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EDITORIAL NOTICE

Street railway news, and all information regarding changes of officers, new equipments, extensions, financial changes and new enterprises will be greatly appreciated for use in these columns.

All matter intended for publication must be received at our office not later than Tuesday morning of each week, in order to secure insertion in the current issue.

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The New Jersey Situation

As stated elsewhere in this issue, President Thomas N. McCarter, of the Public Service Corporation, announced on Jan. 29 the resignation of W. W. Wheatly as general manager of the railway department of that company and that the practical operation of the system hereafter would be under the personal direction of Albert H. Stanley, as general superintendent. As readers of this paper know, there has been considerable public dissatisfaction with the service furnished by the company during the last few months. This fact, coupled with the announcement of Mr. Wheatly's resignation, has caused considerable surprise to those who are acqainted with his high reputation as a railway manager. It is generally understood, however, that the policies of the company which have provoked the greatest public dissatisfaction have never met the approval of Mr. Wheatly, and that they were carried out by him only because they were insisted upon by the board of directors and against his protest. Many new cars were ordered under Mr. Wheatly's management and other improvements were commenced which will soon show their effects in an improved service.

It is the belief of all those who have studied the situation carefully, that the causes for the dissatisfaction which now exists can be made to disappear and that success will crown the efforts of President McCarter and Superintendent Stanley, provided they receive the support of their board of directors. If, however, the latter does not adopt a broad and harmonious policy, the new management will be able to do little more than that lately in charge of the property, and the sacrifice of the recent manager to appease the public will have been useless.

Trippers and Time Tables in St. Louis

In another column is given an interesting interview with A. B. Du Pont, second vice-president of the St. Louis Transit Company, in which he outlines briefly the policy which he has pursued since taking the management of that company, in the matter of fast schedule speeds and increasing the number of trippers as compared with regular cars. Mr. Du Pont probably stands as the most radical advocate of fast city schedules to be found among the prominent managers of the country. It will be seen from this interview that the St. Louis Transit Company's city service is remarkable not only on account of the average speed, which is high for a city the size of St. Louis (being a little over 10 m. p. h.), but also on account of the enormous increase in the number of cars in operation during the rush hours, as compared with the regular mid-day schedule, this increase amounting to about 144 per cent. While all will probably agree with Mr. Du Pont's position that fast schedules are economical as far as ordinary operating expenses are concerned, providing motor equipments are of the proper size, many managers will take issue with him on the question of accidents, on the ground that very fast schedules are dangerous in city practice. Mr. Du Pont's position in this matter, however, is consistent with his convictions, even if quite radical, as he maintains that accidents are less frequent with fast than with slow schedules, when once the public has been educated to the fact that a fast schedule is in force. There is, undoubtedly, much in the theory that the more the public is fraternalized and surrounded by safeguards, the less care each individual takes to look out for himself, and while it may work out well in St. Louis and some other places, we apprehend trouble for many managers elsewhere should such a course be pursued. For instance, any attempt at fast runs on Broadway or other congested thoroughfares in New York, State Street in Chicago, or Chestnut Street in Philadelphia, would result in a panic, and settle forever the question of high speed in any of those cities.

As regards the unusual number of trippers put in service in St. Louis during the rush hours, there will be few managers to disagree with Mr. Du Pont in the statement that ample and quick service during the crowded hours is conducive to short distance riding during those hours, and hence results in increased gross revenue. That more companies have not adopted the same plan during the rush hours to the extent practiced by Mr. Du Pont is due to a number of causes. In some of the largest cities, there is simply not room on the down-town tracks for such an increase. In others the company's supply of rolling stock has not kept pace with unexpected increases in travel. In the smaller cities the number of cars is not reduced during the middle of the day to correspond with the traffic to such an extent as in St. Louis. That this reduction is not made may be due to a desire on the part of the manage-

ment not to have the cars too far apart on any one line during the quiet hours, or to a desire to increase the number of working hours of the conductors and motormen, so that they will be satisfied with the wages they are earning. Indeed, the question of giving the trippers work enough to permit them to earn good wages is an important one on every large road.

As to the way the ideas adopted by the St. Louis management actually work out in the service, it has been the observation of the writer that, leaving out of account small blockades, which are frequent though unavoidable, very few passengers are not provided with seats during the rush hours at St. Louis. This is as would be expected where such a large number of tripper cars are turned loose on the streets during the rush hours. Brief blockades, however, are sure to occur, and St. Louis people, like those in every other city in America, invariably pile on to the first car to be let out of a blockade, even though several cars following it are half empty. The writer's observation has been that while there are seats enough as a rule, it is a tolerably frequent occurrence to see one crowded car followed by a number partially empty. It might be supposed that with so many trippers on the streets there would be few "kicks" in St. Louis on the rush-hour service; but, apparently, the people of that city exercise the American citizen's inalienable prerogative of kicking as vigorously, as often and as inconsistently upon the transportation service as anywhere else. If numbers of cars during the rush hours could silence complaints, the service in St. Louis should certainly accomplish this.

The Repulsion Railway Motor

We are pleased to be able to present to our readers the interesting Institute papers of Messrs. Slichter and Steinmetz. There has been so much enthusiasm aroused by the coming, of single-phase alternating railway motors, as evidenced by the almost simultaneous announcements of Eichberg and Winter, Finzi and Lamme, that a pronounciamento from the immediate propinquity of Dr. Steinmetz has been awaited with some eagerness. It has been an open secret for some time that very interesting work with the Thomson repulsion motor was in progress, and this pair of papers may be taken as a sort of preliminary report. They are exceedingly well worth reading, but hardly illuminating as regards the actual properties of the machines thus far turned out. In fact, lest we be thought hypercritical, all the data yet published regarding any one of the single-phase motors thus far announced could be crowded under a very small hat without the least need of stretching it. Of course, commercial necessity sometimes makes it desirable to keep details out of print for long periods, but under this condition we think general statements, which, backed by the reputation of a great company, will pass current at their face value, are quite as instructive as fragmentary technical data like those proffered by Mr. Slichter. We do not wish to be censorious in the matter, but merely to call attention to the fact that in his paper, Curve Sheet 1 is from the tests of an actual machine of a rather early type; Curve 2, which gives a comparison with a d. c. railway motor, relates to another and later form of repulsion motor, and to a "standard" railway motor of unnamed type and size. Curve 3, which gives comparative running tests, relates to unspecified motors, both a. c. and d. c., which may or may not be those previously mentioned, and finally Curve 4 gives the expected characteristic of a motor which exists merely on paper.

When one has to pick up such incoherent scraps of knowledge as these, he not unnaturally feels a certain disappointment. It is apparent, however, that the motors referred to are machines well worth serious consideration in railway service. Like all the others of the new crops of a. c. motors they are of rather low power factor at or near starting, but give satisfactory results when up to speed. Their efficiency is likewise lower than that of d. c. motors, but, as we have several times remarked, one may as well lose efficiency in the motor itself as in a rotary converter and the rest of the outfit. The weight of the motors alluded to by Mr. Slichter is not given, but it should, from the type of motor represented, be not materially in excess of ordinary railway motors of a similar output. As to the theory of the motor, Dr. Steinmetz elucidates that in his usual workmanlike manner, and by his customary symbolic methods, although in the abstract of the paper, as published in this issue, the mathematical discussion is omitted. We wish, however, that in this instance he would step out of the beaten track and give a discussion of the repulsion motor without recourse to the fiction of a rotating field, or, still worse, two rotating fields spinning simultaneously in opposite directions. Considering the fact that a typical repulsion motor has but a single magnetizing coil, supplied by a simple alternating current, and a commutating armature with its polar line definitely located by the short-circuited brushes, its theory, although containing some annoying details, ought to be expressible in less artificial terms. The repulsion motor is, indeed, one of the most straightforward and effective types of alternating motor, and likewise one of the earliest. It would have long since taken a prominent place in the art but for its possession of those very "series characteristics" which render it so valuable for the present purposes. The demand for alternating motors in the past has been of a kind requiring constant speed, a condition best met by polyphase induction motors.

Now, however, that a demand for alternating railway motors has made itself felt, the repulsion motor is thoroughly available. The difficulties of commutation are probably rather less in the repulsion motor than in a series-alternating type, and at the frequencies now used upon a large scale, ought to be in great measure overcome. When the customary frequency was 125 cycles per second, or thereabouts, the commutation of an alternating current was a pretty serious matter, but at 25 cycles or less, it is far more practicable. The repulsion motor is certainly somewhat easier to insulate properly than an alternating series-wound machine and its connections seem a bit simpler. It also can, when reversed, act as a generator, and turn back power into the line even at moderate speeds. Whether this property can be made commercially valuable is a matter to be determined in practice, although in the case of direct-current motors we are not aware that the saving of power thus possible has been of any material value in electric railroading. Certain it is that the repulsion motor has been evolved into a form that compares on, at least, practically even terms with any other commutating alternating motors yet proposed.

We earnestly hope that the cover will soon be taken off the entire subject, so that practical electric railway men may get a clear insight into the actual working properties of these very interesting machines. In this connection it should be pointed out that although most necessary for the improvement of interurban work, the alternating motors are the subject of very strong claims on economical regulation of speed. In the present case Mr. Slichter shows gains from this source more than enough to compensate for the lower intrinsic efficiency of the alternating motor. Since the final test of practical efficiency is

the power taken to run a car on a given schedule and track, gains in regulation are important, and particularly so in ordinary tramway service in which a motorman may run for several miles without ever getting the resistance fully out of circuit.

Heating Cars

The Legislature of New York has under consideration a bill providing for "the proper heating of steam, elevated and surface cars." The proposed measure is the result of complaints made during the last few months, when unusually severe weather has prevailed throughout the State, and it has been simply impossible for the operating companies to keep the cars comfortable at all times. Representatives of steam roads have protested vigorously against the enactment of the bill, on the ground that conditions over which the railways had absolutely no control whatever, made it impossible for them to heat the cars. At times during the winter, it was pointed out, the most powerful engines employed have been unable to make sufficient steam to haul the trains and make the schedule without furnishing any heat whatever for the coaches. Yet, on these lines, if anywhere, it would seem, heat should be furnished, owing to the fact that the passengers ride much longer distances than upon electric lines. On the surface street railways the difficulties are even greater, owing to the frequent stops that are necessary to permit passengers to enter and leave, thus admitting enough cold air to chill the cars. Although the stops on the elevated trains are much less frequent than on the surface lines, it is even more difficult to keep them warm in extremely cold weather, owing to the fact that both front and rear doors are thrown open at every station while the train is still in motion, thus creating a draft through all excepting the front and last cars. Last month trains were started out comfortably heated, but before making the third stop they were invariably cold, and no amount of heating apparatus that was practicable for such service could keep them warm.

Under the circumstances it can readily be seen that legislation on this subject is wholly uncalled for, that the proposed measure suggests the possibility of endless litigation and much acrimonious discussion, and that the entire movement looks suspiciously like a raid upon the transportation interests. There is scarcely any other subject upon which there is such a wide divergence of opinion as that of the proper temperature for a public conveyance. Some patrons are constantly complaining because the cars are too hot and "stuffy," others as vigorously protesting every time a ventilator is opened to admit fresh air, so that it is certainly a difficult task to satisfy any considerable number of passengers.

A Movement for a Track Association

In another column is given a copy of the circular letter now being sent out by Fred. G. Simmons, superintendent of construction and maintenance of way of the Milwaukee Electric Railway & Light Company. This letter invites the co-operation of track and way superintendents in the organization of an association devoted especially to their interests. This definite move on the part of Mr. Simmons comes as the culmination of considerable quiet agitation on the subject which has been going on, among those interested, during the last six months, or since the American Railway and Mechanical Association committed itself definitely to the policy of not taking up subjects connected with the construction and maintenance of track. Indeed, it is not unlikely that the next street railway convention will see a profitable convention of track men. There are those who decry multiplication of organizations, but it is only by specialization that results can be accomplished in these days. One argument urged against dividing up the work among so many associations is that on the smaller roads one man looks after all departments. On the other hand, it is undoubtedly true that the greater part of the attendance and support of such organizations comes from large and medium-sized companies with whom the work is divided among different department heads. The company which can afford to send its master mechanic and superintendent of power to a convention can equally afford to send its superintendent of track. A large amount of money is going to waste every year in electric railway tracks for the lack of interchange of knowledge and the results of experience among track men of various companies. Although it has been thought by some that track men were not numerous enough to have an organization of their own, Mr. Simmons believes that it will be demonstrated that there are more available men for membership in a track organization than for membership in the Master Mechanics' Association. This belief is probably based on the fact that practically every company having a master mechanic has also a track superintendent. The formation of a track and way association will undoubtedly tend to bring out many track superintendents who have heretofore remained in the background, as far as conventions were concerned. The same thing happened at the time the Accountants' and Master Mechanics' associations were formed, and there is no reason to suppose that it will not be true in this case. All interested in the formation of a track and way association should communicate at once with Mr. Simmons so that further plans of organization can be formulated.

Snow Removal and Blockades

An old-fashioned winter brings sorrow to the street railway superintendent as surely as it causes joy among the small-boy contingent, and in about the same relative proportion. Operating forces on city lines have always had their troubles in winter, and these are in no degree lessened by the universal dependence that is placed upon trolleys nowadays in every community, especially during periods of bad weather. When it is most difficult to operate cars, the demand is greatest upon the system and patrons are most exacting. But the troubles of the city superintendent are as nothing in comparison with the lot of the interurban manager, whose line extends through an exposed district with many opportunities for drifts. However, it must be admitted by the most severe critics of interurban roads that during the unusually severe weather that has visited all parts of the North this winter the electric lines have given a good account of themselves, and have nothing to fear by comparison of their record with those of the steam lines in their immediate vicinity.

A new problem has come up in some localities, which is due to the unusually heavy snowfall; namely, complaints on account of the delays occasioned by teamsters using the tracks, thus compelling the trolleys to crawl along at a snail's pace, and the demand of city officers that companies carry away the snow on streets occupied by car lines. Teamsters arrested for obstructing traffic pleaded that they were compelled to use the tracks, as the embankments of snow thrown up on either side effectually closed the rest of the street so far as traffic was concerned. The city officers contended that the railway companies must cart away the snow and not pile it upon the sides of the roadway. In one instance a compromise was effected, the company agreeing to divide the cost of carting away the snow on the streets occupied by its lines.

THE CONNEAUT & ERIE INTERURBAN SYSTEM

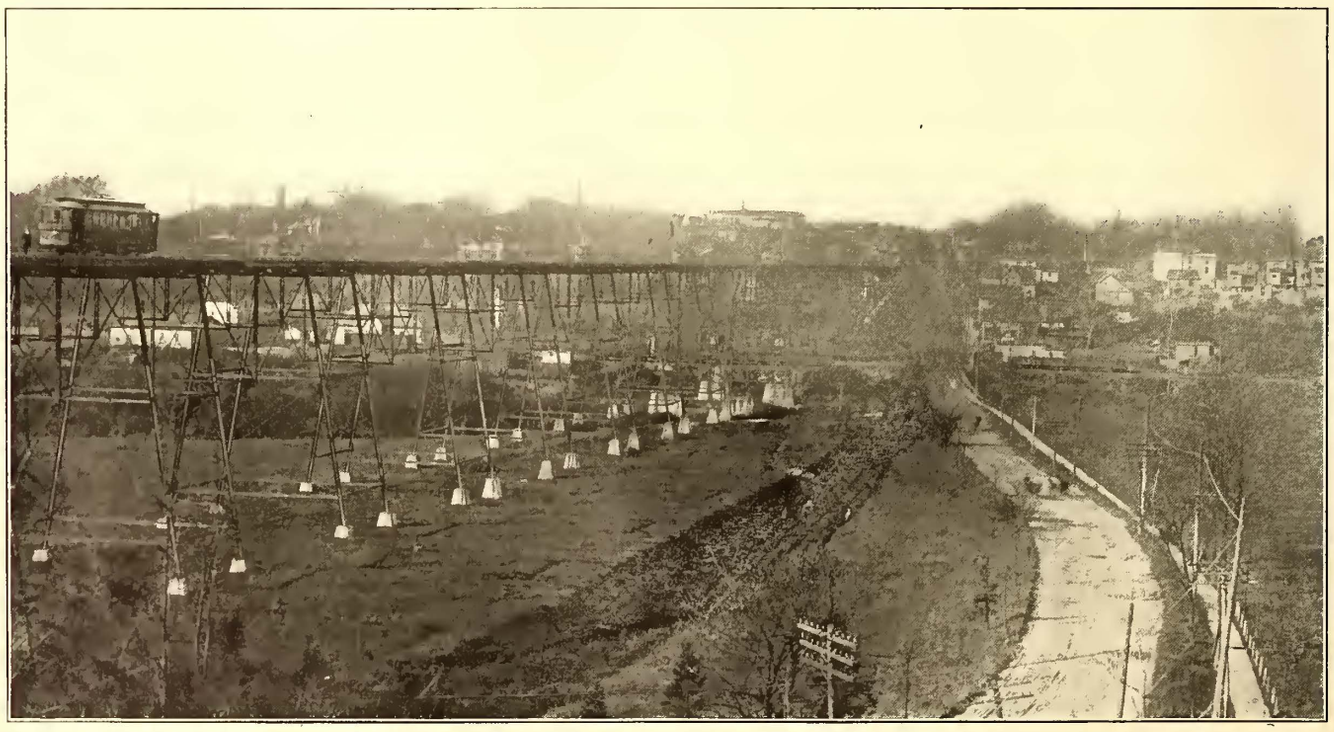
When the Conneaut & Erie Traction Company, on Nov. 7 last, completed its line from Conneaut, Ohio, to Erie, Pa., the necessary connecting link was supplied, making it possible to travel from Detroit, Mich., to Westfield, N. Y., entirely by electric cars. At its west end the line connects with the Pennsylvania & Ohio Street Railway, and at the east end with the Erie Rapid Transit Railway, the total distance between these points being about 35 miles. Beginning at Erie the intermediate localities of importance are Weigeltown, West Millcreek, Swanville, Bear Creek, Fairview, Doblers, Girard, Milesgrove, Elk Creek, Cudneys Corners, East Springfield, West Springfield, East Conneaut and Conneaut. As is usually the case the road was opened in sections as fast as they were built; the first division connected Erie and Swanville being 6 miles long, and the first car ran over it on June 14, 1903. About one month later the second section, 8 miles long, was extended from Swanville to Girard. The third section, Conneaut to East Springfield, 8 miles long, was completed on Sept. 26, and finally the entire line, as indicated on the map on page 195, was put in operation on the date already given.

THE LINE

The country through which the road passes is fairly level for long stretches and required but little grading. For a few short distances, however, it is very rocky and irregular, and in these places considerable cutting, filling and trestle work were necessary. One of the most serious difficulties was encountered near Conneaut, where, as shown in one of the views on this page a steel viaduct was built, 1860 ft. long and 68 ft. high, at the deepest part of the valley it spans. The roadbed, as at present completed, is very good, having been leveled so that there is nowhere a grade steeper than 4 per cent. The only criticisms that can be made of it are, that there are a number of short curves, the consequence of right-of-way compromises (about 80 per cent of the line is on private right of way), and that in some parts the track is exposed to sweeping winds, which give trouble in winter by drifting snow over the rails. Both of these faults will be corrected as rapidly as experience suggests remedies and circumstances allow their application.

The numerous views taken along the line give some idea of the variety of scenery passed through—urban and rural, flat and hilly, open and wooded. Probably the most beautiful sections are along the gorges near Elk Creek, Crooked Creek and especially in Walnut Canyon, between Swanville and Fairview. Erie, one of the terminals, is a city of 60,000 inhabitants; Conneaut, at the other extremity, has in the neighborhood of 15,000, and the population of the entire territory served by the road is about 100,000. An average total of about 4000 passengers daily, or 1,250,000 annually, is carried, with ordinarily five cars runing at a time. These start hourly from each terminal, the road being single track, and pass one another at long, properly spaced turnouts, of which there are ten. The schedule time required to make the trip from end to end of the line is 2 hours and 20 minutes. This makes the average speed, including stops for passengers and waiting on switches, 14.5 m. p. h.

STATE STREET AND POST OFFICE, ERIE



LONG VIADUCT AT CONNEAUT

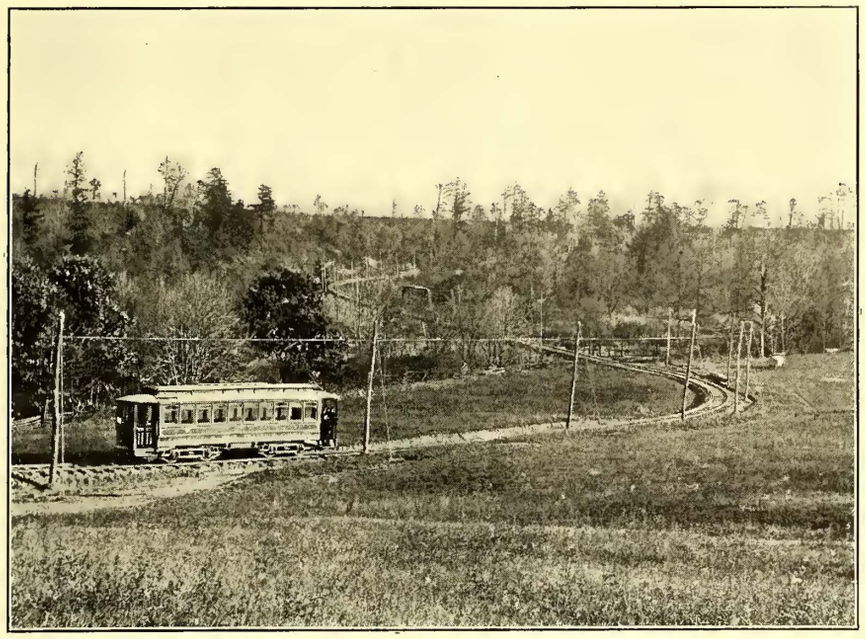
OVERHEAD CONSTRUCTION

The overhead construction throughout is of very substantial character and has in all possible details been arranged to secure

permanence both of alignment and operation. The road is equipped with double trolleys from end to end, which are divided into three sections by section insulators, located at the power station and at Swanville. The sections from the power station west to Conneaut and east to Swanville are operated directly from the station bus-bars, while the third section from Swanville to Erie is operated through the booster.

The general construction of the pole line, as well as all details and sizes of the materials and fittings used, is shown by the cut on page 200. Between the power station and Erie 35-ft. chestnut poles are used, each carrying two cross-arms, double banked, and located so as to allow sufficient room at the top of the pole for a future alternating current feeder for the operation of the Erie end of the line by a rotary converter, if the traffic develops beyond the capacity of the present booster. From the power station to Conneaut 30-ft. chestnut poles are used, each having a single cross-arm at the top of the pole.

DEEP CUT AND FILL BETWEEN SWANVILLE AND FAIRVIEW



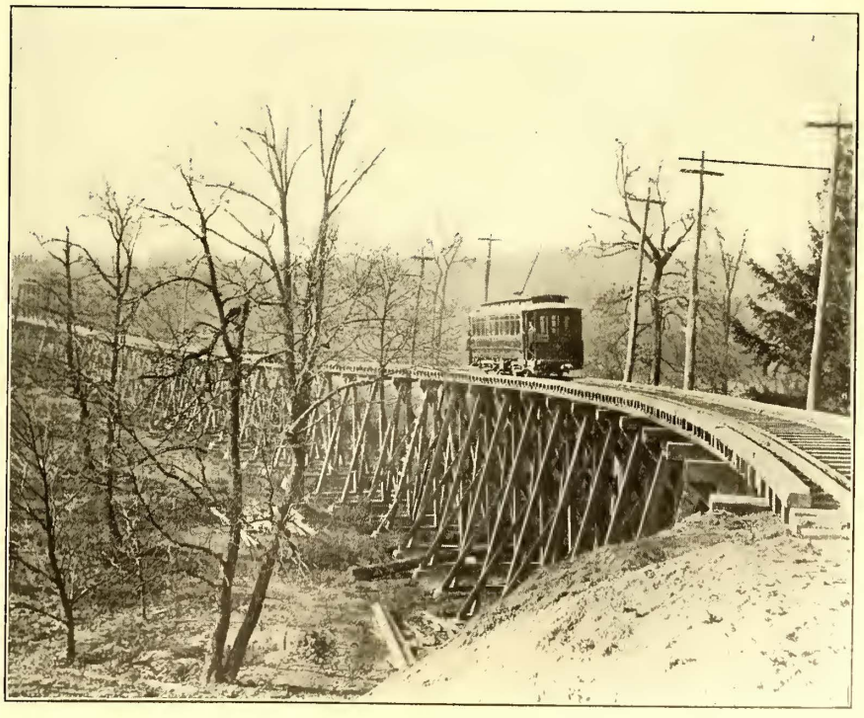
LONG REVERSE CURVE AT ELK CREEK

The feeders are of copper, and are of two sizes, No. 0000 and 500,000 circ. mil. They are all carried by the main pole line, except where several cut-offs have been arranged, by which the feeders are carried on a special pole line in crossing the ravines and long curves, representing a material saving in the distance of transmission. The main pole line also carries two No. 12 hard-drawn copper wires, forming the telephone circuit.

About 25 per cent of the line is span construction, and the remainder of bracket construction, carried by 10-ft. Ohio Brass Company Richmond type brackets of 2-in. steel tubing. The cross-arms are four-pin, heart yellow pine, 4¼ ins. x 3¼ ins. cross-section by 5 ft. long, with 1½-in. boiled locust pins and No. 2 and No. 2½ saddle top, triple-petticoat, glass insulators. At curves, corners and all points of heavy strain, iron pins and composition insulators have been used. The trolley wires are No. 00 hard-drawn round wire, and were erected in mile lengths. They are continuous from end to end of the road, so as to pass around all turnouts without frogs or switches, and are carried by 15-in. deep groove clinch ears, which are also soldered. All overhead materials and fittings are of extra heavy weight, and were furnished by the Ohio Brass Company. In addition to the lightning arresters on the station switchboard and the main arresters at the outside of the station, the line is thoroughly protected by lightning arresters, spaced every half mile from end to end of the road and grounded in special charcoal-filled holes.

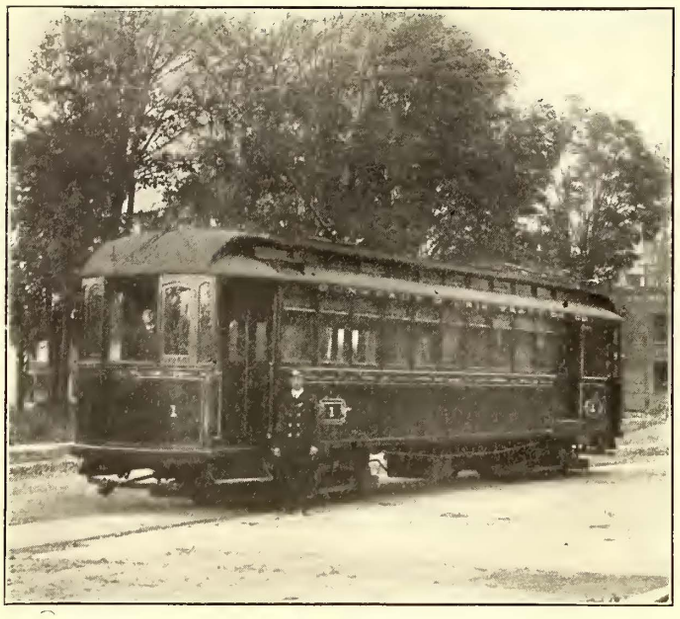
CAR EQUIPMENT

Six double-truck Brill interurban cars and two Jackson & Sharp combination passenger and baggage cars, similar to those shown in the illustrations a rotary snow-plow, a box car with ball-nose snow pusher, and two flat cars make up the present rolling stock. The rotary plow, said to be the second largest in the United States, is an eight-wheel Ruggles, having four 1000 G. E. motors on the trucks and a 200-hp motor to drive the fans. The cars are about 45 ft. long over the end panels, and weigh with full equipment in the neighborhood of only 20,000 lbs., the manager having insisted on the lightest



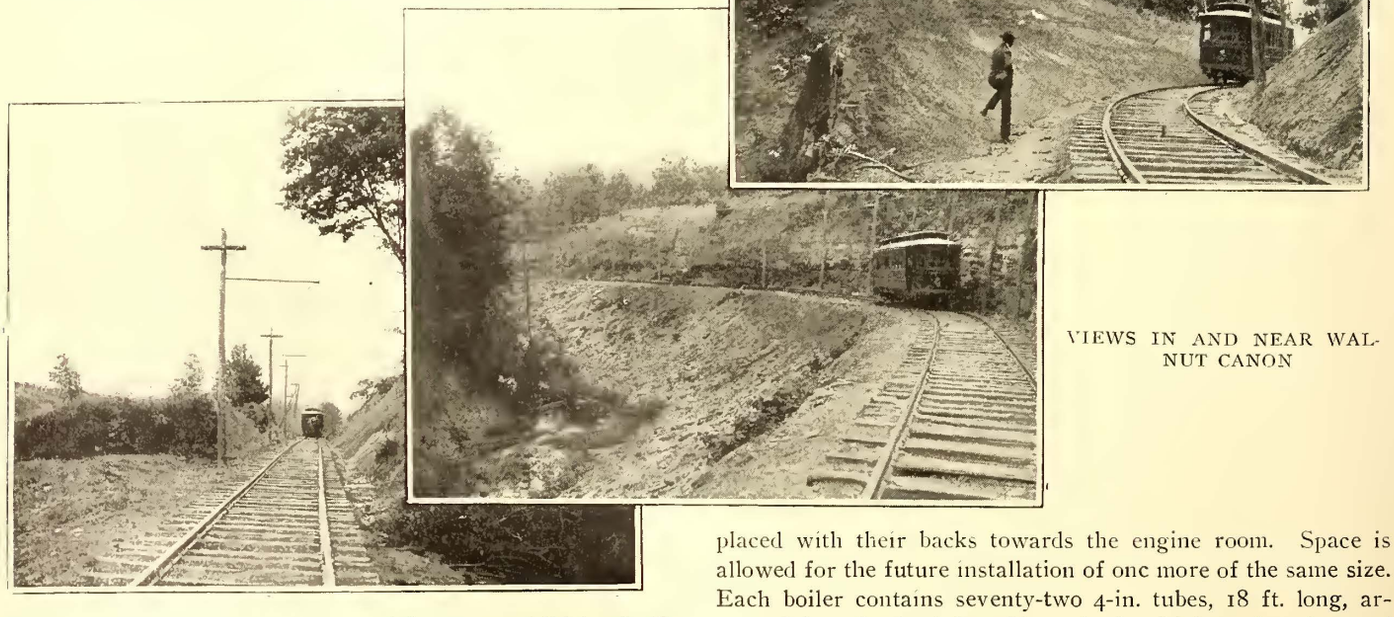
EAST APPROACH TO ELK CREEK TRESTLE

weight consistent with strength. Six are each provided with four G. E. No. 1000 motors and G. E. controllers, and two are equipped with four Westinghouse No. 56 motors and K-14 controllers. The cars are heated by electric heaters, built by the Gold Street Car Heating Company, and have double side seats



STANDARD CAR

with an aisle in the center. There are ten seats on each side so that each car will seat forty passengers outside of the baggage compartment. Air brakes and whistles are provided, compressed air being furnished by a motor-driven pump, built by the Christensen Engineering Company, and a special form of cash register is used, manufactured by the Ohmer Cash Register Company, of Dayton, Ohio. It is arranged to record and indicate the total number of fares at each of the several rates charged, according to the distance traveled by the passenger—



VIEWS IN AND NEAR WALNUT CANON

5, 10, 15, 20, 25, 30, 35, 40, 45, 50 and 60 cents and "ticket." To set the register for any one of these points, there is a long spindle extending the length of the car, having frequently spaced handles, which rotates a pointer on the dial and shows when the proper position is reached. The register cord is then pulled when the amount of the fare and its sequential number is shown on the face of the register, and at the same time printed on a slip of paper inside of it.

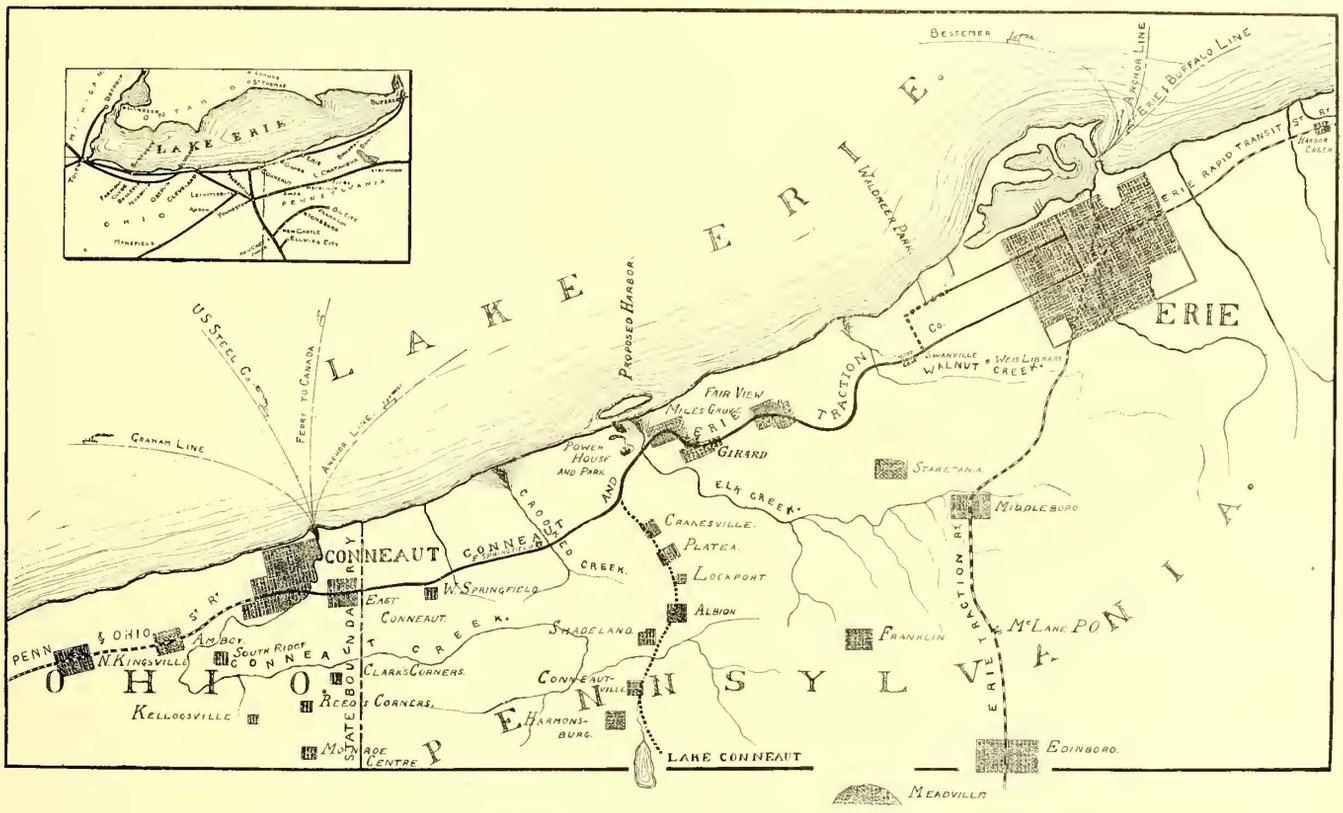
POWER PLANT

At Elk Creek, not quite in the center of the system, being about 17 miles from Erie and 14 miles from Conneaut, the company owns about 22 acres of land, upon which the power plant has been erected. It is admirably located near a source of spring water for boiler feeding and condensing purposes, and at the same time has favorable facilities for receiving coal. The water from this creek has already proved of an unusually good quality for use in the boilers, as shown by analysis, and has so far caused no discernible deposit in the tubes. The plant comprises two buildings, a boiler house and engine house, placed back to back with a common separating wall. The boiler house is 42 ft. long by 40½ ft. wide, and 37½ ft. high to the center of the glass-sided monitor which extends its length. The engine room is 54 ft. long by 44 ft. wide, and since it receives ample light from its large windows, has an ordinary timber-trussed gable roof, the center of which is 42½ ft. from the floor, and the eaves 31½ ft. The floor level in the boiler house is about 10¼ ft. below that of the engine room, as indicated in the accompanying cross section. This arrangement has two advantages, it facilitates the coal handling and reduces the length of the steam piping. From an opening into the engine room a gallery extends between the boilers at about the center of the room. This allows the engineer to keep watch of the conditions in the boiler room, and enables him to give his firemen instructions in case of an emergency.

The steam generating outfit includes three Babcock & Wilcox boilers, containing 1508 sq. ft. of heating surface each, placed with their backs towards the engine room. Space is allowed for the future installation of one more of the same size. Each boiler contains seventy-two 4-in. tubes, 18 ft. long, arranged in a bank eight wide and nine high, and a drum of 7-16-in. steel, 42 ins. in diameter and 20 ft. 4 ins. long. The usual water columns, feed and blow-off connections, gages and safety valves are provided, the latter being set to open at a pressure of 150 lbs. Each furnace has a grate area of 35 sq. ft., made up of ordinary flat grate bars, containing about 40 per cent of air space in 9-16-in. openings. The smoke breeching is 66 ins. x 48 ins. in area at its largest cross-section, and delivers into the base of a Custodis chimney, 5 ft. in diameter and 125 ft. high. The coal is delivered to the rear of the boiler

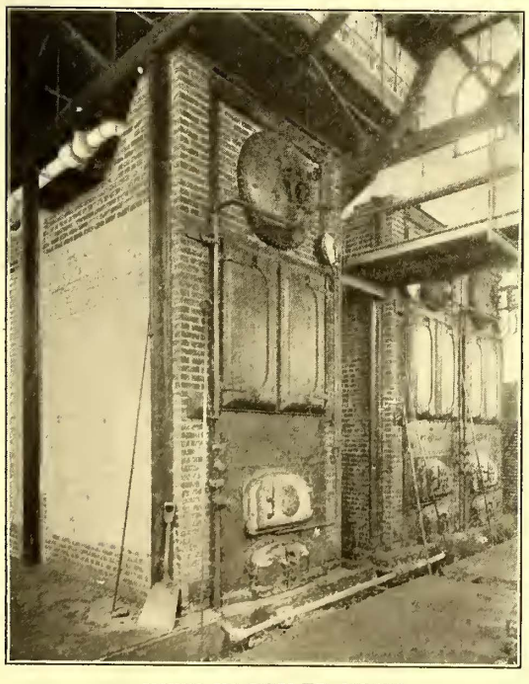
plant in cars on a spur trestle extended from the tracks of the Nickel Plate Railroad, and is chuted through the coal doors onto the floor in front of the furnaces.

