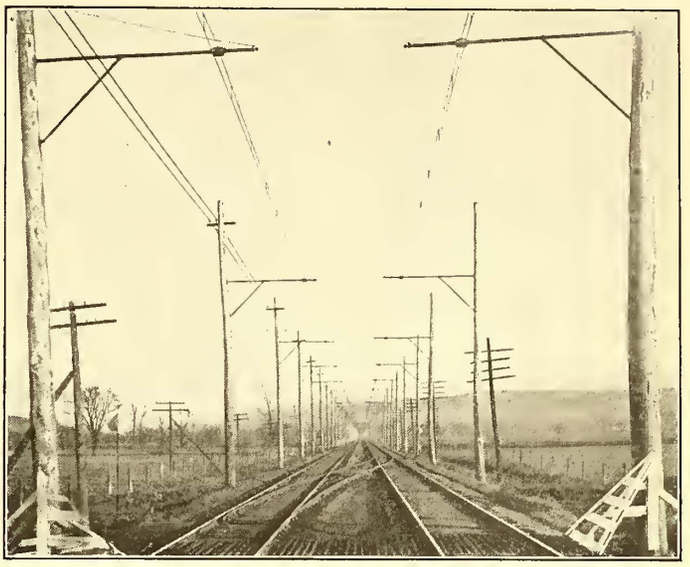


VIEW SHOWING CATENARY CONSTRUCTION ON WEST SHORE CUT-OFF, UTICA & MOHAWK VALLEY RAILWAY

this stretch of track now forms a cut-off that will materially shorten the through line, and with the exception of 2400 ft. of track in the city of Utica, gives the Utica & Mohawk Valley Railway a thoroughly modern double-track system from Rome to Little Falls, a distance of approximately 40 miles. For the present the same schedule as before will be maintained on the old line from Frankfort through Ilion and Mohawk to Herkimer, but the through cars will run by way of the cut-off over the West Shore.

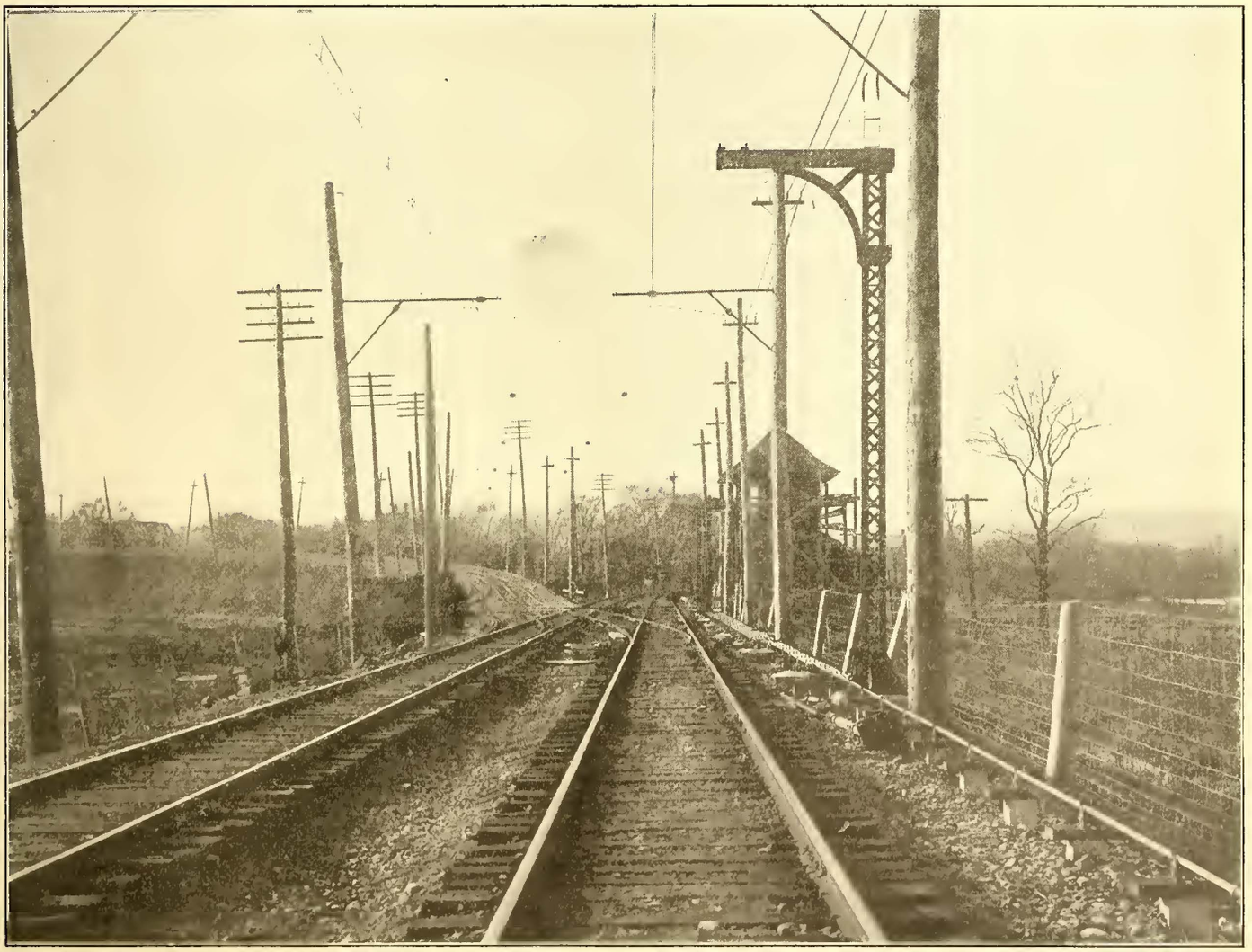
When the through service from Utica to Little Falls was placed in operation in 1903, the running time from the center of Utica to the center of Little Falls was 1 hour and 20 minutes. From Utica to Herkimer the time was 1 hour, and from Herkimer to Ilion was 45 minutes. By the installation of electricity on the West Shore cut-off, the running time from the center of Utica to the center of Little Falls will be 1 hour, and this will be cut ultimately to 52 minutes for the total distance of 23 miles. The time from Utica to Herkimer will be 45 minutes, and this will be cut ultimately to 37 minutes. The running time from Herkimer to Ilion will be 35 minutes for the present, but this will be reduced to 32 minutes. This reduction in the running time between these points will be accomplished with the same schedule speed as formerly, but the cars will travel over double tracks unobstructed by team traffic and other causes of delay. The new service will therefore save the people of this section anywhere from 10 minutes to half an hour on the trip to and from Utica. Incidentally it may be said that it would have cost the company in the neighborhood of $200,000 to reconstruct the old track from Frankfort to Herkimer under the conditions imposed by the municipalities, whereas the cut-off over the West Shore has been equipped electrically, ready for service, at a cost of not over $75,000.

At each end of the electrified section of the steam road, which



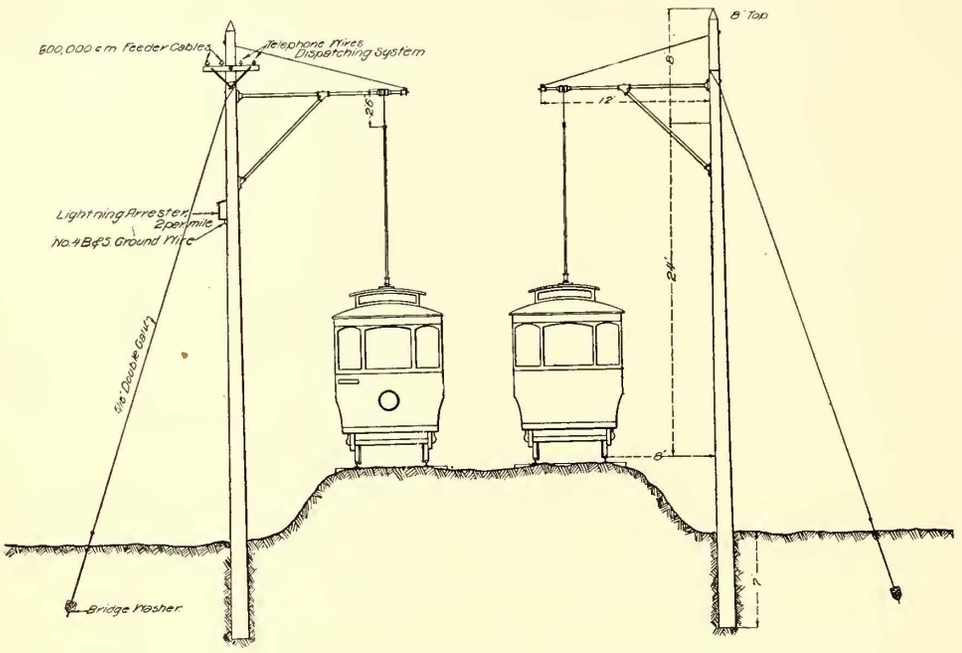
ELECTRIFIED SECTION OF WEST SHORE RAILROAD, LOOKING EAST

will be used jointly by the steam trains and electric cars, the company has installed block signals of the standard New York Central type, and a third block has been established in the



SHOWING CONNECTING TRACKS BETWEEN UTICA & MOHAWK VALLEY RAILWAY AND ELECTRIFIED SECTION OF WEST SHORE RAILROAD

middle of the section, so that the 3 miles of track will be operated as two distinct blocks, and the movement of all cars and trains through this section will be made by signal movements.

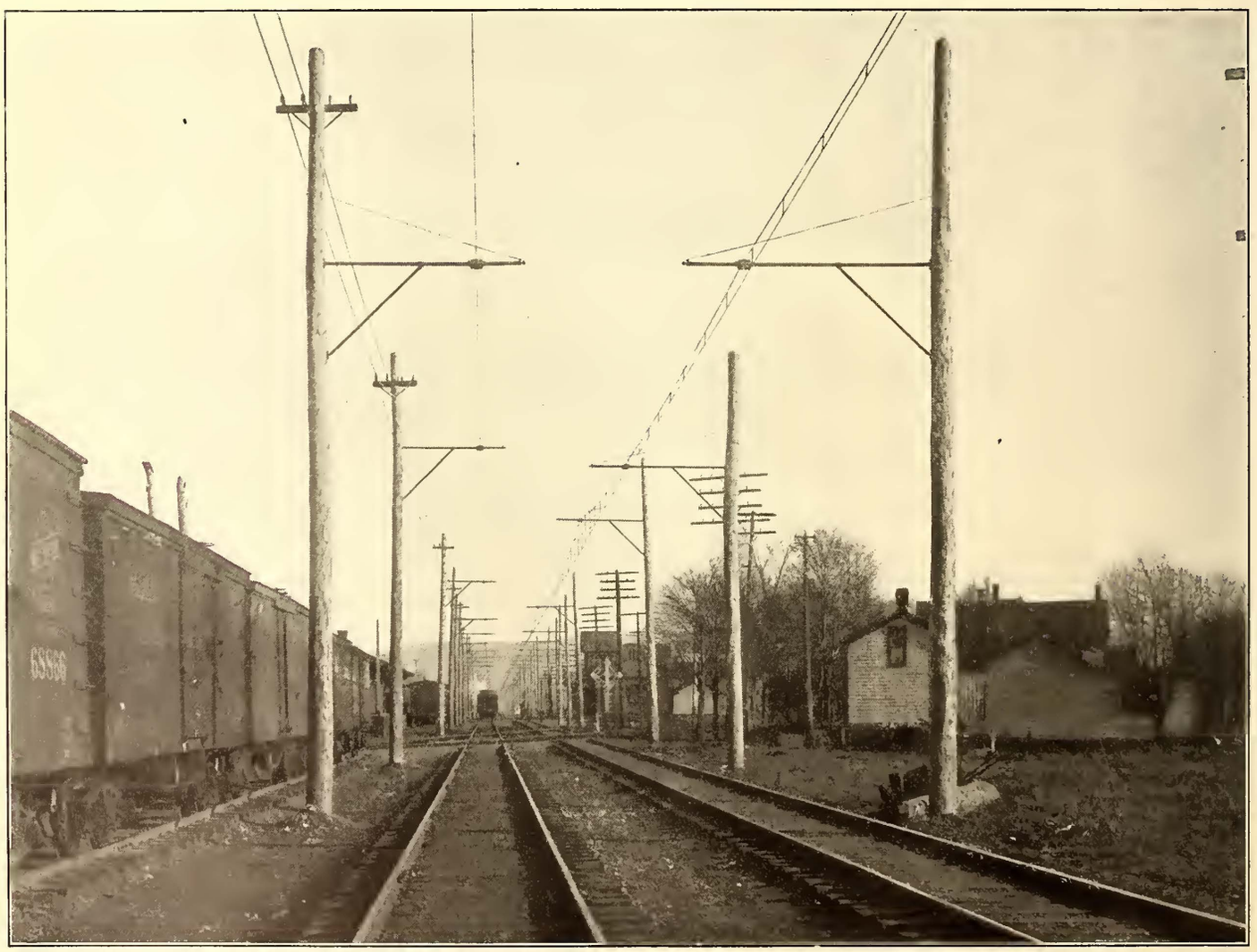


CROSS-SECTION CATENARY CONSTRUCTION, WEST SHORE RAILROAD CUT-OFF

Although electrical operation for the present will be by direct-current motors on the cars, the overhead construction on the West Shore cut-off has been built with catenary construction and is designed eventually for alternating-current operation. It may be said that advantage has been taken to make certain experiments in electrifying the cut-off, and the lessons here learned will be applied in the work of electrifying the West Shore tracks from Utica west to Syracuse, which work is already under way.

On the cut-off the trolley is 0000 grooved copper wire suspended from a catenary, which consists of 9-32-in. extra high strength steel cable covered with weatherproof insulation to protect the cable from deterioration caused by locomotive gases. The hangers or spreaders between the trolley wire and the catenary are placed 10 ft. apart, and consist in each case of a ½-in. iron pipe flattened at the top to bolt between the lips of a strap clip attached to the catenary and threaded at the bottom into the boss of a bronze clip attached to the trolley wire. The bronze clip on the trolley wire is held together by four screws, and the entire clip is 5 ins. long.

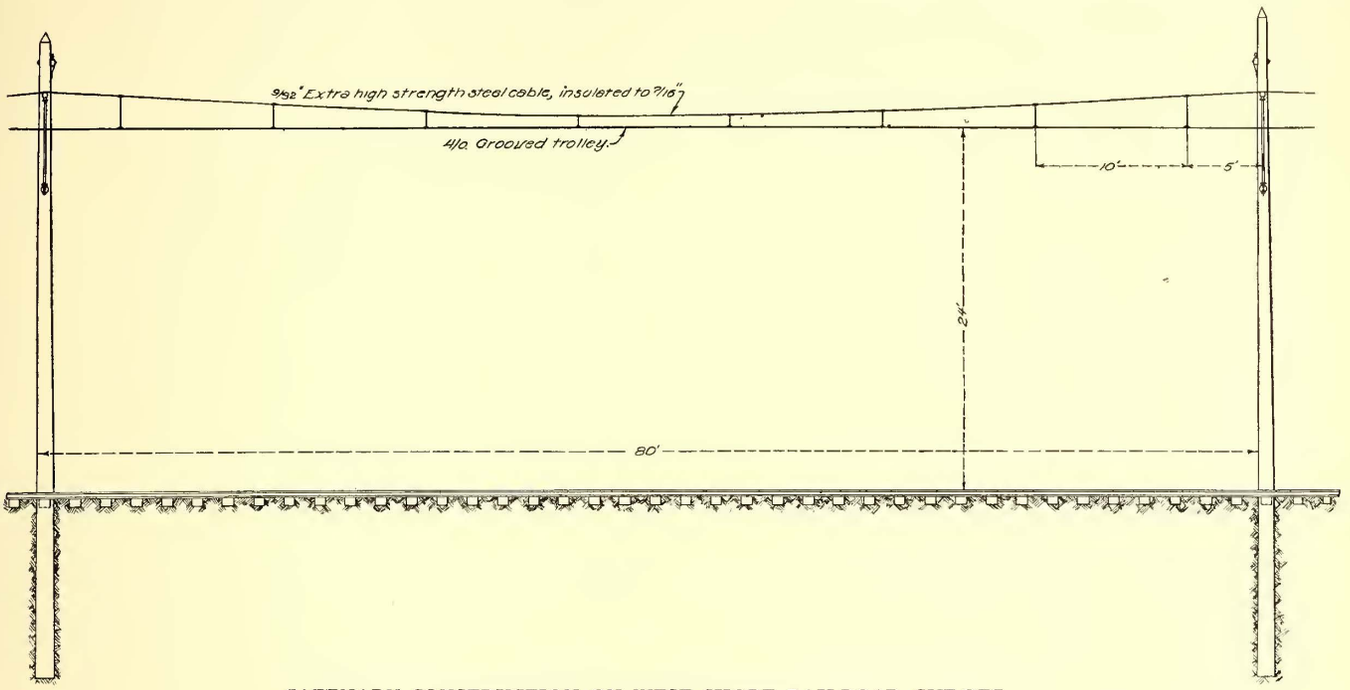
The poles are Southern white cedar, and the catenary is carried on side brackets made of extra heavy 2-in. iron pipe. The line is put up with large insulating



ELECTRIFIED SECTION, WEST SHORE RAILROAD, LOOKING TOWARD ILION STATION. THIS SECTION IS TO BE USED JOINTLY BY STEAM TRAINS AND ELECTRIC CARS OF UTICA & MOHAWK VALLEY RAILWAY

collars slipped over the bracket arm to receive the catenary, this having been designed to facilitate the use of a higher voltage a. c. trolley at some future time. The whole overhead construction, including the clips, spreaders, catenary and arms, with the exception of the trolley wire, has been painted with graphite paint in order to give protection against locomotive gases. By demonstration it has been found the gases have no deteriorating effect upon the trolley wire, but the gases do have a tendency to attack unpainted iron or steel. The type of overhead catenary construction used is shown in the accompanying illustration.

The poles are spaced 80 ft., and the wires are drawn a little



CATENARY CONSTRUCTION ON WEST SHORE RAILROAD CUT-OFF

tighter than the true catenary would be. It may be stated that the spacing of the poles and also the spacing of the spreaders between catenary and trolley have been made somewhat shorter than would otherwise be necessary, owing to the fact that the track will be used jointly for steam and electric operation, and it was deemed advisable to take more than usual precautions to avoid any possibility of interruption to either service.

The trolley wire is carried 24 ft. above the top of the rail, and this extra height has made necessary the use of 14-ft. trolley poles on the cars. By designing a special trolley base, however, no difficulty has been encountered in this regard. The trolley base is carried directly over the center of the rear truck, which gives the most advantageous location.

At one point of the line where it was necessary to pass over a crossing, the catenary has been carried on a single span of 220 ft. between poles, and the distance between the catenary and trolley has been increased accordingly. It is probable that in straightaway electric railway work, catenary spans could be carried 250 ft. or 300 ft., or even longer, with entirely satisfactory results. One rail of each track on the cut-off has been reserved for the signal system, and the other is bonded with Lord Electric soldered bonds placed on the side of the rail head to carry return current.

The Utica & Mohawk Valley Railway Company has taken the occasion of the opening of the cut-off to readjust and simplify its rates of fare between all points from Utica to Little Falls. The new rates will average 1.5 cents per mile for one-way trips and 1.4 cents per mile for round trips, these fares being a slight reduction from the former rates. The complete system of fares, tickets and methods of collecting will be described in a later issue of the Street Railway Journal.

MEETING OF THE NEW YORK STATE STREET RAILWAY ASSOCIATION

R. E. Danforth, of Rochester, president of the New York State Street Railway Association, with the sanction of the executive committee, has called a meeting of the association to be held Jan. 10 next in the rooms of the Schenectady Railway Benefit Association, Schenectady, N. Y. The meeting will be called promptly at 9:30 in the morning and will adjourn the same evening. The entire day will be devoted to a discussion of topics relating to Accounts Nos. 6, 7, 8 and 9, namely, Maintenance of Cars; Maintenance of Electrical Equipment of Cars; Maintenance of Miscellaneous Equipment, and Miscellaneous Shop Expenses.

The official announcement of the meeting will state that this will be the first of regular quarterly meetings or, more properly speaking, conferences, to be held under the auspices of the New York State Street Railway Association, each conference to occupy one whole day and to be devoted entirely to discussions of practical topics. It is probable the first quarterly meeting in each year will be devoted to mechanical subjects; the second, held some time in March, to purely operating topics; the third meeting, held some time in June, will be the regular annual convention of the association, occupying two whole days, and devoted to papers and discussions on broad and general subjects of policy and management. The fourth quarterly meeting, to be held some time in the fall, will be devoted to maintenance of way and structures.

In announcing the institution of regular quarterly one-day meetings, emphasis is particularly laid on the fact that these meetings, or conferences, will be wholly and entirely devoted to hard work. All the entertainment features will be eliminated and there will be no exhibits or entertainments of any nature.

For the January meeting, to be held in Schenectady, there will be two short papers, one on "Cleaning and Handling Cars in Car Houses," and one on "Layover Inspection vs. Night Inspection." Leaders will be appointed to open the discussion on each of these and other topics, and the meeting will then be thrown open and the fullest opportunity will be given for asking and answering questions and an interchange of opinions and ideas relating to the maintenance of cars and equipment. In announcing the meeting, a most cordial invitation is extended not only to non-members within the State, but also to

companies outside of the State to send representatives of the mechanical department to take part in this conference. Individual representatives of electric railway companies and of engineering firms are also cordially invited to attend and take part in the discussions. The meeting is for active electric railway men only, and the supply men are not invited.

THE TRAFFIC PROBLEM IN CLEVELAND

The Cleveland Electric Railway Company has agreed to another radical tearing up of its system of operation in order to relieve the congestion at the Public Square, the heart of the business section of Cleveland, and looking toward a possible solution of the entire street railway question. As outlined in this paper some weeks ago, the Chamber of Commerce appointed a committee to investigate the necessity for subways which had been urged by the company as the most desirable plan for relieving the congestion at this point. In its report made some weeks ago, the committee maintained that subways were not yet necessary, and suggested building loops around all four corners of the square and running all cars around these loops, making all lines terminate at this point instead of operating lines across the city as at present, thereby cutting out the crossing in the center of the square as well as several other crossings at sides of the square.

Although feeling that this was not a permanent solution of the problem, and that it contained a number of undesirable features, the company agreed to a trial of the plan, and at a meeting held last week the entire plan was gone over and the Board of Public Service authorized the necessary changes for the trial.

As already outlined, the plan contemplates the removal of all through lines and the running of all cars from various portions of the city around the corner of the square most convenient to the street upon which they enter the square. The plan eliminates entirely crossing in the center of the square or on any of its sides. The northwest loop will accommodate five lines entering Superior Street from the west; the northeast corner, four lines entering on Superior Street from the east; the southeast corner, four lines entering on Euclid Avenue from the east, and the southwest corner, seven lines entering on Ontario Street from the south. The plan is to make the loops single track, all cars running in the same direction, the tracks being placed on 6 ft. of the present 30-ft. sidewalks surrounding each section of the square, thus leaving the streets entirely free. One serious objection is that the company may be obliged to unload the people in the streets or cut doors on the inner sides of all its cars so that passengers could unload onto the sidewalk of the square, because at present its cars are all single-enders, running in one direction, and having the inner side next to the devil strips entirely closed on summer as well as box cars.

While admitting that the plan will decrease the congestion of cars in the center of the square, the company pointed out that the plan will enormously increase the amount of transferring at that point. It stated that at present one-third of all passengers ask for transfers, and that 42 per cent of these, or 13 per cent of all passengers carried, transfer at the square under the present arrangement, while if all through lines are cut out, the number of transfers at that point will probably be doubled. Under the present plan many people walk out one of the main arteries to board their car before it reaches the square, thereby securing a seat. Under the proposed plan these people will either flock to the square during the rush hours to board their car or will board another car and transfer at the square; in either case they will add to the congestion of people at that point.

It is stated that it will cost the company approximately $60,000 to purchase and lay the special work necessary to inaugurate the plan. It is quite probable that the present tracks in the centers of the streets will be allowed to remain until the success of the plan has been determined, and it is very probable that the necessary material cannot be secured and laid before next spring. The company will probably insist upon a trial covering several months.

In order to relieve the congestion immediately, the city authorities have announced their determination to divert all team traffic from the center of the square during rush hours. Statistics were recently prepared showing the amount of this team traffic. On a recent Friday, which is not a heavy day, it was shown that 3187 teams traversed the central portion of the square, of which 1987 went directly through the square, the others going around corners at that point. During the rush hour from 5 to 6 p. m., 209 teams went directly through the square and 51 went around corners. During the same hour about 40,000 people were transferring at the square and cars were passing the crossing at intervals of about 15 seconds, which gives some idea as to the congestion at this point. By removing all the teams and all crossing points for the cars, it is believed that the congestion will be much less, although the number of people transferring will be much greater.

From the standpoint of operation it will probably be more expensive for the company because of increased dead mileage for the cars, and it will probably cause loss of time on account of increased transferring at this point, although the time lost at the crossings may compensate for this.

It is a peculiar fact that neither the company's officials nor Mayor Johnson are heartily in favor of this plan. Mayor Johnson is opposed to breaking the lines at the square, believing that the best service can be given by running cars in through routes across the city. The company coincides with this view, and believes that a subway at the square is the only practical solution of the problem. Frank DeHaas Robinson, a prominent railroad man, who formerly operated some of the lines in Cleveland, says it is a step backward, as he claims that it will force 90 per cent of the people in the downtown district to walk to the center of the square to get their car, making it much more dangerous than at present, even though teams and crossings were eliminated.

Altogether it is a most interesting problem, and indicates more strongly than ever the liberality and broadmindedness of the management of this company in testing out schemes in which it has little faith in an effort to suit requirements of the public and its representatives.

It is believed by some that this test may result in the working out of the entire franchise problem in Cleveland on a basis of 2-cent or 3-cent fare for a ride to the Public Square, with an additional 2 cents for a transfer. Needless to say, such a settlement would be even less satisfactory to the company than the 3-cent and 4-cent zone plans which were tested out by the company some months ago in an effort to settle the fare question.

On Tuesday of this week the police authorities of Cleveland instituted a stoppage of team and automobile traffic through the Public Square, this being in line with the recommendations of the Chamber of Commerce committee for eliminating congestion at this point. Red pedestals 4 ft. high, with ropes strung across them, were placed across the various roadways leading to the square, preventing all vehicles from passing through the square by way of Ontario Street, Superior Street or Euclid Avenue, but permitting them to pass around the north side of the square, where there are no car tracks. This plan will be operative during the rush hours and will be continued until after the holidays at least, and perhaps indefinitely. A record of traffic in the Public Square for a period of five minutes during a rush hour recently showed the following: Teams, 427; automobiles, 42; cars, 140; pedestrians, 5444; bicycles, 6.

THE DECEMBER MEETING OF THE MASSACHUSETTS STREET RAILWAY ASSOCIATION

The regular meeting of the Massachusetts Street Railway Association was held at Young's Hotel, Boston, Wednesday evening, Dec. 13, 1905. About 100 members and guests were present, and the meeting was preceded by the usual banquet. Hon. W. Caryl Ely, president, and Bernard V. Swenson, secretary, of the American Street and Interurban Railway Association, were the especial guests of the association, whose members had been invited to hear these gentlemen outline the future plans of the national association.

After the dinner, Hon. E. P. Shaw, president of the association, congratulated the members on the large attendance at the meeting, which he said was the 182d in the history of the association. He also stated, as an interesting and striking coincidence, that the first meeting of the American Street Railway Association had been held at Young's Hotel, Wednesday, Dec. 13, 1882, so that it was twenty-three years ago to the very day of the week since that association was organized. He then asked J. E. Rugg, superintendent of transportation of the Boston Elevated Railway Company, to give an account of the first meeting.

Mr. Rugg, in 1882, was superintendent of the Highland Street Railway Company, and one of those who issued the call for the first meeting of the association. He is also one of the few survivors of those who attended that meeting, and gave some most interesting reminiscences of the early history of the association.

Mr. Ely was then called upon by the speaker, and presented an address which was devoted principally to a discussion of the reasons which led up to the formation of the American Street and Interurban Railway Association. Afterward he discussed some of the future plans of the new association, especially certain of the topics, like municipal ownership, upon which it is proposed by the association to collect data. Following Mr. Ely, Bernard V. Swenson, secretary and treasurer of the association, discussed the plans of the new association more in detail, and suggested certain ways in which the main organization and the State organization could co-operate to mutual advantage. Both of these addresses were received with the closest attention by those present, and on account of their great interest will appear at length in the next issue of this paper.

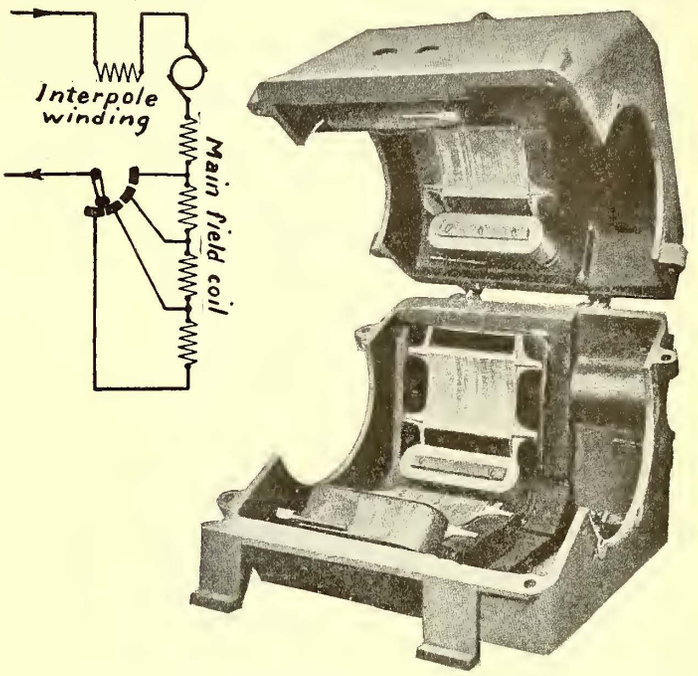
At the conclusion of the speeches, F. H. Dewey, president of the Worcester Consolidated Street Railway Company, speaking in behalf of the Massachusetts Street Railway Association, extended the thanks of the association to Messrs. Ely and Swenson for their addresses, and promised them the hearty co-operation and support of the Massachusetts street railway companies for the national association.

FIRE DAMAGES HUNTINGTON PRIVATE CAR

The private car "Alabama" of Henry E. Huntington, president of the Pacific Electric Railway Company, the Los Angeles Interurban Company and the Los Angeles Railway Company, recently caught fire on the streets of Los Angeles. Aboard the car at the time were Mr. Huntington, General Manager A. D. Schindler and Electrical Engineer R. S. Masson, who were compelled to make a hasty exit. The motorman tried to put out the blaze with a fire extinguisher, but it became necessary for a policeman to turn in a fire alarm, and the department responded in time to save the car from serious damage. The "Alabama" was making its third trial trip for the day, and was returning after a successful trip to Mt. Lowe. The damage to the car is estimated at $500.