As will be seen from the plan the steam lines are quite short, so short in fact that it was unnecessary to install steam separators on the engines. From each boiler a 5-in. branch, taken with a sweeping right-angle bend, leads to a horizontal 10-in. header, extending along the dividing wall on the engine room side, the joints of which are of the improved recessed Van Stone type with rolled steel flanges. On the boiler room side these branches are tied together with 6-in. connections, containing valves. Valves are also placed in the branches on both sides of these connections, on the 10-in. header between each of the branches, so that it is possible to supply either engine from any boiler in two ways. The connections from the header to the engines are vertical 180-deg. bends of 6-in. pipe, which serve to prevent any considerable amount of moisture from passing over into the engine cylinders. Whatever condensation collects in the header is removed through a trap and drain.

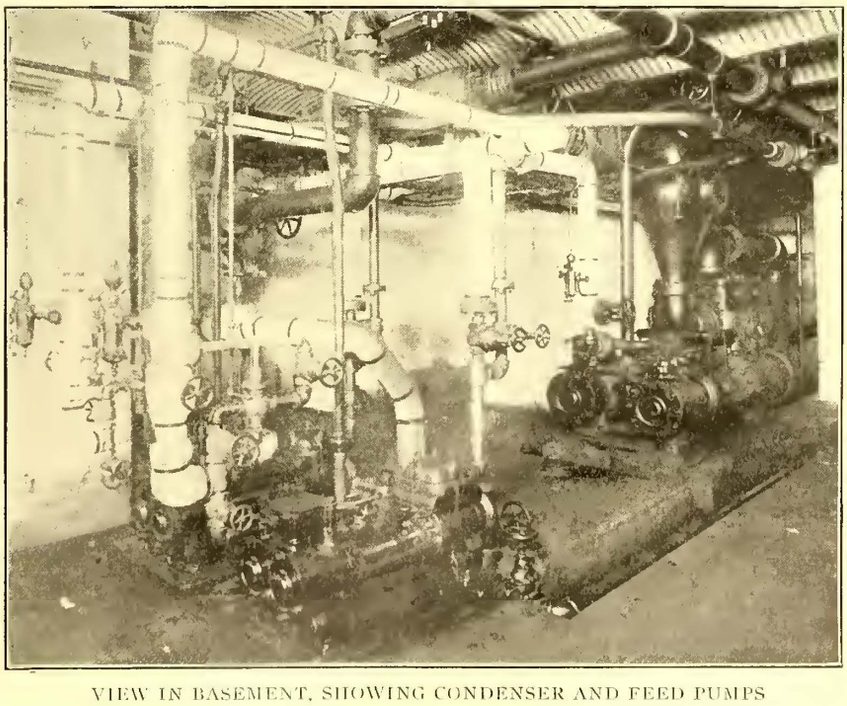


MAP OF THE LINES OF THE CONNEAUT & ERIE TRACTION COMPANY

In the engine room there are two direct-connected generating sets, each composed of a Pennsylvania Iron Works' cross-compound engine, with cylinders 18 ins. and 36 ins. x 56 ins., and a 400-kw Crocker-Wheeler 448-D railway-type generator. The generators have fourteen poles, are cumulative-compound wound, deliver current at about 560 volts, and have a normal capacity of over 700 amps. each. Traffic is generally nearly



VIEW IN BOILER ROOM



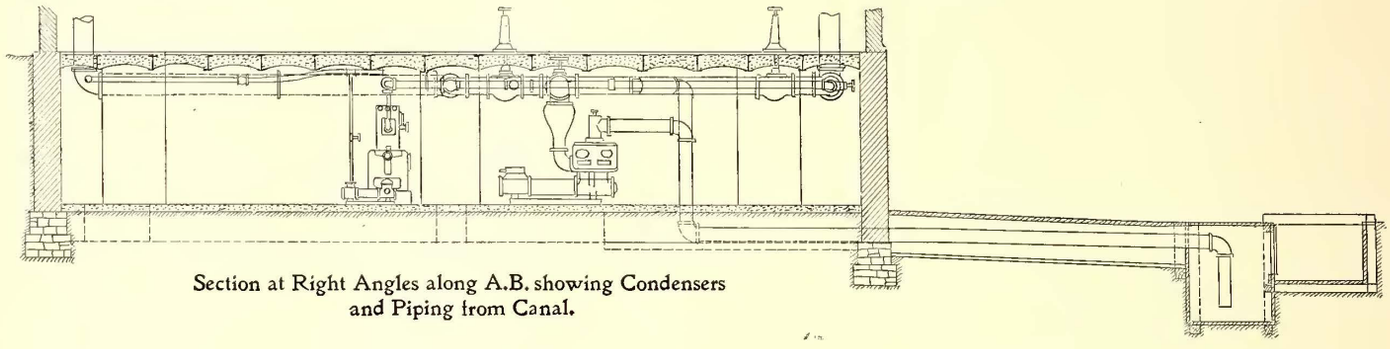
VIEW IN BASEMENT, SHOWING CONDENSER AND FEED PUMPS

constant during the day time, and the maximum average load is but 450 amps.; consequently, either set will carry it alone. The maximum load possible with both machines running without overload would be about 1500 amps. The generators have cast-iron, internally-flanged magnet frames, in which the mild steel poles are cast-welded, and iron-clad armatures, consisting of toothed cores of laminated mild steel, the windings being secured in the slots by wooden wedges fitting in notches near the tips of the teeth. To improve the heat radiating qualities of the field coils they are individually wrapped, taped and insulated, and separated from one another by small wooden wedges. Another characteristic feature is the parallel-movement type of brush holder. On each one, four sets of copper leaves carry the current and control the movement of the brush from or toward the commutator, always maintaining the same angle with its surface. This causes the brushes to wear away evenly, and as they become shorter allows them to be extended and clamped in a new position without altering the surface of contact. To regulate the brush pressure there is a helical spring, which, since it carries no current, is less inclined to heat and vary its tension. To compensate for any inequalities among the magnetic circuits, the brush-holder arms may be shifted independently, and to secure the position of sparkless commutation, when the various circuits are in equilibrium the entire rocker ring may be revolved by the hand wheel.

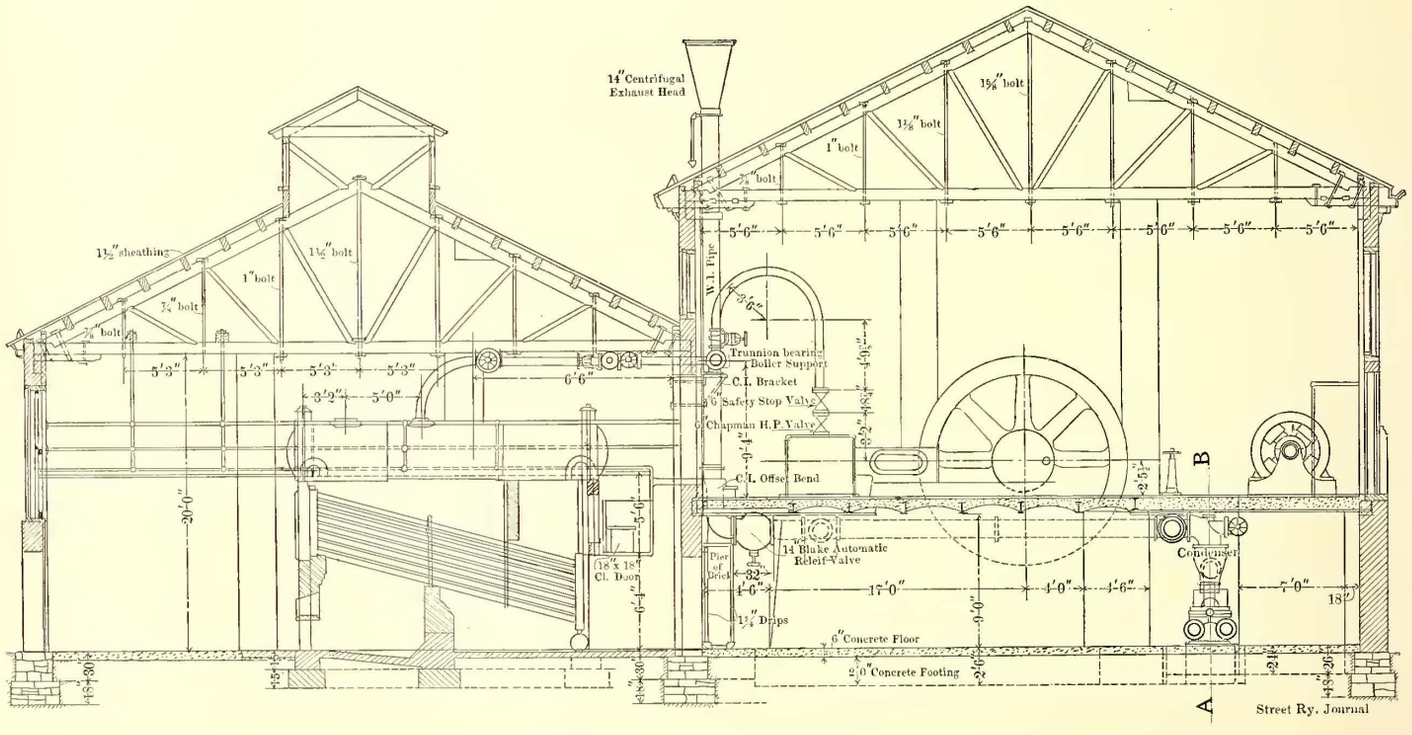
The engines are rated at 600 hp when supplied with steam at 140 lbs. and running at their present speed, 120 r. p. m. They have Corliss-type valve gear, with separate eccentrics for the admission and exhaust valves of each cylinder. Speed regulation is afforded by means of a ball governor, which is connected with the shaft through bevel gearing, and alters the point of cut-off on both high and low-pressure cylinders simultaneously. There is also a separate trip governor embodied in the fly-wheel of each unit, which for an increase in speed of 7 revolutions automatically closes a butterfly valve on the steam supply, just above the throttle valve.

Between the high and low-pressure cylinders there are receivers, 2½ ft. in diameter by 6 ft. long, placed horizontally below the floor. Each is equipped with a relief valve and a live steam connection controlled by a stand valve on the floor above, so that, whenever one of the engines stops with the high-pressure side on dead center, live steam may be temporarily admitted to the low-pressure cylinder through the receiver. All bearings and rubbing parts on the engines have brass-mounted lubricating fixtures, fed by a gravity-oiling system, and cold water is circulated over the bearings which have the greatest tendency to heat. No oil is wasted. Drip pans at various points collect the oil from whence it drains to an oil filter, built by the Capilar Company, of Philadelphia, Pa. After passing through this it is pumped by a 2-in. x 1⅛-in. x 2¾-in. Worthington pump to a tank well above the engine room floor, so as to give a sufficient head to force it to all of the surfaces to be lubricated. The lubricating system and metal housings were installed by Bingham & Company.

Near each engine there is an equipment of gages, including



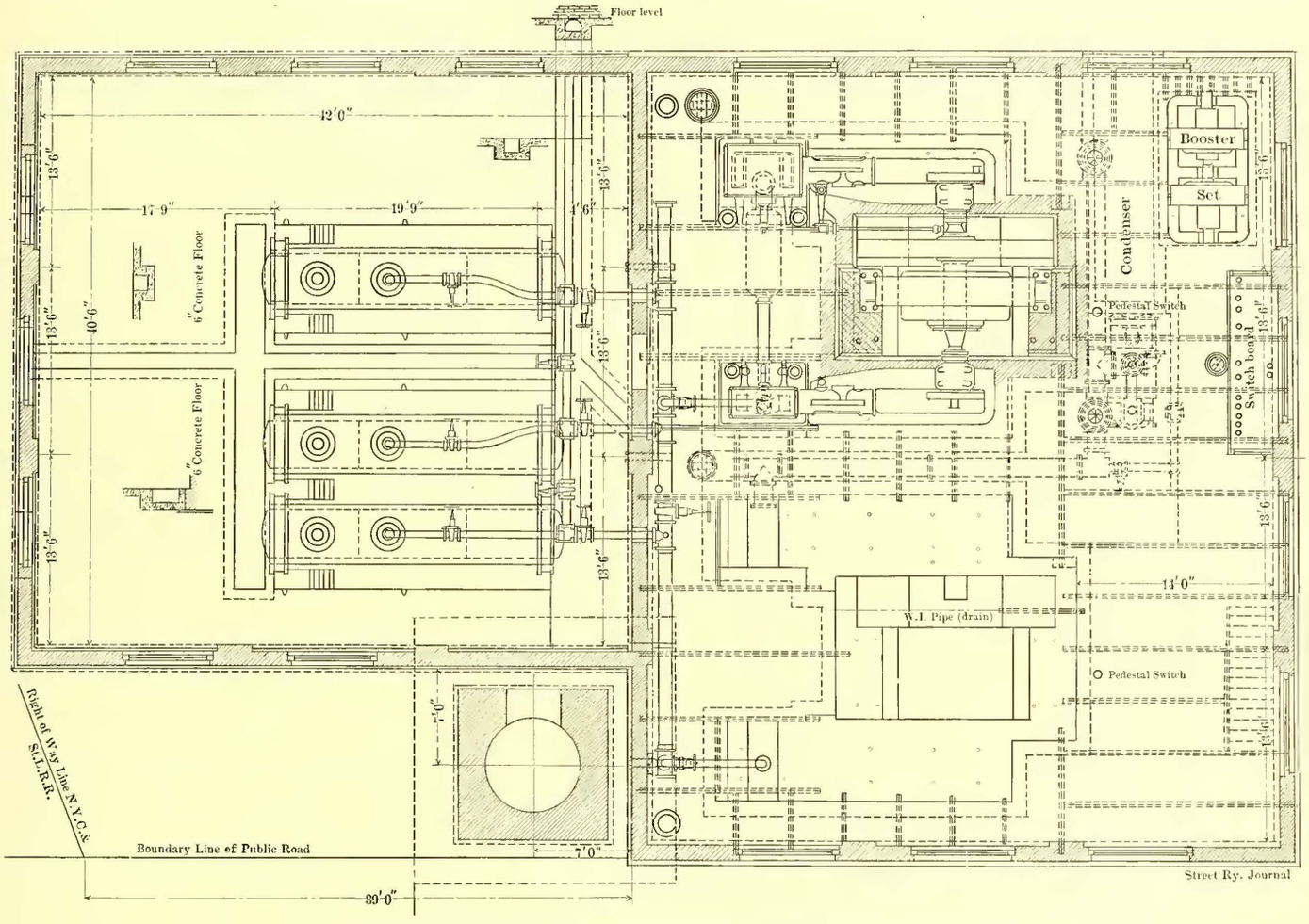
Section at Right Angles along A.B. showing Condensers and Piping from Canal.



SECTIONS OF POWER STATION

one pressure gage on the live steam main at high-pressure cylinder, one on the receiver and a vacuum gage on the exhaust. These are mounted on a board, which is supported on a hollow cast-iron pedestal, the lower part of which serves as a closet for wrenches, etc., while the upper part holds the bars used in setting up the admission valves and butterfly valves before starting. The throttle valves on the engines each have a small by-pass and valve, by the opening of which the main valve may be more easily operated.

Ordinarily, the engines are operated condensing, the exhaust being led through 14-in. pipes under the floor to a 12-in. x 15-in. x 15-in. Worthington condenser, located in the basement; but provision is also made for exhausting the engines to the 10-in. main from a sluice, which has its origin in Elk Creek. Since the condensers are of the jet type, the condensed steam and condensing water are mixed, and a small per cent of this mixture is used for boiler feed. The remainder is wasted and discharges through a 10-in. pipe back to the canal at a point lower down in its course, after it has passed over two small falls. The greasy drips and blow-off from the boilers are discharged in the same manner to avoid contaminating any of the water above, from which is taken the supply for boiler feeding, washing and drinking and condensing purposes. The canal is about 232 ft. long, 4 ft. deep and 6 ft. wide on the inside, and is walled with boards its entire length, even where excavated below the surface. The sides and bottom are of 2-in. white



PLAN OF POWER STATION BEFORE INSTALLATION OF SECOND UNIT

atmosphere individually. The atmosphere exhausts, which are also 14-in. lines, contain Blake automatic free-exhaust valves, and are surmounted by William L. Simpson centrifugal exhaust heads. When it is desired to run the engines non-condensing, the branches of the exhaust lines leading to the condenser are closed by means of Schutte swinging check valves, which are controlled by hand wheels from the floor above, and the free-exhaust valves at the base of the risers to the roof open automatically. The Schutte swinging checks take the place of regular stop valves, and at the same time prevent damage to the engines when shutting down, due to air-pump action of low-pressure cylinders, and avoid the consequent flooding of the cylinders with water. As an illustration of the advantage of running the engines condensing it may be stated that two of the three boilers, under a pressure of 125 lbs., will carry the same load when the engines are running condensing that would require all three boilers under a pressure of 145 lbs. were the engines running non-condensing.

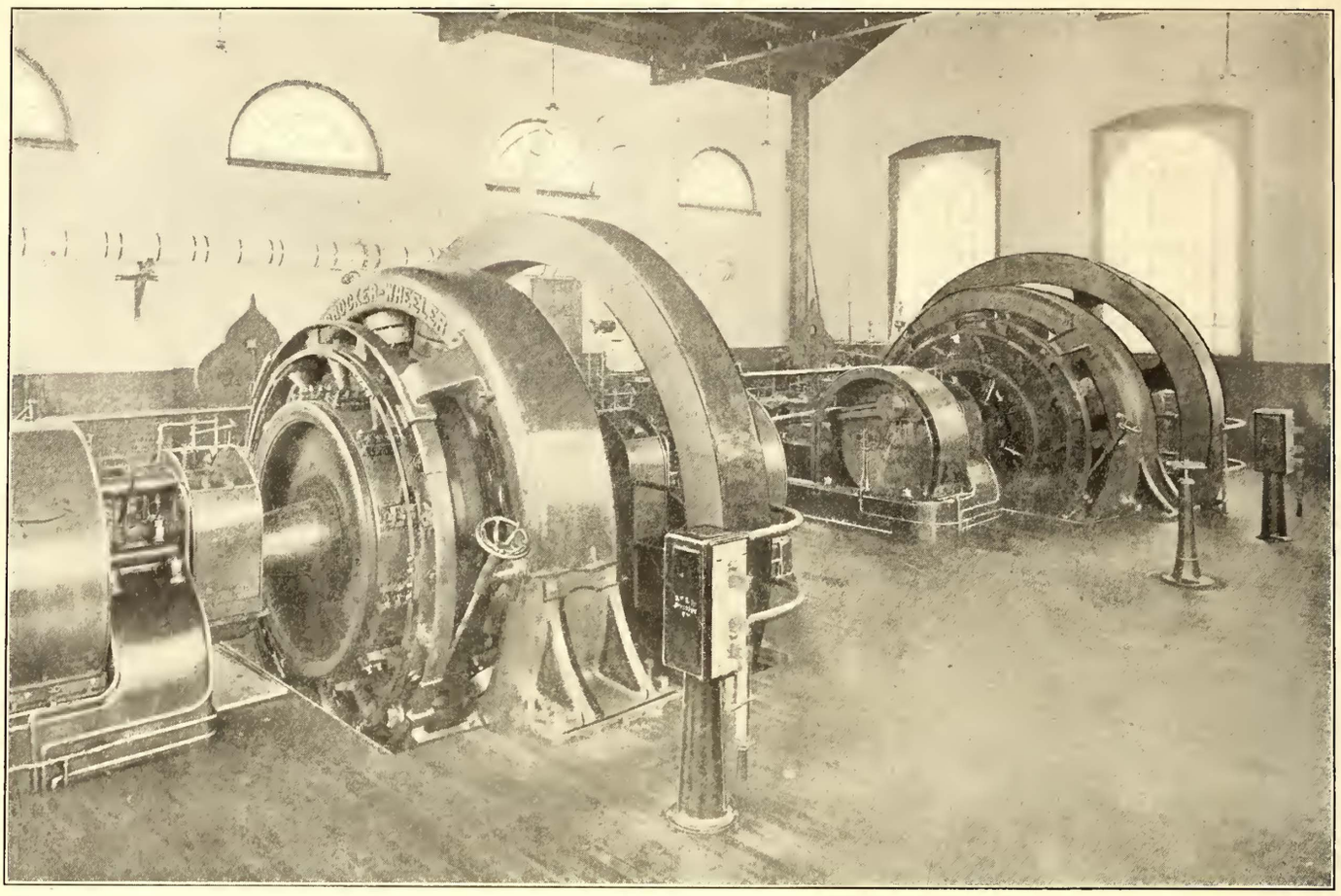
The accompanying plan of the engine room shows the piping layout. Water for condensing purposes is taken through a

oak, and every 6 ft. a rectangular frame work surrounds it. These consist of 8-in. x 8-in. timbers on the sides and bottom, and 3 ins. x 8 ins. on the top.

It is necessary to clean that portion of the discharge from the condenser which is utilized for boiler feed, and it is, therefore, passed through a Webster star vacuum feed-water heater, purifier and filter. This has a rated capacity of raising 12,000 lbs. of water per hour, 100 degs. in temperature, and is of the open type; consequently, but slight pressure is required to pass the water into it. To provide this pressure the discharge pipe from the condenser contains a loop seal, the top of which is 4 ft. above the inlet to the heater, this head producing sufficient back pressure to force the water required for boiler feed into the heater. The water is admitted to the heater through a 2½-in. pipe, which contains a loop seal to allow the escape of air and prevent any water from drawing back from the heater. The supply is regulated by a float valve; but in case this should fail to shut off, an overflow pipe will waste the excess water.

Two Worthington 6-in. x 4-in. x 6-in. pumps are used for boiler feeding. These are also located in the basement under

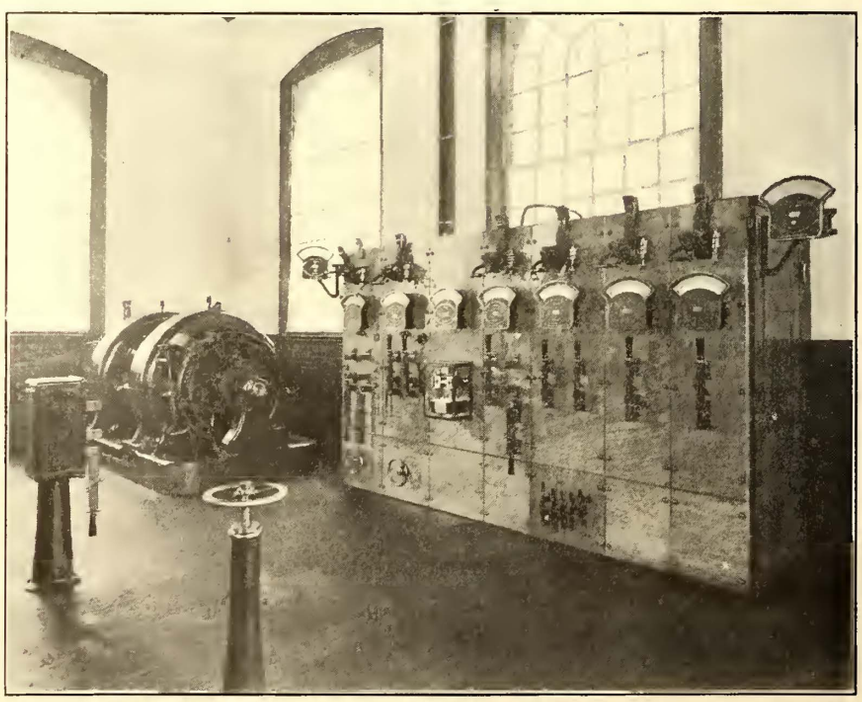
the engine room, and are cross-connected so that they may be used interchangeably in any one of three different ways—either one may draw the heated water from the heater and pass it to the boilers; either one may pass cold water directly to the boilers, or one may pass cold water into the heater, when the engines are not running condensing, while the other passes the heated water on to the boilers. For water supply to the building and for fire purposes a 6500-gal. tank has been provided. It is mounted on a steel tower 52 ft. high, and was built by the W. E. Caldwell Company, of Louisville, Ky. A 6-in. x 5¾-in. x 6-in. Worthington pump has been installed for filling the tank, but it is also possible to use either one of the feed pumps for the same purpose.



INTERIOR OF ENGINE ROOM

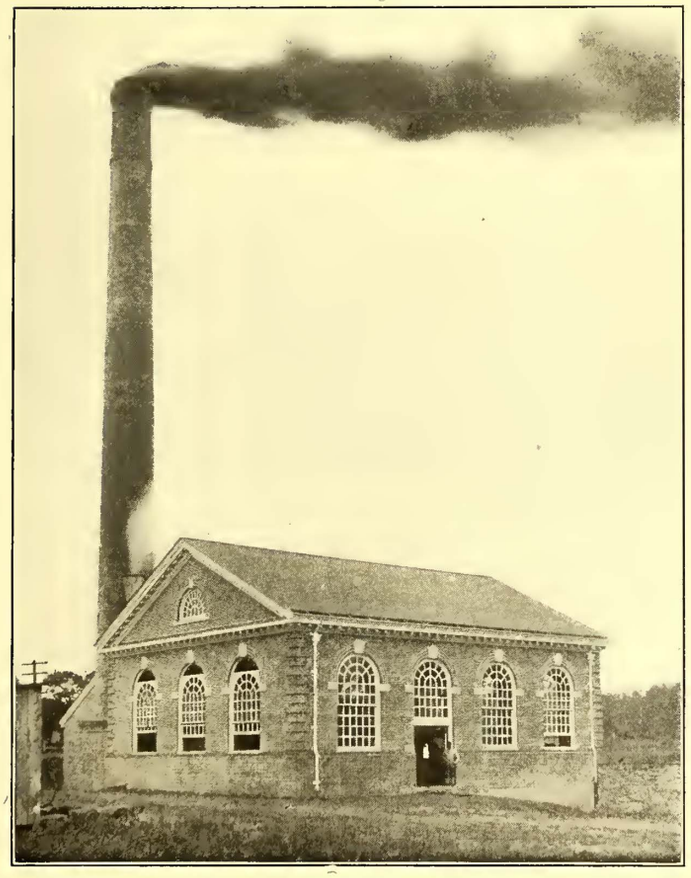
The steam supply to pumps and condensers in basement is taken off at the bottom of the steam main through two 2½-in. connections, join in one 3-in. pipe, leading downward through the engine room floor. The condensation and entrainment is removed by a 3-in. separator (in the basement), which is bled by a 1½-in. trap. Normally, the exhaust steam from the pumps and condenser is utilized in the feed-water heater, but it is also arranged so that any or all of the pumps may be exhausted into either of the engine exhaust pipes near the condenser, or to the base of one of the exhaust risers to the atmosphere. All piping work in the station was done by W. K. Mitchell & Company, of Philadelphia, and all high-pressure steam pipes are covered with Monarch asbestos train pipe covering, made by the Franklin Manufacturing Company, Franklin, Pa.

The switchboard, shown in an accompanying cut, is 13 ft. long and 7ft. 6 ins. high. It was furnished by the Crouse-Hinds Electric Company, of Syracuse, N. Y., and includes seven panels of gray Tennessee marble, which, from left to right, are as follows: Two generator panels, one station panel, two booster panels and two distributing panels. On the swinging bracket at the left, near the top, there is a Weston voltmeter, which may be connected to either generator by means of plug switches on the corresponding panels, and at the opposite end



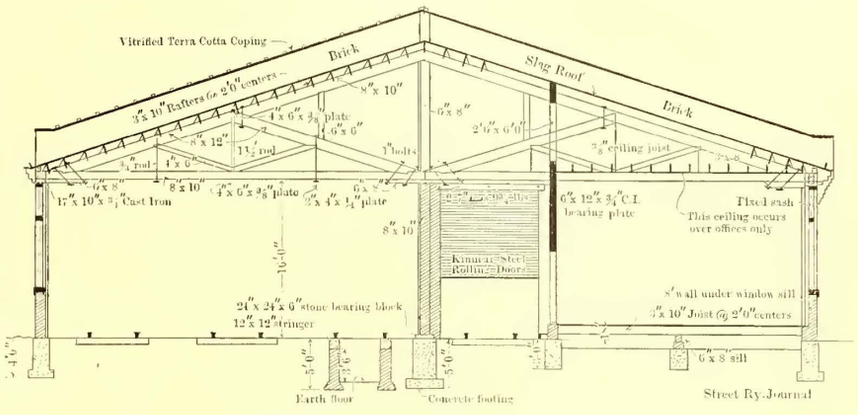
SWITCHBOARD AND BOOSTER

of the board there is a voltmeter similarly mounted, which indicates the pressure obtained through the booster. Each of the generator panels contains a circuit breaker, an ammeter, a pilot lamp, two single-pole dynamo switches, a single-pole field switch for the plant lighting, and a field regulating rheostat. The equalizer switches are not placed on the board but are mounted on stands near the generators, as will be seen in the view of the engine room interior. The station panel contains an ammeter with a scale range of 3000 amps. and a Thomson integrating wattmeter. Of the two booster panels the left one is for use in connection with the dynamo end of the machine and the right for the motor end. The former carries a circuit breaker, an ammeter and two single-pole switches, one having double throw, so that the booster may be connected to the feeder which leaves that board, or may be cut out to supply directly from the generator. The motor panel also contains a circuit breaker, which is connected with the circuit breaker on the dynamo panel in such a way that the tripping of either one will throw out the other and protect the machine from injury. An ammeter, two single-throw switches and a four-blade automatic Crocker-Wheeler starter complete the equipment of this panel. The distributing panels are equipped with a circuit breaker, an ammeter and a single-pole switch for each feeder. The extreme right-hand panel controls two feeders leading to the Conneaut end of the line. The other panel connects to a feeder to Fairview, in the opposite direction from the plant, about 6 miles distant. The dynamo panel for the booster controls two feeders leading to Erie.



VIEW OF POWER STATION

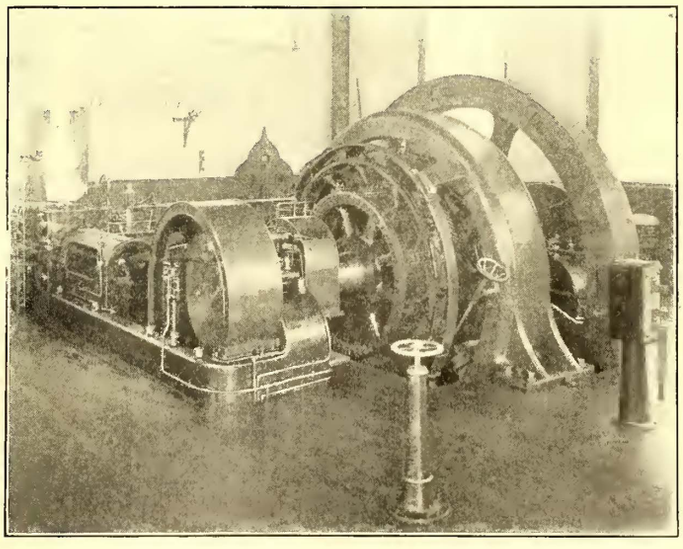
The booster is made up of two Crocker-Wheeler 150 Form-D machines mounted on the same base, direct connected and designed to run at about 600 r. p. m. The motor is shunt-wound for about 575 volts, and the dynamo series wound for 175 volts, with a full-load current capacity of about 300 amps. It raises the pressure at the station to nearly 750 volts. The circuit breakers are of the Cutter I-T-E type, the indicating meters are of Weston make, and Ward Leonard rheostats are used.



CROSS SECTION OF CAR HOUSE

CAR HOUSE

The car house, shown in plan and elevation in the line drawing herewith, is located about 500 ft. from the power plant. It is 127½ ft. long, 78½ ft. wide, and 16 ft. high to the bottom of the horizontal chords of the roof trusses. At present it contains a repair shop, storage room for twelve cars, a stock store room, lounging room for the men, and two offices; but provision has been made so that it may be readily extended when occasion demands it. The foundations are of stone, the walls of brick, the framing and trusses of wood, and the whole is surmounted by a slag-covered wooden roof. With the exception of the repair shop, which is enclosed by brick walls, the inside partitions are of wood. Where the tracks pass through the walls, Kinnear steel rolling doors are used. In one-half of the building there are three tracks, one of which has a pit its entire length. A fourth track, on the right of the center line of the car house, extends into the repair shop, where there is a short pit. The repair shop is 43½ ft. x 37 ft. 10 ins. in plan, and is equipped with the following tools: A 28-in. Cincinnati drill press, a 34-in. Porter lathe, a 14-in. Reed lathe, a 20-in. steptoe shaper, a 36-in. 60-ton wheel press, a Buffalo forge, and a complete complement of small tools, all driven by a 5-hp motor. In one of the repair pits there is a pneumatic hoist for raising the motors into position on the trucks, and a Barrett armature lifter for use when it is only necessary to

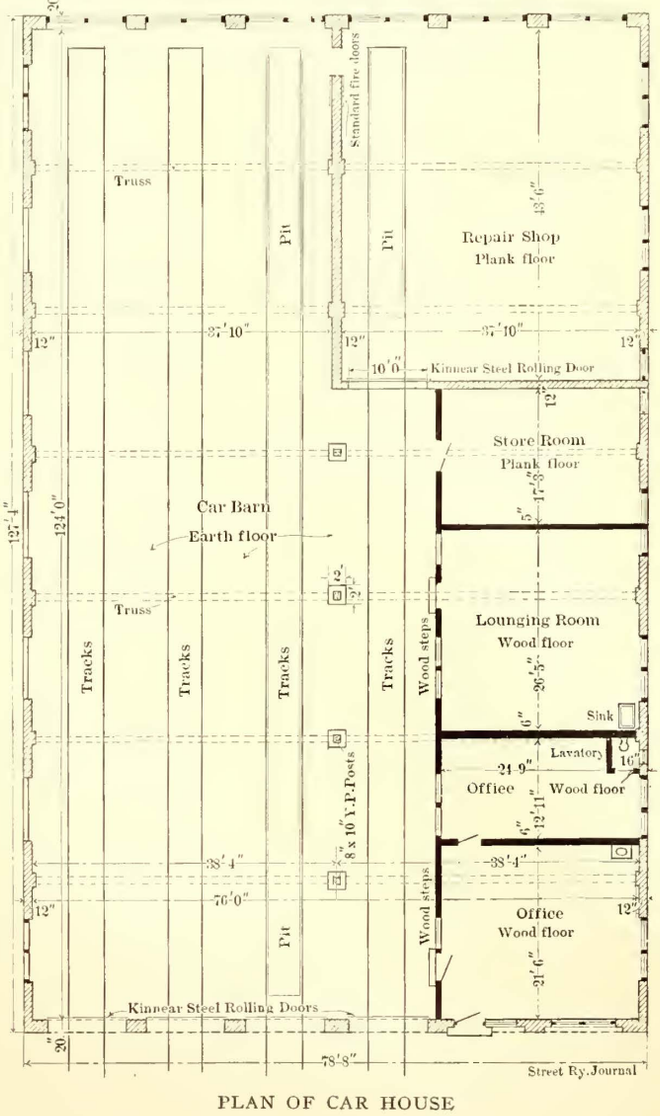


ENGINE AND GENERATOR

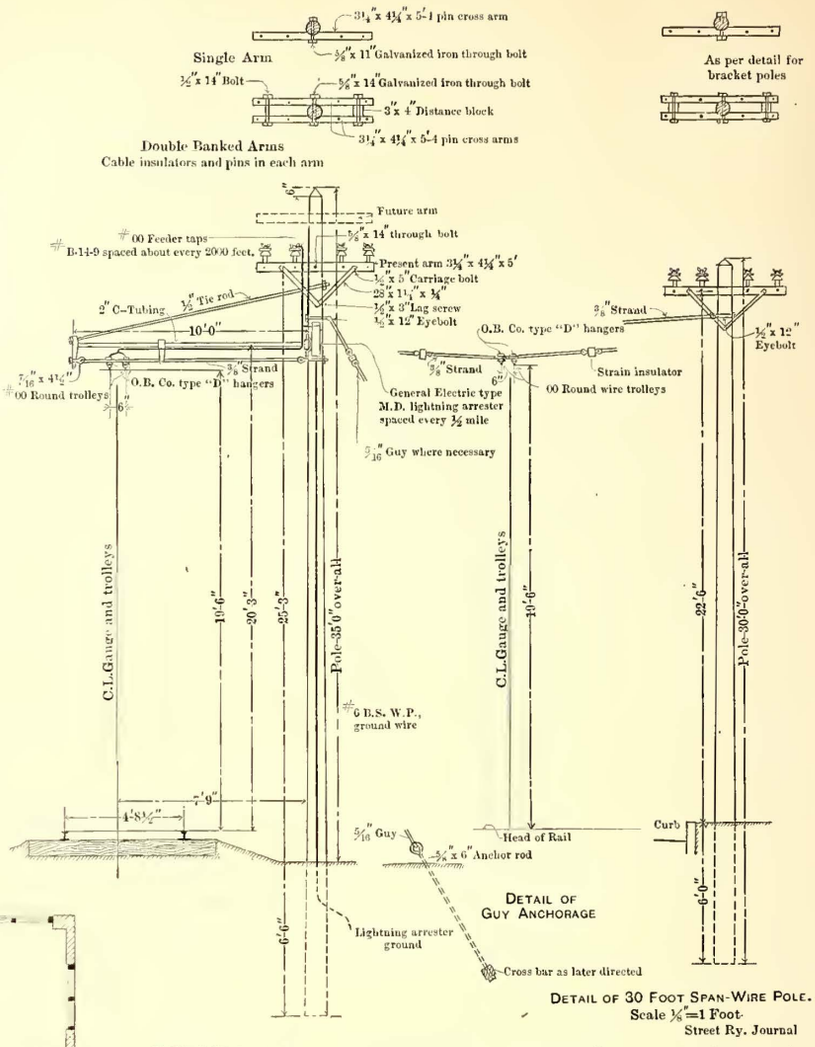
remove that part of the motor. At one point of the large pit it is so arranged that the wheels may be lowered without lifting the car body. The building is amply lighted by day from its closely-spaced windows, and will be provided with both gas and electric light. Subsequently, it is very probable that the heating will be obtained through the use of natural gas, which is extremely abundant in this region. A well has already been sunk which gives promise of a generous and apparently lasting supply of gas. Should the supply prove as plentiful as is expected it is possible that an attempt will be made later to use it under the boilers in the power plant.