HIGH-VOLTAGE DIRECT-CURRENT RAILWAY MOTOR

In view of the interest which is being taken in the possible use of high-voltage direct-current motors for railway service, the recent experiments in this direction by the Oerlikon Machine Works, of Zurich, Switzerland, is of interest. The latest motor of this company is built for 800 volts, and has a rating of 200 hp with one hour's load when running at 400 r. p. m. In this machine the company has introduced a method for improving the commutation under varying loads which has been employed for some time with great success in the case of stationary motors, particularly by the Electro Dynamic Company, of this country, but which up to this time has not been incorporated in any railway motor so far as known. This is by the use of small auxiliary poles between the main poles of the field



INTERIOR OF HIGH-VOLTAGE MOTOR AND DIAGRAM OF FIELD CONNECTIONS

magnet, as shown in the illustration of the motor case open. The effect of this construction, which is known as the interpole type of construction, is to compensate for the armature reaction due to the variations in current with the load and to keep the line of commutation constant. Another novel feature in the construction of the motor is that the armature has completely closed slots. The maximum number of revolutions for which the motor is designed is 1000, at which the circumferential speed of the commutator is 25 m (82 ft.) per second. The armature has 518 turns, two per slot, and the commutator has therefore 259 segments. The exciting windings are made of copper ribbon and are insulated with pressboard. Cotton insulation is entirely absent.

Regulation of speed is secured partly by resistance and partly by commutating the main field windings. The latter are in several sections, which can be gradually cut out, so that only a single coil may be left in the circuit, as shown in the diagram. The motor alone weighs 2300 kg, the gears 310 kg and the gear case 78 kg. The efficiency curve appears to be quite remarkable, being almost a straight line at 90 per cent between one-fourth load and full load.

The Michigan Central Railroad Company has reduced its rate of fare between Detroit and Toledo to $1.50 for the round trip to meet the competition on the Detroit, Monroe & Toledo Short Line Railway. The former price on the steam road was $1.30 each way.

A TALK BY A. H. ARMSTRONG ON THE SELECTION OF THE PROPER MOTOR EQUIPMENT

On the evening of Dec. 5 the members of the transportation course given by the Polytechnic Institute of Brooklyn, N. Y., listened to a lecture by Albert H. Armstrong, of the General Electric Company, on "How to Select the Proper Motor Equipment." The greater part of Mr. Armstrong's lecture was devoted to a detailed description of methods for constructing and using speed-time, energy, acceleration, resistance, braking curves, etc., blue prints of which were handed to those present. Several fundamental traction formulæ were also presented, together with examples of their application to different problems. Special attention was given to the subject of train resistance. Mr. Armstrong defined the different kinds of resistance encountered by the car, and pointed out the saving in power obtained by operating cars in trains instead of singly.

The concluding portion of the lecture was devoted to comparisons of the costs of rolling stock, as shown in the following tables. The figures given, of course, are only approximate:

DATA ON CARS

Type of Car	Length Body	Length Over All	Weight Lbs.	Passengers	Cost
Single truck.....	18 ft.	26 ft.	12,000	26	$1,500
Double truck....	30 ft.	40 ft.	24,000	42	3,000
Double truck....	40 ft.	50 ft.	35,000	52	4,500
Double truck....	50 ft.	60 ft.	50,000	64	6,000

COST AND WEIGHT PER HORSE-POWER OF DIRECT-CURRENT RAILWAY ELECTRICAL EQUIPMENT

	Cost	Weight
Up to and including 200 hp with hand control.	$15.00	700 lbs.
From 200 hp to 300 hp with multiple-unit control	16.00	650 to 500 "
For 400-hp equipments and larger, with multiple-unit control.....	16.00	350 "

Owing to the fact that alternating-current equipments have not yet been standardized, the lecturer could not give very definite figures. In general, a. c. motor equipments would appear to cost about $25 per horse-power for all sizes from 75 hp to 150 hp. The weight of the 75-hp equipment averages 900 lbs. per horse-power, and that of a 175-hp equipment 750 lbs. per horse-power. These weights include the controlling equipment, transformers, wiring, etc.

DATA ON DIRECT-CURRENT LOCOMOTIVES

Type	Approximate Weight	Cost Per Ton
Low speeds, geared or gearless...	100 tons or more	$300 to $350
High speeds, gearless.....	75 tons or more	350 to 400

Regarding the relative cost of maintenance, Mr. Armstrong stated that cars equipped with two 125-hp direct-current motors can be maintained for approximately $.01 per car-mile, this cost including maintenance, inspection of the motors and control, car bodies, trucks, painting, varnishing, etc. Of this $.01 per mile, he estimated that the electrical equipment amounted to $.003. On a four-motor equipment the cost per car-mile of the electric equipment would be $.004 to $.0045.

In considering locomotive maintenance, Mr. Armstrong compared the annual maintenance charge of the average steam locomotive with the record made by the two 40-ton electric locomotives running between Buffalo and Lockport. Each of these electric locomotives, which have been in service for the past four years, has cost $170 annually. Since each locomotive made 35,000 miles per year, the maintenance charge amounts to $.00485 per mile as against the steam locomotive average of $.06. The New York Central electric locomotive which is undergoing a 50,000-mile endurance test run has already covered half of the distance with an average maintenance cost of $.017 per locomotive-mile, and this at speeds up to 80 m.p.h. and with loads sometimes as high as 450 tons. It is expected that the second 25,000 miles will show an even lower maintenance cost.

CHANGES IN THE RULES ON CAR WIRING

As stated in the last issue of this paper, a meeting of the Underwriters' National Electrical Association was held Dec. 6 in New York to consider changes in the National Electric Code. The only change in the rules in regard to car wiring was in Rule 32 g, 2, which was changed on the recommendation of the committee on car wiring, to read as follows: "Heaters to be constructed with a protecting ventilated metal casing providing an air space of not less than 2 ins. on all sides of the resistances. Heaters to be so located that the resistances will be not less than 4 ins. below the under side of the seats or from any woodwork, unless the under side of the seat, or such woodwork, is protected by not less than ¼-in. fire-resisting insulating material, or .04 sheet metal, with 1-in. air space between the sheet metal and the seats or woodwork." This is the only change made in the rules on "Car Wiring and Equipment of Cars" in the National Code, and since a revised edition of the Code will not be published until after the next meeting of the Underwriters' National Electric Association in 1907, it might be well for those interested to make this change in their editions of the Code.

SINGLE-TRUCK CARS FOR PEORIA

The Central Railway Company, of Peoria, Ill., has just received from the American Car Company eighteen single-truck closed motor cars similar to a number furnished by the same company several years ago. The platforms of these cars, as the illustration of the exterior shows, are closed at one side, so that the entrance is from the rear only. It will be noticed that

SINGLE-TRUCK CAR USED IN PEORIA

there are two window openings at the closed side of the platform, and that the one next to the car body is provided with a wooden panel as well as a sash. This is for the purpose of excluding the light which comes through the side windows at night and is reflected by the glass of the sash in front of the motorman, and which would prevent him from seeing the roadway clearly. Curtains are also provided for the sashes and doors at the car ends for the same purpose. The platforms are 5 ft. long from the end panels over the vestibule sheathing, and are used to increase the standing space of the car. The destination signs on the hoods are placed at an angle, so that they may be read from the side as well as from the front of the car. The window sashes of the car are in two sections, with the upper stationary and the lower arranged to drop into pockets in the side walls, which have hinged covers. The interiors are finished in cherry and the head linings are of bird's-eye maple.

The general dimensions of the cars are as follows: Length over end panels, 20 ft.; over crown pieces, 30 ft.; from end panels over vestibules, 5 ft.; width over sills, 7 ft., and over posts at belt, 7 ft. 8 ins.; sweep of posts, 3 ins.; from center to center of side pieces, 2 ft. 9½ ins.; size of side sills, 4⅝ ins. x 7¾ ins.; end sills, 3¾ ins. x 9 ins. The sill plates are on the

outside of the sills and are 7 ft. x 5/8 in.; thickness of corner posts, 3¾ ins., and side posts, 2¼ ins.; height of platform steps, 13⅞ ins., and from step to platform, 12 ins.

THE ALLIS-CHALMERS STEAM TURBINE

The recent starting up of a steam turbine at the Washington Street power house of the Utica Gas & Electric Company, Utica, N. Y., calls attention to the fact that this is the first turbine to be put into operation by the Allis-Chalmers Company, which has recently entered the steam turbine field. The turbine outfit installed at Utica is shown in the accompanying Fig. 1.

This turbine is rated at 1500-kw normal load, and runs at a speed of 1800 r. p. m. It is direct coupled to an Allis-Chalmers two-phase, 60-cycle, revolving-field alternator, operating at 2500 volts. The unit has a continuous overload capacity of 25 per cent, with a three-hour, 50 per cent overload capacity without exceeding a safe generator temperature, and capable of a 100 per cent safe momentary overload. Artificial ventilation by means of an electrically-driven fan blower will, however, enable the unit to be run safely beyond its rated overload capacity. The turbine follows the well-known Parsons type, which has proven itself eminently successful in numerous installations both here and abroad. The Allis-Chalmers construction, however, embodies a number of features which are new in this country, and which are claimed by the builders to be distinct improvements.

The chief distinguishing feature of this construction is the blading, which, while it is of the Parsons reaction type as regards the principle of operation, differs in mechanical construction in a number of essential details. The roots of the blades are formed in dove-tail shape by special machinery, and are inserted in slots cut in foundation or base rings, these slots being formed by special machine tools in such a way as to exactly conform to the shapes of the blade roots. The foundation rings themselves are of dove-tail shape in cross section, and are inserted in dove-tailed grooves cut in the turbine cylinder and spindle respectively, in which they are firmly held by key pieces, much in the same way that the well-known "Lewis bolt" is fastened. In order to further insure the integrity of the construction, the key pieces or rings after being driven into place are upset into undercut grooves.

Another noticeable feature of the blading is the method of reinforcing and protecting the tips of the blades. This point in steam turbine design is one upon which much thought has been expended by various inventors, and the company building this type claims that the construction employed by it successfully solves all difficulties. In forming the blades a shouldered projection is left at the tip. This is inserted in a slot punched in a shroud ring, the slots being punched by special machinery in such a way as to produce accurate spacing and at the same

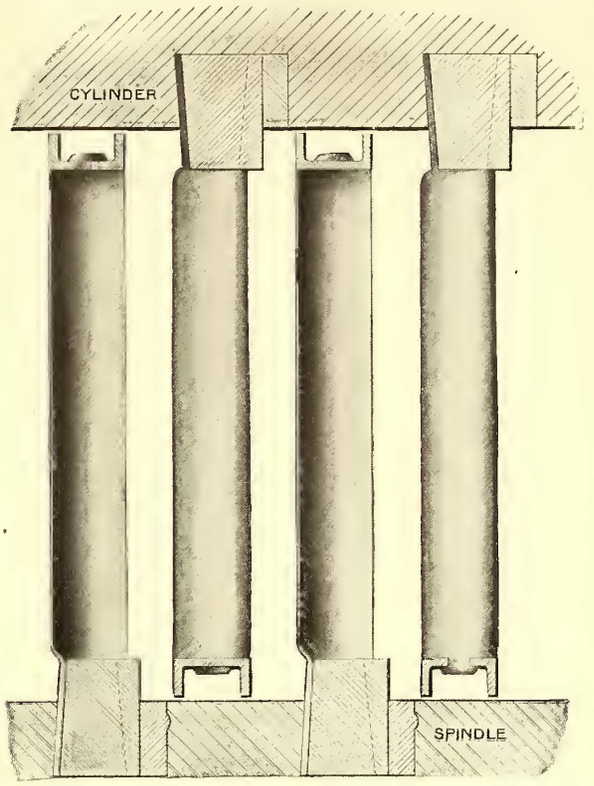


FIG. 2.—ILLUSTRATING THE METHOD OF FASTENING THE BLADES AS WELL AS THE CHANNEL-SHAPED SHROUD RING

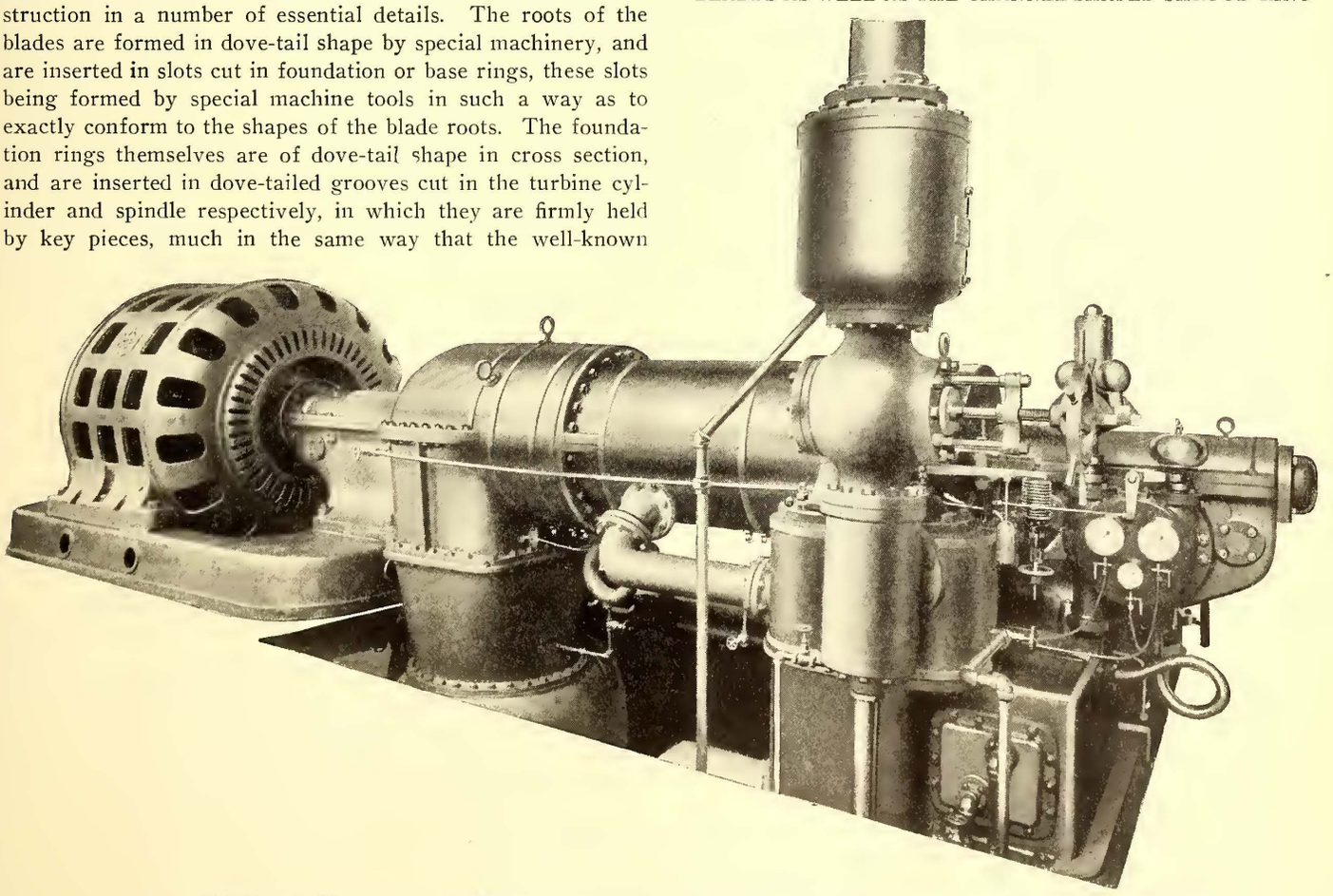


FIG. 1.—VIEW OF THE TURBO-GENERATOR SET INSTALLED FOR THE UTICA GAS & ELECTRIC COMPANY

time form the slots so that they will give the proper angles to the blades independent of the slots in the base ring. After the blade tips are inserted in the slots in the shroud rings they are riveted over by specially arranged pneumatic machinery.

The shroud rings are made in channel shape, with outwardly projecting flanges, which, after assembly in the turbine, are turned and bored to give the necessary working clearance.

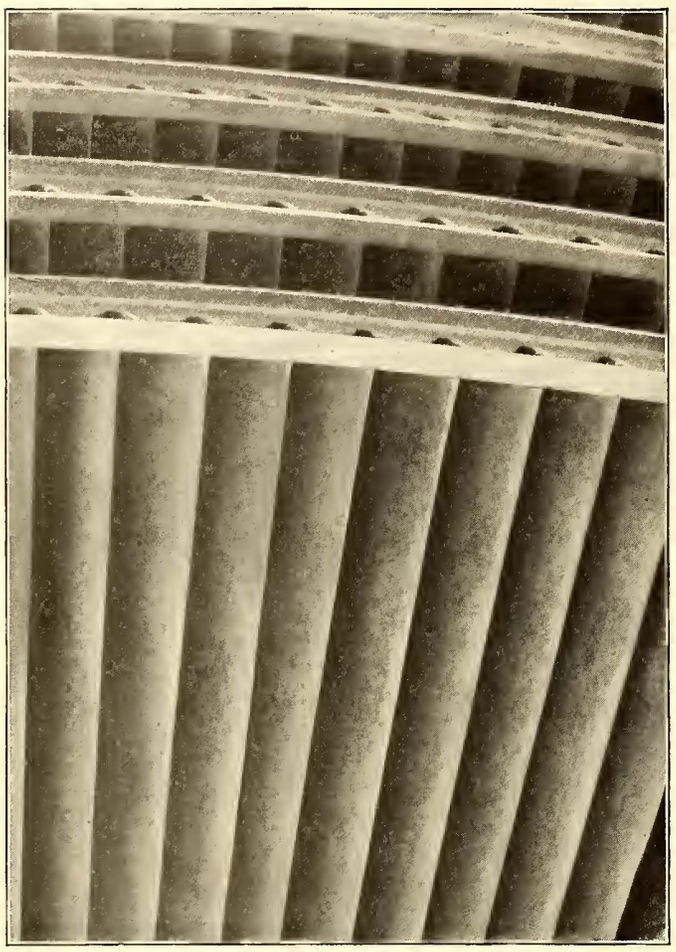


FIG. 3.—VIEW OF THE TURBINE BLADING

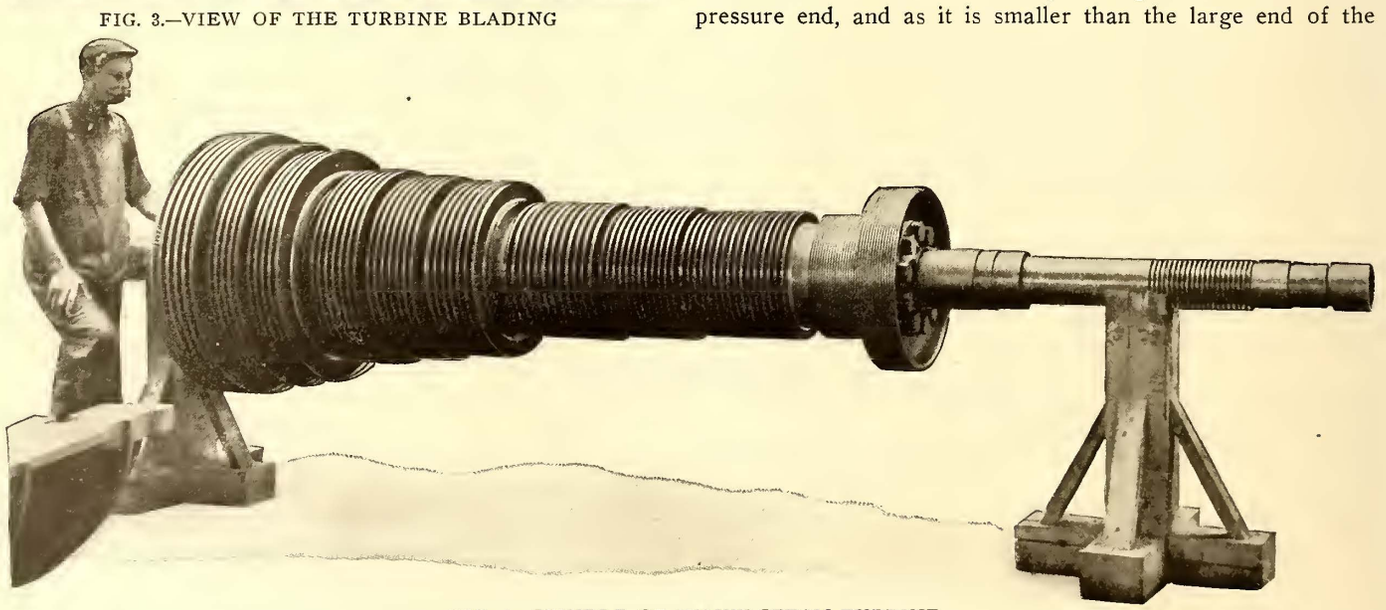


FIG. 4.—SPINDLE OF 1500-KW STEAM TURBINE

The flanges of the channels are made so thin that, although amply sufficient for stiffness, the shroud ring does not have the disadvantage of a solid shroud which acquires a dangerous temperature by friction in case of an accidental contact of the rotating and stationary parts. It is claimed for this construction that the blades are stiffened against the effect of vibration in a much more substantial manner than by any other means thus far employed, while the use of a protecting shroud ring enables the working clearance to be made smaller than in the case of naked blade tips, without danger in case of accidental contact, thus reducing the leakage loss to a minimum, the leakage past the blade tips being the principal source of loss in the steam turbine. As to the safety from damage in case of accidental contact, it is claimed that this has been proven by experiment with actual blading, by throwing the bearings out of center so as to produce contact, without detrimental results. An incidental advantage claimed for this construction is that if by chance a blade should prove defective, it is so held in place by the shroud ring that it cannot possibly work loose and produce damage.

By the method of construction described, the entire blading is produced by machinery, thus eliminating the personal equation which enters into blading done by hand work, which depends upon the skill of the individual workmen. Besides insuring that every blade is securely fastened, all blades are necessarily set at exactly the designed angle and pitch, the openings between blades, upon which in great part the economical performance depends, being absolutely uniform. The blading is made up in half rings in the blading shop and is carefully inspected before being inserted in the turbine.

Fig. 2 shows the general scheme of the blading, illustrating the method of fastening the blades as well as the channel-shaped shroud ring. Fig. 3 is from a photograph of blading, showing the character of the construction as well as the uniformity of the work. Fig. 4 shows a turbine spindle of the same size as that of the Utica turbine, this illustration having been taken in the West Allis shops of the turbine builder.

Another special feature of this turbine will be noticed by referring to Fig. 4, viz., the absence of the usual low-pressure "balance piston," the illustration showing only two balance pistons instead of the three pistons formerly used in this type of turbine, where it is said to have been found difficult to produce a balance piston of the size required for balancing the low-pressure stage of the turbine and at the same time make it sufficiently rigid to run with the necessary small working clearance. In the Allis-Chalmers construction there is, however, a third balance piston, but instead of being at the high-pressure end of the turbine, as formerly arranged, it is at the low-pressure end, and as it is smaller than the large end of the spindle, it is hidden from sight in the illustration. By making this piston in such a way that its circular area is equal to the annular area of the pistons used in the older construction, the low-pressure balance piston is made much smaller. Instead of reducing the leakage past this piston by means of "dummy packing," as in the high-pressure and intermediate pistons, and as used in the low-pressure pistons of the older construction, a labyrinth packing of radial baffling type has been

adopted, thus eliminating small axial clearance in this turbine. A considerable advantage is claimed for this construction in permitting of the use of smaller working clearances in the high-pressure and intermediate balance pistons.

There are a number of other points of improvement claimed for this type of turbine which will not permit of description within the space of the present article. These include details of spindle construction, governing mechanism, lubrication and other minor features.

The alternating-current generator of the Utica outfit, which also is deserving of a more detailed description, has for one of its most noticeable features the substantial design of the revolving field, providing great strength and at the same time giving the thorough ventilation which is essential. Particular attention has been paid to the insulation, as may be inferred from the fact that the armature was subjected to an alternating-current insulation test of 10,000 volts for 15 minutes.

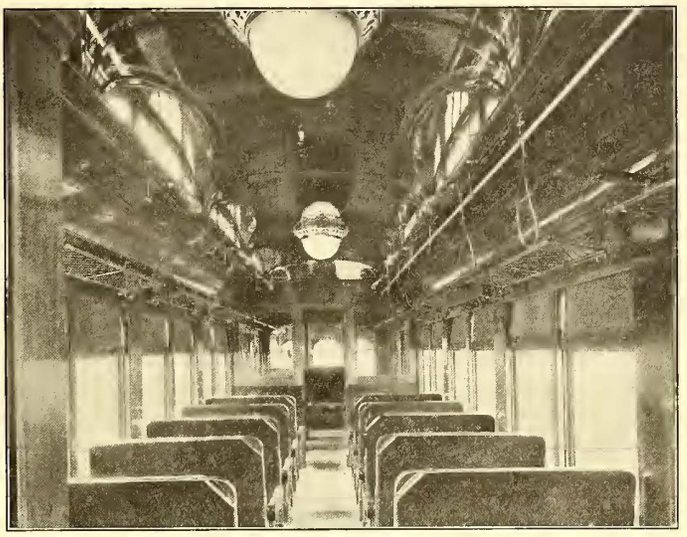
The Allis-Chalmers Company, in entering the steam turbine field, effected an alliance with the Turbine Advisory Syndicate of England, thereby securing the co-operation of the firms therein interested, including Willans & Robinson, the high-speed engine builders, of Rugby; Yarrow & Company, the torpedo boat builders, of the Isle of Dogs, London; and the Neptune Shipbuilding Works, of Walker-on-Tyne. The Utica turbine, in fact, was built for the Allis-Chalmers Company by Willans & Robinson, to whom a number of turbine contracts were sub-let by the Allis-Chalmers Company before the latter had installed its turbine-making machinery.

An agreement has more recently been effected with the Hon. Charles A. Parsons, C. B., for the interchange of data, thereby giving to the Allis-Chalmers Company the benefit of the experience of Mr. Parsons, the inventor of this type of turbine, and to whose engineering ability and indomitable energy the evolution and present state of perfection of the successful steam turbine are principally due. The Allis-Chalmers Company has also secured rights under Mr. Parsons' patents for marine turbines and turbo-compressors and blowers.

At present the company is building its steam turbines in its engine works at West Allis. The growth of the business, however, has led to a large extension of the works, amounting to a practical doubling of the present plant. A considerable part of the extension will be devoted to the manufacture of turbo- generator sets, one of the three manufacturing buildings being given up to the exclusive manufacture of the turbines.

NEW CARS FOR THE CLEVELAND & SOUTHWESTERN TRACTION COMPANY

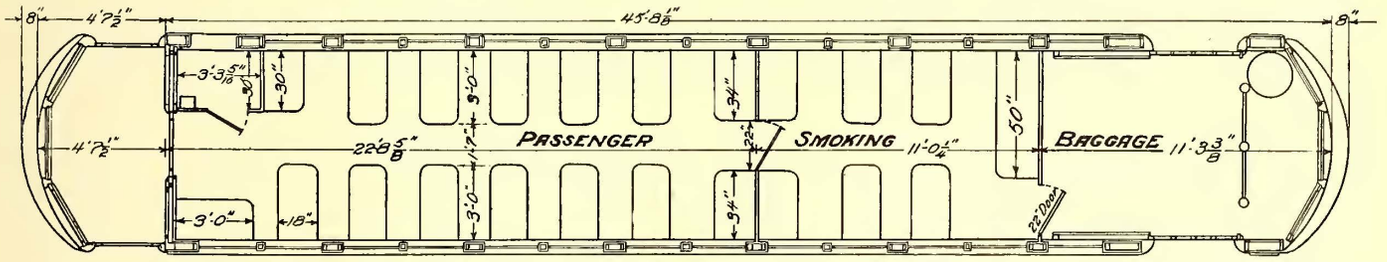
The Cleveland & Southwestern Traction Company, of Cleveland, has received the first of fifteen cars ordered some time ago for the through runs on its main lines. Ten of the cars



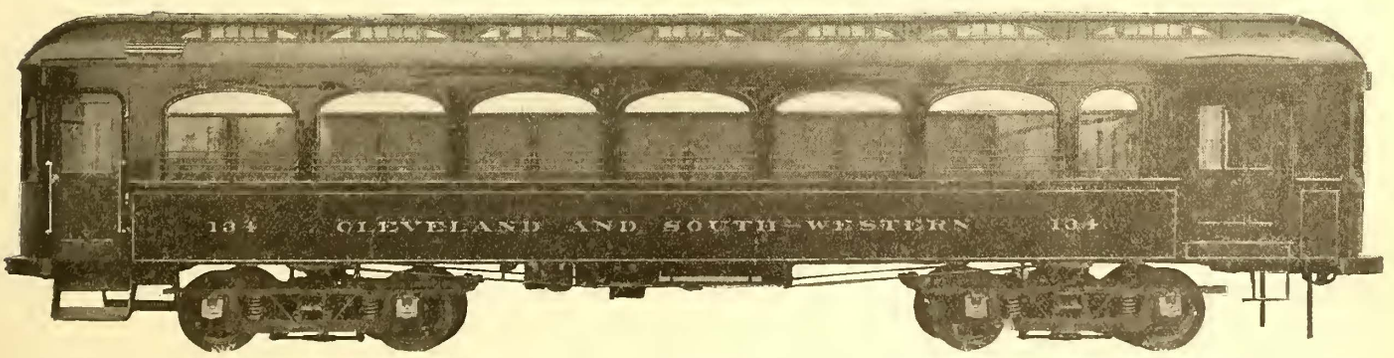
INTERIOR VIEW OF NEW CLEVELAND & SOUTHWESTERN CAR

are being supplied by the St. Louis Car Company and five by the Niles Car & Manufacturing Company. They are practically identical, and the illustrations herewith are some of the Niles cars. The latter were ordered by Charles F. Johnson, of Buffalo, N. Y., who sold them to the Cleveland & Southwestern Traction Company.

In line with the growing policy of all interurbans in that district to carry baggage on all cars, these cars have three compartments. They are 51 ft. 8 ins. long over buffers; extreme width, 8 ft. 6 ins. The baggage compartment is combined with the vestibule, having a 40-in. baggage door at each side, but without passenger entrance, as all cars are run one way. The motorman is separated from the baggage by heavy iron railings extending from floor to deck sills. The hot-water heater is at the left-hand side, and is cared for by the motorman. Next to the baggage vestibule is a smoking compartment occupying the space of four side windows, the door between



PLAN OF LATEST TYPE OF INTERURBAN CAR ADOPTED BY THE CLEVELAND & SOUTHWESTERN TRACTION COMPANY



AN EXTERIOR VIEW OF ONE OF THE CLEVELAND & SOUTHWESTERN TRACTION COMPANY'S LATEST INTERURBAN CARS

the smoker and baggage compartments being at the right side, with long seat against the bulkhead. The main passenger compartment is 22 ft. 9 ins. long, with toilet room in the rear left-hand corner. The rear vestibule has passenger entrance, with double steps at each side. There are no double doors whatever in the car, there being a single sliding door for entrance at the rear end of the car and single swinging door at each side of rear vestibule, with swinging doors between each compartment. The center sills are 6-in. steel I-beams, and the side sills are double, having heavy steel plates between, the intermediate sills being of 6-in. x 3¾-in. yellow pine. All sills extend from the rear end sill under the vestibule to the front buffer, as the rear platform is dropped 6 ins. below the car floor.

The interior finish and furnishings are particularly handsome, polished plate glass being exclusively used, except the deck sash and upper side windows, which are cathedral art glass. The interior finish is solid mahogany, having smooth, plain panels without raised work so as not to collect dust, and which are easily cleaned, the main panels being outlined with neat inlay of colored woods. The ceiling is full Empire style, decorated in green and gold, and fitted with holophane globes, each containing four incandescent lamps. The seats are Hale & Kilburn No. 3-C style, green plush, with stationary backs of the high head-roll style and with mahogany seat arms along the aisle. As it is intended to run the car but one way, it was not considered advisable to have the backs reversible.