ORGANIZATION

The Conneaut & Erie Traction Company has its main office and headquarters at Girard, Pa. George E. Moffat is the manager, and being connected with the road at the time of its construction is responsible many of its mechanical and engineering details as well as those entering into its operation, such as the devising of all forms used, etc., for which he was well fitted by his previous experience. The work of building the line and equipping the plant was undertaken by the Lake Construction Company, Philadelphia, Pa., of which J. J. de Kinder is president. Charles Barton Keen, of Philadelphia, was the architect for the power house building and the car house; A. C. Wood, of Philadelphia, was the consulting engineer for the power plant work; Charles L. Reeder, of Baltimore, Md., was the consulting engineer, and had charge of all details connected with the electrical equipment of power house and rolling stock as well as the overhead work, and Chauncey Ives, C. E., formerly chief engineer of the Cumberland Valley Railroad, was the engineer in charge for the Conneaut & Erie Traction Company. The present engineer in charge of the power plant is William H. Wheaton.



PLAN OF CAR HOUSE



DETAILS OF 35-FT. BRACKET AND 30-FT. SPAN WIRE POLES

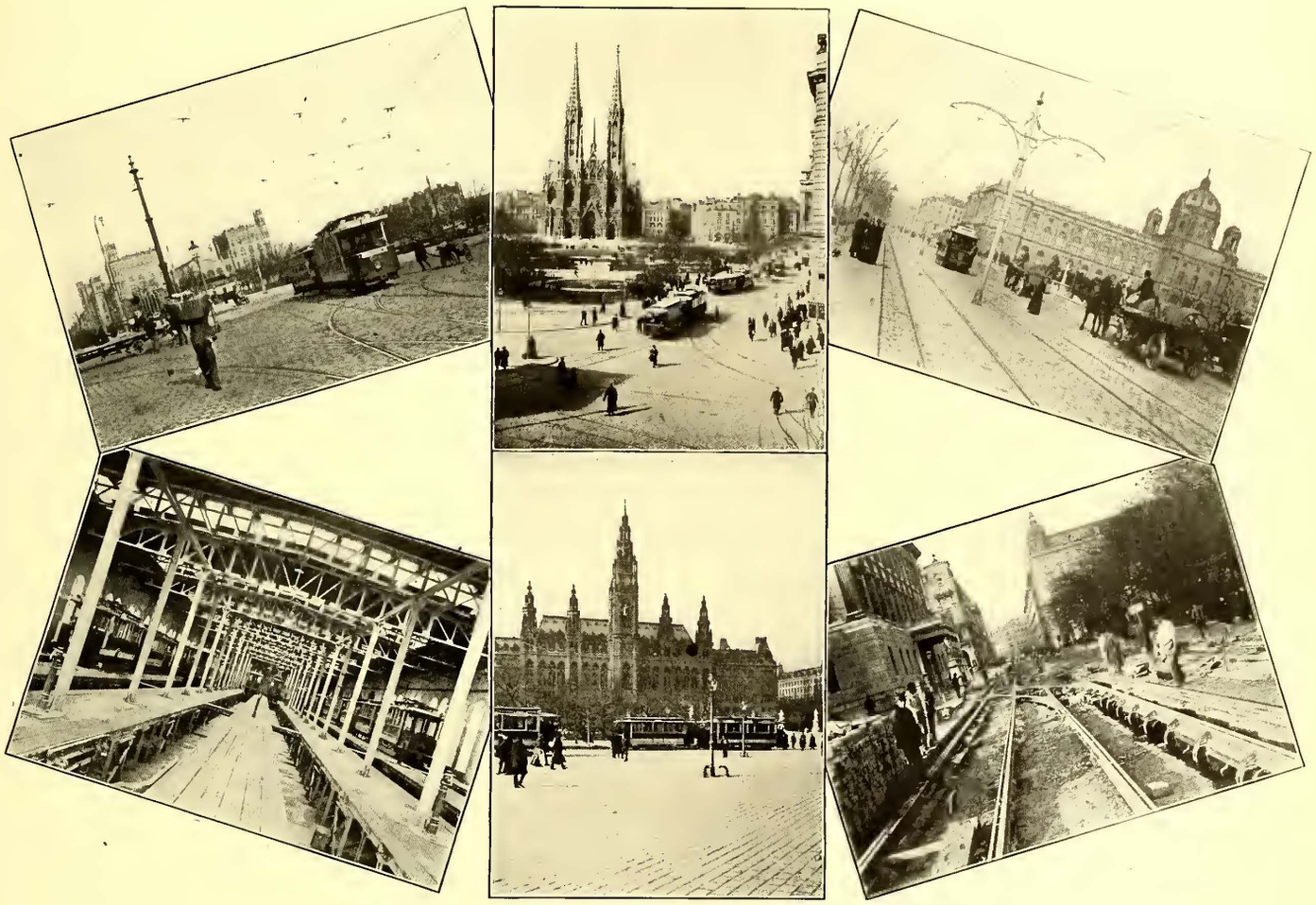
STEAM ROAD IN NEW YORK STATE OPPOSES ELECTRIC RAILWAYS

The memorable fight of the New York Central & Hudson River Railroad against the Buffalo, Rochester & Niagara Falls Electric Railway Company, and of the New York, New Haven & Hartford Railroad Company against the New York & Port Chester Railroad, are recalled by the action recently taken by the former company against the Rochester, Syracuse & Eastern Railroad Company and the Monroe County Electric Belt Line Company. In both cases the relator seeks to review by a writ of certiorari the determination of the State Board of Railroad Commissioners that public convenience and necessity require the construction and operation of the two electric railways. In the first case the Rochester, Syracuse & Eastern Company purposes to equip its line with cars to run 45 m. p. h., with a maximum of 60 m. p. h., 90 miles between Syracuse and Rochester. The Monroe County Company proposes to build from Monroe Avenue to Pittsford, Fairport, Despatch and back to the eastern limit of Rochester, a distance of 20 miles.

The New York Central & Hudson River Railroad has lost much passenger business throughout Central and Western New York due to the competition of interurban electric lines, particularly in the neighborhood of Rochester.

THE ELECTRIC RAILWAY SYSTEM OF VIENNA

On Jan. 1, 1904, the city of Vienna assumed the entire management and operation of its electric street railway and lighting system. This event was reached only after a number of years of preparation, the first important steps of which were taken in the year 1897, when the Siemens-Halske Company, of Berlin, purchased the Vienna tramway system, and made a contract with the city of Vienna by which the franchise was extended and the company agreed to equip the horse car lines with electricity, and to construct a number of extensions. The Siemens-Halske Company formed the Building & Operating Company for the purpose of constructing the lines. The contract was closed on November 28, 1898, and the franchise was



VIEWS OF THE VIENNA TRAMWAY SYSTEM

to run until 1925, with options of purchase by the city at different intervals.

The new company took over the operation of the new system and reconstruction was commenced. But as many of the same difficulties which had been experienced with the Vienna Tramway Company were encountered with the new company, the city decided to hasten matters, and on Dec. 27, 1902, financed a loan of Kr. 285,000,000, of which 101,600,000 ($20,520,000) was paid on April 14, 1902, for the system. In consideration of this the Building & Operating Company turned over its franchises and plans to the city, while the Siemens-Halske Company, during the period from Jan. 1, 1902, to the end of 1903, as the representative of the city, finished the contracts along the lines already laid down, operating both old and new lines during this time.

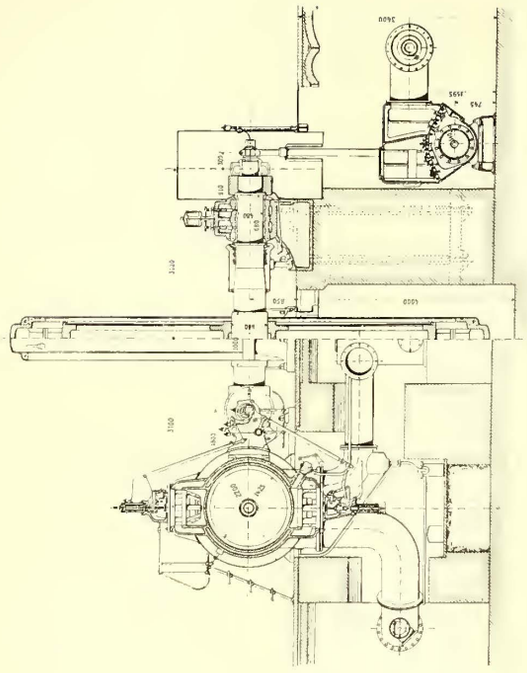
The remainder of the loan was used as far as necessary in the purchase of the power plants from the erecting companies, mention of whom will be made later. The Neuer Wiener Tramway, 20 miles in length, was purchased for Kr. 15,600,000, but another short line, 4 miles in length, which will be referred to later as being equipped with the trolley wheel instead of the bow-contact, could not be purchased. Almost all the lines of the city are equipped with overhead wires and the bow trolley, although those in the center of the city have the side conduit system. The motor cars usually draw trailers, and are for the most part equipped with both overhead bows and plows for operating on either section. When the present construction is completed the Vienna tramway system will comprise 215 miles of track. Although the two power plants were completed and ready for connection in April, 1902, the street railway construction was not correspondingly advanced until the following October, when the motive power of almost the whole system was changed to electricity. The current developed at the power houses at the beginning of 1903 was 10,046,000-kw hours, of which 9,223,000-kw hours were for the use of the street railway system. Of this amount the street railway power plant furnished a large proportion.

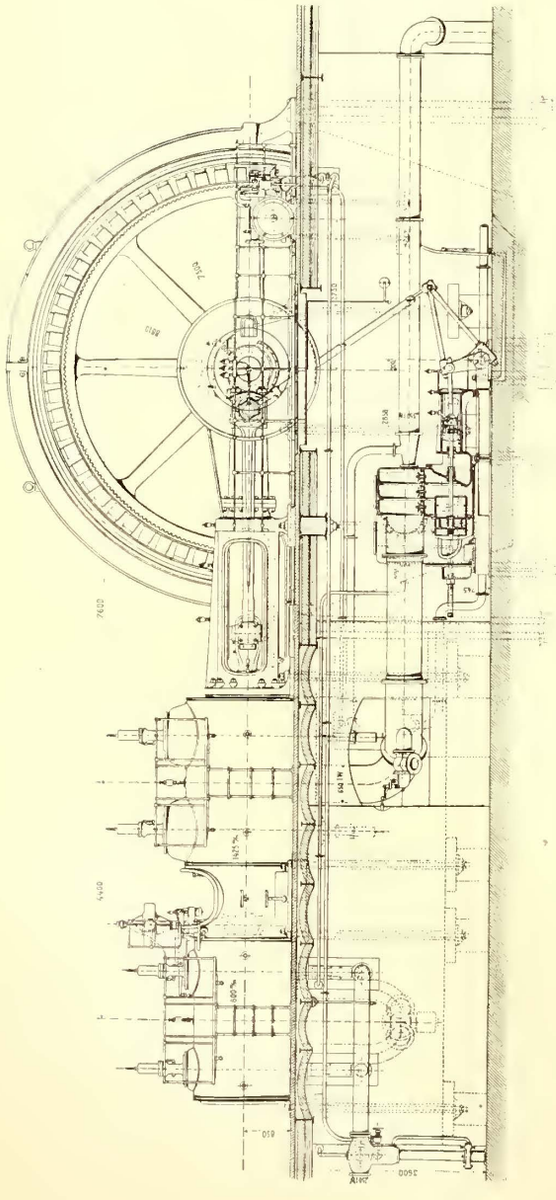
TRACK CONSTRUCTION

The standard rails are 6.8 ins. high, and weigh 102 lbs. per yard (50.61 kg per meter). They are laid in 50-ft. lengths on steel ties, spaced 8.4 ft. Only where the conditions required are wooden ties used. Over filled land the rails rest on concrete stringers.

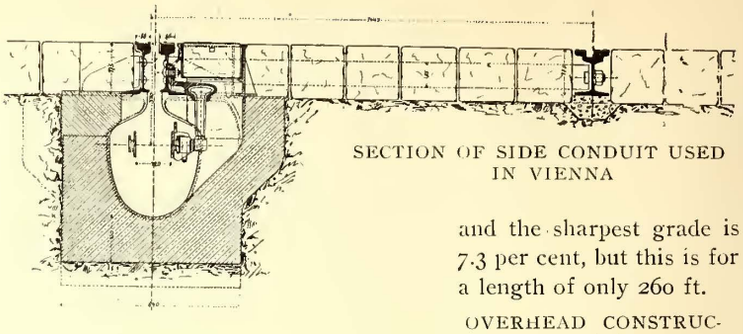
The side conduits are constructed under the outside rail. This groove rail is made up of two slot rails, 6.8 ins. in height, which are bolted to the cast-iron yokes. The latter are 22½ ins. in height and 24½ ins. in width, and form a conduit 16 ins. in height from the bottom to the base of the slot rail, and 12½ ins. in width. The contact-rails are 4½ ins. apart, with vertical faces, and are supported by porcelain insulators, which are spaced 13.8 ft.

Standard gage is employed. The smallest radius is 49 ft.,

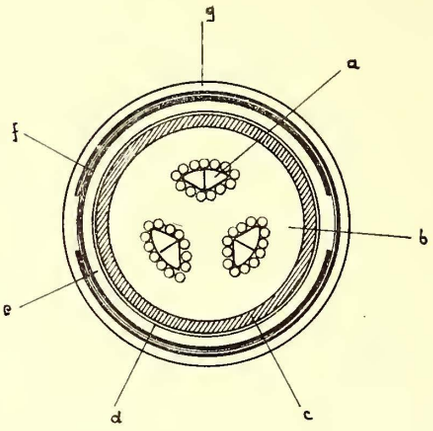




SECTIONS OF 3000-HP ENGINE USED IN VIENNA



SECTION OF SIDE CONDUIT USED IN VIENNA



a Copper wire, 150 sq. mm.
b Cable isolation, paper and jute, impregnated
c Lead cover, 3.2-mm shell thickness.
d Asphalt paper.
e Asphalted jute packing.
f Iron band.
g Asphalted jute-compound and cord binding.

SECTION OF CABLE

and the sharpest grade is 7.3 per cent, but this is for a length of only 260 ft.

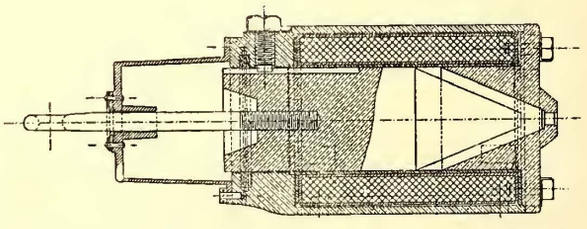
OVERHEAD CONSTRUCTION

The overhead system is provided with the Siemens-Halske sliding contact, with the exception of a stretch of 4 miles passing from Kronprinz Rudolf's Bridge to Kagran. With the sliding contact construction, fewer poles are necessary, and on the Hauptzollamts Bridge the poles are 328 ft. apart.

ROLLING STOCK

When the road was opened to traffic there were 895 cars with two axles, and fifty were double-truck cars. Trailers are extensively used, and at the beginning of 1904 the company owned 700 cars of this type. The maximum speed allowed is 15 km (9½ miles) in the center of the city, 18 km (11½ miles) in the less crowded sections, and 30 km (19 miles) outside the city limits. Each car is provided with two plows, so that contact can be made on either side with the underground conduit, in addition to the bow.

The plow itself has a wooden frame, reinforced with metal. The contacts are hinged so that they can be folded against the shank when the plow is inserted or withdrawn from the conduit, and when in use in the conduit are at an angle of 90 degs. with each other, and 45 degs. below the horizontal plane. The plows are raised and



SECTION OF SOLENOID USED FOR ELECTRIC BRAKE

lowered by a crank, which fits on the end of a rod extending through the end panel, instead of from the dash, as in Brussels, or from the side, as in Buda-Pest.

The trailer, or both trailers, are fitted with electrical brakes, which are furnished with power by the motors of the motor cars when acting as generators. Some motor cars are provided with solenoid and some with disc brakes. The former is preferred.

The fares are based on the zone system, and vary from 10 heller to 30 heller (2 cents to 6 cents) within the city, with an extra charge of 10 heller when the city limits are passed. On Sundays and holidays the same rates prevail, except that the minimum fare is 4 cents. For children under 4.26 ft. (1.3 m) half-fare is charged, while school children for any journey pay only 2 cents.

POWER STATIONS

The power stations were constructed by the Oesterreichischen Schuckert Werke, the Oesterreichischen Länderbank, and the Union Baugesellschaft, of Vienna, the first installing the entire mechanical and electrical equipment. The contract was completed in nineteen and one-half months, an unusually short time for a plant of such magnitude, work being carried on both day and night. The original intention was to construct separate power houses for light and street railway power, as municipal difficulties rendered this necessary. It was found possible, however, to consolidate the operation of the plants, and the one first intended for lighting is used with the larger for both light and power purposes.

The plant is situated adjacent to the Danube Canal, at its intersection with the Vienna Stadtbahn, being thus in a convenient location for fuel and water.

The two power station buildings are separated by a track, upon which the coal cars enter. They are then lifted on a platform, operated by a 35-hp 300-volt synchronous motor, to an elevated roadway, which runs the entire length of the coal bunker in either building.

The boilers in the larger plant are of the Babcock & Wilcox type, and generate steam at a pressure of 205.8 lbs., and have a heating surface of 3228 sq. ft. each. A superheater of seventy-two tubes and 560 sq. ft. surface is placed between the header tubes and the drum, which increases the temperature to 540 degs. F. Green economizers are used.

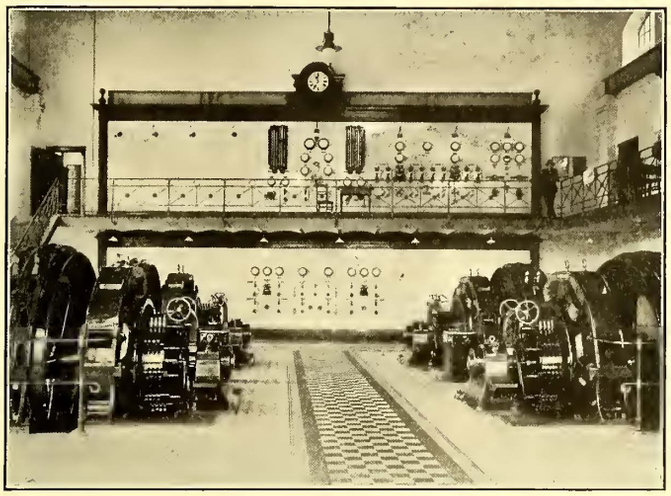
The coal consumption for the month of October, 1902, was 1.117 kg (2.46 lbs.) per kilowatt-hour, which includes heating-up coal and the consumption for pumps and other purposes.

The engines, which are of the Sulzer type, built in Austria, are triple-expansion, with two low-pressure cylinders. The cylinder dimensions are 31½ ins., 46 ins. and 68 ins. x 59-in. stroke, and they run at 172 lbs. pressure and 90 r. p. m. Each has a normal horsepower of 3400, with a maximum of 4200. There are five engine units now in place, but the remaining three, when installed, will be of greater capacity.

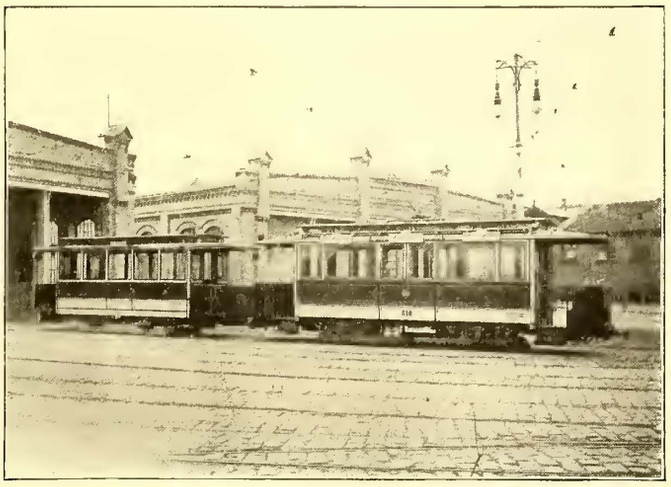
The rotors of the three-phase alternators used are 24.6 ft. in diameter, weigh 43 tons, and have sixty-four magnet poles each. The stator frame is 28.8 ft. in diameter and 31 ins. wide. The normal load is 2000 kw and the voltage 5500.

A two-story switchboard of marble slabs is placed at one side, about the middle of the building.

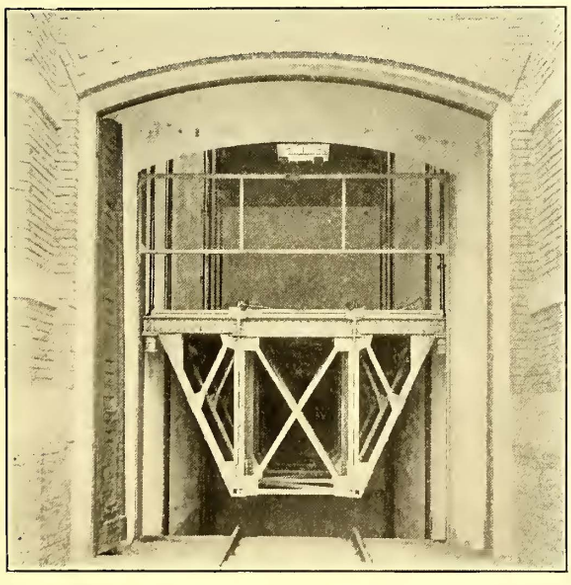
The preceding description relates to the larger plant of five engine units and ten batteries of boilers, which, when completed, will have eight engine units and sixteen batteries. The other power house has three engine units and six batteries, with space for another unit and two more batteries. The buildings are of the same dimensions except as to length, and when the future demands it both will be extended further.



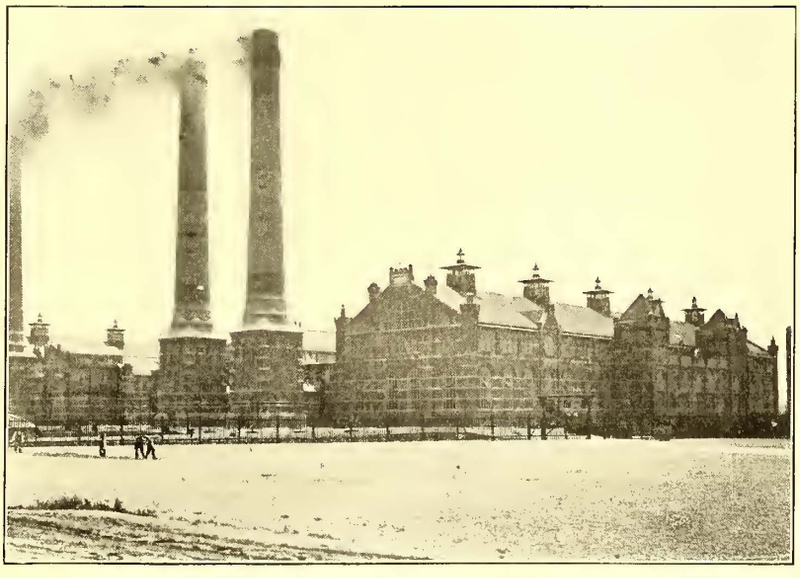
WAERING SUB-STATION



STANDARD TRAIN WITH MOTOR CAR, EQUIPPED WITH BOTH BOW AND PLOW



30-TON COAL CAR ELEVATOR



POWER STATION, WITH ELECTRIC-LIGHTING STATION AT LEFT

The following are the results of a test made on the engines to see whether they met the manufacturers' guarantee:

RESULTS OF THE GUARANTEE TESTS.

Subjects of the Tests.	Terms.	Mfr's Guarantee.	Test Results. Generator No. 4 Ry. Plant.	Test Results. Generator No. 2 Light Pl't
Weight of water, vaporized, per 1 sq. meter per hour	Kg.	15	16.80	16.08
Water raised from 32 deg. to 212 deg. per 1 kg. of coal	Kg.	7.14	7.53	7.73
Total efficiency of boilers	Pr. Cent.	70	71.80	72.80
Calorific value per 1 kg. of coal consumed	Calories	6500	6743	6765
Efficiency of economizer	Pr. Cent.	------	7.60	8.30
Efficiency of superheater	Pr. Cent.	------	4.80	4.80
Indicated work of steam engine	H. P. i.	------	3320	3388
Output of generators	Kw.	2000	2091 2	2086
Efficiency of generators	Pr. Cent	82.7	85.6	83.7
Steam consumption per Ind. H. P. hour, with superheater	Kg.	4.55	4.55	4.28
Coal consumption per Ind. H. P. hour	Kg.	------	0.65	0.60
Coal consumption per kilowatt hour	Kg.	1.100	1.037	0.962
Coal consumption per kilowatt hour in calories	Calories	7150	6992.5	6508
Maximum output of generator	Kw.	2500	2600	2550

For the purpose of distribution, five sub-stations are erected at convenient distances, from 2 miles to 5 miles, from the central station. Each contains its storage batteries, from four to ten 550-kw motor generators for lighting and power, and a set of two coupled boosters. The efficiency of the motor generators is 87½ per cent. In the largest sub-station, Mariahilf, with ten units, six are for power, two for lighting and two in reserve. The batteries are of the Tudor system, of 276 cells, and have a total capacity of 3800 kw, one and one-half times the power of a unit in the central station for from 1 hour to 3 hours.

With coal at $3.60 per ton (Kr. 18) the cost of generation per kilowatt-hour was 0.36 cents (1.8 heller) in the power plant, while in the sub-station the cost was 0.4 cents.

DISTRIBUTION SYSTEM

The cables are laid together with telephone wires in sand-carpeted trenches and covered with tiling. The high-tension cables, as shown in the illustration, are made up of three centers or cores of copper, surrounded by paper and jute. The cores are of unusual design, being two triangular wires with their bases adjacent, and the pair surrounded by round wires, the whole of 150 mm (6 ins.) cross-section. Lead, asphalt paper, jute, iron and asphalt jute with cord binding make up the remainder of the cable, which is tested for 10,000 volts for a space of 15 minutes.

From April, 1901, to November, 1902, a space of fourteen working months, the winter months being omitted, the following work was done in cable laying:

	French Length in Miles.	Length of Cable in Miles.	Weight of Copper in Tons.	Cost in Dollars.
Street Railway work	45	190	840	800,000
Lighting	120	555	830	1,100,000
Total	165	745	1670	1,900,000

The total cost of cables and cable laying was $1,900,000. The mechanical equipment of the two plants, $1,200,000; for the sub-stations, $650,000, and for the power plant buildings, $1,040,000. The total cost was $6,800,000, of which $3,000,000 was for the lighting plant. These figures represent the initial cost, and are a portion of the expense for which the city authorized the Kr. 285,000,000 loan.

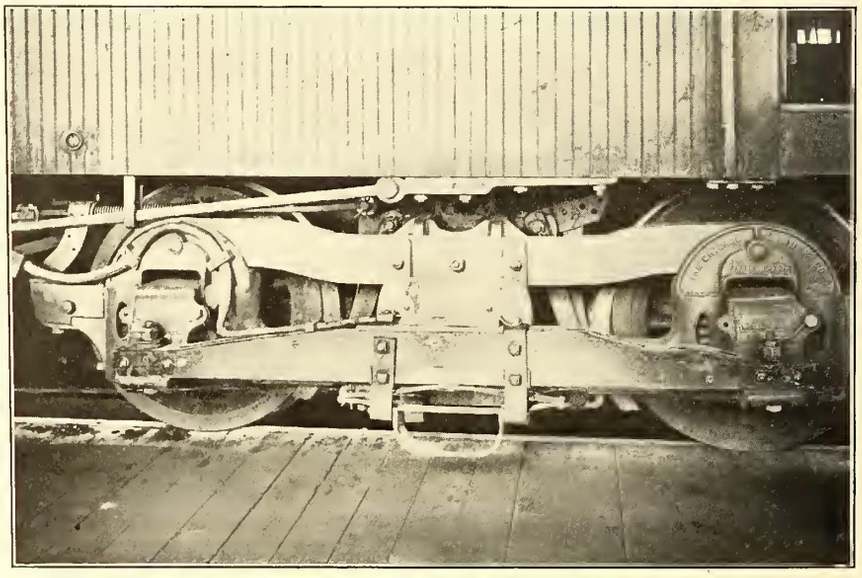
The Tamaqua & Lansford Electric Railway extension to Mauch Chunk has caused the steam road to discontinue through trains from Mauch Chunk to Pottsville.

NEW THIRD-RAIL SHOE ON THE BOSTON ELEVATED RAILWAY

All cars on the Boston Elevated Railway, to the number of 151, have been operating since Nov. 15, 1903, with a new type of third-rail shoe, which has been on trial for the past eight months with very satisfactory results. The shoe differs radically from the "slipper" form, which, with various modifications, is used on all other third-rail roads and which was also employed on the Boston elevated until superseded by the new form just adopted.

The principal new feature in the present Boston shoe is the substitution of spring pressure for gravity in making contact. The equipment, complete, consists of a short, flat bar of steel, with two right-angle bends at each end, two wrought-iron hangers in which the ends of the bent steel bar rest, an iron strip for uniting the two hangers electrically, and a thin elliptical steel spring for holding the ends of the shoe in the hangers. The combined weight of these parts is about 28 lbs. The weight of the moving parts alone of the old shoe was about 25 lbs.

In the mechanism of the new shoe the soft steel bar with which contact with the rail is made is the vital part. This bar, before it is bent, measures 23 ins. long, 3½ ins. wide, and ½ in. thick, and weighs 10½ lbs. After being bent into the proper form a channel is forged in the flat part of each end to receive the side of the elliptical steel spring. The lower side of the contact-shoe is 3½ ins. wide, and is worn from contact with the top of the third rail into a concave form. Measurement of this concave surface on a worn-out shoe gave a length of 10 ins., and a width clear across the 3½-in. under surface of the shoe. As the top of the third rail is 2½ ins. wide, it seems that the maximum possible contact surface between each shoe and the third rail is 25 sq. ins.

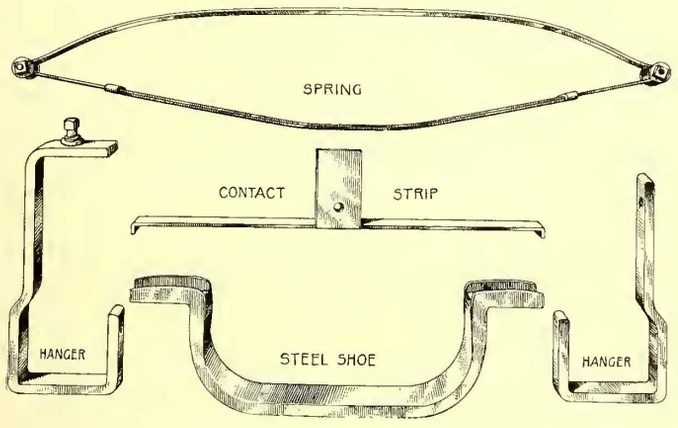


NEW SHOE ON BOSTON ELEVATED CAR

Each of the two hangers is bolted to the wooden bar carried on the boxes, and the bolts used for this purpose also hold the thin iron strip in contact with both hangers. The elliptical spring is bolted to this same spacing strip, and is thus in permanent electrical contact with the two hangers. To one of these hangers the motor cable is connected through a long wire fuse, as shown. Together the two hangers weigh 9 lbs., and the weight of the spring is 6½ lbs. Each end of the steel shoe is simply laid into one of the hangers, and is held down by its own weight of 10½ lbs., and by the pressure of the spring above. In a vertical direction the greatest possible motion of the contact-shoe is 1½ ins., but in its normal operation on the

rail it can rise, or rock, ⅝ in. from its seat in either hanger. Each shoe is pushed, not pulled, along on the third rail by that hanger which happens to be nearer to the rear end of the car, depending on the direction in which the car is moving. A result is that the shoe tends to bunch up and make harder contact with the third rail as the speed of the car increases, since a component of the pushing force acts perpendicular to the third rail.

The elliptic spring is constructed to give a downward pressure of 50 lbs. on the contact-shoe when the latter is at its lowest position in the hangers. When the third rail lifts the shoe from its seats in the hangers the pressure between the shoe and rail is thus about 50 + 10½ = 60½ lbs., without regard to any motion of the shoe along the rail. The push given by a hanger to each shoe is imparted close to the right-angle bend near one end of the shoe, and wears a bright contact surface across the entire width of the shoe at this point. Through this contact surface most of the current entering the shoe passes



PARTS OF CONTACT SHOE

to the car motors. As may readily be seen this contact-shoe has a rocking motion both crosswise and lengthwise of the car, by lifting at either end or on either edge of the parts that rest in the hangers. These motions enable the shoe, impelled by the spring, to follow readily any irregularity of the third rail, prevent all jumping at inclines and joints, and avoid most of the blow that was common with the old shoe when it took a new section of the rail. This tendency of the shoe to cling to the third rail results in the almost total prevention of sparking between the contact surfaces.

Steel shoes of this type are operated until nearly worn through at the center of the contact surface, and it has been found that the life of a shoe is about ninety days on a car that covers 150 miles per day, a run of about 13,500 miles. The steel shoes are hardened a little to increase their life. Very little current seems to pass through the steel spring, most of it going directly from the shoe to the hangers, and there has been no trouble about over-heating of the springs. It has been found that this form of shoe is more effective than the old type in the removal of ice and sleet from the third rail, although a steel wire sleet scraping brush is also used.

These facts have been secured through the kindness of C. S. Sergeant, vice-president; Paul Winsor, and John Lindall, the inventor of the shoe, all of the Boston Elevated Railway Company. It is understood that patents on this contact-shoe are now pending.

MOVEMENT TO ORGANIZE TRACK SUPERINTENDENTS

The discussion which has been carried on in this journal and elsewhere regarding the advisability of forming an association of track engineers and superintendents, after the manner of the master mechanics and accountants, has attracted considerable attention, and an effort is now being made to secure expressions of opinion on the desirability of forming an association from those most interested. The following circular letter, accompanied by the necessary blanks, has been sent out:

MILWAUKEE, Wis., Jan. 25, 1904.

Dear Sir—An editorial article in the Nov. 7 issue of the STREET RAILWAY JOURNAL, entitled "Comparing Notes on Track," which has probably received your attention, also an editorial article in the Jan. 16 issue upon the same subject, and calling particular attention to the necessity for organizing this department, have brought very forcibly home to the writer the necessity of pushing a plan to effect an organization of electric railway "way" men, which has been in contemplation for several years.

The editorial articles cited very truthfully state that there is probably more money expended through this division of the various electric railways of the country than any other single department; that less discussion of matters pertaining to this important work has been had, and that the practice of no one department is probably less uniform.

It is reasonable to assume that an intelligent, painstaking and thorough comparison of results obtained throughout the country could in no other case lead to such far-reaching economy for all concerned as in the practice of track laying. "Will your track last ten, twelve, fifteen of twenty years?" What more important question can you ask the electric railways of the country?

In order somewhat to broaden the scope of the proposed organization, it has been suggested that under the title of "Way" be included the right of way, roadbed, track, poles, overhead line and underground conduits and feeders.

A plan of organization similar to that of the American Railway Mechanical and Electrical Association might be used, or such changes made therefrom as would be suggested as advisable.

The membership of that association might be briefly outlined as follows:

Active Members—Heads of departments; membership fee, $5 per year.

Associate Members.—Owning or operating companies or individual owners; membership fee, $20 per year.

Junior Members.—Lesser employees engaged in this work, where either their company or departmental head is a member; membership fee, $3 per year.

In order that a concensus of opinion on this important matter may be arrived at, a form of blank circular is enclosed herewith, which we would very much like you to fill out and return to the undersigned, after which the work of organization would be taken up and continued by the persons and in the manner indicated by a majority of said replies.

The rough idea as now in the mind of the writer contemplates an association similar in aims and purposes to the Mechanical and Electrical Association already cited; to meet at the time and place chosen by the American Street Railway Association for its yearly convention, and to act as an offshoot of the said American Street Railway Association, receiving and furthering suggestions therefrom, and endeavoring in every way to improve and perfect, toward some reasonable degree of uniformity, the practice of the way departments of the gigantic electric railway interests represented therein.

The writer has reason to believe from interchange of ideas with many of the department heads in charge of this class of work throughout the country that a large number of them are as firmly convinced as himself that such an organization cannot be formed too soon, and it is therefore with considerable hope of good results this letter is launched, upon the idea that there must be a beginning if there is to be progress.

A plan of organization may be advisable by which the heads of departments can become active members, even though the company they represent does not affiliate with the association.

We think the companies should join wherever possible, as we are convinced that the matter of $20 or $25 for a membership fee and the expense of a representative at the annual meetings would soon be repaid an hundredfold by the benefits to be derived therefrom.