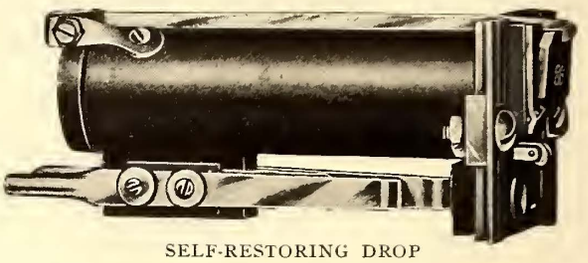
The cars are mounted on Baldwin extra heavy M. C. B. trucks with 7-ft. wheel base, and carry four Westinghouse No. 112 motors with L-4 controller and single-end control. The trucks are of special design, embodying ideas of C. N. Wilcoxon, general superintendent of the Cleveland & Southwestern Traction Company. The wheels were made by the Standard Steel Company, and are of forged steel, 37 ins. in diameter. They are equipped with Christensen 2-B air brakes and heated by Smith heaters. All of this equipment was purchased for the company by Charles F. Johnson, of Buffalo, N. Y.

ADDITIONAL ROLLING STOCK FOR LAKE SHORE ELECTRIC RAILWAY

The Lake Shore Electric Railway Company, of Cleveland, has closed contracts for ten new interurban cars. They are intended for its limited service between Cleveland and Toledo, 120 miles, and while following the company's standard as closely as possible, they will be designed for a maximum seating capacity. It is the intention to precede each limited car with a baggage car, so that the new cars will not be equipped with baggage compartments. The contract for car bodies was awarded to J. A. Hanna & Company, of Cleveland, general sales agents for the Niles Car & Manufacturing Company. The cars will be 52 ft. long, seating fifty-four passengers; twelve in the smoker. They will be finished in cherry, have semi-Empire ceilings, Pullman type windows with art glass above, and Hale & Kilburn leather upholstered seats. They will have type M controllers and will be mounted on Baldwin heavy interurban trucks fitted with four Westinghouse No. 121 motors. The cars will be equipped with storage batteries for operating the headlight and two lamps in the car, which are automatically switched on if the trolley leaves the wire, the batteries also taking care of the Lintern car signal marker and classification lamps with which they will be equipped. This system gives all the signals required for the classification of trains, and provides for rear end marker lamps. On the cars two red lenses will be fixed in the panel above the vestibule windows, with a small incandescent lamp behind each lense. The lamps are in multiple connection with each other. On the front end are green and white lenses fixed in the panel above the vestibule windows, with a lamp behind each lense. The various signals are controlled by separate switches.

TELEPHONE SWITCHBOARDS FOR INTERURBAN RAILWAYS

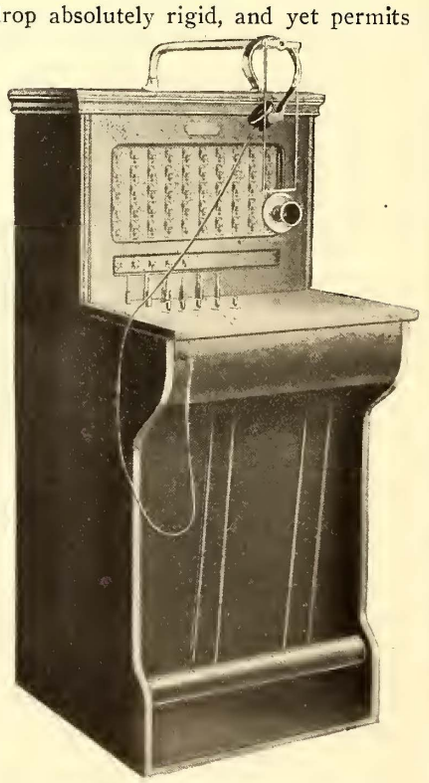
The telephone has been in use for several years by interurban railway systems for despatching trains, but it is only within a recent period that the value of private telephone systems connecting the central offices with the shops, power houses and stations has been fully appreciated. For the latter service the Fisk-Newhall Company, of Chicago, has placed upon the market the switchboards shown in the accompany illustrations.



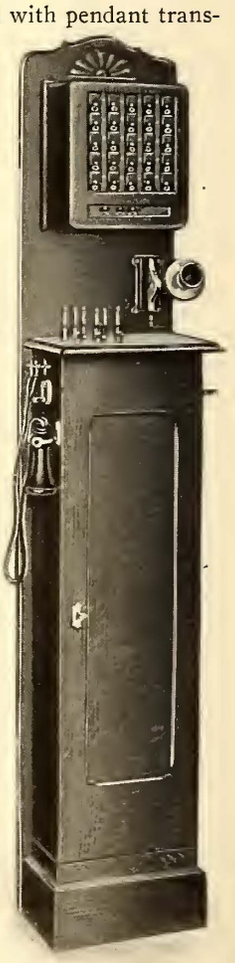
SELF-RESTORING DROP

The smaller of these has a capacity of twenty-five stations or telephones, and, as may be inferred from the form in which it is built, is designed for systems where the calls are not sufficiently frequent to require the constant attention of an operator. Calls on the board are readily answered by any of the office force nearby as easily as with an ordinary telephone.

For telephone needs beyond the capacity of this board, the company manufactures a cabinet of fifty-station capacity. This, as may be observed in the illustration, is built for a constant attendant, being constructed with pendant transmitter and head telephone. The "Fi-ne" tubular drop used on the switchboards is the outcome of years of study by Mr. Fisk, who, it is stated, is the inventor of the first self-restoring drop. A prime feature of the switchboards is the steel frame drop cabinet which holds the drop absolutely rigid, and yet permits its removal at the front by simply loosening a screw. Messrs. Fisk and Newhall claim that their equipments are simple, sensitive, efficient and durable beyond any similar telephone apparatus yet offered, and are ready to make installations for a thorough trial on any electric railway.



SWITCHBOARD FOR FIFTY TELEPHONES



SWITCHBOARD FOR TWENTY-FIVE TELEPHONES

FINANCIAL INTELLIGENCE

WALL STREET, Dec. 14, 1905.

The Money Market

The money market ruled decidedly strong during the past week, rates for all classes of accommodations making new high records for the year, as a result of a continued heavy demand for funds both from local and out-of-town sources, and a complete wiping out of the surplus reserves of the New York City banks for the second time within the past month. At the beginning of the week the heavy requirements, in connection with an active stock speculation, sent the price of call money up to 28 per cent, the highest point attained since September, 1902, while short time accommodations commanded a premium. The local banks practically withdrew from the situation, but the announcement that the Secretary of the Treasury would anticipate the payment of January interest in government bonds, amounting to between $4,000,000 and $4,500,000, together with the influx of considerable amounts of funds from the interior and from Canada, were reflected in a gradual decline in the call loan quotations. International houses also loaned freely against exchange transactions. From the high rate quoted above, call money declined to 3 per cent, but subsequently it advanced to 8 per cent, which was the final quotation. The time money market continued decidedly strong throughout, and at the close rates for all maturities ruled practically unchanged from those prevailing earlier in the week. Sixty-day money commanded a per cent and a commission, equivalent to 8 per cent, while three and four months' accommodations were difficult to obtain at 6 per cent. For six months' maturities 5½ per cent was strongly bid, with little offered under 6 per cent. Commercial paper was practically at a standstill, merchants generally securing necessary requirements direct from their respective banks. The minimum rate was 5¾ for the very best indorsed bills receivable. The foreign exchange market has been irregular, rates being influenced almost entirely by the fluctuations in call money quotations. The European markets have ruled easier, especially at London and at Paris, owing to the improvement in the Russian situation. At Berlin, however, the market has ruled decidedly firm, the Imperial Bank of Germany advancing its discount rate to 6 per cent. The statement of the associated banks published on last Saturday was rather disappointing. Loans decreased $7,561,500, as a result of the extensive operations in the money market by foreign houses. The decrease in cash amounted to $7,546,100, which was considerably more than expected. The reserve required was $3,734,200 less than last week, which, deducted from the loss in cash, resulted in a reduction in the surplus reserve of $3,811,900, leaving a deficit of $246,525, as against a surplus of $9,365,200 in the corresponding week of 1904, $8,007,975 in 1903, $8,386,900 in 1902, $5,455,025 in 1901, and $6,325,375 in 1900. At the close, all indications pointed to a continued firm market until after the turn of the year. It is generally conceded that the position of the local institutions has been materially strengthened during the week by the heavy receipts of funds from the interior, but at the same time preparations must soon be made for the Jan. 1 interest and dividend disbursements, which promise to break all previous records, and which will be sufficient to check any decided easing off in rates for money.

The Stock Market

Despite an advance in the call money rate to the highest point attained in three years, and a complete wiping out of the surplus reserves of the New York City banks, which, under ordinary circumstances would have resulted in great demoralization in the stock market, speculation on the stock exchange during the past week continued to broaden and strengthen in a manner little short of astounding. It is true that the general public still refrained from taking an active hand in regulating the course of values, but at the same time there were unmistakable evidences of a considerable influx of this important element. This, together with the fact that stocks are at present concentrated in unusually strong hands, which, therefore, necessitates extraordinary happenings to dislodge them, accounts, to a great extent for the failure of security values to yield under the depressing influences above noted as well as for the really sensational advances that took place in certain parts of the list. Additional reasons for this state of affairs were, however, found in a belief that the splurge in the money market was to some extent not genuine, and that within a comparatively short time conditions will have become considerably and permanently easier. As a matter of fact, toward the close of the week there was a distinct let up in the tension that prevailed in the call money market earlier, and leading bankers express the firm conviction that after the first of the year rates will rule much lower than at present. This of itself was an encouraging feature of the speculative situation, but there were others of a similar nature. Chief among these, no doubt, was the disposition to devote more attention to the higher grade industrial and standard railway shares, which was reflected not only in greater activity but also in substantial advances in a number of such stocks. One of the principal reasons for the increased demand for railroad issues was the excellent condition reported for the winter wheat crops, while another was a disposition to regard the Cincinnati, Hamilton & Dayton affair as a help rather than a deterrent to the general railroad situation. A better tone to the foreign securities markets, due chiefly to a sharp recovery in Russian Government bonds, likewise proved a help, as did also the continued prosperity of all leading industries in this country, the most notable instance of which is the copper metal trade, where prices both for immediate and future delivery rose to the highest figures attained since 1899. The stocks of the Southern coal and iron companies still occupied positions of prominence, on account of more talk of a probable merger of these properties, while the copper stocks, for reasons just given, and the United States steel securities also attracted more attention than of late. However, such issues as Union Pacific, St. Paul, Reading, New York Central and Pennsylvania moved prominently forward in the closing days of the week, and as above stated the attention given to these constituted one of the most hopeful signs for the future of the market in general.

Speculation in the local traction issues was comparatively quiet, and fluctuations in prices were generally narrow and in sharp contrast with those that have recently taken place, especially in the case of Brooklyn Rapid Transit. The week was remarkably free of developments of one character or another in connection with these properties, and for the time being the disposition appeared to be to refrain from an extensive speculation in them.

Philadelphia

Moderate activity developed in the traction stocks this week, and although prices displayed some irregularity as a result of profit-taking sales, the general tone of the market was firm. Interest again centered in the speculative issues, of which Philadelphia Rapid Transit was the feature. From 32 at the opening the price ran off to 31⅝, but later it advanced sharply to 33⅜ on good buying. At the close heavy selling for New York account carried the price to 32½, but the buying on the decline was considered excellent. Upwards of 17,000 shares were traded in. Philadelphia Company common was exceptionally weak, the price declining steadily from 52⅜ at the opening to 51⅛, which was the closing figure. About 5000 shares changed hands. The preferred sold at 49¾ and 49⅞ for several hundred shares. Philadelphia Traction was quiet but strong, odd lots of the stock selling at 100¼ and 100⅞. Union Traction held firm around 63 during the early part of the week, but later sales were made at 62, ex. the quarterly dividend. About 1000 shares were dealt in. Other transactions included Fairmount Park Transportation at 17 and 16½, Railways General at 6¼ and 6⅜, United Companies of New Jersey at 272 and 271, American Railways at 52¼ and 52½, Consolidated Traction of New Jersey at 82½ and 82¾, Rochester Railway & Light at 120, and United Traction of Pittsburg at 51.

Baltimore

The market for traction issues at Baltimore were extremely dull and heavy. United Railway issues, which have displayed considerable activity of late, ruled unusually quiet, and prices for both the 4 per cents and the incomes sustained fractional losses. About $20,000 of the former were traded in at 92¼ and 92⅛, while the dealings in the incomes aggregated only $40,000, all of which sold at 65. The trust receipts representing income bonds deposited were pressed for sale, $25,000 changing hands at 64½ and 64. Other transactions were United Railway free stock at 15, 632 deposited stock at 15¼ and 15⅝, $5,000 City & Suburban 5s at 112¾, $7,000 Virginia Electric Railway & Development 5s at 99¾, and $7,000 Washington City & Suburban 5s at 106½.

Other Traction Securities

The Chicago market continued dull, trading being restricted to some extent by the prevailing high rates for money. A feature of the dealing was a sale of a small lot of City Railway at 200, a decline of 5 points as compared with the last previous call. Chicago Union Traction preferred sold at 40 for 100 shares, which is 2¾ below the last previous call. North Chicago sold at 85 and 83 for odd lots. The elevated issues generally displayed firmness. Metropolitan common rose from 27 to 28 on purchases of about 300 shares, while several hundred shares of the preferred brought 70 and 69½. Northwestern Elevated common brought 24, and the preferred sold at 63. South Side held firm at 97, nearly 300 shares changing hands at that price. Chicago & Oak Park common sold at 6, and the preferred at 23 and 22¾. The feature of the Boston market was the activity in Massachusetts Electric issues. At the opening the common sold at 16½, but later the price ran off, and closed at 15¾; while the preferred, after selling at 60, rose sharply to 62¼. In the final dealings there was a reaction to 61, which was the closing figure. About 800 shares of the common, and about 1000 shares of the preferred stock, changed hands. Boston Elevated sold at 152 and 153. Other sales included Boston & Worcester preferred at 74 and 75, West End common at 98½, preferred at 114 and 113½, and one $1,000 bond of 1915 at 102¼. In the New York curb market Interborough Rapid Transit has displayed moderate activity and firmness. Early in the week several thousand shares changed hands between 211 and 212, but later the price dropped to 209 ex. the 2 per cent dividend. At the close there was a partial recovery to 210. In all nearly 4000 shares were traded in. New Orleans Railway issues were in good demand, but even at the higher prices very little stock came upon the market. Of the common, 300 shares sold at 38, and 500 of the preferred brought 84 and 85. The 4½ per cents sold to the extent of $51,000 at 90.

Security Quotations

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

	Dec. 6	Dec. 13
American Railways	*52⅛	52½
Boston Elevated	152½	153
Brooklyn Rapid Transit	85	86
Chicago City	200	200
Chicago Union Traction (common)	10¾	11¾
Chicago Union Traction (preferred)	—	—
Cleveland Electric	83	83
Consolidated Traction of New Jersey	81	81
Consolidated Traction of New Jersey 5s	108	107½
Detroit United	92¾	94¼
Interborough Rapid Transit	211	*210
International Traction (common)	35½	35½
International Traction (preferred) 4s	75½	75½
Manhattan Railway	163	163
Massachusetts Electric Cos. (common)	15	15
Massachusetts Electric Cos. (preferred)	59	60
Metropolitan Elevated, Chicago (common)	28	27½
Metropolitan Elevated, Chicago (preferred)	70	70
Metropolitan Street	117¾	118⅜
Metropolitan Securities	72¼	73½
New Orleans Railways (common), W. I.	37	38
New Orleans Railways (preferred), W. I.	84	84½
New Orleans Railways, 4½s	90¾	91
North American	100	100
North Jersey Street Railway	25½	25½
Philadelphia Company (common)	52⅛	51⅞
Philadelphia Rapid Transit	31¼	32½
Philadelphia Traction	100½	100¾
Public Service Corporation 5 per cent notes	95	95
Public Service Corporation certificates	65	66
South Side Elevated (Chicago)	96	97
Third Avenue	122	121
Twin City, Minneapolis (common)	114	114¾
Union Traction (Philadelphia)	62½	62
West End (common)	97½	98
West End (preferred)	113½	113½

* Ex-dividend. W. I., when issued.