Your advice and help is earnestly solicited in order that a thorough and comprehensive organization may be effected.

Trusting that your approval and assistance may be secured in the furthering of this project, I am

Sincerely yours,

FRED. G. SIMMONS,
Superintendent of Construction and Maintenance of Way,
The Milwaukee Electric Railway & Light Company,
Milwaukee, Wis.

ST. LOUIS TRANSIT COMPANY'S NEW CARS AND MOTORS

As mentioned a number of times in these columns the St. Louis Transit Company has ordered 450 new cars to take care of World's Fair Traffic. Drawings showing the dimensions of this new standard type of semi-convertible car adopted by this company were shown on pages 354 and 355 of the STREET RAILWAY JOURNAL of Aug. 29, 1903. A number of these cars have now been completed, so that it is possible to reproduce photographs of them herewith. Fig. 1 shows the exterior appearance of this new car. The car bodies were built by the St. Louis Car Company, and, as can be seen, have the channel steel side sills peculiar to that company's patented construction, which allows the windows to be lowered between the channels, and so permits a low window-sill. The front platform is very short, as it is occupied only by the motorman, although used as an exit and entrance. This platform is 4 ft. 3¼ ins. from the end of the car body to the bumper, leaving an actual platform space at the widest point of about 3 ft. The car body is 33 ft. 4¾ ins. over the corner posts and has seats for forty-eight passengers. The seats are 32 ins. wide, 30 ins. between centers. The aisles are 32 ins. wide. The car body is unusually wide, being 9 ft. 1 in., which is the widest in use in any of the large cities of the United States.

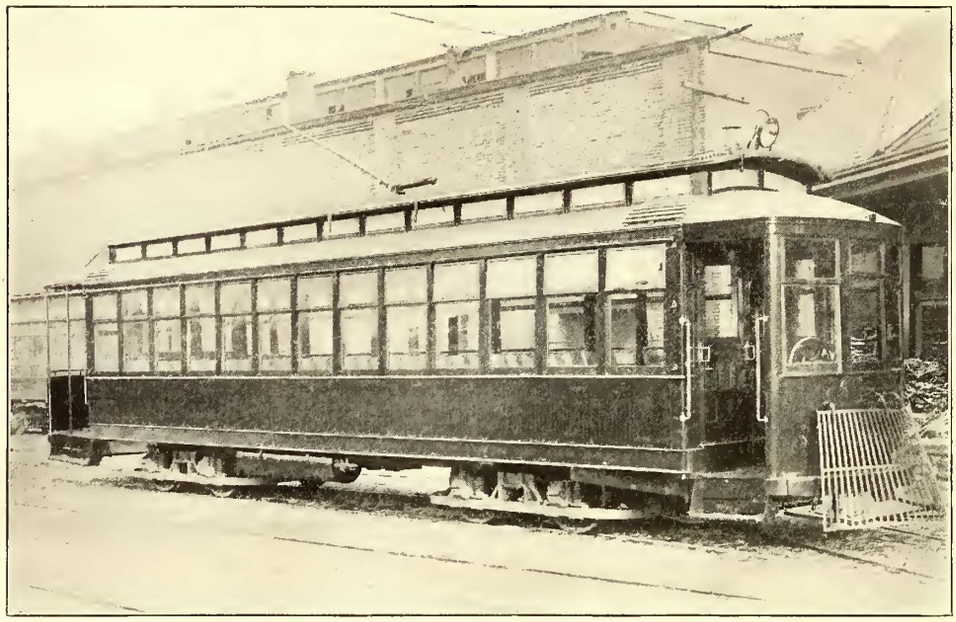


FIG. 1.—NEW SEMI-CONVERTIBLE CAR IN ST. LOUIS

The rear platform is 7 ft. long, and represents the extreme development of the Du Pont type of platform. The platform is shown in Fig. 2. It is divided into three parts by two hand rails for the support of the passengers standing on the platform. These hand rails, however, are short, so that there are passages around the ends of both.

One special feature of the car shown in Fig. 3 is the unobstructed view which the conductor has of passengers at the rear step when in the car collecting fares. Much less room is taken up by the window sash in the vicinity of the corner posts than is usual.

The heating of the car is accomplished with a stove placed directly in the middle at the front end, as shown in Fig. 4. The front entrance is at the right of this stove. In this location the stove does not take up room which would otherwise be used for seats, as the seat in the front left-hand corner is simply placed with its back to the window. A further advantage of this location of the stove as against placing it, as usual, in the middle of the car, is believed to be a better circulation of warm air.

FIG. 2.—LONG PLATFORM WITH TWO RAILINGS IN ST. LOUIS

FIG. 3.—LOOKING TOWARD REAR PLATFORM IN ST. LOUIS CAR

Both upper and lower sashes of the windows lower into a space in the side of the car. As far as their raising and lowering is concerned, the ordinary passenger or conductor would notice nothing unusual, as they operate like any street car type of sash. They have, however, a very novel patented design, which makes it possible to take out both sashes without removing any screws. Fig. 5 shows the windows and grooves in which they slide. Although it is not intended to take out the sashes in the summer, this feature is nevertheless valuable, as a sash can be removed quickly while the car is on the road, in case the glass is broken, and it is but the work of a few

minutes to remove all the sashes before the car is run in to paint or for cleaning. The trucks under this car are the Du Pont type, with 4-ft. 6-in. wheel base. They are being made in the shops of the St. Lolis Transit Company, where many labor-saving methods have been introduced in their manufacture, as mentioned in the article on the St. Louis Transit Company's shops in the issue of Nov. 14, 1903.

NEW DESIGN OF MOTOR.

The motors under these cars are the new Westinghouse No. 95 motor, which is a 40-hp motor, with oil lubrication, designed especially to meet the specifications of the St. Louis Transit Company. A truck equipped with these motors is shown in Fig. 6, and a side view of a motor by itself, as shown in Fig. 7. The motor opens from above, as it is intended to do away with pit work entirely in the repair of these cars. The armature bearing shells of this motor are held in larger shells, which are bolted to the lower part of the motor casing, as shown in Fig. 7. By opening the top of the motor and removing the bolts which hold the bearing shells to the lower case, the armature with its bearings and these shells can be lifted out. The large shells surrounding the bearings are made necessary from the fact that oil is used for lubrication, and, consequently, an oil well is needed in the shell. An opening extends from the oil cup cast on the shell, around one side of the bearing to the oil chamber under the bearing. This passage is filled with wool waste. There is an opening through the babbitt shell into the waste chamber on one side of the bearing. This space being full of waste, the oil is fed by capillary attraction from the oil well to the armature shaft. The motor axle gearings have similar lubrication, but the oil chamber is differently arranged, and the opening from the journal to the oil chamber is in the bottom of the bearing, and the oil chamber forms a part of the lower motor casting, as seen in Fig. 7. Particulars of the company's storage air brake system to be used on these cars are given on on another page.

FIG. 4.—LOOKING TOWARD FRONT PLATFORM, ST. LOUIS CAR

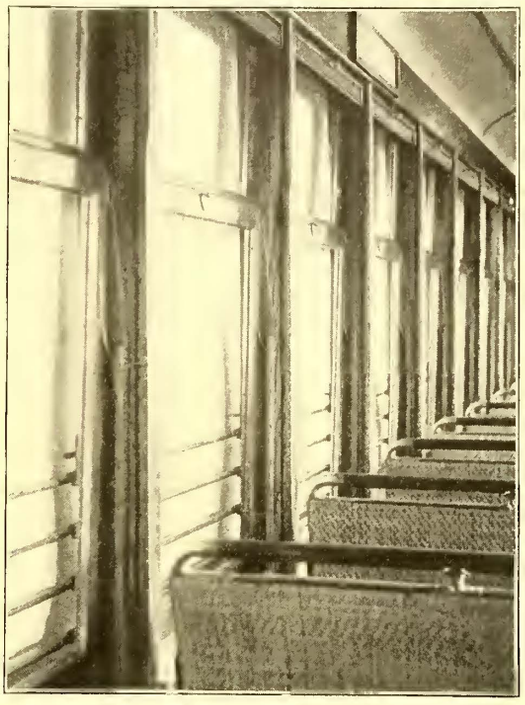


FIG. 5.—ARRANGEMENT OF WINDOWS

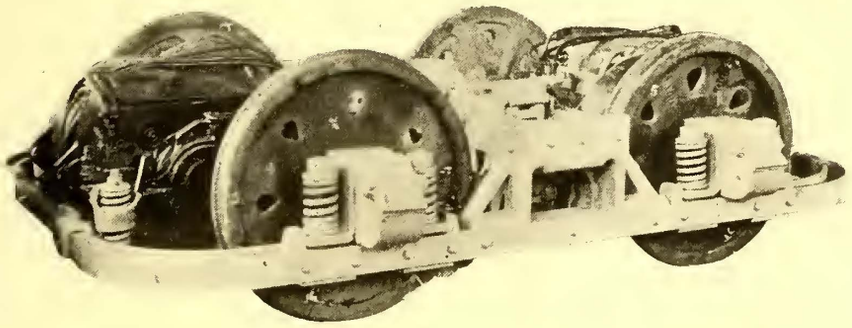


FIG. 6.—STANDARD TRUCK

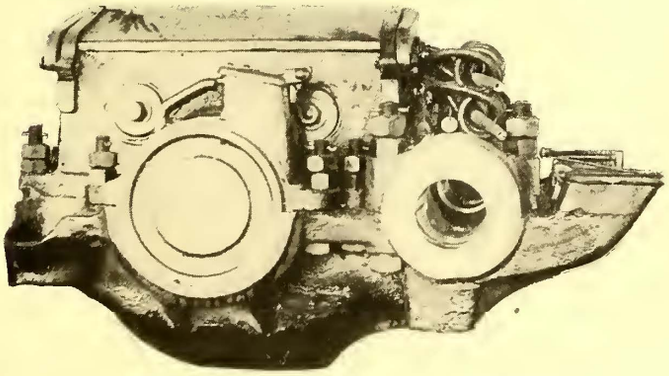


FIG. 7.—NEW MOTOR WITH OIL LUBRICATION

HEATING CARS IN NEW YORK

Senator Russell's bill to compel the comfortable heating of elevated and surface railroad cars in cities of the first class in New York was favorably reported in the Senate from the committee on codes. The original bill was defectively drawn, so the committee reported a new bill which adds a new section to the Penal Code as follows:

"A railroad corporation, or any officer or director thereof having charge of its railroad, or any person managing the same, which railroad is owned and operated wholly or partially within the limits of a city in the first class and not including railroads whereon the trains are propelled by steam power, who fails to keep any passenger car on any such railroad while in motion, for the carriage of passengers, so heated between Oct. 1 and April 1, that the temperature of the atmosphere in such car shall not be less than 50 degs. above zero Fahrenheit, is guilty of a misdemeanor."

At the hearings much opposition was offered, especially by the New York Central, which claimed it a physical impossibility to heat steam cars during such extreme weather as has prevailed this winter. The company's representative said that it was doing its best to heat the cars and should not be held criminally liable, as the engineers had difficulty in making steam at a temperature of 20 degs. below zero.

STORAGE AIR BRAKE SYSTEM IN ST. LOUIS

As announced elsewhere in this paper, the St. Louis Transit Company has been making a large number of important improvements to its rolling stock and system in preparation for the traffic which is expected during the coming summer on account of the Louisiana Purchase Exposition. Among the largest contracts which it has awarded during the last six months is for a system of storage air brakes for all its cars. This order has attracted considerable attention from the fact that while storage air brakes have been used to a considerable extent during the past four or five years they have not been adopted exclusively on any large system, and only one order, that given in Detroit a short time ago for this type of air brake, at all approximates that recently placed by the St. Louis Company. For this reason an examination into the reasons for the adoption of this type of system and the particulars of the system itself are of more than usual interest.

According to the officers of the St. Louis Transit Company the storage system rather than an independent compressor system was adopted on its cars, because of the smaller investment required for the equipment of the road and the greater economy in the maintenance and operation of a few stationary compressor plants as compared with those of a compressor on each car. The officials also state that they consider the system more reliable and less likely to fail on the road than the individual compressor system.

The St. Louis Transit Company has ordered 1500 car equipments of storage air brake apparatus. This will equip every car on the road. It has also ordered forty motor-driven compressors, all of the same size and design. These compressors will be placed at eighteen different compressor stations. A compressor station, for instance, will be located at the outer end of each line, and others will be placed at different points within the city. All of the compressor plants will be so located that cars can charge while lying over at the end of a line, so as not to delay traffic. The largest compressing stations will be equipped with three compressors. In most cases the compressing equipment will be located in neat brick buildings, although in some cases where the terminus is in a fine residence district it may be located in a vault under the street.

Besides the compressing stations permanently located, a number of portable compressing stations mounted on cars will be built. These will serve several purposes. They can be used on the ends of lines operated only in summer, they can be employed during construction for various purposes as well as to supply air for brakes, and they can also be used in emergencies to take the place of a stationary compressor during repairs.

CAR EQUIPMENT

Fig. 1 shows a plan, elevation and section of the storage air brake equipment on the cars, which is being supplied by the Westinghouse Traction Brake Company. As will be seen, there are two storage reservoirs, one on each side of the car, each being 18 ins. in diameter by 6 ft. long. Each has a capacity of about 10 cu. ft., so that the air storage of 20 cu. ft. at 300 lbs. pressure, carried in these reservoirs, is equivalent to approximately 100 cu. ft. at 45 lbs. pressure, which is the pressure used in the service reservoir and brake system. The outlets for charging the reservoirs are at the side near one of the storage reservoirs, and consist of a pipe fitting which is very similar to the standard air brake coupling head, and which is arranged to screw into a 1-in. pipe. Between the charging coupling and the branch to the first storage reservoir are a cock and check valve, so that when the reservoirs are fully charged the cock is closed, and any tendency of the air to leak through it after the coupling is detached will be at once stopped by the check valve.

The service reservoir, which corresponds to the ordinary reservoir in the straight brake system, is 14 ins. in diameter by 33 ins. long, and contains approximately 4400 cu. ins. Near this service reservoir in the main high-pressure supply piping is placed the reducing valve. This valve, in its operation, is in every way identical with the feed valve of the engineer's brake valve, as used in the ordinary steam railroad air brake system. The function of this valve is, of course, to keep the pressure in the service reservoir at 45 lbs., which it does very accurately and independently of the pressure in the storage reservoir.

The operating valve on the front platform is the standard O. V. J. valve of the Westinghouse Traction Brake Company, and is practically a three-way valve, which is operated by a handle which can be inserted only when the valve is on the lap. The brake cylinder is the standard 10-in. x 12-in. stroke cylinder of the Westinghouse type, and operates the brake rigging in the usual way, with a wire cable connection to a hand-brake handle for emergency use. As will be noticed from the plan all of the tanks are within easy reach of a man standing beside the car, so that they can be easily drained. All the valves, including the reducing valve between the storage and the service reservoirs, are also within easy reach. The piping to the front platform is carried under one side, and that from the platform to the brake cylinder is carried under the other side. The wire cable to the hand brake is also carried on one side just inside the side sills, so that there is no interference with the swivel trucks.

AIR COMPRESSORS

The air compressors will be electrically driven from the trolley circuit, and are being supplied by the Ingersoll-Sergeant Drill Company. They are of the straight, tandem-compound, single-acting type, arranged with the Westinghouse electric motors, directly connected to Morse silent-running chain drive, and are designed for a final discharge air pressure of 325 lbs. per square inch. The cylinders are 6¼ ins. and 14¼ ins. in diameter by 12-in. stroke. Both cylinders have standard mushroom-type discharge valves, the air passing from the low-pressure cylinder through a specially constructed intercooler to the high-pressure cylinder, thence to the storage reservoirs. The storage capacity at each station is, of necessity, somewhat in excess of usual practice in compressed air installation. This is caused by the fact that during the rush hours the stations will be called on to furnish more air for charging cars than the actual capacity of the air compressor could supply. As a rule, there will be at least two compressor units in each station, as well as two storage tanks, 36 ins. in diameter by 18 ft. long. The actual capacity of the compressors when operating at their specified speed of 110 r. p. m., will be about 100 cu. ft. free air per minute. This gives a maximum capacity to each station of 200 cu. ft. free air per minute. The storage tanks are charged at the higher pressure, 325 lbs. per square inch, while the cars will be charged to about 275 lbs. per square inch. This excess storage capacity, however, is counted on to supply extra air for a short duration only, when there is an extra heavy demand for air, and the compressor units are of sufficient capacity in themselves to supply the air required during the heaviest average duties.

On account of the severe conditions to be met with, the compressor being practically on duty for 24 hours per day, it was decided by the St. Louis Transit Company to make these outfits as nearly automatic in their operation as possible. They are, therefore, equipped with an automatic starting and stopping control, governed by a predetermined range in air pressure drop, viz., 325 lbs. maximum and 275 lbs. minimum.

Fig. 2 is a wiring diagram of the electric connections of the automatic controlling device, which in the half-tone engravings is shown as operated directly from the compressor shaft through worm gearing. This gearing drives an automatic magnetic clutch, which, through a connecting link, raises the rheostat arm over the resistance plates. In the wiring diagram the main circuit is showed by dashes, and the auxiliary circuit by

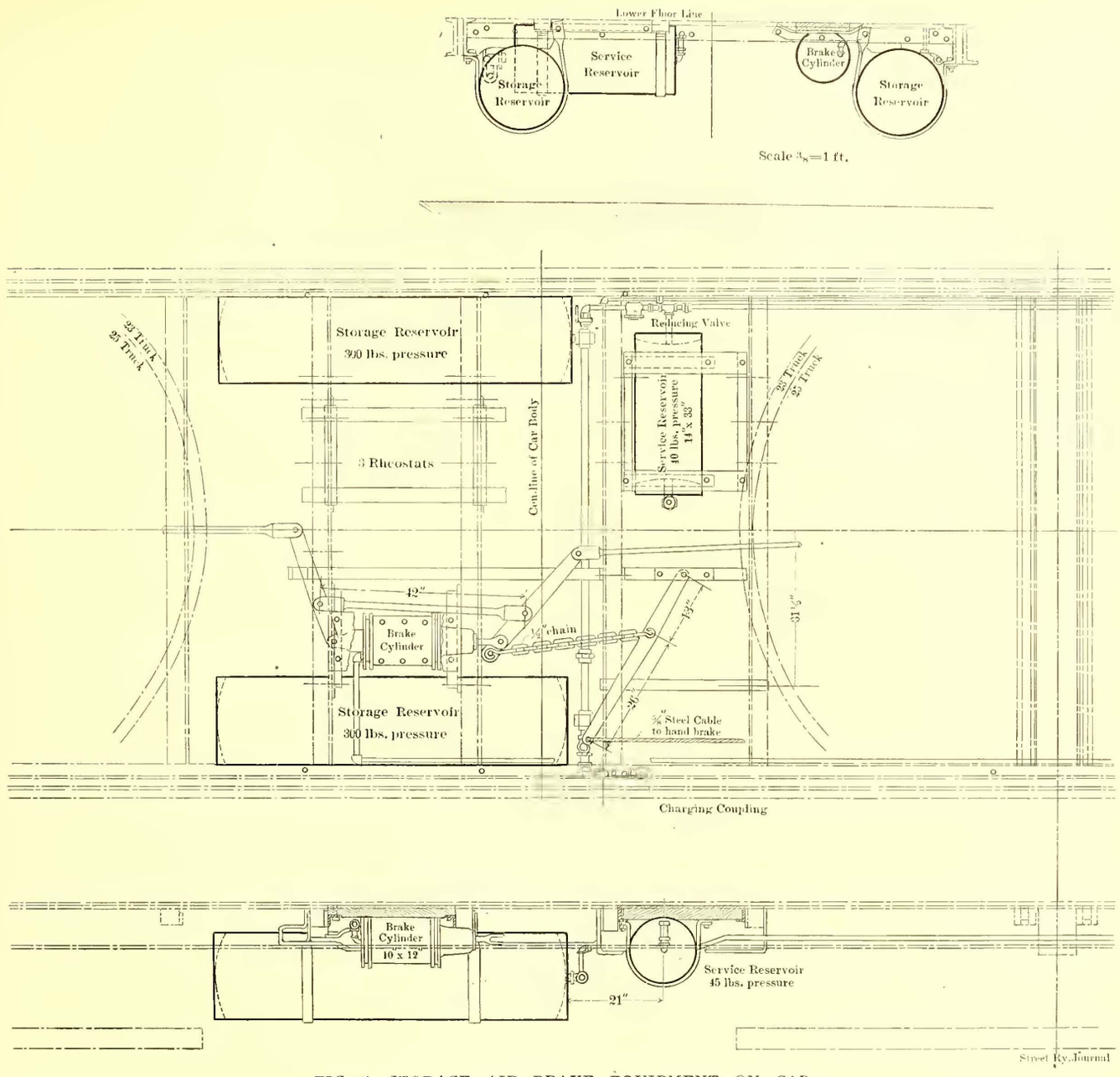


FIG. 1.—STORAGE AIR BRAKE EQUIPMENT ON CAR

dots. These controlling circuits are all shunted off the main line, having high-pressure resistance rods in their circuits. *G* is the hand switch for closing the main circuit, which is also open until closed by the magnetic switch at *C* in making contact at *M*. *A* is an air-pressure controlled pilot switch, which consists of a standard Bourdon gage, which, when the pressure in the receiver falls, will contract, allowing the pilot finger, as shown, to make contact on the upper point, which in turn short circuits the lower coil of the secondary contactor shown at *B*. The upper coil acting as a solenoid immediately raises its core, making contact through the secondary circuit at *B*, thus throwing the current through the operating coil of the magnetic switch at *C*, the holding coil of the rheostat at *D*, and the operating coil of the magnetic clutch at *E*. The effect on the magnetic switch, *C*, is that it closes the main circuit at *M*. The main circuit is then made through the rheostat to the motor, and the rheostat is gradually cut out as the worm gearing gradually rotates the disc *E*, raising the rheostat arm, *F*, through the link *H*.

To keep down the initial current, the motor is started without load. This is accomplished by the unloading device, shown in the lower part of the diagram and in the side view of the compressor on the side of the low-pressure cylinder. It con-

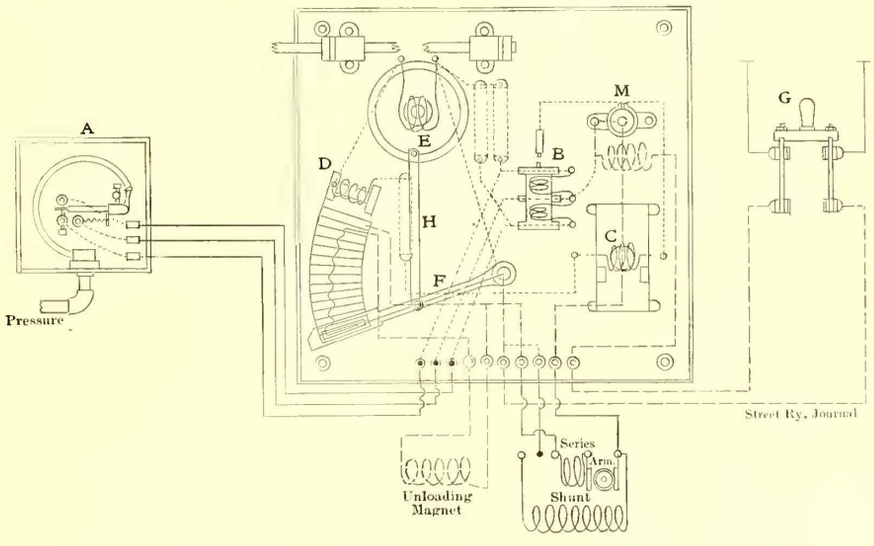
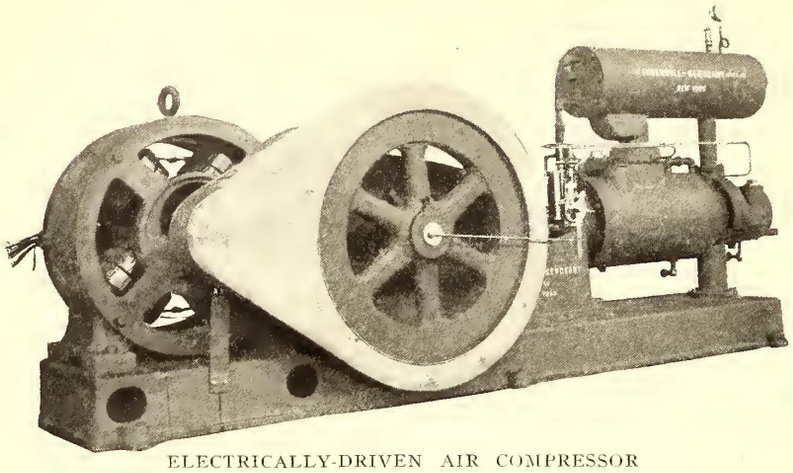


FIG. 2.—DIAGRAM OF CONNECTIONS OF AUTOMATIC STARTER

sists of the Sergeant type of compound air compressor unloader, arranged to be operated by a powerful solenoid in place of the air piston, which is used on compressors operated by steam. When contact is made through the main circuit at *M*,

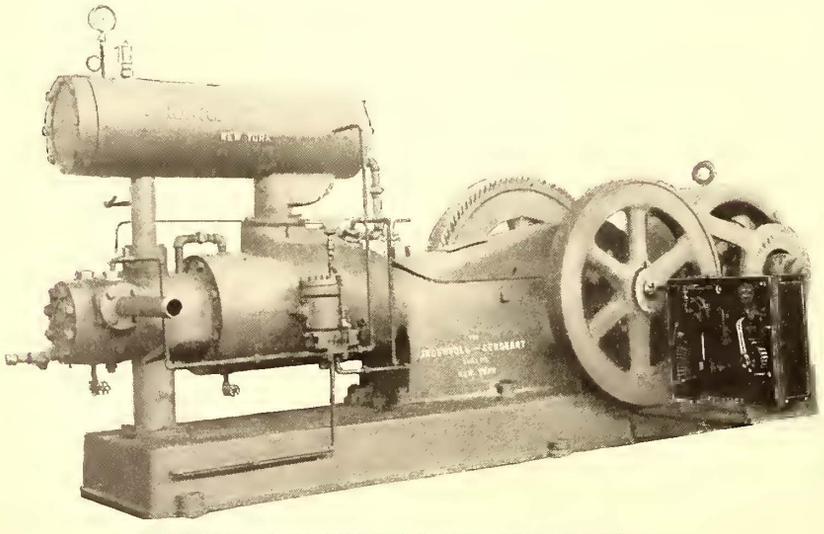


ELECTRICALLY-DRIVEN AIR COMPRESSOR

as described, current is also thrown on this unloader, which is connected in between the last two steps of the rheostat. This keeps the load off the motor until the last step on the rheostat is reached, when it is automatically short circuited. In practice it is found that the in-rush starting current required is about 52 amps. This drops off while the motor is getting up speed to about 27 amps. When the load is thrown on, the current required is from 47 amps. to 52 amps.

When the maximum pressure desired is reached in the reservoir, the pilot finger of the pilot control switch, *A*, makes contact again, this time on the lower contact point, short circuiting the upper coil of the solenoid contactor *B*, thus breaking the secondary controlling circuit at *B*, and releasing the entire apparatus from "no voltage release."

The arrangement of the air compressor units which are installed in duplicate in the various stations is such that, by throwing a double switch in the pilot control circuit, it is possible to make either one or the other unit carry the brunt of the load. This is done by setting one of the low-pressure contacting points of the two air-pressure controlled pilot switches at about 5 lbs. lower than the other. The compressor thrown in at the lower pressure would then only be called on to



ELECTRICALLY-DRIVEN AIR COMPRESSOR

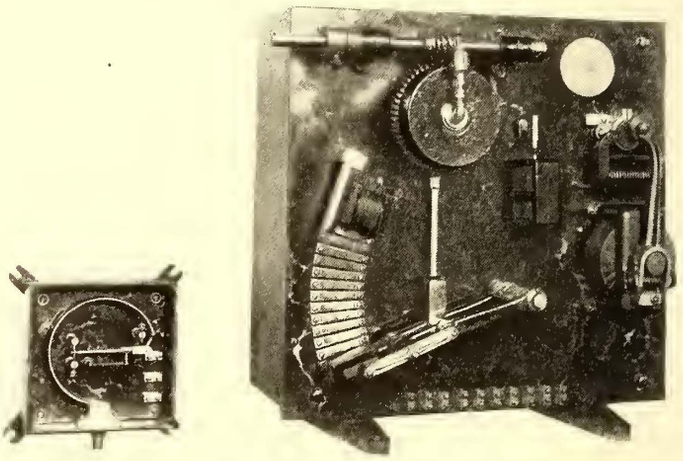
operate when the load is more than can be carried by one unit.

This arrangement permits of equalizing the work on the two compressors, and in case of accident to one it can easily be put out of service for repairs. It is the intention to have an inspector call at the sub-stations about once or twice a day, at which time any irregularities in the operation can be looked into by him and taken care of. This inspector will also fill up the oil reservoirs of the automatic oiling devices. No other attention is necessary.

A number of points were considered in connection with the selection of the type of air compressor and of controlling device, which are of interest to engineers contemplating the use of this type of apparatus, and they will be briefly mentioned.

On account of the high pressure used it was considered desirable to do away with any form of high-pressure packing which is liable to give out. It was decided, therefore, to use the tandem construction as shown, in which there is only one low-pressure stuffing box. These stuffing boxes are equipped with approved metallic packing, and form practically the only air joint on the compressor which requires any adjustment, with the result that the necessity for adjustment is reduced to a minimum.

The intercooler between air cylinders is of a special horizontal receiver type, so arranged that it can be tested for leaks and the same repaired without removing any part except the heads at each end. It is also arranged to take



AUTOMATIC STARTING DEVICE

up the expansion or contraction resulting from differences in temperature without any extra undue strains. The capacity of this intercooler is sufficient, so that a practically constant pressure is maintained within it, thus allowing the passage of air through it at a comparatively low velocity, giving ample time for cooling. The compressors themselves are equipped throughout with ample cooling jackets on air cylinders and heads, and are piped for circulating water connections through the intercooler and jackets. Caution should be used in placing the inlet and discharge valves in the high-pressure cylinder, where 260 lbs. unbalanced pressure is encountered, in such a position that if any accident befell these valves the broken parts would not enter the cylinder and cause extra damage. It was, therefore, specified that these valves should be placed on the sides of the cylinders and arranged so that the trouble mentioned could not happen.

Among other points specified by the St. Louis Transit Company was that these compressors would be arranged for entire automatic lubrication. The cross-heads, crank pins, connecting rods and main bearings are, consequently, lubricated by a system of splash lubrication, and a double-feed mechanically-operated oil pump was furnished for the air cylinders.

The electric conditions under which the motors operate are comparatively severe, the voltage varying over the different parts of the line from 400 volts to 650 volts. This necessitated a special study of starting devices, which would not show a material change in operation over this wide range of voltage. This fact practically eliminated the serious consideration of any form of controlling device in which solenoids are used, as the starting period of this type of controller is dependent upon the voltage, and with a fluctuation as large as that at St. Louis it would be impossible to adjust for the even in-rush of current necessary.

The motors, which are furnished by the Westinghouse Electric & Manufacturing Company, and are of the "S" type, having the field slightly over compounded to make a strong starting motor, and built so as to have a comparatively slight fluctuation in speed over the above range of voltages.

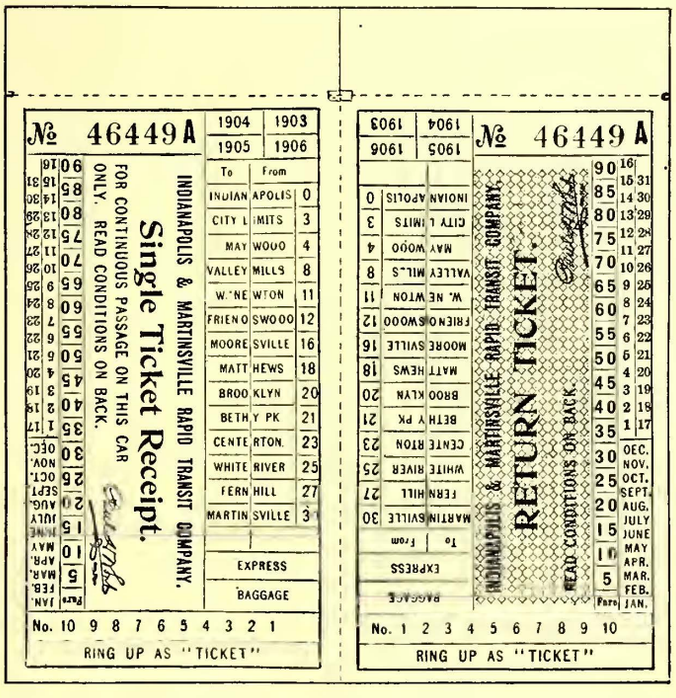
CORRESPONDENCE

INTERURBAN TICKETS

INDIANAPOLIS & MARTINSVILLE RAPID TRANSIT COMPANY,
Indianapolis, Jan. 12, 1904.

EDITORS STREET RAILWAY JOURNAL:

The modern interurban railway exists in the Middle West because of its successful solution of the operating problems involved. Elimination is the process that makes these undertakings what they are, and the extent of this process governs the per cent of income to expense. Were these properties compelled by custom to maintain depots, agents and all the incidental expenses thereto, the financial burden would soon

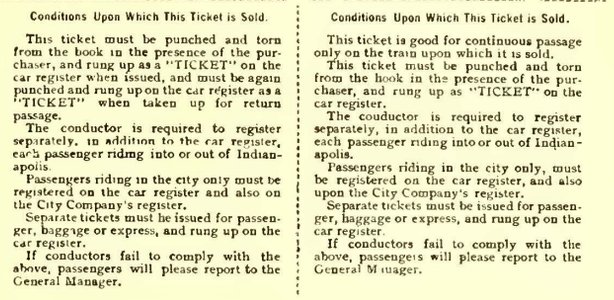


TICKET FOR SINGLE OR ROUND TRIP, OR BETWEEN ANY TWO POINTS ON THE LINE

outweigh the other good points, and the undertaking would be a poor attraction for the investor.

One of the incidentals referred to is the ticket and its uses. Where a system of stations is maintained, the printing, recording and issuing to each station its supplies involves an amount of work that is considerable. The auditing of all these forms demands an office force sufficient to keep the business records up to the day's work. Of course, the agent and his expenses are imperative in this system. By eliminating all these ticket forms and doing the business through the conductor entirely, the whole of the business is simplified. The conductor must always be supplied with cash fare receipts and flag station tickets. By extending this so as to cover the operation of the whole road, very little is added to his labors, and the auditing is brought all under one head, and materially reduces the chance for error or confusion.

A ticket system has been installed by the Indianapolis & Martinsville Rapid Transit Company that meets the conditions of simplicity and flexibility, coupled with cheapness and accuracy in auditing. The sample shown illustrates a ticket that


Conditions Upon Which This Ticket is Sold.

This ticket must be punched and torn from the book in the presence of the purchaser, and rung up as a "TICKET" on the car register when issued, and must be again punched and rung up on the car register as a "TICKET" when taken up for return passage.

The conductor is required to register separately, in addition to the car register, each passenger riding into or out of Indianapolis.

Passengers riding in the city only must be registered on the car register and also on the City Company's register.

Separate tickets must be issued for passenger, baggage or express, and rung up on the car register.

If conductors fail to comply with the above, passengers will please report to the General Manager.

Conditions Upon Which This Ticket is Sold.

This ticket is good for continuous passage only on the train upon which it is sold.

This ticket must be punched and torn from the hook in the presence of the purchaser, and rung up as "TICKET" on the car register.

The conductor is required to register separately, in addition to the car register, each passenger riding into or out of Indianapolis.

Passengers riding in the city only, must be registered on the car register, and also upon the City Company's register.

Separate tickets must be issued for passenger, baggage or express, and rung up on the car register.

If conductors fail to comply with the above, passengers will please report to the General Manager.

CONDITIONS PRINTED ON BACK OF TICKET

is good between any two points on the line, and may be sold as a one-way or a round trip. One form only is used in the business of the company. All tickets are sold by the conductors. They are the ticket agents and attend to all the business outside of the general office.

The ticket is punched at the time of sale as follows: The point of origin, the destination, and the fare, three punches only. The balance of the punching is done previous to the sale and at the convenience of the conductor. The same method of punching and the same points are punched out, whether selling single trips or round trips. A mistake on this score cannot be made.

The ticket is printed and bound in the duplex style into pads. Half of the ticket (that used for the round trip ticket) has a green-colored background in the center, to distinguish it from the other half, which is used for a one-way ticket.

The tickets can be torn from either the top or bottom of the pad. When one-way passage is paid the ticket is torn from the pad, with uncolored side up, and is then properly punched. The one-way half is given to the passenger, and the conductor retains the other half. Should a round trip passage be next called for, the pad is simply turned over and a colored half is sold from that side, punched in duplex each time. This leaves in the pad the portions of the duplex ticket not sold. These are placed in an envelope at the conductor's convenience, and are handed by him to the auditor at the end of each trip. The auditor knows that for every one-way slip returned to him a round-trip ticket has been sold, and, vice versa, for every round trip slip returned a one-way ticket has been sold. A check on this is also the punching of the fare; as between the same points the round trip being higher than the one-way. There is absolutely no confusion either with the conductor or the auditor, and the stock of printed tickets for the entire road is always known.

Any number of either one-way or round trip tickets can be sold from the same pad, and the sum of both kinds will be equal to the number of tickets bound in the pad.

Any interurban road that assumes the burden of card and station tickets must have agents to handle them. This requires an additional force at the main office to handle the business. The conductor must, in any case, be supplied with cash fare receipts. Why not let that feature cover all cases? It is just as safe, simpler, much cheaper, more accurate and highly satisfactory in the auditor's office and to the patrons.