Iron and Steel

According to the "Iron Age," the Lake Superior ore market has furnished in the past week one of the most remarkable developments of this record-breaking year. At the end of the first week in December, with cargoes of 1905 ore still coming down the lakes, it was authoritatively estimated that nearly 90 per cent of the merchant ores to be mined in 1906 had been sold. Counting the ore of consumers having their own mines, and of consumers receiving ore on long-time contracts, there has now been placed 95 to 96 per cent of all the lake or available for next year. The eagerness of buyers has taken sellers by surprise. Returns from the shipping ports show that the water shipment this year aggregates 33,473,761. Adding all-rail shipments this indicates total shipments for the current year of 34,100,000 tons, a record output, which compares with the maximum 22,757,121 gross tons in 1902, and an average of 23,500,000 tons for the past four years.

MICHIGAN PROPERTY LIKELY TO CHANGE HANDS

Plans are making for the transfer of the control of the Muskegon Traction & Lighting Company, of Muskegon, Mich., from the eastern owners to other interests. It is said that the new owners will be the Grand Rapids-Muskegon Water Power Electric Company, but this has not been verified. The power company is preparing to market power, which it will manufacture at its dams on the Muskegon River, in Muskegon and in Grand Rapids. It will also furnish power for the operation of the Grand Rapids, Grand Haven & Muskegon Railway, and could operate the traction lines and lighting plant in that city much more economically than the present management. Preparatory to the sale, which it is planned to consummate early in December, F. A. Nims, president of the Lighting & Traction Company, has petitioned the Council for an amendment of its franchise for the traction lines. The present franchise has no definite term to run and does not provide for the transfer of the franchise to other parties. The city is seeking along with the granting of the request of the traction company, that the franchise run for twenty-five years from Jan. 1, 1906, for the right to demand a 10-minute service in place of the 20-minute schedule on which cars are now operated, when the Council shall deem it necessary. It may also ask for a reduction from the rate of $76 now charged for street lights and also of the gas rate. The business management of the property, when the transfer is made, will remain as at present with local stockholders. The company is capitalized at $600,000.

AUGUSTA, GA., SYSTEM SOLD

The Augusta Railway Company and the Augusta-Aiken Electric Railway have passed out of the hands of the Williams-Mittendorf people into the hands of James U. Jackson, of North Augusta, and the syndicate which he represents. Hampton Terrace Hotel and hundreds of acres of land in North Augusta are included in the sale. It will be recalled that these interests were once in the hands of Mr. Jackson, he having built the Aiken line and the Hampton Terrace Hotel, and organized the North Augusta Land Company.

CHANGE IN CONTROL OF A LONG ISLAND RAILROAD

It is stated that the Belmont interests, which own the New York & Queens County Railway, have acquired control of the Long Island Electric Railway Company, of Jamaica, N. Y. This line is about 27 miles in length, and is the successor to the New York & North Shore Railway Company, and connects Brooklyn, Queens, Jamaica and Far Rockaway. It owns about forty-six cars. The president of the company is Charles A. Porter, of Philadelphia.

EARNINGS OF APPLEYARD PROPERTIES

The report of the receivers of the Appleyard properties just filed with the United States Court, shows that all of the Appleyard lines have a net surplus over the operating expenses for the month of October. The figures do not give the amount of the bonds or the amount of interest due on the same, consequently there is no telling from the part of the report published just what shape the various roads are in. The following is the report of the receivers as to earnings:

"The Central Market Street Railway Company: Gross earnings, $12,729.27; for 1904, $9,055.42; for ten months, $120,810.32; surplus for October, $1,149.98; for ten months, $10,216.18.

"The Columbus, London & Springfield line: Gross earnings, $21,278.41; for October, 1904, $19,026.20; for ten months, $186,109.05; surplus for month, $5,288.83; for ten months, $52,142.33.

"The Urbana, Bellefontaine & Northern line: Gross earnings for month, $2,207.15; for ten months, $19,426.01; net income for month, $317.19; for ten months, $3,174.10.

"Columbus, Grove City & Southwestern: Gross earnings for month, $4,343; for ten months, $38,200.86; surplus for month, $896.61; for ten months, $4,936.95.

"Dayton, Springfield & Urbana: Gross earnings for month, $20,123.35; for ten months, $186,279.05; surplus for month, $3,260.97; for ten months, $41,010.96."

ANNUAL REPORT OF THE MASSACHUSETTS ELECTRIC COMPANIES

The report of the Massachusetts Electric Companies for the year ending Sept. 30, 1905, as presented to the stockholders by Gordon Abbott, president of the company, shows earnings as follows:

	1905	1904
Gross receipts	$6,734,127	$6,380,863
Operating expenses	4,456,303	4,479,520
Net earnings	$2,277,824	$1,901,342
Fixed charges	1,543,514	1,462,626
Surplus	$734,310	$438,716
Dividends	372,448	466,003
Surplus	$361,862	def. $27,286

The profit and loss statement we compare with previous years as follows:

	1905	1904
Dividends on stock owned	$372,540	$466,016
Miscellaneous interest on notes	77,029	105,181
Total income	$449,569	$571,197
Total expenses	17,170	15,222
Net income	$432,399	$555,975
Interest on notes	127,400	121,500
Four per cent on preferred stock	.....	822,296
Surplus	304,999	def. 387,821
Total surplus	*$176,919	$29,419

*After $157,500 has been charged out for discount on coupon notes.

The general balance sheet of the Massachusetts Electric Companies as of Sept. 30, 1905, compares with previous years as follows:

Assets—	1905	1904
Sundry stocks in treasury	$29,913,784	$33,026,744
Stock deposits to secure notes	7,086,000	2,711,000
Cash	35,938	69,769
Notes and accounts receivable	1,305,350	1,750,000
Due from other companies	349,408	54,170
Cash to pay dividends	668	2,449
Total	$38,691,149	$37,614,134
Liabilities—		
Preferred stock	$20,557,400	$20,557,400
Common stock	14,293,100	14,293,100
Coupon notes	3,500,000	2,700,000
Accounts payable	2,187	1,390
Accrued dividend on preferred	.....	.....
Accrued interest on notes	39,375	30,375
Dividends uncalled for	668	2,249
Discount reserve	121,500	.....
Surplus	176,919	29,419
Total	$38,691,149	$37,614,134

President Abbott, in presenting the report, said in part:

"The weather conditions for the year, in spite of the several warm spells during the summer, were not, on the whole, favorable. The winter, while by no means as severe as the winter of 1903-04, was still much more trying to street railway operation than any other winter since the Massachusetts Electric Companies were formed, as will be shown by the following table of figures of the winter expense on the lines during the past six years:

1900	$20,378.14
1901	17,293.54
1902	41,300.62
1903	43,459.24
1904	173,084.81
1905	82,658.38

"These figures give only the amount expended for the removal of snow and ice, and do not include the amount expended for increased consumption of coal, or for the repairs to equipment, power stations and cars, made necessary by a severe winter, which were especially costly last year.

"One more fact remains to be noted, which is that the past summer gave more than the usual proportion of stormy Sundays and holidays. The business done on Sundays and holidays from May 1 to Sept. 30 amounts to more than 11 per cent of the total passenger business of the year. The earnings on those days amounted to $719,106.91 in 1904 and $724,554.94 in 1905, an increase of less than 1 per cent, while the increase in the total earnings for the same months amounted to $135,664.95, or 4½ per cent.

"Since the publication of the last annual report, the new power station at Quincy has taken on the operation of practically the whole Old Colony Street Railway system. There was delay in securing an entrance for the transmission line into Fall River, but since June 19, 1905, the Quincy station has furnished all the power south of Boston, with unimportant exceptions. The results have been satisfactory. The economies resulting from the consolidation of the scattered plants into one, and the employment of the steam turbine have more than paid the interest on the money invested, and instead of being short of power, as was the condition of the line before the completion of the Quincy plant, there is now a surplus large enough to take care of all the increase in business which is likely to occur in the next five years. The electrical engineers of the system are of opinion that further experience in operation and the adoption of improvements which are now being applied will result in substantial further savings. During the past year additional machinery has been installed in the stations at Woburn and Gloucester, and steam turbines are now being erected in the stations at Salem and Haverhill. This work when completed will, in the opinion of the engineers, give the Boston & Northern sufficient power to take care of any probable increase in the business on that road during the next few years, so that the matter of power may be considered as disposed of for the present as far as capital expenditure goes; and the cost per unit of producing this power has been reduced to a figure which is satisfactory.

"In the last annual report a summary was given showing that $10,549,681.05 had been expended on the various properties since you became interested in them. During the fiscal year ending with the 30th of September last, a total amount of $2,255,777.97 was further expended for the same purposes, as follows:

Track and line construction	$741,301.20	
Cars, plows, rolling stock and electrical equipment	158,159.97	
Land and buildings	52,730.96	
Power stations and machinery	779,433.76	
Sundry equipment	19,908.73	
		$1,751,534.62
Track and Line reconstruction		504.243.35
Total		$2,255,777.97

"As against the above work, and some which was done in the previous fiscal year, the Board of Railroad Commissioners have authorized the issue at various times during the year of $700,000 par value of stock and $500,000 par value of bonds, of the Boston & Northern Street Railway Company, and $500,000 par value of stock and $500,000 par value of bonds of the Old Colony Street Railway Company. Application for an issue of a further amount of $200,000 par value of stock of the Old Colony Street Railway Company is now pending before the board, and it is the intention of both of the above-mentioned companies to apply for permission to issue further bonds as soon as this matter is settled.

"In the last annual report it was stated that 'while improvements and a certain amount of reconstruction must be necessary from time to time on any system as large as that in which you are interested, your trustees feel that by far the largest part of the work which ought to be done has been already accomplished.' The trustees have now come to a point where they believe that it is possible for the experts to make an estimate as to the amount necessary to be spent in the next two or three years in order to put the entire properties into first-class condition to do the business which is now in sight and take care of the probable growth during the same period. A summary of the estimates of the experts follows:

Track construction	$443,636
Reconstruction	1,377,638
Cars and snow plows	1,069,245
Feed wire and bonding	159,900
Power stations*	281,225
Buildings	223,400
Total	$3,555,044

* Now under construction.

"There are now in the treasuries of the operating companies $1,390,500 bonds, and application will soon be made for leave to issue others on account of work done since Aug. 31 last. These bonds will be sold when the directors of the operating companies

deem it advisable so to do. The proceeds should provide funds enough to complete work which will justify an application for leave to issue additional stock of a par value of $1,500,000, which will be taken by the Massachusetts Electric Companies and paid for by surrender of notes held in the treasury at the date of the publication of this report. The issue of this stock will give the operating companies the right to apply for leave to issue a further amount of $1,500,000 in bonds, whenever that amount is expended on the above-mentioned work.

"The increase in income was due to two causes, namely, increase on existing lines and increase due to enlarged trackage. In 1900 there were 770 miles of track and 21,733,725 car-miles run; in 1905, 866 miles of track and 25,707,594 car-miles run.

"Maintenance of Roadway and Track.—This item represents only the increase which was charged to operating expenses. In addition there was expended in track reconstruction and charged to profit and loss in the six years included in the above period, $1,061,682.61.

"Maintenance of Equipment.—This increase was due to the greater number of cars operated in 1905, to increase in cost of materials and wages, and to a higher standard of maintenance. In addition there was expended in reconstruction of cars and charged to profit and loss in the six years the sum of $106,785.35.

"Wages of Conductors and Motormen.—This increase was due to increase in wages made March 1, 1903, and to an increase in number of cars operated.

"Cost of Power.—This increase was due to more cars operated, to larger cars, the use of four-motor equipments, higher speed, more severe winter conditions and heating cars for a longer period. By order of the Railroad Commissioners cars are now heated seven months of the year instead of five months as formerly. The cost of production of each unit of power has decreased, but a great many more units are used than in 1900.

"Accidents.—The number of serious accidents has not increased, but litigation has increased to a very marked extent.

"Winter Expenses.—The winter of 1904-05 was much more severe than that of 1899-1900, and cost of removal of snow and ice was nearly four times as large.

"Taxes.—The valuation has been reduced, but the number of shares on which the tax is assessed has largely increased. There has been an increase in property tax and in excise tax, which last amounted to $131,590.80 in 1905. When this tax was imposed in 1899 by the Legislature it was intended to relieve street railway companies from expense of removal of snow and ice and repairs of surface of streets. The Boston & Northern and Old Colony Companies get very little, if any, benefit from the payment of this large tax.

"Much interest has been expressed by shareholders in the question of increasing fares. Both companies have increased their rates of fare in cases which appeared justifiable and necessary, but these changes have not been in effect long enough to enable intelligent conclusions to be drawn.

"The efforts of the past six years have been directed to improving the properties for passenger income, and therefore little has been done until 1905 toward securing the necessary permissions to do a freight and express business. Some freight grants have been obtained and others are pending on the Old Colony lines. When they have been obtained, that company will begin immediately to do that class of business. The Boston & Northern is endeavoring to arrange for transporting its own coal from tidewater to inland points, a matter which is of much more consequence to it than to the Old Colony, where nearly all the coal is consumed at tidewater.

"Future annual reports will not contain balance sheets of the Massachusetts Street Railway Accident Association, because the association has ceased to do business and has distributed its surplus among the companies heretofore insured, who will hold it as the nucleus of a separate fund for the payment of damages for injury to persons and property. The association was formed when the companies in which you were interested were many in number, and it was at that time a useful instrument. Since then they have been reduced by consolidation to four, and suits against them can now be taken care of by a claim department quite as well as by a mutual insurance company. For the purpose of saving the taxes which the Accident Association has had to pay, it was considered judicious to wind it up and let the operating companies insure themselves.

"The unusual amount of reconstruction determined by the Railroad Commissioners during the past year necessitated a charge of $311,970.61 to the profit and loss account of the operating companies. The remaining surplus permitted dividends of only 2 per cent for the year, excepting in the Hyde Park Electric Light Company, which earned and paid 8 per cent. These dividends were paid into the treasury of the Massachusetts Electric Companies, but after charging off the discount on the coupon notes your trustees have thought it wiser not to declare any dividend on the preferred shares in view of the work still to be done on the properties. They believe that this conservative policy is the wisest one to pursue for the present, and that the result will be more favorable to the shareholders than that of any other course.

GENERAL ELECTRIC COMPANY GETS CONTRACT FOR EQUIPPING PENNSYLVANIA'S ATLANTIC CITY LINE

The Pennsylvania Railroad has given to the General Electric Company a large contract for the electrification of one of its lines from Philadelphia to Atlantic City. The contract includes the necessary power station, equipped with large Curtis turbines and sufficient car equipments to maintain a 15-minute train service between Philadelphia and Atlantic City. Also to maintain local train service between Philadelphia and Millville and Philadelphia and Woodbury. The cars will be equipped with direct-current motors and the Sprague-General Electric control. This change to electrical equipment will represent an expenditure of from $2,000,000 to $3,000,000. While electrical contracts have been placed for terminal facilities and local service, this is the first instance where a great trunk railroad has taken such a decided step as to replace steam by electricity for express service on a complete line.

NEW CARS FOR CHATTANOOGA ELECTRIC RAILWAY COMPANY

The St. Louis Car Company has received an order for six 28-ft. cars for the Chattanooga Electric Railway Company. The bodies will be mounted on St. Louis Car Company No. 47 trucks. The cars ordered are duplicates of some furnished the company about a month ago. The St. Louis Car Company also announces that it has received from the Sharon Coke Company, of Pittsburg, Pa., an order for several of its No. 23 A. M. C. B. trucks.