Interurban roads must not follow the steam road practice,

unless they have all the conditions of the steam road, and they have not. Much that is done is wholly or in part experimental, and in this form of transportation the functions must be as elemental and free from complexity as they can be made. Every vestige of superfluous system and work must be eliminated, and the expense kept at a point that cannot be questioned. Properties adhering to this policy will be the ones to command the respect and confidence of the investing public.

Paul H. White, General Manager.

SHOP KINKS AT JOLIET

CHICAGO & JOLIET ELECTRIC RAILWAY COMPANY
Joliet, Ill., Jan. 12, 1904.

Editors Street Railway Journal:

I have in use in our shops an armature truck for carrying armatures to and from the armature room, which has some features in its design that I have not seen used in other places on such trucks but which may prove of interest to some other small shop situated as we are. The wheels of this truck are 40-in. buggy wheels, which permit the armature to be hung below the axle, so that the center of gravity is low and the truck can be run directly over an armature so as to pick it up off the floor. A sketch giving the essential dimensions is shown in Fig. 1. The gage or distance between wheels is 20 ins. A bar 5 ft. long, terminating in a handle, rests on the middle of the axle between the wheels. From this bar another bar, 42 ins. long, is hung by links, as indicated in the accompanying sketch. Each of these links is 5 ins. from the axle. The 42-in. bar which is hung by these links carries the hooks by which the armature is hung. These hooks are large enough so that they will take in armature-bearing shells if necessary.

The peculiar feature of the device is the removable pin, from which the link nearest the operator is suspended. When an armature is to be picked up the removable pin is taken out of the link, allowing the hinged hook farthest from the operator to hook under the armature shaft, and allowing the hook nearest the operator also to hook under the armature shaft.

The handle is then brought down as a lever until the removable pin can be again placed in the link. Then, by raising the handle the armature is hoisted clear of the floor and the truck can be pushed wherever desired. This truck is narrow enough so that it will pass between cars as they stand in the car house. Another advantage of the large wheels not previously mentioned is that they go over small obstacles easily, but, of course, the chief advantage of this peculiar construction is in allowing an armature to be picked off the floor without the aid of any other devices and by one man. The distance between the hooks can be varied to suit different lengths of armature.

We have found that there is a tendency for the brake-shoes on some of our double-trucks to wear more on the flange side than on the outer side. This tendency, of course, if unchecked, would result in shortening the available life of the brake-shoes. As the brake-shoes wear in this way the hangers tend to draw inward, as shown in an exaggerated way in the accompanying sketch, Fig. 2. The way to counteract this tendency on a new truck would be to fix the brake-shoe hangers a little farther out, so that there would be an equal pressure on both sides of the shoe; but changing the location of hangers is likely to be an expensive job on a truck already built. A simple substitute in use on this road was devised by our car-house foreman. It consists of a hook attached to the angle-iron of the truck frame, as in the sketch, Fig. 3. This hooks into the fork in the rod between the brake-shoes, and keeps the rod and hangers from swinging inward, as they would naturally do when the brake-shoes begin to wear too much on the flange side. By this simple device the life of our brake-shoes has been much increased, as they now wear evenly and can be run very thin. We use two of these clamps on each side of a truck. This is also a safe guard which would hold the brake rigging should the hanger break, when, ordinarily, the whole rigging would drop to the track and might derail the car.

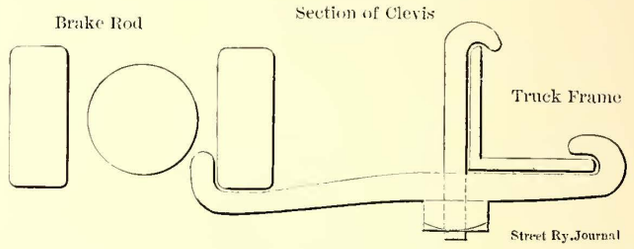


FIG. 3.—HOOK FOR KEEPING BRAKE-ROD AND HANGERS TO CENTER AT JOLIET

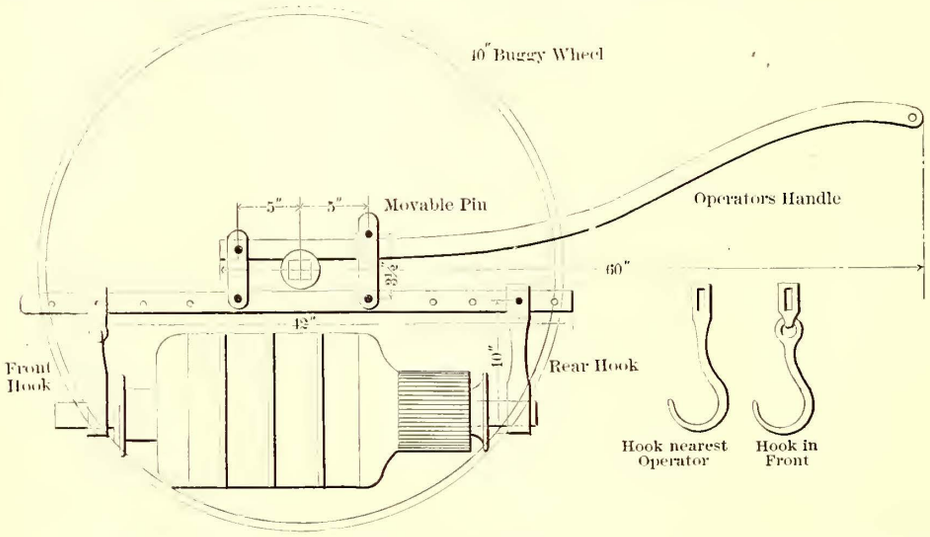


FIG. 1.—ARMATURE CARRIAGE—JOLIET

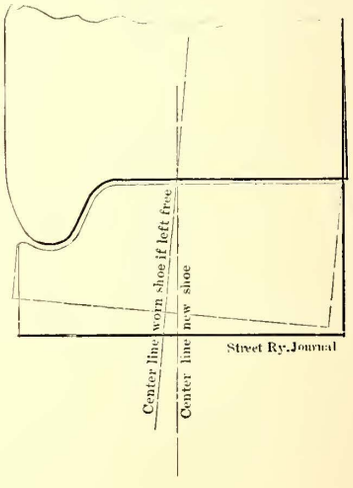


FIG. 2.—SHOWING WEAR OF BRAKE SHOES WITH HANGERS OFF CENTER

G. S. Patterson, Master Mechanic.

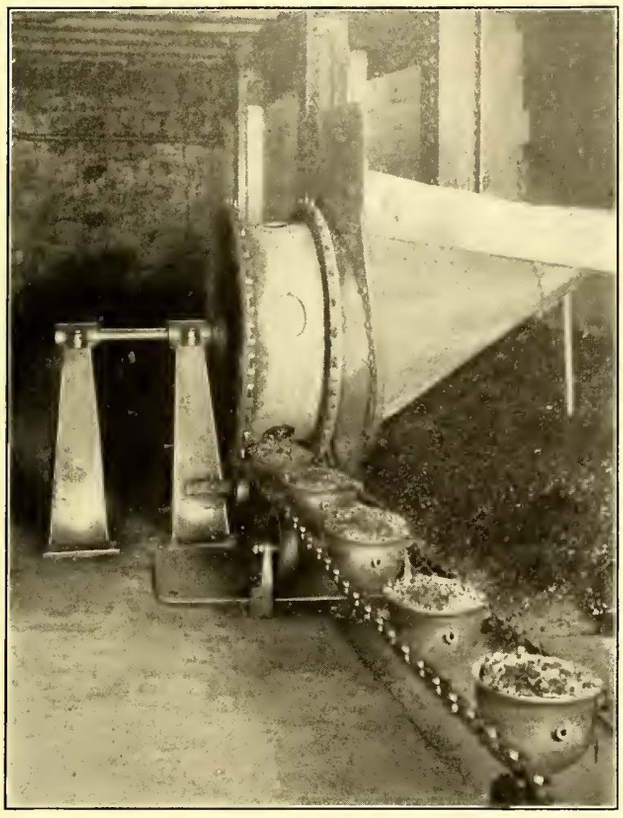
COAL CONVEYING MACHINERY

LINK BELT ENGINEERING COMPANY
Philadelphia, Jan. 25, 1904.

Editors Street Railway Journal:

Some of your readers might be led to believe by Mr. Little's article on page 28 of your issue of Jan. 2, that some of the devices he describes were new and of English origin. As a

matter of fact, the drum feeder described by Mr. Little in the first conveying plant mentioned by him, has been used in this country for a number of years. The accompanying photograph shows one not made by us but built, and in use for a number of years at the Baldwin Locomotive Works, from designs of their mechanical engineer, Charles E. Wolle. It works very well on small coal, but if a stick or a piece of rope happens to be in the



DRUM FEEDER IN THE BALDWIN LOCOMOTIVE WORKS

coal there is trouble at once. The construction of the coal carrier described by Mr. Little is also not new. The same details of malleable iron bucket, steel bar link chains, bush joint, center pin for roller, and hollow roller have been used by us for a long time.

We also take exception, as engineers, to one feature of the coal handling arrangements of the Mersey Railway power house at Birkenhead. Two hoppers for feeding coal are installed, to avoid the risks (as Mr. Little says) of complete shutdown by reason of clogging of the coal in the feed chute; in other words, it seems to be taken for granted that the coal must clog and that a man must be there to clean it out. This problem was solved by American manufacturers of conveying machinery years ago, and there are on the market several devices which will feed from a hopper at a regular rate, without attendance and without danger of clogging, any coal from slack to run of mine.

F. V. HETZEL, Assistant Chief Engineer.

STREET RAILWAY COMPANIES AS PARK OPERATORS

544 La Salle Avenue, Chicago, Jan. 14, 1904.

EDITORS STREET RAILWAY JOURNAL:

Replying to the recent inquiry in your paper regarding the operation of parks by street railway companies, I have come to the very decided conclusion, after a number of years of experience in the management of companies controlling parks, that while a park is a very good thing for a company to own and control it is not a good thing for a company to operate. In my opinion, the only sound basis upon which to operate a park or pleasure resort is to lease it to some person who can give his entire attention to making the park in itself a financial success. If a street railway company attempts to operate a park on its own account the park is sure to be considered not as a revenue producer but simply as a means of producing traffic, and its income and expenditure accounts are not scrutinized with a view to profit and loss as they are by an individual who is running the resort for what he can get out of it. It is desirable that the company own, or in some way control the park, so that it can specify the kind of entertainments that are to be provided, and keep out objectionable features, but beyond that let the park business be taken care of by a specialist in that line. I know from experience that a large amount of money can be sunk in a park each season by a street railway company without half trying, and it takes a large amount of revenue from created traffic to pay the enormous expenses that easily run up in connection with park entertainment, where they are not conducted strictly on a business basis, as any other enterprise which must stand by itself. From my observation plenty of other street railway managers have come to the same conclusion.

Where a street railway company can obtain, say, $400 or $500 in yearly rentals for its park property, I have found it a good idea to use this revenue for additional attractions at the park on days that there are few or no attractions; for instance, some parks are so located that little or no amusement can be had on Sundays. At that time a sacred band concert at the park creates considerable traffic. Real estate for park purposes is generally located in the outskirts of the city or in the country, where land is cheap, and where the interest on the investment is small and can be generally covered by a portion of the rentals received from the lease of the park property to other parties.

C. E. FLYNN.

SPEED-TORQUE CHARACTERISTICS OF THE SINGLE-PHASE REPULSION MOTOR*

BY WALTER I. SLICHTER.

The single-phase commutator motor has attracted considerable attention of late, as there is quite a demand in railway work as well as in numerous other lines for an alternating-current motor that will start under a heavy load with a reasonable consumption of energy. At present it appears that a commutator motor is the only type that will fulfil these conditions.

For some months past the writer of this paper has been in charge of a series of experiments with various types of alternating-current commutator motors. During these experiments much attention was given to the repulsion motor. It is the purpose of this paper to place before the Institute some of the results obtained, and to point out some of the characteristics of the motor which give future promise of making it a very prominent factor in some lines of electric railroading.

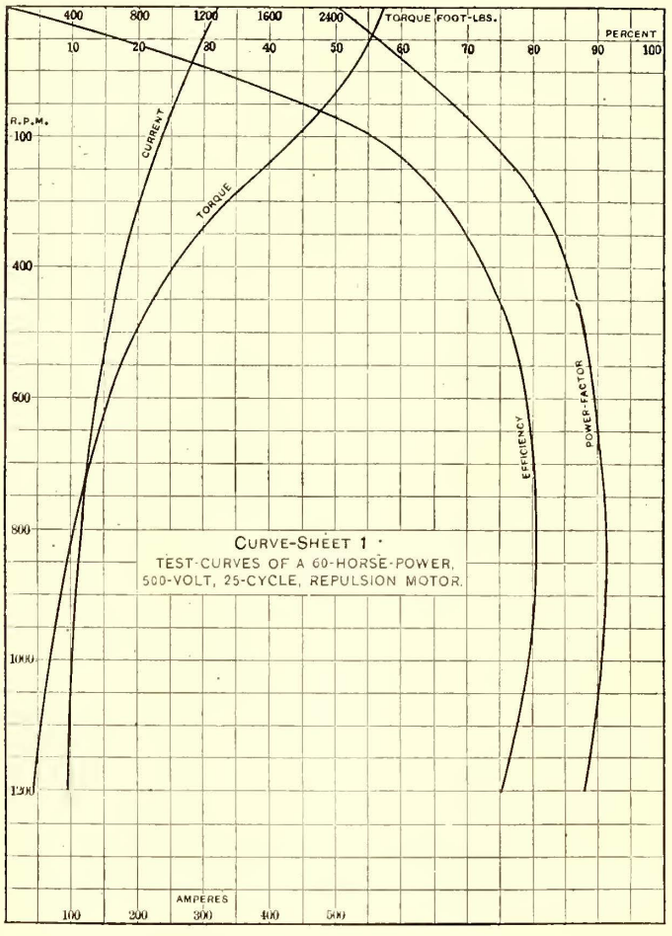
For the benefit of those not already familiar with this type of motor, it may be here stated that it is a single-phase commutating motor, resembling very much a regular direct-current armature in an induction-motor field. The resemblance to the induction motor is carried still further in that there is no electrical connection between the primary and secondary. This makes it possible to wind the primary for a high line voltage, while the voltage of the secondary winding is chosen at such a value as may be commutated satisfactorily, since it is short circuited on itself through its brushes.

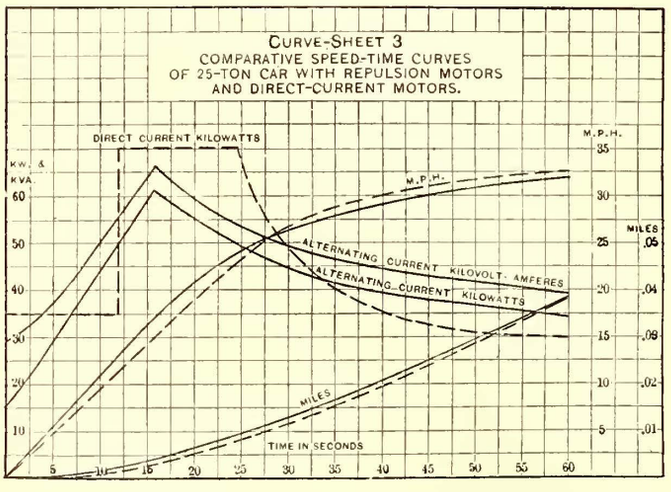
The motor has the same characteristics as the direct-current series motor; namely, maximum torque at starting, increasing torque with increasing current and decreasing speed, and comparatively constant efficiency through a wide range of speed. The maximum speed of the motor is limited only by the load

* A paper presented at meeting of the American Institute of Electrical Engineers, New York, Jan. 29, 1904.

and impressed voltage and has no relation to the synchronous speed.

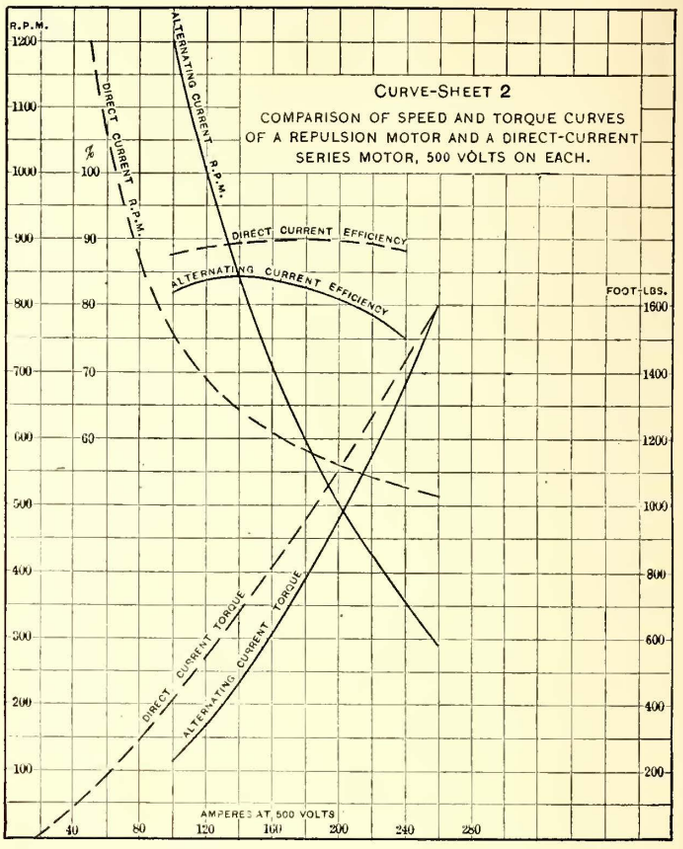
Due to the reactance of the motor circuits, the power factor at starting is low and will be with any alternating-current motor; but in the repulsion motor a low power factor does not mean small torque. On the contrary, the maximum torque occurs simultaneously with the lowest power factor; that is, at starting. The power factor of the repulsion motor rises very

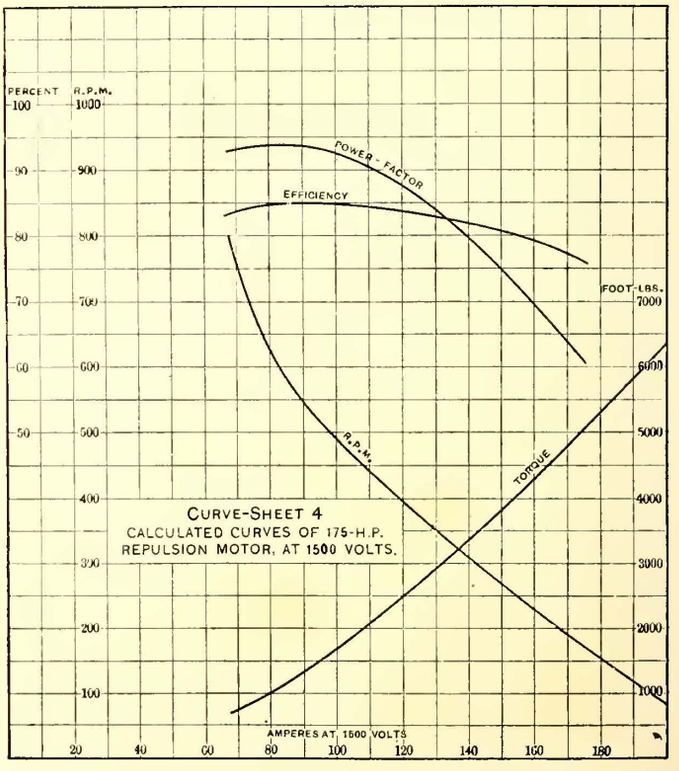




rapidly with the speed; it reaches a good value at one-third synchronous speed, and values near to 90 per cent are obtained over a considerable range of speed. For this reason a large number of poles is not necessary and frequencies of 25 cycles, 40 cycles, and even 60 cycles, may be employed.

The rotating conductors of the secondary cutting the primary flux, generate a leading electromotive force, which causes a leading current to flow therein and gives the high power factor of the motor. In the plain repulsion motor this leading current never reaches a value great enough to compensate entirely for the magnetizing and other wattless currents at available speeds, but the phenomenon is utilized to obtain unity power factor in the compensated type by the addition of a





second circuit. The inherently good power factor of the repulsion motor makes it possible to use larger clearance between field and armature than is permitted in induction motors, thus greatly increasing its value in railway work where comparatively large air-gaps are necessary.

The curves given are partly from test and partly from calculation of motors having air gaps on a side of ⅛-in. and more. The air gap of corresponding stationary induction motors would be .040 in. and more.

The efficiency, while not so good as in a direct-current motor,

is yet very good, reaching values of from 80 to 85, including gear loss for sizes ranging from 50 hp to 200 hp.

Commutation at normal speeds is inherently good, due to the revolving field. As the speed decreases the current increases rapidly, producing a tendency to spark, but with the reduced voltage of starting the rush of current is limited to values within the range of good commutation, as in the direct-current motor. At higher speeds, ranging above one and one-half times synchronism, the frequency of commutation becomes high and sparking appears.

The motor of Curve Sheet 1 will start with 75 per cent of full voltage and twice full-load current with no trouble from sparking. As these curves are prepared upon a railway-motor basis and full-load current will produce a rise of 75 degs. C. after one hour's run, the ability of the repulsion motor successfully to commutate overloads is equal to that of the direct-current series motor; in fact, better, due to the short-circuited commutator which makes flashing-over impossible.

Curve Sheet 1 shows the characteristics of a repulsion motor plotted with revolutions per minute as a base. These curves are taken from tests on a 60-hp, 25-cycle, 500-volt motor; they show the rapidly rising efficiency and power factor and the large torque at starting. The starting torque is 2300 ft. lbs., with an input of 325 amps., and the normal torque during acceleration, 450 ft. lbs. at 750 revolutions and 125 amps. Thus the starting torque is five times normal and the starting current 2.6 times normal; or the torque per ampere at starting is 1.92 times what it is at normal speed, should occasion demand the full starting capacity of the motor.

This gives an idea of the steep speed characteristics of the motor, which are even better shown in Curve Sheet 2. The full lines refer to a later type of repulsion motor and the broken lines to a standard direct-current series railway motor; these curves are plotted in the usual way with current as a base. This shows that the torque increases more rapidly with increasing current in the repulsion motor than in the series; and conversely that the speed of the repulsion motor increases more rapidly with decreasing current than in the series motor. Efficiency, including gear loss, is given, and is 84.5 per cent at the maximum for the alternating-current motor. This motor was designed with the steep speed characteristics for acceleration work, while the motor of Curve Sheet 4 is designed for constant speed running and has not such steep curves but better constants at light loads.

The characteristics show the repulsion motor to be admirably adapted for acceleration work, the efficiency of acceleration being higher than in direct-current work, due to the possibility of obtaining fractional electromotive forces with alternating currents without introducing the dead resistance losses of the direct-current system of control.

This is shown in the curves on Curve Sheet 3, which gives the acceleration curves from tests of a 25-ton car equipped with two 60-hp repulsion motors. The full lines indicate the repulsion motor characteristics and the broken lines those calculated for a direct-current equipment. The gearing is chosen for the same free running speed, 33 m. p. h., the same average acceleration, and the same distance covered in 60 seconds. For the direct-current motor the curve of kilowatts input, miles per hour, and miles traveled, are given as calculated; and for the alternating-current motor the kilovolt-ampere input, kilowatt input, miles per hour and miles traveled from test.

The repulsion motor remains on the controller only 16 seconds, and the direct-current motor 25 seconds. The maximum power taken by the direct-current motor is 70 kw, and by the repulsion motor 61 kw, or 67 kilovolt-amperes. At the end of 25 seconds the total kilowatt-hour input in the two cases is .375 for the direct current and .30 for the alternating current. At the end of 60 seconds both cars have covered a distance of .039 mile, and have reached practically the same speed of 32.5 m. p. h., the kilowatt-hour input being .72 for the direct current and .685 for the alternating current.

By comparing the areas of the kilowatt curves in the two cases the gain, or rather the saving by the use of the alternating current, is readily seen. It is also worthy of note that the volt-ampere input of the alternating-current motor is least at starting; that is, the line current is least. As this is the time at which the power factor is lowest, it is seen that the effect of the low power factor on the regulation of the system is much modified by the small value of the current.

Curve Sheet 4 shows the calculated characteristics of a 175-hp railway repulsion motor having an air gap of .15 in. and wound for 1500 volts and 25 cycles. The efficiency, including gear loss, is 85 per cent at the maximum, and the power factor is 93. Such a motor is designed for heavy, slow-speed locomotive work, which is probably one of the most promising fields for the alternating-current motor. It is readily seen how well it is adapted for freight haulage by the fact that the efficiency of 85 per cent is attained at a speed as low as 500 revolutions, thus permitting a speed of 12 m. p. h. to 15 m. p. h., with a good gear reduction.

Thus the repulsion motor is well adapted for acceleration work as well as for efficient running at light loads, and having good constants at low speeds is well adapted for freight haulage at low speeds.

The curves given in this paper all refer to the simple repulsion motor, the theory of which is given in the paper by C. P. Steinmetz. There are many variations of the repulsion motor, more or less complicated, from which a better power factor and even a better efficiency have been obtained in test. However, a description of these various schemes with their characteristics would require sufficient space to warrant a distinct paper, and it is hoped to present such to the Institute at some future date.

THE ALTERNATING-CURRENT RAILWAY MOTOR*

BY CHARLES P. STEINMETZ.

For electric railroading a motor is required which maintains a high value of efficiency over a wide range of speed. That is, the torque per ampere input at constant impressed voltage must increase with decrease of speed, the speed increase with decrease of load.

In electric motors, torque is produced by the action of a magnetic field upon currents flowing in an armature movable with regard to the field. If then the field is constantly excited—shunt motor on constant potential—the torque is approximately proportional to the current, the speed approximately constant at all loads. If the field is excited by the main current of the motor—series motor on constant potential—the field strength and thereby the torque per ampere varies approximately proportional to the current, and thereby the load, the whole torque approximately proportional to the square of the current and the speed inversely proportional to the current, leaving saturation out of consideration. That is, the motor has the characteristic specified above for a railway motor.

Since the direction of rotation of the direct-current motor is independent of the direction of the impressed electromotive force, with laminated field the direct-current motor can be operated with alternating currents. By the use of alternating currents it becomes possible to transfer current from circuit to circuit by induction, and instead of passing the main-line current through the armature of the alternating-current motor, the armature circuit can be closed upon itself and the current induced therein as transformer secondary by a stationary primary coil in the main circuit surrounding the armature.

* Abstract of a paper presented at meeting of the American Institute of Electrical Engineers, New York, Jan. 29, 1904.

Condition of operation of the direct-current motor type on alternating current is, however, that the current in field and armature reverses simultaneously. This is by necessity the case in the series motor. In the shunt motor, however, the armature current as energy current should be in phase with the impressed electromotive force, while the field current as magnetizing current lags nearly 90 degs. To bring it back into phase, W. Stanley tried condensers in series in the field circuit,

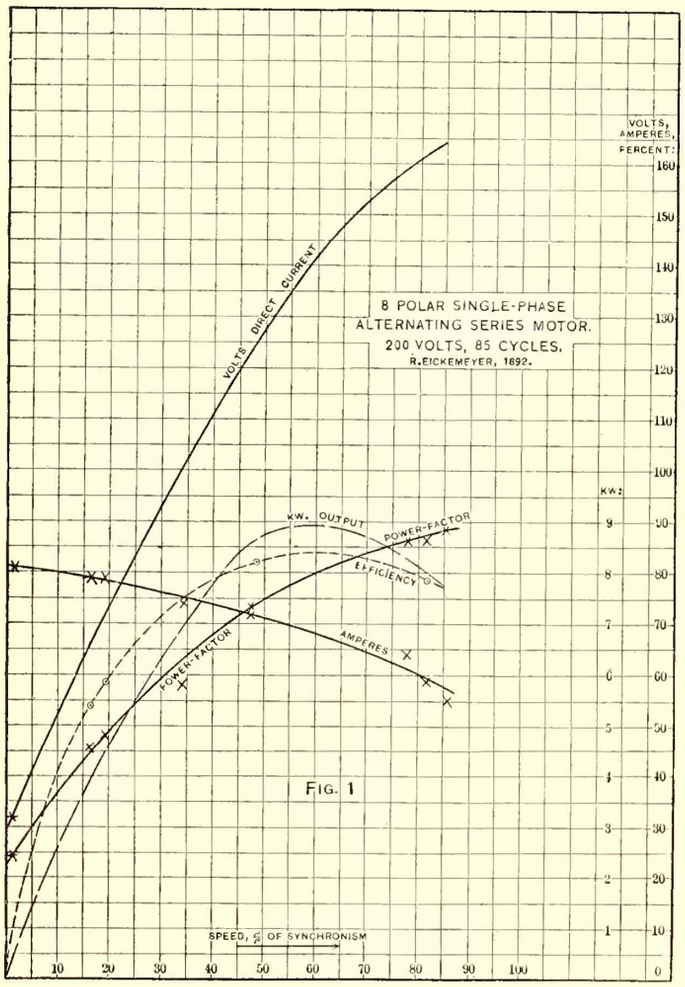


Fig. 1

but failed, due to the impossibility of neutralizing the self-induction of the field, which varies with the commutation and the frequency, by the negative self-induction of the condensers, which varies with the frequency in the opposite direction. The

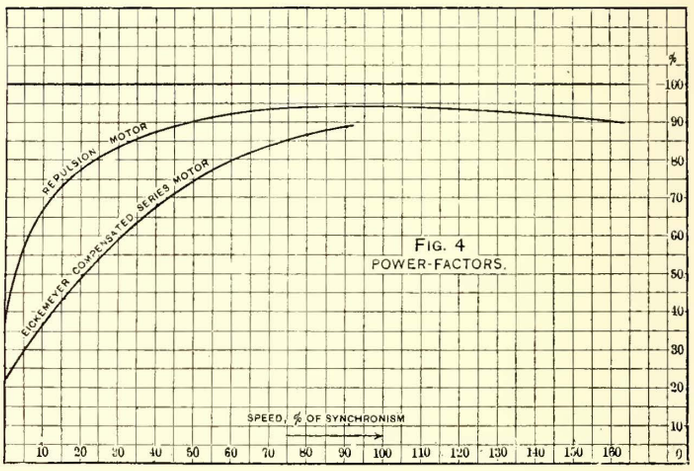


Fig. 4
POWER-FACTORS.

quency of alternation, thereby giving the armature the same number of turns as the field (which is more than permissible in good practice, since good practice requires weak armature and strong field). Even at synchronous speed the electromotive force of rotation of the armature would still only be equal to the electromotive force of self-induction of the field; and the power factor, allowing for an additional self-induction of the armature, would be below 70 per cent. This probably deterred the other engineers from considering the alternating-current series motor.

Eickemeyer solved the difficulty by designing the armature with a number of turns several times greater than the field (24 to 7 in the first motor built) and neutralizing the armature

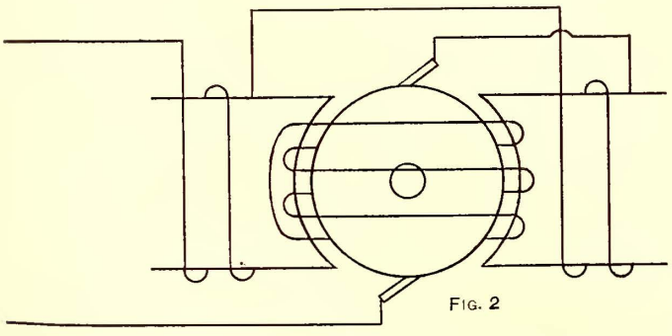


Fig. 2

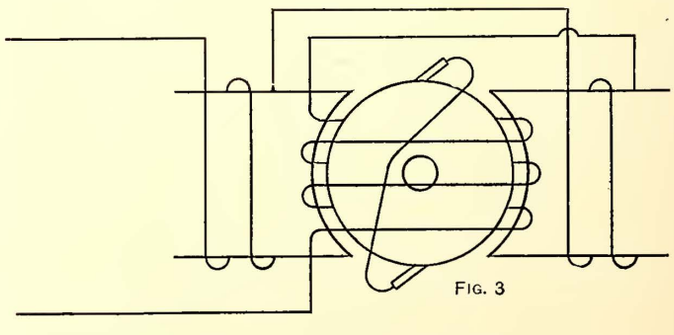


Fig. 3

solution of the problem has been found by the use of polyphase systems, by utilizing for the field excitation the electromotive force in quadrature with the armature currents acted upon by the field magnetism. As I have shown elsewhere, the polyphase induction motor can be considered as a development of the direct-current shunt motor for alternating-current circuits, and, indeed, has all the shunt motor characteristics regarding speed, torque, etc. As a railway motor the induction motor has, therefore, not been exploited, although it has been strongly recommended in those very few cases where it appeared good engineering. Experimental work with polyphase induction motor railways has been carried on continuously since 1893.

While in the early days of alternating-current motor development all other engineers were industriously developing the type with shunt-motor characteristic, only Rudolph Eickemeyer, of Yonkers, was far-sighted enough to realize the absolute necessity of the series motor characteristic for railway work and undertake the development of the single-phase alternating-current series motor. I had the good fortune at that time to be associated with Mr. Eickemeyer.

As was pointed out by G. Kapp, I believe in 1888, the power factor of the alternating-current series motor is inherently low, since the same magnetic flux which induces, proportional to the frequency of rotation, the electromotive force of useful work in the armature conductors, induces in the field coils an electromotive force of self-induction, proportional to the frequency of alternation, thereby giving the armature the same number of turns as the field (which is more than permissible in good practice, since good practice requires weak armature and strong field). Even at synchronous speed the electromotive force of rotation of the armature would still only be equal to the electromotive force of self-induction of the field; and the power factor, allowing for an additional self-induction of the armature, would be below 70 per cent. This probably deterred the other engineers from considering the alternating-current series motor.

Eickemeyer solved the difficulty by designing the armature with a number of turns several times greater than the field (24 to 7 in the first motor built) and neutralizing the armature self-induction and reaction by a stationary secondary circuit surrounding the armature at right angles electrically to the field circuit (the "cross-coil," as he called it), and either short-circuited upon itself or energized by the main current in opposite direction to the current in the armature.

In January, 1891, I tested the first motor of this type, a bipolar motor with the following constants:

Field, two coils of fourteen turns No. 10 B. S. wire, connected in parallel.

Armature, twenty-four coils of four turns each of No. 12 B. S. wire.

Secondary circuit, two coils of eighteen turns each of No. 10 B. S. wire connected in parallel.

At 100 cycles and 150 volts impressed electromotive force, this motor gave a three-fourths synchronous speed:

Current, 45 amps.

$I^2 R$, 400 watts.

Hysteresis and eddy currents, 900 watts.

Total output, including friction, 4000 watts.

Hence:

Efficiency, 75.5 per cent.

Power factor, 79 per cent.

The starting current of this motor at 150 volts was 70 amps.

With a bipolar motor and the very high frequency then used, the speed, 4500 revolutions at three-fourths synchronism, was undesirably high, so we immediately proceeded to build an eight-pole motor. In this, solid copper rings were used as secondary circuits surrounding the armature and neutralizing its self-induction, with an effective copper section more than four times that of the armature conductors. The ratio of armature series turns to field series turns was about four. This motor was tested in 1892. The record of tests is given in Fig. 1, the observed values being marked on the curves. For comparison on this sheet is also given the direct-current voltage required to operate this motor at the same speed and current.

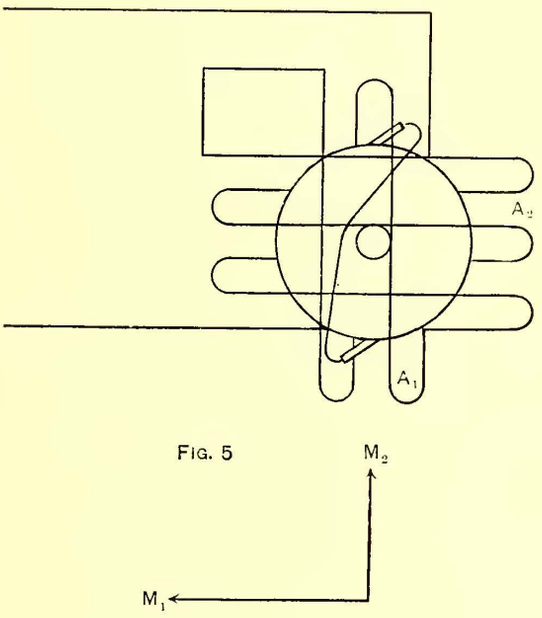


FIG. 5

As seen, when approaching synchronous speed, the power factor is nearly 90 per cent. The commutation was fair at 85 cycles, the highest frequency at which our factory engine was able to drive the alternator, and perfect at 33 cycles.

A number of railway motors of this type were designed. The great difficulty, however, was that during these early days 125 cycles to 133 cycles was the standard frequency in this country, 60 cycles hardly considered, and 25 cycles not yet proposed.

The efficiency of this alternating-current series motor is slightly lower than that of the same motor on direct-current circuit, due:

(1) To the hysteresis loss in the field.

(2) The hysteresis loss in the armature core, which is of full frequency up to synchronism and of still higher frequency, the frequency of rotation, beyond synchronism.

(3) The $I^2 R$ loss in the short-circuited secondary conductors surrounding the armature.

As seen, to make the alternating-current series motor practicable, the transformer feature must be introduced, by having its armature as primary circuit closely surrounded by a short circuited secondary circuit, as shown diagrammatically in Fig. 2.

Instead of closing the stationary circuit upon itself as secondary circuit and feeding the main current into the rotating armature as primary circuit, mechanically the same results would obviously be obtained by using the stationary circuit as primary, energized by the main current and closing the armature upon itself as secondary by short circuiting the brushes and thereby keeping the main current and the line potential away from the armature, as shown diagrammatically in Fig. 3. This introduces the great advantage of reversing the sign of the uncompensated part of the armature self-induction, so that it is subtractive, which results in an essential improvement of the power factor, especially at low speed.