INSPECTION OF INDIANA SINGLE-PHASE RAILWAY

The Westinghouse interests invited a large party of electric railway managers and engineers in the Central States to inspect the single-phase line of the Indianapolis & Cincinnati Traction Company between Indianapolis and Rushville on Saturday, Dec. 9. About sixty were taken in special cars from Chicago at the invitation of T. P. Gaylord, manager of the Westinghouse Electric & Manufacturing Company's Chicago office. Smaller parties were also brought from the Cleveland and Detroit offices, and a few persons from other parts were present, making the total number convening at Indianapolis about seventy-five. All were entertained at breakfast on Saturday at the Claypool, after which, through the courtesy of President C. L. Henry, of the Indianapolis & Cincinnati Traction Company, a multiple-unit train, consisting of two cars equipped with single-phase motors and apparatus, was run from the interurban terminal station in Indianapolis, to Rushville, stops being made en route, to inspect the line and the sub-stations. These sub-stations, it will remembered, are operated entirely without attendants. The power house and shops are located at Rushville, and every opportunity was afforded the visitors to study details of equipment and the repair work as it is actually being carried out on these equipments and to inspect the power supply. The party was divided between two hotels in Rushville for lunch, and after lunch was given an opportunity further to investigate the shops and shop methods. The return to Indianapolis was made on limited time in 1 hour and 20 minutes for the run of 40 miles. Dinner was served in the banquet room at the Claypool Hotel, after which a theater party was given at the Grand Theater. The Chicago party returned by night, arriving in Chicago Sunday morning.

The single-phase road was found to be in first-class operating condition, most of the minor defects which gave trouble at first having been weeded out. The situation is as outlined in the editorial in the Street Railway Journal of Sept. 23, 1905, and in the paper by Charles F. Scott before the American Street Railway Association, which appeared in the Street Railway Journal of Sept. 30, 1905.

The opportunity to inspect this line was much appreciated by every member of the party, and the willingness of the company to lay before electric railway men exact information as to the performance of the road has been the subject of much favorable comment.

MEETING OF BOSTON SUBURBAN ELECTRIC COMPANIES

At the annual meeting of the shareholders of the Boston Suburban Electric Companies, held last week, Frederick H. Lewis and Horace B. Parker declined re-election as trustees, owing to the pressure of other business, and G. Fred Simpson and Henry Hornblower were elected for three years to succeed them, with Charles M. Baker, William H. Coolidge and R. Elmer Townsend, the retiring trustees. There were represented in person and by proxies 42,189 shares of the preferred stock out of a total of 47,969 outstanding, and 40,818 shares of the common stock out of a total of 47,119 outstanding.

President Claflin said: "The condition of the companies is materially better than at the time of our last meeting, and it is still improving. The last two months, the first of the current fiscal year, show a material increase over the year previous.

"The improvement extends to all branches of our interests, and promises much for the future. Operating expenses have been reduced, and gross income has increased, and it will be our endeavor to continue to reduce our cost of operation still further the present year.

"There has been some discussion concerning an increase in the dividend rate, but your executive committee is not prepared to recommend an increase at this time, just as we are entering upon the most critical period of the year, believing it will be better policy to wait until the end of the winter season. With normal winter conditions, there is hope that earnings will warrant an increased dividend later.

"The physical condition of our properties is better than ever before, and extraordinary expenditures are no longer required upon them. Under normal conditions, the subsidiary companies may be expected to make a much better showing than ever before.

"Our relations with the authorities of the towns through which we operate are very harmonious at the present time. Under the authority of the Railroad Commissioners, we have been able to revise fares and discontinue certain transfer privileges. Under these more reasonable conditions we are looking forward to the best year in the history of the companies."

The annual report of the companies for the fiscal year ended Sept. 30, 1905, compares as follows:

	1905	1904
Gross income	$164,556	$102,283
Expenses, inc. interest	30,595	37,481
Net income	$133,961	$64,802
Dividends	88,196	93,303
Surplus	$45,765	def. $28,501
Previous surplus	10,358	38,359
Total surplus	$56,123	$10,358

The trustees of the companies have declared the regular quarterly dividend of 50 cents per share on the preferred stock, payable Jan. 16, to stock of record Dec. 15. Transfer books do not close.

A YEAR OF THE INDIANA INTERURBAN LINES

The figures compiled by Joseph H. Stubbs, chief of the State Bureau of Statistics, relative to the interurban traction lines of Indiana for the year ending June 30, 1905, show that the gross disbursements exceeded the gross earnings for the year by $615,798.16. The gross income was $6,758,900.27, and the gross disbursements $7,374,698.43. This report includes some local street railways that are connected with interurbans.

The report shows other interesting totals, such as that 122,838,665 people were carried on the interurbans during the year, and 33,216 tons of freight and express. The latter seems a small amount as compared with the railroads, until it is realized that, so far as freight business is concerned, the interurbans are still in their infancy. Companies report 847.49 miles of main and 34.25 miles of side-track. The employees during the year numbered 3337, and received wages and salaries amounting to $2,003,161.02.

Forty persons were killed and 4346 injured during the year. Of those killed, one's death resulted through causes classed as being beyond control, the other 39 being due to carelessness.

Injury to 60 persons resulted from causes classed as being beyond control, and injuries to 4286 are classed as being due to persons' own carelessness. Ten of those killed were passengers, 3 employees and 27 others. Of those injured, 1907 were passengers, 141 employees and 2298 others.

The total earnings were divided as follows: Passengers, $6,308,653.95; freight, $120,770.37; express, $66,522.48; mails, $3,741.17; rents, $82,033.60, and other sources, $176,008.65. The total expenses under the class name expenses are divided as follows: Maintenance of way and structures, $405,039.43; maintenance of way and equipment, $369,265.60; conducting transportation, $1,798,928.91; general expenses, $1,078,236.19; additions and betterments, $1,027,557.44, making a total of $4,679,027.57 counted as expenses. Added to that total are the following items: Interest on the debt, $2,078,302.01; taxes, in Indiana, $294,619; taxes in other States, $55,748.17, and rentals, $267,001.68; and these items, added to the total under the head of expenses, brings the total disbursements up to $7,374,698.43. The comparative figures follow:

EARNINGS AND EXPENSES

Gross earnings	$6,758,900.27
Grand total expenses	4,679,027.57
Gross income	$2,079,872.70

EARNINGS IN DETAIL

From passengers	$6,308,653.95
From freight	120,770.37
From express	66,522.48
From mails	3,741.17
From rents	82,033.60
From all other sources	176,008.65
	$6,758,900.22

EXPENSES IN DETAIL

Maintenance of way and structures	$405,039.43
Maintenance of equipment	369,265.60
Conducting transportation	1,798,928.91
General expenses	1,077,236.19
Additions and betterments	1,027,557.44
Grand total expenses	$4,679,027.57

DISBURSEMENTS IN DETAIL

Total expenses as above	$4,679,027.57
Interest on funded debt	2,078,302.01
Taxes for Indiana	294,619.00
Taxes for other States	55,748.17
Rentals	267,001.68
Grand total disbursements	$7,374,698.43

PASSENGER AND FREIGHT BUSINESS

Total number of passengers carried	112,838,065
Total tons of freight and express	33,216

MILES OF TRACK

Number of miles of main track in Indiana	847.49
Number of miles of side-track in Indiana	34.25

WAGES—1905

Employees in Indiana—	Number Employed	Total Yearly Compensation
General officers	51	$115,141.83
Other officers	38	65,875.68
General office clerks	140	70,889.64
Station agents	66	23,255.00
Other station men	29	13,340.00
Motormen	806	489,291.35
Conductors	803	489,235.38
Other trainmen	119	90,351.74
Machinists	33	23,093.61
Carpenters	39	26,231.54
Other shopmen	265	151,490.16
Section foremen	90	51,991.99
Other trackmen	524	199,271.05
Flagmen and watchmen	16	8,040.55
Operators and despatchers	23	13,315.20
All other employees	295	172,346.30
Totals	3,337	$2,003,161.02

	Killed	Injured
Passengers	10	1,907
Employees	3	141
All others	27	2,289
Totals	40	4,336

The amount paid in damages during the year 1905 for accidents was $96,061.36.

ELECTRIC RAILWAY FOR VIGO, SPAIN

A plan for the construction of an electric railway in Vigo, Spain, which is likely to be accepted, has been made by Emilio Montenegro, of the Bank of Vigo. It comprises five lines of tramway and one side line, altogether about 14 km in length. The trolley system will be adopted. The rails are to be of Bessemer steel, Phœnix type, with automatic switches. The gage of the line will be 1.44 m, and the minimum radius of curves is not to exceed 16 m. As regards rolling stock, there will be wanted thirty-nine motor carriages and traction cars, to be in constant use. Each motor carriage is to accommodate thirty-two, and each traction car twenty-four persons. There will be two principal and two auxiliary stations. The electric power will be furnished by the gas company from the fall of the River Lerez. Telephone service is to be established for the use of the line. The estimated cost is $332,000.

Persons interested may apply for further particulars to E. Mulder, consular agent at Vigo.

CENTRAL BUYS MORE TROLLEYS

Henry D. Walbridge, of Hodenpyl, Walbridge & Company, of New York, who is president of the Rochester Railway & Light Company, has announced that the Andrews-Vanderbilt syndicate has arranged to purchase a controlling interest in the Rochester Company.

It has been currently reported for more than a year that the Central was after the Rochester railways, but the actual deal has been on only since Dec. 1. Mr. Walbridge says that the syndicate has purchased the $6,500,000 of common stock, the price being 125. The company also has $3,000,000 preferred stock and controls a large number of subsidiary companies. Its purchase gives the New York Central control not only of the traction lines and lighting plants in the city of Rochester, but also of four railroads running from Rochester to Lake Ontario, and of the Rochester & Sodus Bay Railway Company.

One of the first steps which the New York Central will take, now that it has secured control of the Rochester company, will be the formation of a holding concern to take over all the electric railway lines and lighting plants which it owns. Among the concerns the New York Central owns which will be operated by the new company are the Syracuse Rapid Transit Company, the Rochester & Eastern Rapid Railway and the Rochester Railway & Light Company. The new company will be known as the Mohawk Valley Company.

THE OPENING OF THE NEW YORK ELECTRICAL SHOW

The electrical show, which is being held in Madison Square Garden, New York, until Dec. 23, was formally opened on the evening of Dec. 12. Temporary Chairman George A. Miller, Jr., secretary of the Exposition Company of America, introduced Prof. George F. Sever, of Columbia University, as chairman of the Exposition. Prof. Sever made a brief speech of welcome and introduced Borough President Fornes as the speaker of the evening. As Mr. Fornes finished his address of dedication the news was flashed to Washington over a special wire, and President Roosevelt pressed the golden key, completing the circuit which started the machinery of the exhibits and turned on the numberless lights. The spectacular opening created much enthusiasm, which reached its height as the strains of the "Star Spangled Banner" rose from the band stand, and the President's salute of twenty-one lyddite shells crashed from the roof of the Garden.

Not only are the engines and generators shown in operation, lighting various exhibits, but motors from the very smallest sizes and of an infinite variety of form adapted to all sorts of service. The portable electric tools and labor-saving devices form an interesting group.

Electricity, as applied to the preparation of food, is also ably presented. The manufacturers of shredded wheat biscuits have a complete exhibit, showing every detail of their electrically-prepared and baked product, from the whole wheat to the finished wafers, passed out fresh and hot to visitors. A large and absolutely complete electric kitchen proved a great attraction.

Among the other interesting exhibits are models of the Williamsburg Bridge and a complete working model of the New York City incinerating plant, which has attracted much attention. Safety elevators also are shown in operation.

A wireless telegraph system and miniature electric contact system are shown, as well as the telautograph or writing telegraph.

A NEW PARK FOR GREATER PITTSBURG

West View Park is the name of the newest amusement park of Greater Pittsburg. Thirty acres of land have been taken on the outskirts of Allegheny, and with all the devices known to the promoter of summer parks, the new spot will be opened in the coming summer. A charter will be applied for on behalf of the West View Park Company, headed by T. M. Harton and F. W. Henninger. The site of the park will be easily reached by street cars. The West View line, which is soon to be made a belt line through Bellevue and Avalon, thence back to Pittsburg, passes the grounds and a station of the Pittsburg Railways Company will form the entrance to the park. A liberal transfer system for the use of park patrons will come into being when it opens, and for a nickel any resident of Allegheny can reach it, as well as anyone in downtown Pittsburg. A storage battery is to be erected at the park by the railway company to insure against the non-failure of current.

Most of the concessions will be owned by the operators of the park, who now control large concessions in twenty-five parks of the country and own the famous Athletic Park in Buffalo. It is probable that a "chute the chutes" into a lake will be erected. Circle swings, switchbacks, Ferris wheels, small theaters and every other sort of amusement device will also be installed. T. M. Harton, of North Highland Avenue, Pittsburg, is to be president of the company, and Mr. Henninger is to be the secretary-treasurer.

ELECTRICAL SHOW AT CHICAGO

An exhibition of electrical appliances, similar to that held at the Madison Square Garden in New York this year, is to be held, Jan. 15 to 27, 1906, in Chicago at the Colliseum. This will be the first exhibition of the kind to be held in Chicago, and space is being taken rapidly by various electrical manufacturing concerns. The officers of the association are well known electrical men of Chicago, as follows: Samuel Insull, president; Edward B. Ellicott, Charles E. Gregory, E. B. Overshiner, vice-presidents; John J. Abbott, treasurer; Stewart Spalding, secretary; Thomas R. Mercein, general manager.

The conventions of the Northwestern Electrical Association and the National Electrical Salesmen's Association will be held during the time of the exhibition in Chicago. The Northwestern convention dates are Jan. 17 and 18.

OCEAN SHORE OFFICIAL SAYS SOUTHERN PACIFIC HOLDS NO STOCK IN THE NEW CONCERN

That the Southern Pacific Company is largely interested in the Ocean Shore Railway Company and has even granted it rights of way which had formerly been contested, as well as helping its erstwhile rival with track construction at the Santa Cruz end, is denied by the officials of both companies, although it is admitted they have traded rights of way.

Burke Corbet, attorney for the Ocean Shore, explained the matter of the Southern Pacific's contract to deliver machinery for a cement plant by saying that his road had the Southern Pacific so completely blocked by the rights of way that it had secured that the latter could never hope to haul in the machinery unaided or to take out the cement as it had contracted to do.

"The Southern Pacific, awaking too late to the realization that it had agreed to handle traffic without tracks or even a place to put them," said Mr. Corbet, "came to us in an imploring mood and signified its willingness to do some bargaining. We were willing, so rights of way that would enable the Southern Pacific to reach the cement plant were traded for rights of way for the Ocean Shore Railway across Southern Pacific tracks in San Francisco and Santa Cruz."

Mr. Corbet denies that the Southern Pacific is aiding the Ocean Shore in the construction of track at Santa Cruz. "The untangling of the right of way has been quite a job," he says, "and the Southern Pacific has lent all the assistance possible in order that the cement may be delivered at the time the contract calls for—over the tracks of the Ocean Shore. The only track work being done by the Southern Pacific at Santa Cruz is on its own tracks, which, according to the terms of the right of way, are to parallel ours for a considerable distance.

"You may quote me as saying," continued Mr. Corbet, "that the Southern Pacific has nothing to do with the Ocean Shore, and that the stockholders of the former hold no stock in the latter."

THE ALLIS-CHALMERS STEAM TURBINE

On Tuesday, Dec. 12, a party of about 100 engineers inspected, by invitation, the 5500-hp Allis-Chalmers turbine in course of installation in the Williamsburg power station of the Brooklyn Rapid Transit Company. Asa M. Mattice, chief engineer of the Allis-Chalmers Company, was present to explain to the visitors the special features of the turbine, the upper casing of which was removed to facilitate inspection. An account of the Williamsburg station appeared in the issue of the STREET RAILWAY JOURNAL of Sept. 23, and on another page the new turbine is described in detail.