This is shown in Fig. 4, where with the speed as abscissas, in per cent of synchronism, are plotted the power factor of the Eickemeyer compensated series motor of Fig. 1, of ratio armature to field = 4, and the power factor of one of the first railway repulsion motors, of ratio armature to field = 3.5.

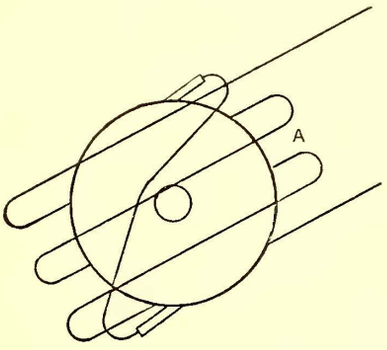
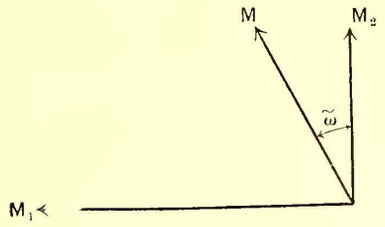


FIG. 6

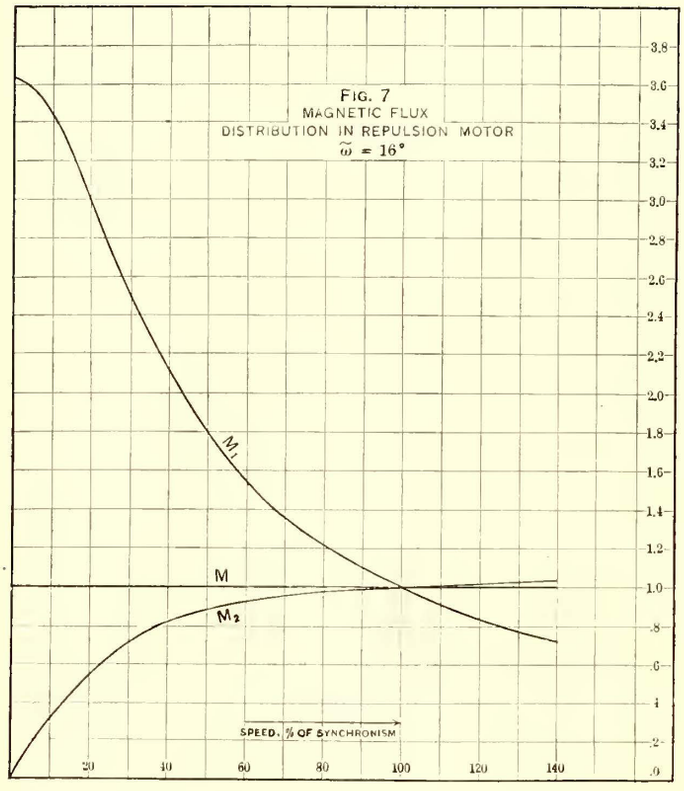


The compensation of the armature self-induction in Fig. 3 is based on the feature of the transformer that primary and secondary current are in opposition to each other. The secondary current of the transformer, however, lags slightly less than 180 degs. behind the primary current; that is, considering it in the reverse direction, is a leading current with regard to the primary current. The current in the armature in Fig. 3 is, therefore, a leading current with respect to the line current, and so not only does not add an additional lag but reduces the lag caused by the self-induction of the field-exciting coil.

This motor then consists of a short-circuited armature surrounded by two coils at right angles with each other and connected in series, as illustrated in Fig. 5; the one, A_2, parallel with the effective armature circuit, acting as primary of a transformer to induce the secondary armature current; the other, A_1, the field exciting coil. The ratio of turns of these coils, n_2 to n_1, is the ratio of effective armature series turns to field turns, as discussed before. Obviously, these two coils can be replaced by one coil at an angle with the position of brushes as shown in Fig. 6, and the cotangent of the angle of the axis of this coil with the position of the brushes is the above ratio; that is, the smaller this angle the greater is the ratio of armature to field turns; that is, the better the power-factor of the motor.

This motor, Fig. 6, is Professor Elihu Thomson's repulsion motor.

In the armature an electromotive force is induced by the alternation of the magnetic field, M_2, of coil A_2, proportional to M_2, and to the impressed frequency and in quadrature with M_2 and an electromotive force is induced by the rotation through the magnetic flux, M_1, of coil, A_1, proportional to M_1, and to the frequency of rotation and in phase with M_1. These two electromotive forces must be equal and opposite, since the armature is short circuited (neglecting the resistance and self-inductive reactance of the armature) and at synchronism. Therefore, M_1 and M_2 are equal and in quadrature with each other; that is, in the armature of the motor, Fig. 5, and, therefore, of the repulsion motor, Fig. 6. At synchronism a



uniform rotating field exists and the hysteresis loss in the armature core is, therefore, zero at synchronism and at other speeds proportional to the difference between speed and synchronism; that is, to the slip, just as in the polyphase induction motor, while in the motor, Fig. 2, the hysteresis loss in the armature core is proportional to the impressed frequency or the frequency of rotation, whichever is the higher frequency. The hysteresis loss of the repulsion motor is, therefore, lower than that of the same motor as compensated series motor.

Unlike the plain series motor, which can never return power into the line, the repulsion motor when reversed becomes a generator, consumes mechanical power as brake and returns electric power into the line, even at low speeds. Experiment verifies this feature.

CITY SCHEDULES IN ST. LOUIS

Important changes in the schedule speed of cars have been made on the lines of the St. Louis Transit Company since the management of the property was taken by A. B. Du Pont, now second vice-president of that company. The interest manifested among other street railway managers in these radical changes which have been taking place during the last three years in St. Louis, and Mr. Du Pont's well-known position as an advocate of fast schedule, led a representative of the Street Railway Journal recently to ask Mr. Du Pont for a brief statement of the facts in the case. These inquiries resulted in bringing out some interesting facts regarding schedule speeds and number of trippers in St. Louis. Mr. Du Pont says that the average schedule speed of the cars in the city service on the lines of the St. Louis Transit Company is now a little over 10 m. p. h. The ordinary schedule during the middle of the day calls for 359 regular cars, to which 520 trippers are added during the rush hours, making a total of 879 cars during the rush hours. These figures alone demonstrate Mr. Du Pont's belief in fast schedules, and it is doubtful whether there is another city the size of St. Louis in the world where the average speed is as fast considering all the conditions; although, of course, there are cities with less congested streets where better time is made. It is also evident that the St. Louis Transit Company's rush hour schedule is most remarkable, as there is an increase of about 144 per cent over the regular schedule. Mr. Du Pont does not believe that a fast schedule increases accidents, but, on the other hand, that it tends to decrease them, as he maintains that the public will not take such chances in a city where fast schedules are common as in a city where schedules are slow and there is more temptation to take chances; in other words, the greater the risk the greater the care on the part of those exposed to it. He believes that fast schedules decrease the operating expenses, unless motors are too small for the schedule, in which case, of course, the saving in conductors' and motormen's wages by the fast schedule would be decreased by motor repairs. As to the great number of trippers, summing up the whole case briefly, Mr. Du Pont says, "I believe in going after the nickel; give people a chance to ride and seats, if possible, at the times when they want to ride the most." In his experience fast schedules tend to increase riding, especially during the noon lunch hour. Now many people ride home to lunch, where formerly they lunched downtown. The large number of trippers during the morning and evening rush hours tends to induce short distance riding, as people now ride who would otherwise walk in preference to taking crowded cars during the rush hours.

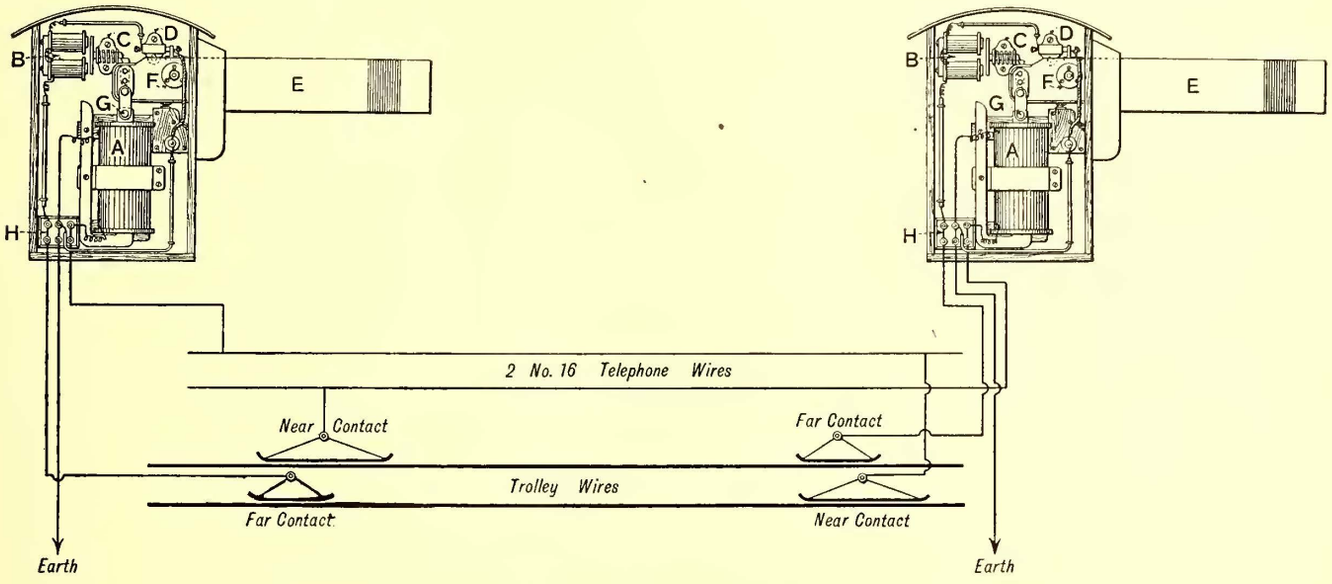
AUTOMATIC ELECTRIC TRAMWAY SIGNAL SYSTEM

An automatic electric tramway signal system, made by Estler Brothers, of London, England, has been in use for some considerable time on a large English corporation tramway, and is reported to be giving excellent satisfaction.

The construction details and wiring of this system are clearly shown in the accompanying illustration. The apparatus consists of a main solenoid (A), which receives current direct from the trolley wire by the special contact plates described below. The solenoid is wound with thin wire, having a total resistance of about 750 ohms, consequently only takes a very small current. In the core of the solenoid is a soft iron plunger (G), which is connected to the semaphore arm (E) by links. The semaphore arm is made of wood, and is free to swing about the pin (F). The normal position of the arm is down, indicating that the line is clear. As soon as a car passes the contact plate connection is made, and current passes through the solenoid, which pulls the signal to horizontal or danger position. It is held in this position by a catch (C) until the car passes the far contact-plate, when current is conducted to the solenoids (B), which release the catch (C), allowing the signal arm to fall. As soon as the signal arm falls the circuit breaker (D) is opened, so that current only flows through the solenoids (B) for a short period. All the necessary electrical connections are made from a small terminal block (H). The whole apparatus is contained in a weatherproof case, and owing to the small number of parts can be relied upon to act without any special attention. The connection between the signals consists of two No. 16 telephone wires supported on insulators.

The wiring connections shown are those used in the case of a single line of track having turnouts which are invisible from each other, but provided with double trolley wires; consequently two signals are necessary and four contact-plates. A car approaching from, say, left to right, would proceed if the signal on the left were down, and would on passing the near contact-plates set the signal on the right to danger. When the car passed the far contact it would release the signal on the right, indicating that line was again clear.

The sleet cutter illustrated consists of a malleable iron casting, the shank of which bolts securely into the harp and fitted with a lock washer to prevent it from working loose. The body of the device is made of malleable iron, and is practically indestructible. The brass which makes the contact is soft enough to take the brunt of the wear, thus saving the trolley wire, and when it is worn out it can be easily replaced at a small cost. This cutter fits snugly in the harp, and is so designed that it offers no obstruction which could catch on the



DETAILS OF AUTOMATIC ELECTRIC TRAMWAY SIGNAL SYSTEM

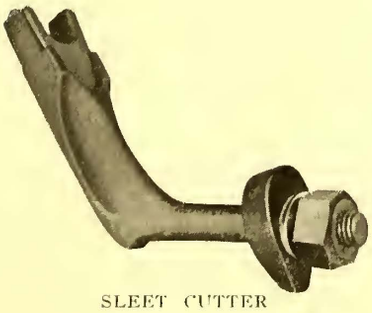
The contact-plates consist of flat plates suitably suspended above the trolley wire. A smooth contact is made between plate and trolley wire by the trolley wheel, as the plates are supported by means of springs.

The manufacturers state they have found it unnecessary, especially on town service, to provide lamps in the signal apparatus, as the lights on the car give ample illumination to see the semaphores at night.

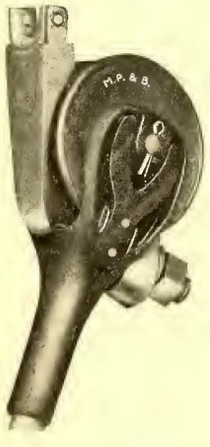
AN EFFICIENT SLEET CUTTER

The accompanying cuts illustrate the O. K. sleet cutter, manufactured by Porter & Berg, of Chicago, which has met with very flattering success during the three years it has been on the market. The makers state that it is now used by almost all of the electric railways throughout the Middle West and in many other places where sleet is encountered.

The removal of sleet from the trolley wire is a matter of great importance to any operating road, and to accomplish this work expeditiously a device which may be attached directly to the harp, without disturbing the wheel, is of self-evident value.



SLEET CUTTER



SLEET CUTTER ON TROLLEY WHEEL

span wire or overhead construction when the trolley leaves the wire.

If each car is equipped with one of these sleet cutters, the motorman can easily attach it to the harp, whenever the necessity for its use arises, without loss of time, thus enabling him to maintain his time schedule and avoid much annoyance.

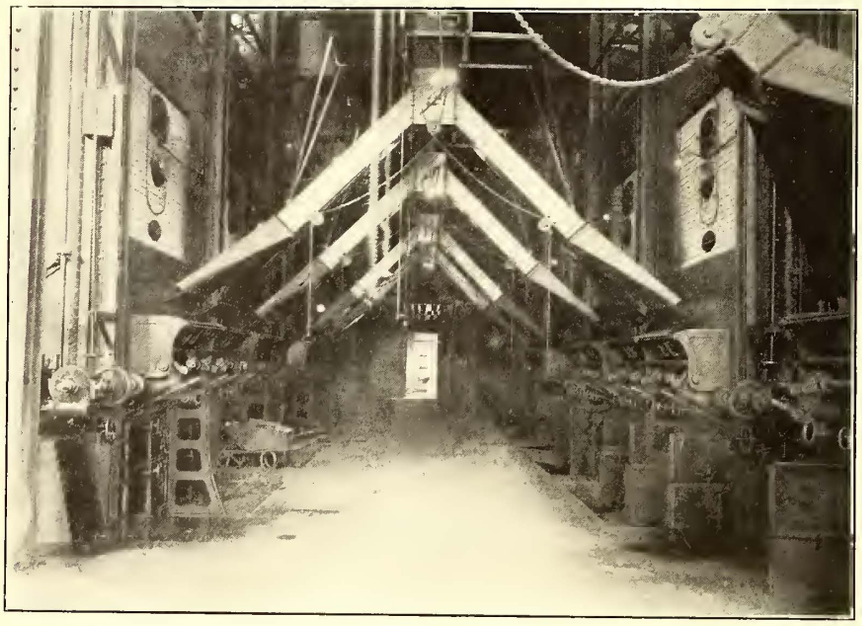
WATER-TUBE BOILERS IN ENGLISH TRAMWAY STATIONS

The increasing use of water-tube boilers in large power plants has been due not only to their greater safety over fire-tube boilers but also to the many improvements in their design made during recent years. The Stirling Boiler Company, Limited, of Edinburgh, has given much attention to this subject, and its water-tube boilers embody many excellent features. A large number has been adopted in important municipal undertakings; among these may be mentioned tramway stations for the London County Council, also Liverpool, Kirkaldy and Sheffield Corporations. The accompanying illustration shows nine Stirling boilers for the Mersey Railway. Each of these boilers is to develop 1500 hp, probably the largest units in England. A valuable testimony to the merits of the Stirling boiler is the number installed with leading engineering firms of wide knowledge and experience, such as Vickers Sons & Maxim, Siemens Brothers & Company, Limited, D. Colville & Company, Limited, Sir B. Samuelson & Company, Limited, and many others.

The Stirling boiler has three top and two bottom drums, connected by four banks of tubes. The tubes can be renewed individually, and as they are expanded direct into the drums the construction is very simple. There are no complicated headers and joints requiring elaborate machine work. The top drums are carried by a girder framework independent of the brickwork, and as the bottom drums are built clear at the ends they are free to move with any expansion or contraction of the tubes; thus strains due to this cause are completely avoided.

The three steam drums are all connected above the water level by tubes, and likewise the front and mid drum, below the water level. The main tubes are straight throughout the greater part of their length, but curve with easy bends toward each end, to enable them to enter the drum radially.

The combustion chamber has its three sides lined with fire-brick, the action of which assists to perfect the high-temperature combustion caused by the effective mixing of the furnace gases in the large combustion chamber before the gases give out their heat to the water-tubes of the boiler. The banks of tubes have fire-brick baffles arranged between them, which cause the hot gases from the furnace to take a devious course along and between them. The temperature of the outgoing gas is said to be reduced to such a minimum that no economizer is necessary.



BOILER DIVISION OF MERSEY RAILWAY POWER STATION

It will be evident also that the circulation of the water should be good. Every tube has a free outlet to the drums at each end, so that all steam formed has the full area of the tube for its passage to the steam space, and is not confined in narrow necks or headers. The bottom drums maintain a supply of water ready to take the place of the steam formed, so that there is no possibility of tubes being filled with steam only. The steam is made principally in the two front banks of tubes, and these tubes are inclined at a good angle for allowing the steam to pass freely to the steam space, while the circulation of water between the front and middle drums is very free through the numerous tubes which connect them below the water line. The water level is about the center of the top drum, so that the steam and water spaces are considerable, and fluctuations of the water level are not rapid. The feed-water is led into the top back drum and passes slowly down the back bank of tubes into the back bottom drum, where solid matter and impurities are deposited. The water then slowly passes into the front drum, where it joins the general circulation.

This arrangement of the admission of the feed into the back section is claimed to achieve the important result that deposition from the water takes place at the rear of the generator, where the temperature is not sufficient to cause injury through overheating. The Stirling boiler is stated to have a very high efficiency, mainly due to this cause and to the large fire-brick combustion chamber, which maintains a high initial temperature, and insures perfect combustion of the fuel. For this reason fuel of inferior quality can be used, and it is said this is now being done in a number of cases with remarkable economy in the cost of steam produced.

A feature of the Stirling boiler, in its improved form, is the ease with which it can be examined, as by removing a man-door (of the usual internal pressure type) on each drum, access is gained to the inside of every part of the drums, which being from 3 ft. to 3 ft. 6 ins. in diameter, are ample in size, and to the ends and interior of every tube. The easy bends of tubes can be readily cleaned, special provision being made for the thorough and easy cleaning of the tubes from the scale—whether soft or hard—and the tubes being vertical facilitate this. The boiler is also very simple to repair, being so designed that any single tube can readily be replaced without disturbing others in the event of a tube giving out. A temporary repair can be easily effected by plugging a tube and replacing it at a more convenient time.

From reports which have been made on the working of this boiler, and more particularly of tests made by Professor Ewing, it would appear that the steam produced is exceptionally dry, owing to the rapid circulation described above, and to the manner in which the steam outlet is arranged. It is stated to be impossible for any priming to take place, even when the boiler is forced to its utmost. From an actual test with a "Stirling" boiler worked by means of forced draft till it was evaporating 100 per cent more than the guaranteed amount, the percentage of moisture in the steam was less than one-tenth of 1 per cent.

The manufacturer of this boiler also makes mechanical stokers, superheaters and other accessories specially designed to suit boilers of this type.

RCSC

AN INTERESTING ADDITION TO CONVERTIBLE CARS FOR THE WASHINGTON WATER POWER COMPANY

In the Street Railway Journal of May 2, 1903, an article was published describing sixteen convertible cars built for the Washington Water Power Company, of Spokane, Wash., by the J. G. Brill Company. Attention was then called to the fact that the Washington Water Power Company bought the second Brill convertible car built, and after a thorough trial for determining its wearing qualities and capacity to retain warmth, purchased another car of larger dimensions, and later the sixteen cars referred to. The last lot was the first in which the builders' convertible and Narragansett types were combined.

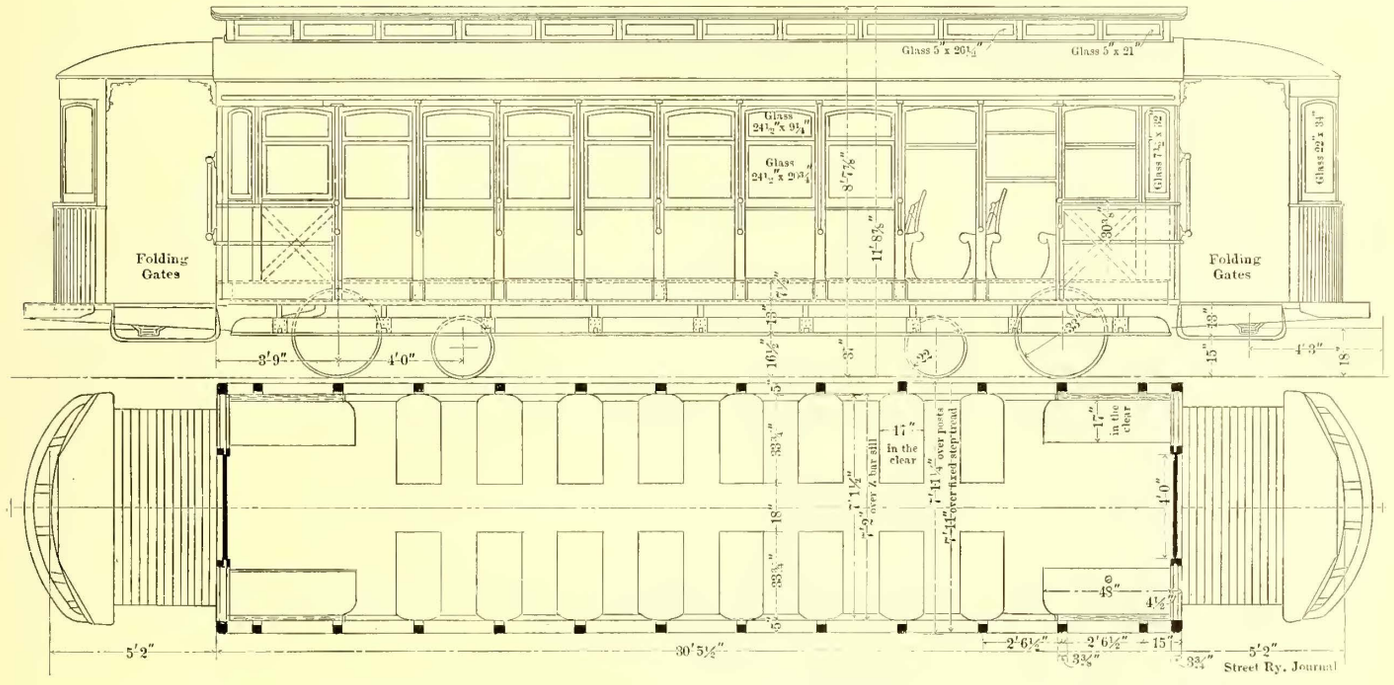
A few months ago the railway company ordered ten more convertible cars of practically the same dimensions as the former lot, and later increased the order to twelve. One of these cars is shown in the accompanying illustrations, and is especially interesting on account of its being the first of this type to have the section between the double corner posts and the first corner posts solidly paneled. The builders' practice in this type is to connect the double corner posts with solid panels, but to provide for longitudinal seats at the corners the additional solid panels have been included, and it is expected that in the future all double-truck convertible cars and many of the single-truck cars will comprehend this feature. Railway men generally are appreciating the value of extra space just inside the doors of their closed cars, to prevent crowding at this point and to facilitate egress and ingress. In the former arrangement of this car single seats were used at the corners; and, therefore, when the car was closed, the space between the doors and the entrances to the aisles was too limited. In the new arrangement the clear space between the longitudinal

corner seats is 4 ft., and from the door to the cross-seats 5 ft. 3 ins. One can readily see that there are no disadvantages with this arrangement. Passengers occupying the corner seats may enter and leave at the side entrances next to the seats or by the platforms. The longitudinal seats are 4 ft. long, giving generous space for three persons. There is, of course, additional strength in the longer solid paneling, obtained by the cross-bracing shown in the diagram, and also by the convex and the concave panels, the belt and the window rails. All spaces between the panels and the side linings not occupied by the bracing are solidly blocked in.

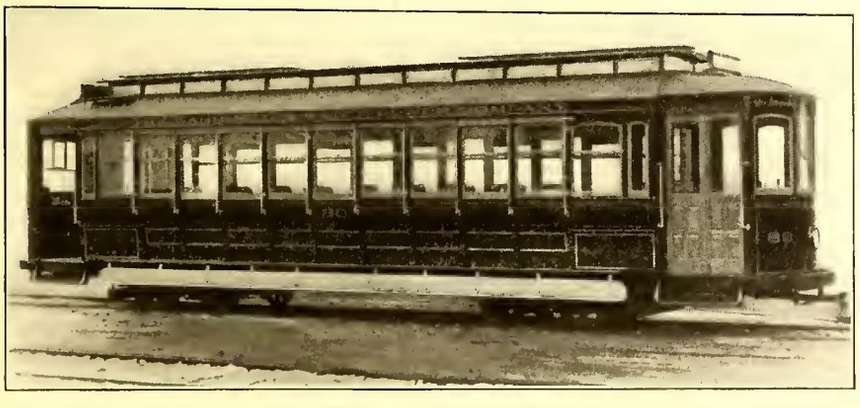
It will be noticed from the illustrations that side steps, or running boards, are practically as low as the platform steps, and that the steps on the outward-extending lower flange of the Narragansett type of Z-bar sills are practically on the same level with the platforms. Side entrance is, therefore, made as safe and as easy as by the platforms. The large double-sash windows of the solidly paneled sections are raised into the roof pockets on the same system as the rest of the windows. The runways which guide the metal trunnions at the sash corners are of metal for their full length, precluding all possibility of sticking. The distance from center to center of the side posts is 2 ft. 6½ ins., the posts are 3⅜ ins. thick, and the corner posts 3¾ ins. Other dimensions are shown on the accompanying diagram.

CONVERTIBLE CAR PARTLY OPEN

The movable panels are composed of two sheets of thin, flexible steel, held apart by horizontal slats, which are tapered at the ends to allow a slight compression at the edges of the outer metal sheet, thus making it water-tight. When the panels are raised into the roof pockets their position is directly behind the head linings. The cars are handsomely finished in ash, and have ceilings of decorated birch, giving a light and pleasant effect. Guard rails on either side are of a single piece, and held under the waterboard by patented gravity catches when not in use.



CONSTRUCTION DETAILS OF CONVERTIBLE CARS FOR WASHINGTON WATER POWER COMPANY



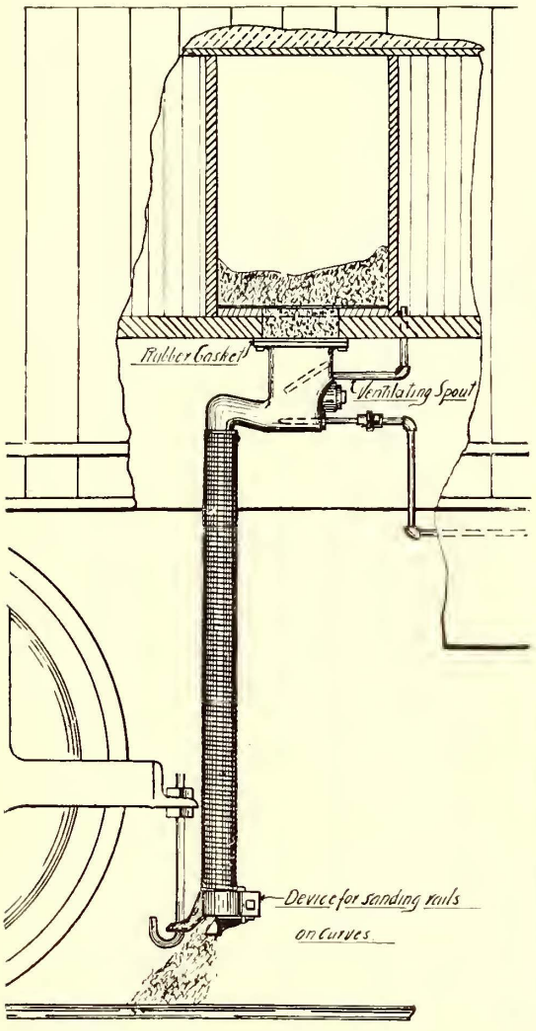
CONVERTIBLE CAR CLOSED

The cars are mounted on Brill "Eureka" maximum traction trucks, having solid forged side frames and a wheel base of 4 ft. The driving wheels are 33 ins. in diameter, and the pony wheels 22 ins.; the axles are 4 ins. The trucks are equipped with 38-hp motors. The sand-boxes, which are of the builder's make, have extra large hoppers, occupying all the available space under the corner seats. Among other specialties used on these cars are channel-iron radial draw-bars, "Dedenda" alarm gongs, angle-iron bumpers and folding gates.

PNEUMATIC RAIL SANDER

The accompanying cut shows some details of the Ham air sander, manufactured by the Ham Sand Box Company, of Troy, N. Y. This sander has been in use on many railways during the past two years, and is stated to be giving excellent service.

This sander possesses a number of special features, among these being the shelf for preventing sand from packing in the bottom of the box, the air space under the shelf and a vent pipe communicating with same for drawing off all moisture from condensation. The latter feature is a very desirable one, as moisture has been the cause of much trouble in sanders formerly used. The cut also shows this maker's special device for sanding rails on curves. This method is reported as having given satisfaction ever since its introduction two years ago.



PNEUMATIC RAIL SANDER

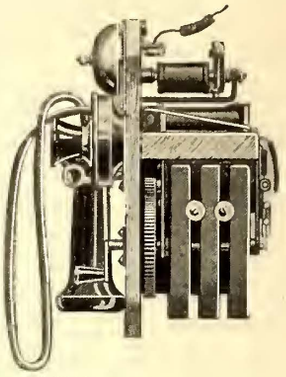
BOSTON & WORCESTER STREET RAILWAY COMPANY PLANNING FREIGHT LINES

The Boston & Worcester Street Railway Company is rapidly effecting plans so that freight may be carried over its lines under the privileges granted by the Commonwealth. The necessary rights to operate the express cars through the several towns have been granted by the authorities of Shrewsbury and Westboro, and arrangements have been been made for hearings in Southboro, Wellesley and Newton.

When the rights in the latter places are secured, the route will be completed for the entire run from Worcester to the tracks of the Boston Elevated Railway Company. The Boston & Worcester Street Railway Company hopes to do an immense business in bringing market garden produce into Boston.

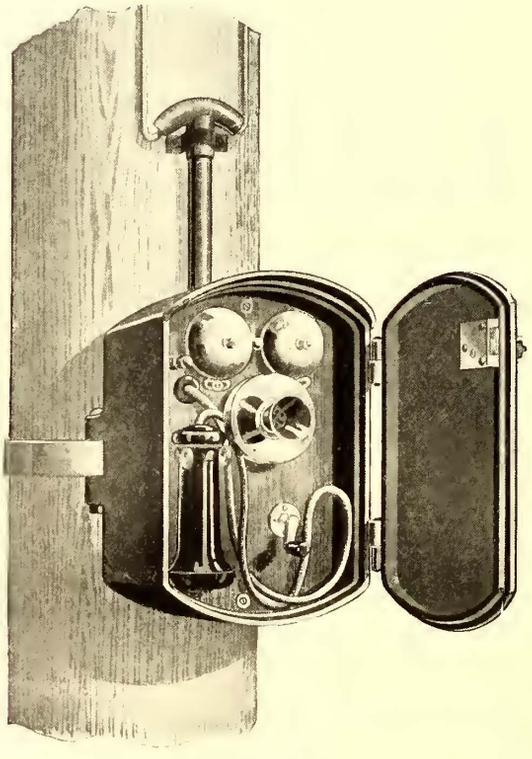
RAILWAY TELEPHONES

A new line of telephone apparatus especially adapted to meet the conditions existing on street railways and interurban lines, has been recently perfected and placed on the market by the Mayer & Englund Company, of Philadelphia. The accompanying illustrations represent two of the principal types of these telephones.

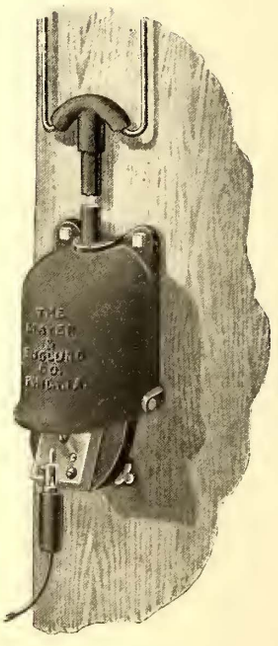


DETAILS ON BOARD

One illustration shows an iron box telephone to be attached to either iron or wood poles. The outer case is made of malleable iron with door equipped with a Yale lock, the whole apparatus being entirely weatherproof. All of the working parts of this telephone, including batteries for the local circuit, are attached to one back board, which is held in place in the iron box by two screws. This greatly facilitates the work of inspection and repairs, as by removal of the two screws the entire mechanism can be taken out, leaving the empty iron case on the pole. As all the inside parts of the telephone are interchangeable, the entire telephone system can easily be kept in good condition by having one or more extra sets of parts on hand mounted on the board.



POLE TELEPHONE



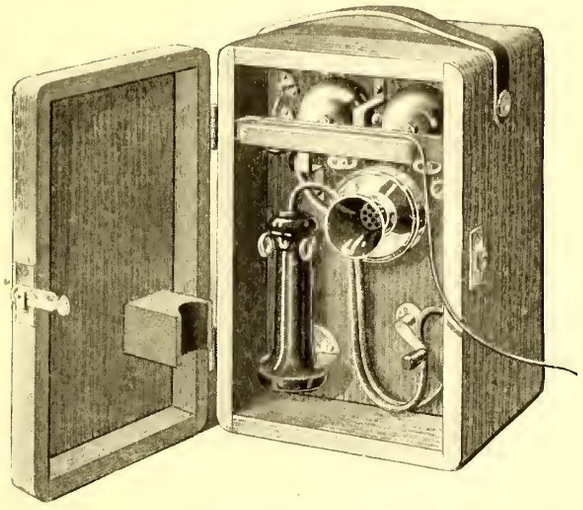
JACK BOX

Another illustration shows a portable car telephone. The inside arrangement of the details of this instrument, which are all mounted on one board, as well as the operating parts themselves, are precisely the same as in the pole telephone, the only difference being that this outfit is installed in an oak box with leather carrying strap.

This instrument is equipped with 10 ft. to 20 ft. of cord, at the end of which is attached a plug inserted in the specially designed jack box, shown in the accompanying cut. These jack boxes are made of malleable iron, are entirely weatherproof, and under all ordinary conditions are also tamper-proof. Jack boxes may be installed on poles along the line about every half mile, and communication had with the central office by plugging

in at these points. The length of the cord will allow the motorman to leave the instrument in the vestibule of the car, so that the instrument need not be exposed while in use, the vestibule being virtually a telephone booth.

All of these instruments are made with standard long-distance transmitters, bipolar receivers and full-size hooks, with ample contact surfaces. Although both of the instruments illustrated are compact, they do not contain any miniature



PORTABLE CAR TELEPHONE

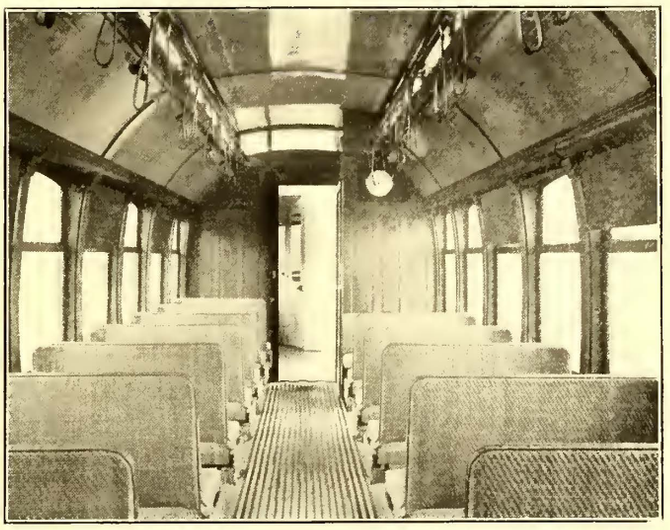
parts, everything being full standard size, and, therefore, conveniently and quickly renewed. The generators are ordinarily wound for 40,000 ohms, and the ringers for 1600 ohms.

The Mayer & Englund Company has already sold a large number of these instruments, which are said to be giving perfect satisfaction. The company announces in this connection that it will soon issue a complete descriptive catalogue of these telephones as well as standard wall and portable telephones.

CARS FOR THE NEW COEUR D'ALENE-SPOKANE LINE

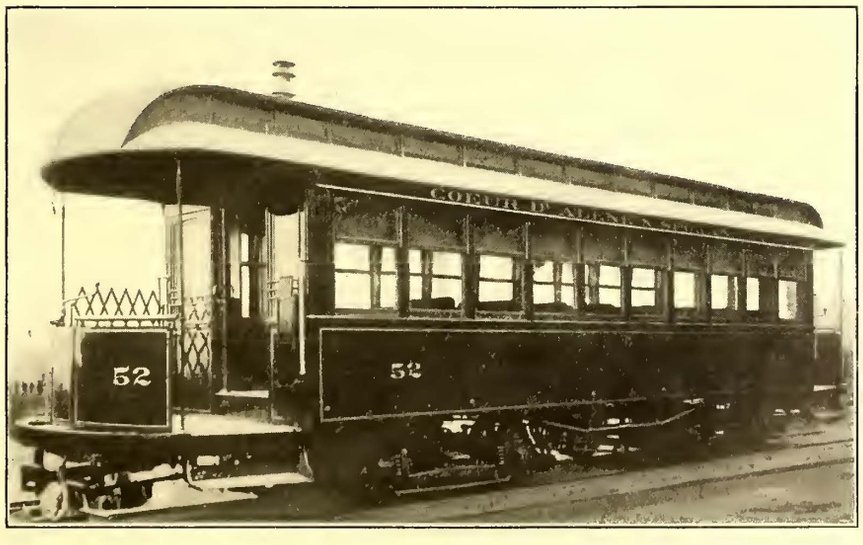
The Coeur D'Alene & Spokane Railway, which has recently been put in operation, is the second electric system in Idaho. It extends from Coeur D'Alene, which is situated on the lake of the same name, in the northern part of the State, to the city of Spokane, Wash., distant about 35 miles. The road traverses the valley of the Spokane River, which has its source in the Coeur D'Alene Lake. The richest mining district in the State is in the vicinity of Coeur D'Alene, and as Spokane is the nearest large commercial center the new road will undoubtedly do a flourishing business.

INTERIOR OF PASSENGER CAR ON COEUR D'ALENE & SPOKANE RAILWAY



INTERIOR OF COMBINATION PASSENGER AND BAGGAGE CAR ON COEUR D'ALENE & SPOKANE RAILWAY

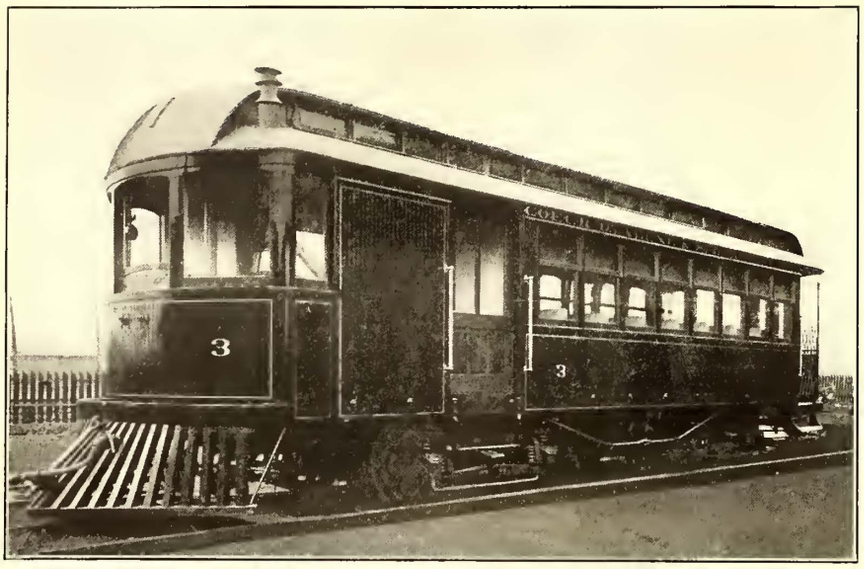
The American Car Company has delivered to the railway three semi-convertibles with 28-ft. bodies, three combination passenger and baggage semi-convertibles with 34-ft. 4-in. bodies, and two baggage and express cars with 40-ft. bodies. The cars are mounted on Brill 27-E-1 trucks, capable of a speed that will rival the steam road which parallels the line. The trucks have solid forged side frames, a wheel base of 6 ft., and 33-in. wheels.



PASSENGER CAR FOR THE COEUR D'ALENE & SPOKANE RAILWAY

The straight passenger semi-convertible cars are 38 ft. long over crown pieces, and from end panels over crown panels are 5 ft.; width of cars over sheathing, 8 ft. 4 ins.; the side sills are 4 ins. x 7¾ ins., and end sills, 5¼ ins. x 7¾ ins. Besides upper and under trusses, 12-in. x ⅜-in. sill plates are included. The interiors are finished in cherry with birch ceilings. The seats are upholstered in plush, are 36 ins. long, and the aisles 23½ ins. wide. These cars are seated for thirty-eight passengers. At one end there are twin doors, and at the other a single door, which is offset to give

ample space for the toilet room in the corner. Provision is made for passing from one car to another (when operated in trains, which is the intention) by removing panels from the centers of the dashers. Single steps are used, their height being 17⅞ ins. from the rail head, and 14 ins. from step to platform.



COMBINATION PASSENGER AND BAGGAGE CAR ON COEUR D'ALENE & SPOKANE RAILWAY

The combination passenger and baggage cars are 39 ft. 4 ins. over crown pieces, and are intended to run in one direction. They are equipped with cow-catchers of standard type. The baggage compartment at the forward end includes the motorman's cab. These cars are of the same width as the straight passenger cars, and their sills are of the same dimensions. The passenger compartment seats thirty passengers, and folding seats are placed against the sides of the baggage compartment for the use of smokers. The toilet room is located in the passenger compartment next the partition. These and the straight passenger cars are of the Brill patented semi-convertible type.

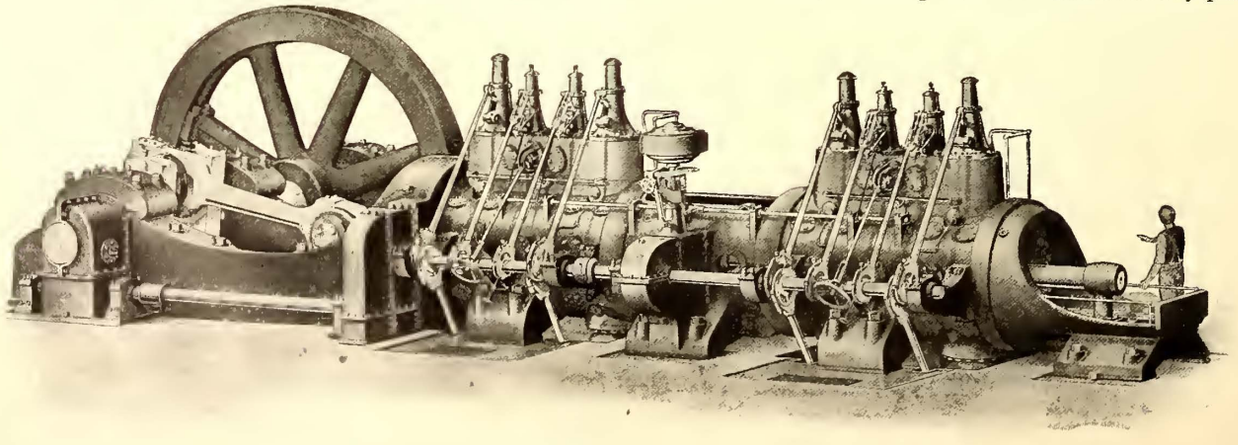
The baggage and express cars are very strongly constructed, as they are expected to carry heavy loads. The side sills are 5¼ ins. x 7⅞ ins., and are substantially trussed. The trucks are Brill No. 27-E-1, with 6-ft. 6-in. wheel base. Five-foot sliding bars are provided at either side, and 36-in. swinging trusses at diagonally opposite corners.

THE ALLIS-CHALMERS NURNBERG GAS ENGINE

The Allis-Chalmers Company has acquired sole rights for and is now building in the Edward P. Allis Works at Milwaukee, the Nurnberg gas engine illustrated herewith. This engine is built in units ranging from 130-brake horse-power to 6000-brake horse-power, to operate with all classes of gaseous fuel, and is adapted to all work that can be performed by a stationary steam engine, including the driving of alternating-current generators for light and power purposes. It is of the 4-cycle double-acting type. Like a modern steam engine, it will develop the same power with a cylinder of one-half the cubic contents required by the older type, while an equal number of Nurnberg cylinders will give to the crank shaft a double number of impulses. In its standard construction, with two cylinders placed in tandem and a single set of transmitting parts, the Nurnberg gas engine utilizes these parts to their full extent, instead of only 25 per cent, as is the case in the ordinary single cylinder, single-acting gas engine; and it accomplishes this without increasing the maximum stresses to which the moving parts are subjected. The valves are operated by means of eccentrics in place of noisy and short-lived old-time cams. The pistons are positively supported by outside cross-heads running on cool slides, so that the cylinder walls are not called upon to bear any weight, and their efficient lubrication and permanent tightness are assured. The inlet and governing valves and their gearing are readily accessible and always in sight, while the exhaust valves are located at the lowest point of the cylinder, to ensure the expulsion of such solid matter as may be carried into the cylinder by the gas, or result from carbonization of the lubricant. The cylinder heads can be removed and replaced without the disconnection or deranging of any part of the valve gearing, and, likewise, the pistons may be withdrawn from their cylinders, examined and fitted with new rings, without disturbing any valve mechanism, or even the metallic packing of the piston rods. In a similar manner access to the inside of the cylinder and valve chambers is rendered easy and quick. All parts of one cylinder are interchangeable with any corresponding parts of all other cylinders of the engine. Regulation is attained by the use of an ordinary, high grade, fly-ball governor. The crank-shaft is journaled in bearings of special construction, giving firm support without undesirable rigidity.

Care has been exercised to allow all parts of the engine full freedom to expand and contract without endangering its perfect alignment. Extensive and carefully distributed water-cooling is provided for, and important moving parts are automatically lubricated under pressure by special oil pumps.

The Nurnberg gas engine has been thoroughly developed, perfected and proved by its original designers and builders in Germany, and its introduction into this country by the Allis-Chalmers Company is an event of importance to power producers and users, including owners of street railway properties.



THE NURNBERG GAS ENGINE

LEGAL DEPARTMENT

CONDUCTED BY WILBUR LARREMORE OF THE NEW YORK BAR.

DEFECTIVE TRANSFER TICKETS

In Indianapolis Street Ry. Co. vs. Wilson, decided by the Supreme Court of Indiana in March, 1903 (66 N. E., 950), it was held that where a passenger is aboard a street car without the proper transfer ticket, which is due to the mistake or fault of the conductor of the car from which he was transferred, and not to the fault of the passenger, the conductor in charge of the car must accept the reasonable explanations of the passenger in regard to the transfer in dispute.

It was further held, that under the facts disclosed in that case, an action for the forcible expulsion of the passenger from one of the defendant's cars would lie, as the conductor's action because of defects in the transfer ticket was unjustifiable. The Indiana court cites and analyzes a large number of authorities in the courts of the different States of the Union in support of its conclusion.

In Jacobs vs. the Third Ave R. R. Co., impleaded with the Dry Dock, East Broadway & Battery R. R. Co. (71 App. Div., 199), the Appellate Division of the New York Supreme Court, First Department, rendered a decision which is in accord with, and even tends to extend the scope of the conclusion reached by the Indiana Court. It was held that where two street railroad companies, for a valuable consideration, agree to accept transfer tickets issued by each other, the conductor of one of the companies, in issuing a transfer ticket entitling the holder to ride upon the cars of the other company, acts as the agent of the latter company. It was further held, that under such circumstances the status of a person riding upon a transfer ticket is the same as if he had paid a cash fare; and where, owing to a mistake of the conductor who issued the transfer ticket, in punching thereon the time it was issued (which mistake the passenger was unable to discover owing to his ignorance of the meaning of the numbers upon the transfer ticket), a conductor, employed by the second company, refuses to accept the ticket, ejects the holder from the car and causes his arrest and imprisonment, the latter company is liable in damages, notwithstanding that the conductor acted in good faith, without malice and with a desire to protect the property of the company. It was also decided that the company cannot shield itself from liability to the passenger under a rule adopted by it respecting the recognition of transfer tickets.

The discussion in the New York case turned entirely upon the possible division of responsibility, and, therefore, of liability, between two distinct but co-operating companies, and it was held that there was a sufficient common interest in the fares received, under the provisions of the traffic agreement, to render the company upon which a transfer pass had been issued liable for the illegal expulsion of a passenger in like manner as if it had been the original company.

In view of the reasoning of the Indiana Court, and the many authorities cited by it, and also in view of the New York decision, applying the principles in question even as to separate but co-operating companies, there seems little doubt that the doctrine of liability upon the issue of transfers must be generally accepted.

It is true that the New York Court of Appeals has recently held, in Monnier vs. N. Y. C. & H. R. R. R. Co. (175 N. Y., 281), that the fact that a railroad passenger, by reason of the absence of the ticket agent, is unable to procure a ticket before entering the train is no justification for his forcible resistance to an ejection therefrom, when, having refused to pay the additional fare required of passengers without tickets, by a rule of the company, made under express statutory authority, the conductor, without undue force, ejects him; and neither the company nor the conductor is liable for damages in an action for an assault and battery brought by the passenger. The court takes the ground that under such circumstances it is the duty of the passenger to pay the additional fare or submit to an ejection, and then resort to his remedy for the negligence or mistake of the ticket agent. This decision is by a bare majority of the New York Court, and rests upon peculiar considerations of public expediency and convenience. There are, however, decisions to the same effect in the courts of other States.

In Townsend vs. N. Y., C. & H. R. R. R. Co. (56 N. Y., 295) it was held that a regulation of a railroad company requiring passengers either to present evidence to the conductor of a right to a seat, when reasonably required so to do, or to pay fare, is reasonable, and for non-compliance therewith a passenger may lawfully be put off the train; that the wrongful taking of the passenger's ticket by the conductor of a previous train, in which the former has performed part of his journey, does not exonerate from compliance with this regulation; that for the wrongful act of the former conductor the company is liable, but that this does not justify the passenger in violating the company's lawful regulations upon another train. The recent decision of the Supreme Court of Maryland in W. M. R. Co. vs. Schaun (55 Atl., 701), is to the same substantial effect as Townsend vs. R. Co., though there are many cases the other way, and the weight of authority would seem to be against the New York and Maryland doctrine.

Undoubtedly, these decisions by the New York Court of Appeals, involving inability to procure a ticket at the ticket office and cases of defective tickets, are somewhat allied in principle to cases of defective passes issued by street railway companies. In the steam railroad cases cited it is conceded that an action for breach of contract will lie, but the right of the passenger to resist expulsion from the train and to sue for damages as for a wrongful expulsion, is denied. It is possible, though it can hardly be deemed probable, that a similar view will be taken by the New York Court of Appeals as to defective street car transfers if the question be taken to that tribunal. Meantime, the law of New York, as laid down by the Appellate Division of the Supreme Court, and the overwhelming weight of authority outside of New York, are that a passenger on a street car, without a proper transfer ticket, the defect of which is due to the fault of the conductor of the car from which he was transferred, may resist ejection and sue for wrongful ejection.

The practical suggestion to street railroad companies is to accept such legal policy as authoritative, and to frame practical rules that shall, as far as possible, promote the detection of fraudulent or irregular attempts to use transfers, while discouraging ejections, if conductors have reasonable ground to believe that a passenger speaks the truth and that irregularity in a transfer presented is due to the fault of another employee.

LIABILITY FOR NEGLIGENCE

KANSAS.—Street Railroads—Accident at Crossing—Care Required—Contributory Negligence.

1. In an action for personal injuries, based on the negligence of a defendant, the burden of proof is on the latter to show contributory negligence on the part of the plaintiff, unless the evidence introduced by the plaintiff to sustain his case tends to show that his want of care contributed to the injury.

2. A traveler on a city street, who is about to cross the tracks of an electric street car company, must exercise his faculties of sight and hearing, and under special circumstances must use other careful and prudent means to ascertain whether a car is approaching.

3. The prevailing rule respecting the care required of a traveler over steam railway tracks applied to one crossing a street railway.

4. The reciprocal rights of the traveler and a street car company considered.—(Burns vs. Metropolitan St. Ry. Co., 71 Pacific Rep., 244.)

KANSAS.—Trial—Submission of Issues—Instructions.

1. The trial court should fairly, fully, and specifically state to the jury all issues of fact made by the pleadings and evidence. An issue made, however, by the pleadings, but not supported by the evidence, should not be submitted to the jury by instructions.

2. In an action to recover damages for personal injuries, the trial court should not particularize acts, and inform the jury that a nonperformance thereof by the plaintiff would defeat a recovery. It is better and more in harmony with our system of practice to instruct the jury generally in the law of negligence applicable to the facts. Held, however, that no error was committed in this case by the instruction given.—(Honick vs. Metropolitan St. Ry. Co., 71 Pacific Rep., 265.)

KANSAS.—Street Railways—Negligence—Injury to Person Driving in Street—Contributory Negligence—Instructions.

1. In an action for damages for injury occasioned by a collision between a street car and plaintiff's buggy while he was driving on or dangerously near the street car track, an instruction to the jury to the effect that the rights of the plaintiff as a traveler upon that portion of the street occupied by the railway track and the rights of the street car company were equal, should have been qualified so as to include the duty of the traveler to turn aside to permit an approaching car to pass.

2. In such an action, an instruction that, even if the jury should find from the evidence that the plaintiff was negligent in having his buggy on or near the track of the defendant, so that it was struck by a car, still plaintiff would be entitled to recover if they should further find that the injury was caused entirely by the negligence of the defendant in failing to provide a headlight sufficient to enable the motorman to discover an obstruction in time to stop the car and prevent injury, and that the injury to the plaintiff would not have happened, notwithstanding the negligence of plaintiff, if such headlight had been on the car, is self-contradictory, and therefore erroneous, in that it postulates negligence in the plaintiff proximately causative of and directly contributive to the collision and injury, in the presence of which no negligent act of the defendant could be a sole or entire cause.

3. The instruction mentioned in paragraph 2, above, was further erroneous in that it permitted the jury to disregard negligence on the part of the plaintiff proximately causative of and directly contributive to his injury. Such negligence is sufficient to defeat recovery.—(Metropolitan St. Ry. Co. vs. Rouch, 71 Pacific Rep., 257.)

KANSAS.—Appeal—Review—Street Railroads—Injury to Person on Track—Proximate Cause.

1. If a judgment entered on a general verdict finds support in the evidence upon any theory of the law embraced within the issues made by the pleadings, it will not be reversed because entirely unsupported by the testimony.

2. In an action against a street railway company for damages in wrongfully causing the death of one on a public street, not a trespasser, although the evidence may show the negligence of deceased in coming upon the track in a position of danger, in the first instance, contributed toward the collision, yet if there is evidence tending to show the motorman in control of the car which caused the death saw deceased in the position of danger, or, by the exercise of reasonable diligence should have seen him, in time to have stopped the car and avoided the death, the proximate cause of the death is one of fact for the jury.—(Metropolitan St. Ry. Co. vs. Arnold, 72 Pacific Rep., 857.

KENTUCKY.—Carriers—Injury to Passengers—Permanent Injuries—Evidence—Damages—Excessiveness.

1. Where a passenger on a street car, who was injured by the premature starting of the car while she was attempting to alight, testified that her ankle had never recovered its strength, and that she walked with difficulty, was unable to go up and down the steps as she had done before, and still suffered pain from the injury, the court was justified in submitting the question of permanent injury to the jury.

2. Where a passenger on a street car was injured by the premature starting of the car while she was attempting to alight, wrenching spraining her ankle, which had not recovered at the time of the trial, a verdict of $1,000 in her favor was not excessive.—(Louisville Ry. Co. vs. Casey, 71 S. W. Rep., 876.)

KENTUCKY.—Street Railroads—Injuries to Pedestrians—Crossing Tracks—Care Required.

1. In an action for injuries to a pedestrian on a street railway track, an instruction that it was plaintiff's duty, when she started to cross the street, to exercise ordinary care, and that if she failed to exercise such care, and by reason thereof helped to cause the injury, she could not recover, was not objectionable for failure to state that it was plaintiff's duty to look and listen for approaching cars before going on the track.—(Louisville Ry. C. vs. Poe, 72 S. W. Rep., 6.)

KENTUCKY.—Railroads—Expulsion of Passenger—False Imprisonment—Arrest of Passenger—Breach of Contract—Action—Complaint.

1. A complaint against a street railway company alleged that, by contract between the carrier and two certain towns, the carrier was bound to transport passengers from a certain city to either of such towns for one five-cent fare, and that, plaintiff having taken passage on a car of defendant's, the conductor refused to accept the five-cent fare offered for a continuous ride from the city to one of the towns. Held, that the allegation did not amount to a statement that defendant refused to carry plaintiff.

2. In an action against a railway company, the complaint alleged that defendant, by an agent, called the police to arrest plaintiff, and that the police illegally placed plaintiff under arrest, and wrongfully held him as a prisoner. Held, that, in the absence of an allegation that it was done maliciously and without probable cause, the complaint stated no cause of action for false imprisonment.

3. A complaint against a railway company alleged that, by contract between the carrier and two certain towns, the carrier was bound to transport passengers from a certain city to either of such towns for one five-cent fare, and that, plaintiff having taken passage on a car of defendants' the conductor refused to accept the five-cent fare offered for a continuous ride from the city to one of the towns, and that defendant, by an agent, called on the police to arrest plaintiff, and that they illegally placed plaintiff under arrest, and wrongfuliy held him as a prisoner. Held, that the complaint did not state a cause of action for false arrest and imprisonment.

4. If plaintiff intended to endeavor to recover for violation of contract, and also for illegal arrest, the complaint stated two separate and distinct causes of action.—(Dierig vs. South Covington & C. St. Ry. Co., 72 S. W. Rep., 355.)

KENTUCKY.—Carriers—Street Railroads—Injuries to Passengers—Operation of Car on Curve—Negligence—Evidence—Exclusion—Avowal—Review.

1. Plaintiff was thrown from the front platform of a crowded trolley car as it was rounding a curve, and partially fell across the gate, when his head was struck by an iron trolley pole. There was no proof that the car was operated negligently, or was running at an unusual rate of speed, and plaintiff's fall was the result of the inevitable swing of the car as it responded to the curve in the track. Held, that such facts were insufficient to establish negligence of the railway company.

2. In an action for injuries to a passenger by being struck by a trolley pole near the track, error, if any, in sustaining an objection to measurements made by a witness subsequent to the accident, on the ground that it was not shown that the pole was in the same position as it was at the time of the accident, could not be reviewed, in the absence of an avowal of the answer expected from the witness.—(Moser vs. South Covington & C. St. Ry. Co., 74 S. W. Rep., 1090.)

KENTUCKY. — Street Railways — Negligence — Passenger Alighting from Car—Care Required.

1. In an action against a street railway for injuries owing to the starting of a car while plaintiff was alighting therefrom, the court instructed that, if plaintiff was injured because of the starting of the car before she could leave it in safety by the exercise of ordinary care, the law was for the plaintiff, and the jury should so find. Held, that the instruction was not erroneous on the ground that the court should have defined the degree of care which the law imposed on the carrier.—(Henning vs. Louisville Ry. Co., 74 S. W. Rep., 209.)

KENTUCKY.—Street Railroads—Injury to Trespasser—Negligence of Motorman—Discovery of Peril—Contributory Negligence—Granting of New Trial—Discretion of Court.

1. The Court of Appeals is slow to disturb the action of the circuit court in granting or refusing new trials where the grounds are in the discretion of the court; especially so where it grants a new trial.

2. If an injury to a trespasser was caused by the negligence of the motorman in failing to exercise ordinary care to know of his presence on the track and of his danger, the company was liable, unless the motorman did not discover his presence in time to have avoided injuring him, and he, by his own negligence, so contributed to case his injury that, but for such negligence, it would not have happened.

3. If the motorman discovered plaintiff's danger in time to have prevented the injury, but failed to exercise such care as was necessary and at his command, the company was liable without regard to his contributory negligence.—(Floyd vs. Paducah Ry. & Light Co., 73 S. W. Rep., 1122.)

KENTUCKY.—Street Railways—Personal Injuries—Drawing Jury—New Trial—Grounds—Qualifications of Jurors—Conflict of Evidence.

1. Ky. St. 1899, section 2265, reads: "The clerk shall write the names of the jurors entered of record on separate slips of paper, as near the same size and appearance as may be, and when a jury is wanted the same shall be drawn from a box after the papers shall have been deposited therein and well mixed. The clerk shall provide and keep for that purpose a suitable box with a sliding lid." An affidavit made by the deputy clerk who selected the jurors recited "that he wrote the names of the jurors entered of record on separate slips of paper of as near the same size and appearance as may be, and that the same were placed in the drawer and well mixed; that for the purpose of the trial he drew from the drawer the names of eighteen of the jurors as required

by law; that this method was uniformly used in drawing jurors in the court; that the drawer was exclusively used and suitable for this purpose." Held, to show substantial compliance with the statute, and that plaintiff was not prejudiced.

2. In an action for personal injuries against a street railway, one of defendant's attorneys asked one of plaintiff's witnesses, a physician, as to the extent of plaintiff's injuries, and as to the fee which had been paid him for his services. Held, not improper, or ground for a new trial.

3. The fact that the physician did not testify as strongly for plaintiff as the latter's attorneys had been led to believe was not ground for a new trial.

4. In an action against a street railway it appeared that the daughter of one of the jurors married the half-nephew of the president of defendant company, but that he died several years before the trial. Held, that the juror was not disqualified.

5. The fact that one of the jurors was in the employ of an express company, and that some of the attorneys employed by the defendant were also attorneys for the express company, was not ground for a challenge.

6. In an action against a street railway for personal injuries, where plaintiff testified that he was attempting to alight from a car it suddenly started forward throwing him to the ground, and there was testimony partially corroborating him, and defendant's witnesses testified that the conductor of the car assisted plaintiff to alight, and that after he had alighted he staggered and fell, and there was other testimony that he used morphine and whiskey, etc., it was the province of the jury to determine which theory as to how the accident occurred was true.—(Miller vs. South Covington & C. St. Ry. Co., 74 S. W. Rep., 747.)

LOUISIANA.—Street Railroads—Collision with Wagon—Petition.

1. A personal injury suit, in which an exception of no cause of action was sustained in the district court. The judgment is reversed as erroneous, and the cause remanded for trial on the merits.—(Welty vs. St. Charles St. Ry. Co., 33 Southern Rep., 730.)

LOUISIANA.—Res Judicata—Several Defendants—Liabilities Inter Se.

1. Where, in an action against four railroad companies for violation of a contract of carriage, plaintiff has obtained a judgment in solido against the four defendants, this judgment, though res judicata between plaintiff and the defendants, does not conclude the latter as to matters between themselves, where they have severed in their defense and their prayer is purely defensive, asking that plaintiff's demand be rejected. If three of the defendants, having paid the judgment, seek contribution from the fourth, the latter has the right to a judgment in its favor, on showing that the violation of the contract was due entirely to their fault.

2. Where a judgment has been rendered against four defendants in solido, who are equally at fault, they are liable inter se according to their interest in the subject-matter of the contract. Civ. Code, art. 2106.—(Smith Bros. & Co., Limited vs. New Orleans & N. E. Ry. Co. et al., 33 Southern Rep., 769.)

LOUISIANA.—Street Railroad—Injury to Traveler—Contributory Negligence.

1. The danger resulting from emerging rapidly from a cross-street and attempting to traverse a double-track railway immediately behind a passing car, without pausing to consider that it may mask a car moving in the opposite direction upon the further track, is understood by those who are at all accustomed to street car travel, and is a danger from which, in the main, the individual wayfarer must be his own protector, since in such case, he appears so suddenly, and affords so little notice of his coming, that the efforts of the motorman to avoid the collision are likely to be of little avail.

2. In the instant case, an intelligent boy, in his thirteenth year, employed as a newspaper carrier, and making his rounds on horseback, rode at a brisk pace out of a cross-street into an avenue upon which there is a double-track electric railway, and, without stopping, traversed the near track, immediately behind a moving car, and then, still without stopping or looking around, attempted to traverse the far track a few feet in front of a car heavily loaded and rapidly moving in the opposite direction from the first. It does not appear that the motorman was negligent in failing to see the boy or divine his purpose, or in attempting to stop the car, and no damages can be recovered for injuries to the boy resulting from the collision which followed.—(Schutt et al. vs. Shreeveport Belt Ry. Co. et al., 33 Southern Rep., 577.)

LOUISIANA.—Intervention—Injunction—Bond.

1. A plaintiff in intervention, who unites with the defendant in resisting the demand of the plaintiff in the suit, does not thereby become a defendant in the suit, nor can that status be conferred upon him by the court, since a person bringing in his individual capacity has the right to determine for himself whom he will sue, and cannot be compelled to sue another against his will.

2. An order authorizing the filing of an intervention, and designating the intervener as a defendant, followed by a judgment on a rule nisi, directing a writ of injunction to issue upon the plaintiff's furnishing bond in favor of the original defendant and of the intervener, is unauthorized in so far as it requires a bond in favor of the intervener, and the latter has no right of action on the bond so given.—(St. Charles St. Ry. Co. vs. Fidelity & Deposit Co. of Maryland,Ltd., et al, 33 Southern Rep., 574.)

LOUISIANA.—Injury to Servant—Contributory Negligence—Electric Wires—Care of Master—Inspection.

1. It is not of itself contributory negligence to engage in a dangerous occupation.

2. Where a person is employed in the presence of a known danger, to constitute contributory negligence it must be shown that he voluntarily and unnecessarily exposed himself to the danger.

3. A company maintaining electrical wires, over which a high voltage of electricity is conveyed, rendering them highly dangerous, is under the duty of using the necessary care and prudence at places where others may have the right to go, to prevent injury. It must see to it that its wires are perfectly insulated, and kept so, or else it must provide adequate guard wires or other sufficient safety appliances, as means of protection against the dangerous wires.

4. The fact that frequent inspections of the line were made to ascertain the condition of the wires and remedy defective insulation, does not relieve the company of liability. If the span wire had become dangerously charged with the electrical current, the company's inspection should have been thorough enough to have detected it. It is the company's business to know the dangerous defects in or along its lines, and, knowing, to safeguard the same. —(Potts vs. Shreveport Belt Ry. Co., 34 Southern Rep., 104.)

LOUISIANA.—Carriers—Injury to Passenger—Defective Station—Liabilities.

1. Parties embarking on or alighting from railway trains upon the invitation, express or implied, of its officials, are justified in acting upon the assumption that the officials have taken proper precautions to insure their safety.

2. Where an accident happens to a passenger by the breaking of one of the railway company's appliances, the burden is upon it to show affirmatively a condition of things which would exonerate it from liability. A railroad company is bound to know of the effect of time and weather upon its appliances. It should, by proper inspection, and timely changes and renewals, keep them safe.

3. Even should a railway company be under no direct obligation to repair or keep in good condition the bridges or streets along its line of way, it should avoid stopping its cars at places where it is not safe for passengers to embark or alight. It should either stop its cars short, or pass them beyond the danger points.

4. A railway company which uses as a station for embarking or disembarking its passengers a pavilion constructed upon a street, is liable to a passenger for injuries received from the breaking of a rotten plank in the steps leading to the cars, whether the station was constructed by it or not. It is liable as a licensee.—(Leverett et al. vs. Shreveport Belt Ry. Co., 34 Southern Rep., 579.)

LOUISIANA.—Street Railroads—Injury to Pedestrian—Proximate Cause—Negligence.

1. Action sounding in damages for personal injuries incurred. Facts and circumstances make out a case of contributory negligence barring plaintiff's recovery.

On Rehearing.

2. Finding himself between two street cars upon a crossing, plaintiff held his ground. A curve in the car tracks began where he stood. On entering the curve, the car in front of him developed a lateral motion, and squeezed him against the other car. Although he had lived in New Orleans all his life, and presumably was as familiar as anybody with this crossing, he did not know of this lateral movement, and did not guard against it, which he could easily have done, and had ample opportunity to do, as the cars at one moment were stationary, the one taking on passengers and the other letting a wagon go by. Under these circumstances, held, that this unexpected lateral movement of the car and the act of plaintiff in remaining between the cars were the proximate causes of the accident.

3. The car behind plaintiff would have passed on, and would not have been there to act as a wall for plaintiff to be pressed against, if it had not made an emergency stop to avoid striking plaintiff, who had negligently passed too close ahead of it. Held, this negligence of plaintiff in passing too close ahead of this car was not a proximate cause of the accident, it being disconnected

judicially from the accident by the deliberate act of the plaintiff himself in choosing to remain between the cars and the deliberate act of the car company in so running its cars upon the crossing as to create a danger by which pedestrians upon the crossing might be overtaken unawares.

4. The act of the car company in creating upon one of the most frequented crossings of the city of New Orleans an insidious danger, when it could have avoided doing so by not permitting the cars to pass each other upon the crossing, is held to constitute actionable negligence.—(Schwartz vs. New Orleans & C. Ry. Co., 34 Southern Rep., 667.)

LOUISIANA.—Street Railways—Injury to Person on Track—Negligence—Evidence.

1. It is negligence, on the part of an electric railway company whose line traverses a city, to have one of its cars in the charge of a young man only eighteen years old, whose experience in the handling of an electric car dates only twenty days back.

2. For the shortcomings of such a motorman, in a case where the death of a human being has ensued, the car company will be held to the strictest accountability; and doubt as to whether the life of the deceased might not have been spared had the car been in the hands of a more experienced and more competent motorman will be construed against the car company.

3. The situation having been that the street was one thoroughfare, with continuous pavement from curb to curb, the car track being in the center, the rails laid flush with the surface, and nothing setting them off from the rest of the street, and that as the car ran the deceased was riding on horseback somewhat ahead of the car, close enough to the track for his proximity to challenge attention (not so close, however, as to be within the line of danger), and that the car was gaining upon him, and that the street was somewhat crowded—held, first, it was not negligence under the circumstances not to have ckecked the speed of the car before the actual emergency had arisen; secondly, it was incumbent on the motorman, under the circumstances, to prepare for emergencies by turning off his current and winding the slack out of his brake, and the failure to do the latter was negligence.

4. From the fact that the car was not stopped within the space within which it was possible to stop it, there arises an inference that the motorman was not as prompt or as energetic as it was possible for a motorman to be, and this inference overcomes the statement of witnesses that the motorman did all that was possible to stop the car.—(Crisman et al. vs, Shreveport Belt Ry. Co. et al., 34 Southern Rep., 718.)

LOUISIANA.—Carriers—Injury to Passenger—Punitive Damages.

1. Plaintiff sues for damages for personal injuries sustained whilst a passenger in a street car, which, through the negligence of its servants, was collided with by a car belonging to the defendant. The plaintiff and the medical experts sworn on his behalf testify that the injuries so received have resulted in partial paralysis. Upon the other hand, medical experts called on behalf of the defendant, whilst conceding that the plaintiff is not responsible for his condition, and also conceding the possibility that such a condition may have resulted from the causes to which the plaintiff attributes it, propound the theory that he is suffering from "railway spine"; that is, that he is the victim of his imagination, and believes that he is paralyzed, whereas he is, in fact, affected by no physical ailment. As it does not appear that he is any more likely to get well in the one case than in the other, and as, in neither case, is he responsible for his condition, it is not clear that it would make any difference, for the purposes of the present claim, whether he is really paralyzed or is merely laboring under a fixed belief to that effect. Considering the whole evidence, however, the conclusion is reached that the defendant's theory is not sustained.

2. The actual wrongdoers, i. e., those in charge of the colliding car, having been prosecuted criminally, and, no doubt, punished if they deserved it, there is no sufficient reason for awarding punitory damages against the defendant, who is only consequentially liable, as the principal is liable for the acts of his agent.—(Patterson vs. New Orleans & C. Ry. Light & Power Co. et al., 34 Southern Rep., 782.)

MARYLAND.—Electric Railway—Tracks in Open Country—Crossings—Negligence—Contributory Negligence—Evidence—Sufficiency.

1. Though an electric railway is negligent in running a car at a higher rate of speed than allowable, and in failing to give signals, its negligence does not excuse that of one who, seeing a car approaching, drives across the track without again looking, relying on his own estimate that he can make the crossing in safety.

2. One about to cross the tracks of an electric railway in the nighttime, and in the open country, saw a car rapidly approaching from one-half to two or three blocks distant, and drove across the track without again looking. His vehicle was struck by the car, and he was killed. There was, at the time he looked, a signal at the nearest crossing, which, if obeyed by the operators of the car, would have required it to stop there, but there was no evidence that deceased saw the light, or knew what it meant. Held, that he was guilty of contributory negligence.—(State, to Use of Meidling et al. vs. United Rys. & Electric Co. of Baltimore, 54 Atlantic Rep., 612.)

MARYLAND.—Street Railways—Transfers—Time Limit—Passenger—Refusal to Pay Fare—Expulsion.

1. Acts 1900, p. 463, c. 313, requiring the street car company of Baltimore City to give, on request, each passenger paying a cash fare a transfer for a "continuous" ride, does not prohibit the company from limiting the time within which a transfer can be used.

2. When the time limit of a transfer issued by a street railway has expired, the transfer is void on its face, and a conductor is justified in refusing to honor it and demanding a fare.

3. When a conductor of a street railway has given a passenger a reasonable time and opportunity to pay his fare, and the passenger has refused, and the conductor has commenced the process of ejecting the passenger, the ejection may be completed, even though a fare be tendered, as the passenger has forfeited his rights as such.—(Garrison vs. United Railways & Electric Co. of Baltimore, 55 Atlantic Rep.)

MARYLAND.—Street Railroads—Injuries to Passenger—Negligence—Warning to Passengers—Construction—Contributory Negligence—Duty of Conductor.

1. Testimony of plaintiff which showed that she was a passenger on defendant's street car and had received from the conductor a transfer to another line, that the conductor notified the passengers to change for that line, that the car stopped, and, while she attempted to alight, started and threw her to the ground, established a prima facie case of negligence on defendant's part.

2. A notice posted in a street car, which states that "cars stop to take on and let off passengers at near side of cross streets," and that those violating the notice do so at their own risk, not meaning that cars will stop only at such places, does not preclude a passenger getting on or off at any other place from recovering for injuries sustained by reason of the company's negligence.