The points which interested visitors in particular were the details of securing the blades, the shroud rings protecting and stiffening the outer ends of the blades, the low-pressure water-packing arrangement and the low-pressure balancing arrangement with its ingenious labyrinth of baffling packing. Among the guests were the following: Frank Hedley, general manager, Interborough Rapid Transit Company; George H. Pegram, chief engineer, Interborough Rapid Transit Company; George E. Thomas, Interborough Rapid Transit Company; John Van Vleck, mechanical engineer, Interborough Rapid Transit Company; H. G. Stott, superintendent motive power, Interborough Rapid Transit Company; M. G. Starrett, chief engineer, New York City Railway Company; Willis Lawrence, New York City Railway Company; C. E. Roehl, electrical engineer, Brooklyn Rapid Transit Company; Edwin W. Winter, president, Brooklyn Rapid Transit Company; J. F. Calderwood, vice-president and general manager, Brooklyn Rapid Transit Company; C. F. Baker, superintendent motive power, Brooklyn Rapid Transit Company; A. Wolff, Brooklyn Rapid Trasit Company; George A. Orrok, constructing engineer, New York Edison Company; J. D. Andrews, New York Edison Company; W. F. Wells, Brooklyn Edison Company; D. S. Kohler, Allegheny County Light Company, Pittsburg, Pa.; W. A. Donkin, Allegheny County Light Company, Pittsburg, Pa.; George H. Howard, Brooklyn Rapid Transit Company; Herbert W. York, chief engineer, American Smelting & Refining Company; H. A. Lardner, George H. Throop, Martin H. Kilgour, London, England. The Allis-Chalmers Company was represented by W. W. Nichols, vice-president and secretary; Asa M. Mattice, chief engineer; F. C. Randall, manager, New York office, and John S. Lord, C. J. Larson, A. G. Christie, Harry Byrne, A. F. Rolf, Frederic D. Herbert, C. A. Hoppin, S. G. Stone, H. W. Rowley, L. C. Marburg and Sam Moore.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED DEC. 5, 1905

806,143. Car Fender; John J. Hoey, New York, N. Y. App. filed March 13, 1905. Consists of a bumper of nested bands of yielding metal graduated in diameter, the outer band of each nest of bands being secured to an outer plate, and all of the bands of each nest to an inner plate, a yielding apron mounted in the rear of the bumper and a fender in the rear of the apron and adapted by novel means to be thrown into operative position when the apron encounters an obstruction.

806,152. Third Rail Protector; William H. Kober and Charles E. Watier, Lancaster, Ohio. App. filed March 6, 1905. A protecting hood and shield made up of alternate sheets of metal and insulating material. The different sheets are lapped with respect to one another so as to be more effectively supported at their edges.

806,215. Railway Coupling; William T. Van Dorn, Chicago, Ill. App. filed April 24, 1905. A draw-bar having oppositely directed rounded hooker ends thereon, and provided with a central cylindric aperture, a coupling pin adapted to rotatively engage therein and in the forward aperture of a complemental draw-head, and a spring in said draw-head adapted to engage the end of the draw-bar and force it against said pin in coupling.

806,225. Car Fender; Wesley G. Winans, Spokane, Wash. App. filed April 5, 1905. The fender is slidably mounted in an inclined frame under the car and is adapted to be pulled up out of operative position by a cable leading around a winding drum under the control of the motorman.

806,248. Trolley; George R. Fletcher, Cambridge, Ohio. App. filed May 31, 1905. A notched scraper blade for removing ice and sleet from the conductor, is spring mounted on the trolley axle.

806,273. Rail-Joint; Franz Melaun, Charlottenburg, Germany. App. filed March 22, 1901. The tread of the rails is cut away at the ends, and a fish-plate provided of such construction as to fill the gap in the tread.

806,294. Street Car Fender; Ernest H. Schulze, Kansas City, Mo. App. filed May 17, 1905. Comprises a supporting frame, a pick-up frame pivotally mounted on the supporting frame and having a bed to receive and carry a person, and a yielding connection between the pick-up frame and the supporting frame to prevent the front end of the pick-up frame dropping below a predetermined plane.

806,310. Trolley Wire Holder; Frank M. Zimmerman, Aurora, Ill. App. filed March 21, 1905. A socket having a cylindrical bore contracted at its mount and provided with ledges in its enlarged chamber, a wire holder stem having an enlarged lower part citted to the mouth and an upper and flanged portion connected to the ledges.

806,430. Trolley Signal; Benjamin H. Roberts, Haverhill, Mass. App. filed Oct. 5, 1905. Details of a single-track trolley signal, consisting of a ratchet, which is stepped around for every car that enters a block, and reversely moved whenever a car leaves the same.

806,442. Electric Switch-Operating Device; Ira J. Stouffer, Altoona, Pa. App. filed July 10, 1905. A contact-shoe mounted adjacent the usual conductor, and adapted to be charged by special contact springs on the trolley pole. Two switch-operating magnets are so connected by compound levers that one of them is effective to hold the switch point in its thrown relation until the other magnet has been energized.

806,453. Metallic Railway Tie; Budd G. Bealor, Aspinwall, Pa. App. filed Feb. 16, 1905. Comprises a trough-shaped metallic member adapted to be placed with its sides projecting upwardly and having triangular portions of its bottom between the rail-seats punched out and bent downwardly to form holding means and drain openings.

806,538. Electric Signal for Railways; John B. Gorrell and Hiram V. Gorrell, Laotto, Ind. App. filed June 21, 1905. Supplemental semaphore signals by which a train may be flagged in case it inadvertently passes the main signals.

806,561. Car Fender; Frederick W. O'Connor, Toronto, Can. App. filed June 27, 1904. A cam operates through the medium of a connecting rod from the car truck to maintain the fender at a uniform height above the rails.

806,567. Switch-Operating Apparatus; James I. Pittman and Elizabeth Harrison, Valdosta, Ga. App. filed May 6, 1905. A depressible frame extending from end to end and side to side of a car, has legs depending therefrom in front of and behind each wheel and shoes at the end of each leg for actuating the switch point.

806,568. Electric Switch for Street Railways; James A. Posey, Midlothian, Tex. App. filed Jan. 21, 1905. A depressible bar adjacent the track rails has connections to the switch point. Also a pair of contact plates for making an electrical circuit, which renders said connections effective to move the switch point to the alternate direction when the circuit is energized.

806,604. Street Car Fender; Vasilie Vlaudutz, Homestead, Pa. App. filed Aug. 26, 1905. Belongs to that type which in the event of an object striking the car, firmly grips said object and holds it during the movement of the car by virtue of a series of spring-pressed arms.

806,630. Trolley; Amos Bopp, Baltimore, Md. App. filed March 25, 1905. The trolley wheel is vertically swiveled in a skeleton guard frame, the arms of which rise sufficiently above the axle to prevent the trolley catching guy wires, etc.

806,635. Motor-Control System; Eugene R. Carichoff, East Orange, N. J. App. filed Aug. 4, 1904. A multiple-unit control system having among other features a pair of locks operable from the controller and operatively connected to both the reversing and controlling switches, one of said locks being inoperative with respect to the reversing switch when the other is actuated.

806,638. Signal for Sectional Conductors; Frank E. Case, Schenectady, N. Y. App. filed May 21, 1904. Signals for indicating to the motorman whether either of two sections of the third rail ahead is grounded, and also whether the sections are at the same potential. A semaphore magnet is energized in case the rail sections are at a different potential, or in case either one of them is grounded.

806,709. Switch Operating Mechanism; Jesse S. Pevear, Schenectady, N. Y. App. filed Feb. 27, 1905. A pair of oil-bath switches are connected to respectively control current through alternating-current and direct-current motors upon the car. The switches are arranged in transformer circuits in such a way as to automatically throw the proper switch by connections to direct or alternating power mains.

806,711. Brake; John H. Piercy, Baltimore, Md. App. filed June 9, 1905. The brake-shoes are spring pressed against the wheels and held out of engagement by means of a chain wound upon a brake-drum.

806,741. Rail-Joint; Patrick J. Haney, Beverfalls, and Patrick J. Lalley, Fallston, Pa. App. filed April 3, 1905. A rail-joint having base portions adapted to bear against the web and flanges of the rails for the full length of the joint, intermediate under portions adapted to project inwardly underneath the rail-flanges, and upper head-bearing portions of less length with downwardly sloping end portions.

806,751. Switch Controlling Mechanism; Jesse S. Pevear, Schenectady, N. Y. App. filed Feb. 27, 1905. Different switches are employed for connecting the apparatus to the source of current supply according as the current which is being supplied is alternating or direct.

806,752. Combined Alternating and Direct-Current Control Apparatus; Jesse S. Pevear, Schenectady, N. Y. App. filed May 8, 1905. A control system for motors operating alternately on alternate and direct currents, so arranged that through the medium of a single master switch the speed of the motor may be governed by a governing device best adapted for use with the particular current on which the motor is being operated.

PERSONAL MENTION

MR. WALTER B. HALL, for nine years connected with the Salem division of the Boston & Northern Railroad, has severed his connection with the company, to become connected with the Old Colony Railroad.

MR. GEORGE H. GIBSON, of George H. Gibson & Company, advertising engineers of New York, presented a paper on "Lost Motion in Machinery Advertising" at a meeting, held in New York on Dec. 8, of the Technical Publicity Association.

MR. RICHARD WORSAM MEADE, president of the New York Transportation Company, of New York, who formerly was assistant to President Vreeland, of the New York City Railway Company, was married on Saturday, Dec. 9, at Trinity Chapel, New York, to Miss Helena Rutherford Ely.

MR. HOWARD E. HUNTINGTON, general manager of the Los Angeles Railway Company, has returned from a trip to Europe. While abroad Mr. Huntington combined business and pleasure, and availed himself of the opportunity to study the methods of operation of the street railway properties in the principal cities which he visited.

MR. C. E. MEAD has resigned from the Westinghouse Electric & Manufacturing Company and opened offices in the Reibold Building, Dayton, Ohio, with his associates, as C. E. Mead & Company. In addition to other work in hand, Messrs. Mead & Company have been retained as consulting engineers for three interurban railways to be built during the coming year.

PROF. FRANK H. ROBERTS, of the University of Denver, Col., has just returned from an extended trip in Europe, where he has been studying the question of municipal ownership of public utilities. He called on President Roosevelt on Dec. 9 and is said to have reported to the President that public ownership of public utilities has been a failure in Europe.

MR. THOMAS B. EATON, of Worcester, has been elected a director of the Worcester Consolidated Street Railway Company, to fill the vacancy caused by the death of the Hon. Stephen Salisbury. Mr. Salisbury had been a director since March 11, 1901, and for a long time previous had been a director of the Worcester Traction Company. Resolutions on his death were adopted.

MR. S. E. WOLFF, recently general manager of the Jackson Gas Company, of Jackson, Mich., has assumed the duties of general manager for the Saginaw-Bay City Railway & Light Companies, vice Bernard C. Cobb, resigned. Mr. Cobb will retain his interest as a director, and will also continue to hold the office of vice-president, though after Jan. 1 he will remove to New York, where he will be connected with the head offices of the Hodenpyl-Walbridge Company, who control the Saginaw properties.

MR. DE KANDO, chief electrical engineer of Ganz & Company, Buda-Pest, arrived in New York on the Cunard turbine liner, "Carmania," on Dec. 11. Mr. De Kando's visit to this country is partly due to the great interest being felt in three-phase traction at present, and the many important projects where this system might be used. He expects to visit also the three-phase line now being equipped between London and Fort Stanley, Ontario, Can., described in the Street Railway Journal of Dec. 9, on page 1026.

MR. RANDALL MORGAN, of Philadelphia, who has been in Cincinnati for about a month as the guest of President W. Kesley Schoepf, of the Ohio Traction Company, has left for California, where he will remain until the first of the year, when he will return to Cincinnati again as the guest of Mr. Schoepf. As previously stated in the Street Railway Journal, Mr. Morgan while in Ohio availed himself of the opportunity of making a study of electric railway operation in Ohio and Indiana, in doing which he traveled over nearly very line in the two States.

MR. H. P. McINTOSH, Mr. Horace E. Andrews, Mr. S. F. Haserot and Mr. E. G. Tillotson have resigned as directors of the Lake Shore Electric Railway Company. As stated in these columns some weeks ago, Mr. Warren Bicknell will leave the company about Jan. 1, to become president of the Cleveland Construction Company, and it is understood to be settled that he will be succeeded as president by Mr. E. W. Moore, who is one of the heaviest stockholders of the property and a leading member of the Everett-Moore syndicate, which recently reassumed control of the property as a result of the winding up of the voting trust which has had charge of the company since the receivership.

MR. CHARLES P. THRASHER, engineer for the Cleveland Construction Company, has opened an office in the Citizens Building, Cleveland, for the engineering department of the Youngstown & Ohio River Railway, which will extend from Youngstown to East Liverpool by way of Salem and Lisbon. Surveys are being made and specifications are being prepared for all the engineering details. The section from Salem to Lisbon will be built first, and work on this will be started early in the spring. The road is being promoted by a Cleveland syndicate headed by Mr. Will Christy, Mr. J. R. Nutt, Mr. Warren Bicknell, Mr. E. H. Hale and others.

MR. L. L. SMITH has been appointed master mechanic of the Schenectady Railway, of Schenectady, N. Y., in place of Mr. J. G. Baukat, resigned. Mr. Smith is a graduate of Cornell University, class of 1890, with degrees of mechanical and electrical engineer. From 1890 to 1899 he was connected with the Chicago, Burlington & Quincy Railroad. From 1899 to 1902 he was division master mechanic and general shop foreman of the Chicago, St. Paul & Western Railroad at St. Paul, Minn., and from 1902 to 1903 he was machine shop foreman of the Central Railroad of New Jersey. Since that date up to Dec. 1 he has been master mechanic of the New Hampshire Traction Company, of Haverhill, Mass.

MR. WALTER W. WHEATLY, president and general manager of the Mexico Electric Tramways, Ltd., left New York for Mexico City on Thursday, Dec. 14, by the Ward Line steamer "Esperanza." Before his departure Mr. Wheatly gave a pleasant farewell dinner on Tuesday evening, Dec. 12, at the Café Martin. Among the prominent guests were the following: H. H. Vreeland, president, Mr. Frank S. Gannon, vice-president, and Mr. Oren Root, Jr., general manager, of the New York City Railway Company; Mr. Thos. N. McCarter, president; Col. Edwin W. Hine, assistant to president, and Mr. Albert H. Stanley, general superintendent of the railway department of the Public Service Corporation of New Jersey; Mr. G. Tracy Rogers, president of the Binghamton Railway company; Dr. F. A. C. Perrine, the well-known transmission engineer; Mr. Frank Hedley, general manager of the Interborough Rapid Transit Company Company, of New York; Mr. W. J. Clark, of the General Electric Company; Mr. Maurice Coster, of the Westinghouse Electric & Manufacturing Company; Mr. Daniel M. Brady, president of the Brady Brass Company; Mr. Ira McCormick, of the New York Central Railroad; Mr. H. W. Blake, editor Street Railway Journal.

MR. R. C. TAYLOR has resigned as mechanical engineer of the Brooklyn Rapid Transit Company, and the position has been abolished. Mr. Edward Taylor, engineer of equipment and tests of the company, also has resigned, and Mr. J. R. Williams, general foreman of shops, has left the service of the company. Mr. Edward Taylor was connected with the company four years, first as engineer of tests and later as engineer of equipment. Before coming to Brooklyn, Mr. Taylor was with the International Traction Company, and before that, during the Pan-American period, was connected with the engineering department of the International Traction Company, of Buffalo. Mr. Williams has been with the mechanical department of the company for a number of years. Another to leave the service of the Brooklyn Company is Mr. E. F. Perrine, assistant to the mechanical engineer. Mr. W. G. Gove has been appointed superintendent of equipment of the company, having charge of construction, inspection and maintenance of rolling stock of both elevated and surface lines. Mr. Gove has been assistant mechanical engineer of the company for about two years. Previous to his connection with the Brooklyn company he was with the Boston Elevated, where he served a term of service of about ten years.