3. A passenger on a street car had received a transfer to another line. As the car approached the transfer point the conductor called out the place, and directed the passengers to transfer to that line. The car came to a stop, and the passenger attempted to alight, but, while so doing, the car started and threw her to the ground. The car stopped because of a wagon in front of it, and when the wagon moved the car started up. The passenger received no notice to delay the transfer. The rear of the car, when it stopped, was from 50 ft. to 100 ft. from the street crossing where it usually stopped. Held, that the passenger was not guilty of contributory negligence, as a matter of law, in attempting to alight.

4. Where, after a conductor of a street car had given directions to transfer to another line, the car stopped, but not for the purpose of enabling the passengers desiring to transfer to alight, it was the duty of the conductor to warn the passengers to keep their seats till he should give further directions.—(United Rys. & Electric Co. of Baltimore vs. Woodbridge, 55 Atlantic Rep., 444.)

MARYLAND.—Carriers—Personal Injuries—Passenger Alighting from Street Car—Evidence.

1. Alleged error in excluding a written instrument cannot be reviewed where the writing is not incorporated in the record.

2. In an action against a street car company for personal injuries from the starting of a car as plaintiff was getting off, in which defendant claimed that plaintiff attempted to get off the car before it reached its regular stopping place at a corner, evidence of a regulation of defendant company requiring motormen to stop at a certain schoolhouse located near the corner, at which plaintiff desired to get off, was not admissible to show a reason for stopping before reaching the corner, it not appearing that plaintiff was aware of the regulation or of any custom to stop at that place.

3. A notice on a street car that "no one is permitted to get off or on when the car is in motion," and that "cars stop to take on and let off passengers at near sides of cross streets," is not sufficient to constitute a notice that the car stopped only at near sides of cross streets so as to render it negligent per se for a passenger to attempt to get off elsewhere.

4. Where a passenger on a street car signaled the conductor to stop, and the car stopped not further than 50 ft. from a crossing at which the passenger desired to alight, it was negligent to start the car while the passenger was in the act of alighting.—(United Railways & Electric Co. of Baltimore City vs. Hertel, 55 Atlantic Rep., 428.)

MARYLAND.—Assignments for Creditors—Construction—Record—Filing Bond.

1. An assignment of a claim for personal injuries to the assignor's attorney, in trust, in case a recovery was had, to pay himself one-half of the amount recovered, to pay a physician's bill for services, and, if sufficient remained, to pay the balance to such persons as the assignor should direct, was not an assignment for the payment of the assignor's debts generally, within Code Pub. Gen. Laws, art. 16, section 205, requiring every trustee for the benefit of creditors to file with the clerk of the court in which the instrument creating the trust is to be recorded a bond, etc., and providing that no title shall pass to the trustee until such bond is filed; and hence such assignment was valid, in the absence of fraud, without record or the filing of a bond by the trustee.—(United Rys. & Electric Co. vs. Rowe et al., 55 Atlantic Rep., 703.)

MASSACHUSETTS.—Street Railroads—Injury to Passengers Standing on Front Platform—Assumption of Risk.

1. Plaintiff boarded the front platform of a crowded street car, on which six or seven other passenges were standing, and was injured by being thrown from the platform by a sharp jerk of the car as it rounded a curve. There was a sign on the car, of which plaintiff was aware, that "Passengers riding on the front platform do so at their own risk." Held, that such rule was reasonable, and precluded a recovery for plaintiff's injuries.

2. It was not negligence for a street car company to take plaintiff on as a passenger, because the car was crowded.

3. The fact that there were passengers on the platform of a street car when plaintiff entered thereon did not show that the rule that passengers riding there assumed the risk of any injury had been waived by the street car company or was not in force.—(Burns vs. Boston El. Ry. Co., 66 N. E. Rep., 418.)

MASSACHUSETTS.—Carriers—Elevated Railroad—Injuries to Passengers—Falling Objects—Res Ipsa Loquitur.

1. Where a passenger was injured by sawdust blowing in her eye from an elevated railroad structure adjoining defendant's depot, and plaintiff testified that she did not know whether the sawdust was thrown or blew down, it being proved that there was a wind blowing at the time from 14 miles to 22 miles per hour, plaintiff was not entitled to recover under the doctrine of res ipsa loquitur.

2. The mere presence of sawdust and shavings and a piece of wood on an elevated railroad structure, by the falling of which a person is injured, is not of itself evidence of negligence.—(Wadsworth vs. Boston El. Ry. Co., 66 N. E. Rep., 421.)

MASSACHUSETTS.—Carriers—Injuries to Passengers—Gross Negligence—Evidence.

1. Plaintiff's intestate boarded an open street car, and took a seat at the extreme left end. There were other unoccupied seats in the car. The conductor approached deceased for his fare, when he arose, put his hand in his trousers pocket, and, while doing so, leaned to the left and backwards, and fell from the car, receiving a fatal injury. The car was running at a speed of about 16 miles per hour, but there was no evidence of any jolt or jar. Held, that the speed at which the car was running, and the failure of the conductor to tell the deceased to sit down, or to warn him of the danger of standing so near the edge of the car, was not such gross negligence as would entitle plaintiff to recover for decedent's death.—(Witherington vs. Lynn & B. R. Co., 66 N. E. Rep., 206.)

MASSACHUSETTS.—Carriers—Elevated Railways—Injuries to Passenger—Negligence.

1. For the rapid handling of the throngs of passengers on an elevated road, the cars were so arranged that the side doors for the exit of the passengers were opened by guards on the platforms at the stations. A passenger who had his hand on one of the doors was injured by the guard's opening it before the train came to a full stop. The guard had no knowledge of the position of the passenger's hand, and the train was so nearly stopped that the opening of the door was the occasion of no danger. Held, that the guard was not guilty of negligence.—(Hannon vs. Boston Elevated Ry. Co., 65 N. E. Rep., 809.)

MASSACHUSETTS.—Street Car Passenger—Injuries While Alighting from Car—Negligence—Evidence.

1. Plaintiff was injured while alighting from a street car by reason of the slippery condition of the steps. The accident occurred during a storm of snow and sleet. The route of the car was about five minutes each way. Before the car started on its trip during which the accident occurred, it had waited at least fifteen minutes. By the rules of the company, it was the duty of the conductor, in case of a storm, to sprinkle sand on the platform and steps. The conductor testified that there was a sand pail at each end of the car. Held, to warrant a finding that defendant had undertaken to prevent, and could have prevented, the steps from being slippery.

2. This evidence, with the testimony of the conductor that about half an hour before the accident he had put a quart of sand on the step while the car was waiting, and the testimony of plaintiff's witnesses that there was no sand on the step when the accident happened, and that there was no sand pail on the platform, was sufficient to warrant the jury in finding that defendant was negligent.

3. Plaintiff testified that she knew that she had to look out for herself, because it was slippery, and so held the handle of the car dasher. Held, that the jury were warranted in finding that she knew that the step was slippery, and exercised due care in view of that knowledge.—(Foster vs. Old Colony St. Ry. Co., 65 N. E. Rep., 795.)

MASSACHUSETTS.—Street Railways—Death by Wrongful Act—Due Care of Deceased—Burden of Proof—Evidence—Sufficiency.

1. In an action against a street railway company for negligent death, the burden of proof was upon plaintiff, administrator, to show that deceased was in the exercise of due diligence when he was killed.

2. In an action against a street railway company for negligent death, where there was no evidence as to what deceased did for several minutes intervening between the time when he was seen walking along the north side of the street and the time when he was seen lying face downward across the track immediately in front of the car and on the south side of the street, whether he tried to pass before an approaching car and fell or stood too near the car, or was seized with vertigo, there was not sufficient proof that deceased was in the exercise of due care to justify a recovery.—(Cox vs. South Shore & B. St. Ry. Co., 65 N. E. Rep., 824.)

MASSACHUSETTS. — Witnesses — Cross-Examination — Admission of Evidence—Exceptions.

1. Whether questions asked on cross-examination in respect to points irrelevant to the matter in issue should be answered or excluded rests wholly within the discretion of the trial judge, and his rulings thereon are not subject to exception.

2. Under Superior Court rule 48, providing that all requests for instructions shall be made in writing before the closing arguments unless special leave is given to present further requests later, a request for a ruling is too late when it is not called to the attention of the court until after the instructions have been given.

3. On the cross-examination of a surgeon who had testified as to his conclusion in regard to the disease plaintiff was suffering from, the trial court properly excluded a question as to whether other surgeons might not arrive at a different conclusion.

4. After a medical witness for defendant in an action for negligent injuries had been requested to state how far he required a patient to disclose the history and symptoms of a disease, he was further asked whether he disclosed the information thus obtained to other persons, to which he replied that it depended on the individual, and the purpose for which the information was desired. Held, that as the question was within the limits of a reasonable cross-examination, and defendant's case was not prejudiced by the answer, the court properly permitted the question.

5. It cannot be said, as a matter of law, that, if a party to an action has testified falsely to a material question, the presumption is that all her testimony is false.—(Root vs. Boston Elevated Ry. Co., 67 N. E. Rep., 365.)

MASSACHUSETTS.—Electric Railroads—Injuries to Pedestrians—Contributory Negligence—Failure to Look.

1. Where plaintiff, before leaving a pathway and going onto a bridge, if he had looked could not have failed to have seen that the motorman in charge of an electric car was about to start the car and run the same over the bridge, and that the car would take up all the room between the sides of the bridge, but he failed to look, and proceeded onto the bridge, and was struck, he was guilty of contributory negligence.—(Judge vs. Elkins et al., 66 N. E. Rep., 708.)

MASSACHUSETTS.—Carriers—Injuries to Passengers—Negligence—Sufficiency of Evidence.

1. In an action against a street railway company for injuries to a passenger, evidence showing that plaintiff, who was standing near the edge of the rear platform without holding onto anything, was pitched off by a sudden jerk in the car, caused by a sudden stop, without showing that there was any defect in the car or rails, or that the apparently sudden stop was not justifiable, fails to show any negligence on the part of defendant.—(Timms vs. Old Colony St. Ry., 66 N. E. Rep., 797.)

MASSACHUSETTS.—Street Railways—Personal Injuries—Collision with Vehicle on Track.

1. In an action against a street railway company for injuries caused by a collision with plaintiff's vehicle, in which it was alleged that the brake of the car was defective, an instruction that, even if the brake was not working properly, yet if the plaintiff crossed the track so near the car that if it had been in the best possible condition it could not have been stopped, then the

plaintiff was not entitled to recover, was properly refused, because separately stating but one fact bearing upon defendant's negligence.

2. The instruction was incorrect, since the car might have been proceeding at a speed so rapid that, even if the brake had been in good condition, the car could not have been stopped in time to prevent a collision, in which case the excessive speed might have been negligence.

3. The instruction was not sufficient as a statement of the principle that a defect in the brake should not be considered unless such defect contributed to the injury.—(Silva vs. Boston Elevated Ry. Co., 66 N. E. Rep., 808.)

MASSACHUSETTS.—Carriers—Electric Cars—Injuries to Passenger—Burning of Fuse—Negligence—Evidence—Res Ipsa Loquitur—Waiver.

1. The ordinary burning out of a fuse used to prevent an excessive amount of electricity to enter the motors of electric street cars is not prima facie evidence of negligence in an action for injuries to a passenger alleged to have been caused thereby.

2. In an action for injuries to a passenger on an electric street car by fire alleged to have been caused by the burning out of a fuse, the expert evidence on both sides showed that the report, flash, and vapor-like puff attendant on the burning out of a fuse in proper condition was instantaneous and harmless. Other evidence established that the fuse on the car in question was located directly under plaintiff's seat, and that the burning thereof was attended with a flame lasting a few seconds, which partly enveloped plaintiff, and burned her face and clothing; while other witnesses testied that they noticed only the smoke, and no flame. Held, that a verdict finding that the flame was not the instantaneous and harmless flame which results from the ordinary burning out of a fuse in proper condition; that the fuse was therefore defective, and that the company was guilty of negligence in placing the fuse where it was, was not contrary to the evidence.

3. Where, in an action for injuries to a passenger on a street car from the burning out of a fuse, there was evidence which would have warranted the conclusion that the duration and intensity of the flame produced by the explosion was greatly in excess of that which would have been the result if the fuse had been in proper condition, and that the improper condition of the fuse could have been discovered by the use of reasonable care, an instruction that the doctrine of res ipsa loquitur did not apply was properly refused, since how far negligence could be inferred from the accident itself under such circumstances was for the jury.

4. In an action for injuries to a passenger on an electric car by the burning out of a fuse, plaintiff's unsuccessful attempt to prove by direct evidence the precise cause of the burning out of the fuse did not estop her from relying on the doctrine of res ipsa loquitur. —(Cassady vs. Old Colony St. Ry. Co., 68 N. E. Rep., 10.)

MICHIGAN.—Negligence — Street Car Company—Passenger Alighting—Starting Car—Evidence—Findings.

1. Where the only question in dispute was as to whether or not a street car was in motion when a passenger attempted to alight, and plaintiff's testimony that the car stopped and as she was stepping off it started was corroborated by other evidence, while the conductor and six passengers testified that the car was in rapid motion when she attempted to get off, and finding that the car had stopped, and started as plaintiff was getting off, was not against the clear weight of the evidence.

2. Where plaintiff in an action against a street car company testified that as she was holding the hand rail of the car with her left hand, with her foot out to step on the ground, she heard the bell ring, became insensible, and when she regained consciousness found her left arm pulled out of its socket, the jury were warranted in inferring that the car started as she was alighting.—(Bartle vs. Houghton County St. Ry. Co., 93 N. W. Rep., 620.)

MICHIGAN.—Master and Servant—Servant's Injuries—Fellow Servant—Assumption of Risk.

1. An employee of an electric railway company, who was injured while returning from work on one of its cars, which was running on time, at the ordinary rate of speed, and within orders, by the wrecking of the car on a switch thrown open by one not in the company's employ, was not precluded from recovery by the fact that the car was in charge of a fellow servant, where the negligence alleged and proved, if any, was not that of such fellow servant.

2. An employee of an electric railway company, who was furnished with transportation on the company's cars in going to and returning from work, did not assume the risk of defective appliances in connection with the track over which he rode, as his work was performed at a distance therefrom, and he had no duty calling his attention thereto.—(Noe vs. Rapid Ry. Co., 94 N. W. Rep., 743.)

MICHIGAN.—Master and Servant—Street Railroads—Injuries to Motorman—Negligence—Collision—Proximate Cause—Rules—Establishment—Caution Against Accidents—Signal Lights — Telephones—Acts of Conductor—Incompetency—Knowledge of Master.

1. Where plaintiff, a street railway motorman, was injured by a collision with a car which was being backed on the same track on which his car was being operated, for the purpose of obtaining relief for a car which had been derailed by reason of a defect in the track some distance ahead, the defect in the track was not the proximate cause of the injury.

2. Where a street railway company had promulgated a rule requiring that cars shall not be started backward before the motorman receives three bells from the conductor, who must remain on the rear platform while the car is moving backward, the failure of the company to promulgate other rules regulating the running of cars backward was not negligence justifying a recovery for injuries to a motorman in collision with a backing car; it not appearing that other or different rules were in use on other roads, regulating such operation of cars.

3. Where a street railway motorman knew that cars were operated backward on some occasions without red lanterns being carried on the rear thereof, and that the company had not established telephone connections to warn following cars of a car being operated backward, he assumed the risk of the operation of such cars without such precautions.

4. Where a street railway car was being run backward, and just before a collision with a following car the conductor signaled the motorman to stop the car, and then jumped, his act in jumping did not constitute negligence on which a liability for injuries to the motorman of the following car could be predicated.

5. In an action for injuries from the negligence of a street railway conductor, witnesses testified that he was slow in ringing bells, and was liable to get excited and give wrong signals. Other witnesses testified that he was not a good conductor, and that he was short, and had to stand on tiptoes to reach the bell cord, which made him slow in emergencies; but none of such witnesses testified that the conductor's incompetency had ever been reported to the company or the union. Held, that such evidence failed to raise a presumption that the company knew or ought to have known of his incompetency, so as to charge it with negligence in failing to remove him.—(Seccombe vs. Detroit Electric Ry., 94 N. W. Rep., 747.)

MICHIGAN.—Error to State Court—Federal Question—Constitutional Law—Due Process of Law—Equal Protection of Law—Validity of Order Requiring Safety Appliances at Grade Grossings.

1. A decision of a State court refusing a petition for a writ of mandamus, in which relator claimed and set up a right under the Constitution of the United States, is tantamount to the denial of that right, and is therefore reviewable in the Supreme Court of the United States.

2. Neither due process of law nor the equal protection of the laws is denied a street railway company by an order of the commissioner of railroads made and issued under Mich. Pub. Acts 1893, act No. 171, section 5, requiring such street railway to pay one-half of the expense of constructing and maintaining safety appliances at a grade crossing of a steam railroad which was not built until after the street railway had been constructed.

3. An objection that a State statute violates the Federal Constitution because it does not provide for notice to those who may be affected by it is not available to a party who was in fact given notice, and who at the hearing objected to the action proposed to be taken under such statute.—(Detroit, Fort Wayne & Belle Isle Railway, Plff. in Err., vs. Chase S. Osborn, Commissioner of Railroads, 23 Supreme Court Rep., 540.)

MICHIGAN.—Street Railroads—Repair of Railway Tracks—Injury to Pedestrian—Negligence—Instructions—Remarks of Court.

1. While plaintiff was walking on a street across defendant's railway tracks, which were being repaired, a rail handled by defendant's employees rolled on her foot and injured her. Her testimony tended to prove that no barriers were placed where the repairs were made. On passing over the track shortly before the accident, she had noticed that some of the planks and rails were taken up. On her return she observed nothing to indicate danger, and was not warned until the very instant she was injured. Defendant's evidence tended to show that the place was guarded by barriers, and that the workmen handling the rail which injured plaintiff did not observe her until too late. The accident occurred about noon. Held, insufficient to justify a finding of actionable negligence notwithstanding plaintiff's contributory negligence.

2. An instruction that, if plaintiff saw evidence of repairs, she was bound to observe whether they interfered with the passage

of persons, and if she saw workmen moving a rail along the walk it was her duty to avoid a danger apparent to a person of ordinary prudence, and if she saw the workmen or might have seen them by the exercise of ordinary caution she was bound to pay heed to what was being done, and if she failed to do so, and was injured, when a person of ordinary care would have avoided the injury, she could not recover, was not erroneous, as directing a verdict for defendant.

3. It was not error to charge that, if barriers were placed across the walk as claimed by defendant, and plaintiff stepped over them and was injured, she could not recover, though the mere fact that barriers are erected will not always preclude a recovery where the evidence in the case was not such as would warrant the jury in finding for plaintiff if the barriers existed.

4. It was not error to charge that the question whether a danger existed in the street should be determined solely from the evidence in the case, and not from a consideration of what other persons had done.

5. Remark of the trial court in denying a motion to direct a verdict for defendant to the effect that the record may show that the court considers this one of the close cases which should go to the jury, and that different minds might draw different conclusions from the evidence, was not prejudicial to plaintiff.—(Sosnofski vs. Lake Shore & M. S. Ry. Co., 95 N. W. Rep., 1077.)

MICHIGAN.—Street Railways—Injury to Animals—Contributory Negligence—Negligence—Failure to Carry Headlight—Evidence—Declarations of Motorman—Res Gestæ.

1. In an action against an electric railroad for death of a cow, evidence of plaintiff considered, and held, not to show that he was guilty of contributory negligence in law.

2. In an action against an electric railroad for death of a cow, testimony of a passenger that, when the car struck the cow, the motorman, while alighting, said: "There, that is running without a headlight," was properly admitted as part of the res gestæ.

3. In an action against an electric railroad for death of a cow, an instruction that defendant's liability under its franchise requiring its cars to be properly lighted, and under the law of negligence, was not materially different; that defendant was obliged to have such a light as would give plaintiff fair notice of its approach; that it was for the jury to say whether the lights were reasonable on the night of the accident, and whether failure to carry a headlight was negligence under the circumstances—fairly presented the law.—(Ensley et al. vs. Detroit United Ry., 96 N. W. Rep., 34.)

MICHIGAN.—Street Railroads—Collision—Negligence—Questions for Jury—Impeaching Witness.

1. Where plaintiff's own testimony shows he was using due diligence to get off the track of an approaching car, and a witness for him states he went right on the track, the question of his negligence is for the jury.

2. A party cannot impeach his own witness by showing contradictory statements made by him because his testimony on cross-examination was not such as he expected.

3. Where negligence charged against a street car company is the failure to reasonably check and control the speed of the car, and the evidence shows the car was heavily loaded and approaching plaintiff on a down grade, the question of negligence is for the jury.—(Westphal vs. St. Joseph & B. H. St. Ry. Co., 96 N. W. Rep., 19.)

MINNESOTA.—Street Railways—Injuries to Passenger—Evidence—Damages.

1. Where a street car stops for passengers to alight, and the servants in charge invite them to leave, such servants have no right to jerk or move the car while such invitation is being acted upon, and it is negligence to do so.

2. It is proper to allow a physician to give the result of information derived by him in the treatment of a patient, when being examined as an expert.

3. A verdict of $4,000 held to be excessive, and reduced to $2,500.—(Skelton vs. St. Paul City Ry. Co., 92 N. W. Rep., 960.)

MINNESOTA.—Street Railroads—Injury to Passenger—Evidence—Excessive Damages.

1. Held, that the evidence in a personal injury case as to the manner in which the accident occurred was not so inherently unreasonable and improbable as to require the court below to grant a new trial upon hearing an alternative motion made by defendant's counsel after a verdict in plaintiff's favor.

2. The jurors were justified in finding from the evidence that both the hearing and eyesight of a child ten years of age were permanently injured and impaired by the accident, and that other injuries were received by her at the same time. Held, that a verdict in her favor in the sum of $6,000 was not excessive, under such circumstances.—(Hunt vs. St. Paul City Ry. Co. (two cases), 95 N. W. Rep., 312.)

MINNESOTA.—Street Railroads—Injury to Pedestrian—Appealable Order.

1. In an action for damages for personal injuries alleged to have been caused by the negligence of defendant, the evidence is examined, and held, sufficient to sustain the verdict for plaintiff.

2. An order directing judgment notiwthstanding a verdict, based upon an alternative motion for judgment or a new trial, is appealable. Bank vs. Graham, 69 N. W., 1077; 67 Minn., 318, followed.—(Peterson vs. Minneapolis St. Ry. Co., 95 N. W. Rep., 751.)

MINNESOTA.—Street Railroads—Injury to Pedestrian—Contributory Negligence—Willful Negligence.

1. In an action for injuries to plaintiff's intestate, who was run upon by one of defendant's electric cars while he was passing over an urban street midway between crossings, held, that the evidence shows that intestate failed to exercise reasonable precautions for his protection and contributed to his own injury.

2. Held, further, that the evidence does not tend to disclose such willful negligence on the part of defendant's motorman, after the discovery of intestate's peril, as to require a summission of that issue to the jury:—(Baly vs. St. Paul City Ry. Co., 95 N. W. Rep., 757.)

MISSOURI.—Carriers—Street Railway—Negligence.

1. Where a street car conductor stopped his car for two ladies to get off, and after one got off, but before the other had done so, some one not in the employ of the railway company, nor with the authority or knowledge of the conductor, gave the motorman the signal to start, and he did so, throwing the second lady to the ground, there was no negligence on the part of the railway company, and such passenger could not recover from the company for the injury so sustained.—(Krone vs. Southwest Missour Electric Ry. Co., 71 S. W. Rep., 712.)

MISSOURI.—Street Railway—Injury to Conductor—Negligence—Contributory Negligence—Instructions—Fellow Servants.

1. In an action by a conductor against a street railway company for injuries sustained by being run into by another car while he was trying to open the gate to the vestibule of his car after changing his trolley for the purpose of crossing to the car sheds, the answer alleged as contributory negligence that he, without looking or listening, allowed himself to be brought into such close proximity to the car as to be struck by it. The court charged that it was immaterial on which side of the car plaintiff walked back to the gate after changing the trolley. Held, not error, as the negligence, if any, did not consist in the walking back, but in the position assumed afterwards.

2. If, after the conductor changed his trolley, he looked in the direction the car which struck him came, and saw no car approaching, and immediately signaled the motorman to go ahead, and attempted to get on his car through the gate to the vestibule, he was not guilty of negligence in failing to continue to look and listen for an approaching car.

3. An instruction, in an action for injuries to a street car conductor by being struck by another car, that it was the motorman's duty to have stopped his car under certain circumstances, was not erroneous for want of evidence as to the ability of the motorman to have stopped the car, though there was no direct evidence as to the time or space within which it could have been stopped, it appearing that as a matter of fact it was stopped within 1½ car lengths after the accident, and it being a matter of common knowledge that cars running at ordinary speed can be stopped in less than 100 ft.

4. Where one is discovered by a motorman of a street car standing in a place of peril, and it is apparent, if he does not move out of it, he will be struck and injured, the motorman must check or stop his car, and has no right to assume that the person will move out of danger.

5. A street railway is a railroad within the meaning of Rev. St. 1899, section 2873, providing "that every railroad corporation, owning and operating a railroad in this State, shall be liable for all damages sustained by any servant thereof while engaged in the work of operating such railroad, by reason of the negligence of any other servant thereof," subject to the defense of contributory negligence.—(Stocks vs. St. Louis Transit Co., 71 S. W. Rep., 730.)

MISSOURI.—Street Railway—Negligence—Crossing Track—Ordinary Care—Instructions—Evidence.

1. In an action against a street railway company for damages resulting from a collision of a car with a team crossing the track, an instruction in general terms that, if the driver was exercising ordinary care, the verdict should be for plaintiff, without specifically stating the care the driver was bound to exercise, was error.

2. Where, in another instruction, the court specifically stated the care the driver was bound to exercise, the error in the first instruction was cured.

3. Where, in an action against a street railway company for damages from a collision of a car with a team crossing the track, the driver testified that as he approached the crossing he looked to see if a car was approaching, but his view was obstructed by a standing car, and as it moved away he looked again, but did not see the approaching car, and could not hear it because of the noise made by the departing car and by his wagon, and other witnesses testified that, had he looked, he could have seen the approaching car, the question as to whether he looked when he should was for the jury.—(Sanitary Dairy Co. of Missouri vs. St. Louis Transit Co., 71 S. W. Rep., 726.)

MISSOURI.—Street Railroads — Negligence — Cities — Police Power—"Vigilant Watch Ordinance"—Instructions—Evidence—Sufficiency—Conductor—Duties.

1. McQuillin's Ann. Mun. Code (page 797, section 1760), providing that the person in charge of a street car shall keep a vigilant watch for all vehicles and persons on foot, and, on the first appearance of danger to such persons or vehicles, the car shall be stopped in the shortest time and space possible, is a police regulation conferring a right of action on a party injured in consequence of a violation of it, without any allegation or proof that the ordinance has been accepted by the street car company.

2. Inasmuch as the meaning of the phrase "shortest time and space possible" is uncertain, the incorporation of the ordinance bodily in an instruction in a personal injury action against a street railroad company is misleading.

3. A petition in an action for personal injuries which joined in the same count a cause of action for common-law negligence and one for negligence under the provisions of a city ordinance is not objectionable for misjoinder of causes of action.

4. Where plaintiff, injured by a street car at a crossing, testified that he could not see the car on account of an obstruction, and that he did not hear it, it was proper to submit the issue of contributory negligence to the jury, though other witnesses, similarly or not so advantageously situated, testified that they saw the car 150 ft. away.

5. The conductor of a street car is not required to keep a lookout and avoid accidents at crossings.—(Gebhardt vs. St. Louis Transit Co., 71 S. W. Rep., 448.)

MISSOURI.—Malicious Prosecution—Street Car Company—Arrest of Passenger—Authority of Conductor—Probable Cause—Malice—Sufficiency of Evidence—Tender of Fare—Defaced Coin—Elements of Damage—Admissibility of Evidence—Punitive Damages—Excessive Verdict.

1. Where the rules of a street car company direct its conductors to call a policeman in case of trouble on a car, a conductor is thereby authorized to cause the arrest of a passenger, and prefer a charge of disturbing the peace against him, so as to render the company liable in an action for malicious prosecution.

2. A street car passenger tendered a defaced nickel, which was all the money he had. The conductor refused to receive it, and proceeded to eject the passenger. On reaching the car door the passenger offered resistance, and succeeded in preventing his removal. The scuffle caused the lady passengers to scream. There was no fighting, or offer to fight, and the passenger used no violent language. The conductor called a policeman, and effected the passenger's arrest. A city ordinance punished any person who should disturb the peace. Held, in an action for malicious prosecution, that there was no probable cause for the arrest.

3. After the arrest the passenger was taken by the officer and conductor to the conductor's boss, and the facts related to the latter. The boss had a telephone communication with some one, and then ordered a charge of disturbing the peace to be made against the passenger. On a trial for malicious prosecution, the conductor swore that he had no malice against the passenger. Held, that the evidence was sufficient to take the issue of malice to the jury.

4. Where a passenger on a street car tenders the exact amount of his fare, in legal-tender coin, the conductor has no right to refuse to accept it, and eject the passenger, though the coin was so worn as to lead the conductor to honestly believe that it was not a good one.

5. Compensation may be recovered for every injury caused by a malicious prosecution, including loss of time, attorneys' fees paid to procure acquittal or release, and injuries to the feelings and reputation.

6. The refusal of an instruction that an acquittal in the original prosecution does not raise a presumption of malice and want of probable cause is not prejudicial error, where the evidence of both parties shows that there was no probable cause.

7. The evidence warranted an instruction that, if the jury found express malice, they might award punitive damages.

8. Where a teller in the United States sub-treasury was permitted to testify as to the appearance, etc., of a coin tendered as car fare, defendant's objection that the evidence was irrelevant and immaterial was too general to require consideration.

9. A party waives an objection to evidence by introducing the same character of evidence himself.

10. In an action for malicious prosecution, it appeared that the only expense occasioned plaintiff was $10 attorney's fee and $3.50 for bond. Plaintiff was a business man and lost half a day's time. There was no direct evidence that he suffered any pain of mind, or that his reputation was damaged. He submitted to arrest rather than be forcibly ejected from defendant street car company's car. The occasion of plaintiff's ejection was the tender of a coin so worn that the conductor, in good faith, refused it, but which was all the money plaintiff had. Held, that a verdict awarding $1,000 actual and $1,000 punitive damages was excessive, and should be reduced to $1,000.—(Ruth vs. St. Louis Transit Co., 71 S. W. Rep., 1055.

MISSOURI.—Personal Injuries—Claim for Damages—Evidence—Nurse Hire—Quotient Verdict.

1. Where the petition in an action against a street car company for personal injuries alleged that, on account of the injuries, plaintiff was compelled to hire nurses to wait upon him, and prayed judgment for a lump sum, evidence of the amount paid out by plaintiff as nurse hire was admissible, though there was no specific sum claimed therefor.

2. The jury in a personal injury case voted ten for plaintiff and two for defendant, and thereafter each juryman put down on paper the amount each considered the plaintiff ought to recover, and divided the total by 12, the quotient being $467. The verdict returned, however, was a majority verdict for $500, ten agreeing thereto. Held, that it did not appear that the verdict was arrived at improperly.—(Moore vs. Southwest Missouri Electric Ry. Co., 75 S. W. Rep., 176.)

MISSOURI.—Street Railroads—Regulation—Municipal Ordinances—Speed—Vigilant Watch—Collision with Vehicle—Complaint—Common-Law and Statutory Negligence—Joinder—Violation of Ordinance—Negligence Per Se—Last Clear Chance—Contributory Negligence—Question for Jury.

1. A city ordinance providing that operatives of street railway cars shall keep a vigilant lookout for obstructions on the track is a police regulation binding on all street railways operating cars in the city limits, whether accepted by such railways or not.

2. In an action for injuries to the driver of a vehicle by collision with a street car, plaintiff is entitled to join in the same count or cause of action negligence arising from a breach of defendant's common-law duty to use due care and negligence arising from defendant's breach of a city ordinance requiring a vigilant lookout.

3. Where at the time of a collision between a street car and a vehicle, the motorman was running the car at a rate of speed prohibited by a city ordinance, defendant was guilty of negligence per se.

4. Where a motorman operating a street car, after having seen plaintiff on the track, attempting to move a balky horse, continued to run his car at a rate of speed prohibited by a city ordinance, and made no effort to stop or check the car, which came into collision with the vehicle, he was guilty of both common-law negligence and of a violation of an ordinance requiring motormen to keep a vigilant watch for obstructions.

5. When plaintiff drove into a street on which a street railway line was operated, he saw a car coming toward him at a distance of 150 ft. to 200 ft. He would have had sufficient time to have crossed the track in front of the car, but when his horse got partly over the track he balked and would not proceed. At the time the horse stopped, the car was from 100 ft. to 125 ft. distant, and could have been checked in time to avoid a collision, but the motorman made no effort to do so. Plaintiff knew that his horse was balky, and might have escaped injury by jumping from the wagon before the collision. Held, that the motorman had the last clear chance of avoiding the injury, and plaintiff's contributory negligence, if any, was no bar to a recovery.

6. Whether plaintiff, by remaining in his wagon, was guilty of contributory negligence, which continued down to the injury, and directly contributed thereto, was a question for the jury.—(Meyers vs. St. Louis Transit Co., 73 S. W. Rep., 379.)

MISSOURI.—Rewards for Arrest and Conviction—Right of Officer.

1. Defendant offered a reward for the arrest and conviction of any person doing a certain act. Plaintiff was a member of the sheriff's posse when he made an arrest, so that he could not claim a reward for this, but he was discharged from the posse, and defendant then renewed the promise, and he then secured the conviction. Held, that he was entitled to the reward.—(Cornwell vs. St. Louis Transit Co., 73 S. W. Rep., 305.)

LONDON LETTER

[From Our Regular Correspondent.]

There is an old agreement between the Great Western Railway and the Metropolitan Railway under which half of the train service between Hammersmith and Aldgate is worked by the former company, so that the new system of electricity initiated by the Metropolitan Company necessitated an alteration in the agreement. An arrangement has therefore been concluded between the two companies by which Edgware Road Station has been selected as a central point, and the Great Western Railway will provide the power from Hammersmith to this station, and is making preparations for a central power station for furnishing the necessary current at Park Royal. The new power station will also supply the current for lighting Paddington Station, hitherto furnished by the company's generating station at Westbourne Park, which is the oldest in London. The company also has a large quantity of capstans, cranes and machinery, which in future will be worked by electricity. An important feature of the new power station will lie in its capacity of extension when the time arrives for more ambitious schemes of electrification. The contract for engines, three-phase generators, condensing and auxiliary plant, aggregating about 10,000 hp for this important station, has been secured by the Electric Construction Company, Limited, of Wolverhampton and London, and will consist of eight 750-kw steam-driven generators, each having a normal full load in each phase of 250 kw. These generators have to be so wound that the full output of 750 kw can be obtained at any voltage between 6300 and 6600 on a non-inductive load. Further, there are to be four 150-kw three-phase generators, one to be driven direct by a continuous-current motor, and another by a high-tension 6500-volt three-phase induction motor, and the remaining two by compound high-speed engines.

The London County Council has decided that English-made rails are to be laid on its new tramways. Tenders were received from twenty-six firms, the successful firms being Bolckow, Vaughan & Coy, Middlesbrough, and the Frodingham Iron & Steel Company, Limited, Doncaster. Tenders were received from Belgium and America, and, although they were lower than the accepted tenders, they were for various reasons passed over. The total to be spent is over £80,000. The committee's recommendation in favor of English rails was enthusiastically welcomed by the Council.

The electrification has now been completed of a further section of the London County Council's southern tramways—namely, the lines extending from the Elephant and Castle to New-Cross and Greenwich. These embrace about 10 miles of double track. The conversion to electric traction of the cable line between Kennington and Streatham is about to be proceeded with, and also of the short connecting line between Kennington Park-Road and the cable line and of some further short lengths, principally in the Southwark and Bermondsey districts. On the completion of this work all the lines which formerly made up the undertaking of the London Tramways Company south of the Thames will have been reconstructed for electric traction, together with short sections of line formerly belonging to the South London Tramways Company. Some new lines are also to be laid, one of which will have a terminus at Southwark Bridge. The underground conduit system of electric traction has been adopted by the London County Council for all the above-mentioned lines. The work of conversion of the Greenwich lines was divided between two firms of contractors, Messrs. Dick, Kerr & Company and Messrs. J. G. White & Company, who acted under the supervision of Mr. Fitzmaurice, the County Council's chief engineer, as regards the track work, and of J. H. Rider, the Council's electrical engineer, as regards the electrical equipment.

Birmingham has initiated its first section of the municipal tramways, the line from Birmingham to Aston Brook, on which there will be a two-minute service.

Having pushed its tramways up to Hampton Court last year, and so invaded the confines of the Thames Valley, the London United Tramways Company now contemplates further operations in the same region. Finding the extension to Hampton Court successful and popular, it purposes seeking Parliamentary authority to carry its lines onward to Taplow and Maidenhead. The scheme is to lay down a tramway from Hounslow on to Colnbrook and Slough, and thence to Skindle's Hotel, at the Taplow end of Maidenhead Bridge. Another and a similar, but much shorter, extension projected is from Hounslow to Staines, and that likewise will tempt many people to journey to the river-side by road rather than by rail. All these developments are calculated to confer a much-needed benefit on the various Thames side towns.

The Wakefield & District Light Railway Company, whose light railways are now being constructed, will shortly be opened for public traffic, deposited a bill in Parliament for next session seeking power to construct tramways in Wakefield, Pontefract, Normanton, Whitwood, Castleford, Featherstone and Knottingley, of a total length of over 25 miles, at an estimated cost of £183,918. The company seek powers to raise £165,000 additional capital, with the right to borrow a further sum of £55,000, but the bill expressly provides that the company shall not create debenture stock. As regards the purchase of the tramways by local authorities, it is proposed that the tramways in Wakefield and the urban districts of Methley Stanley and Altofts shall not be purchased for twenty-five years; in the other districts the period proposed to be fixed is forty-two years.

Shareholders in the Birmingham & Midland Tramways, Limited, have authorized their directors to make a provisional agreement to acquire the whole of the local tramways rights which the British Electric Traction Company has been steadily accumulating these last eight years. The interests of the Dudley, Stourbridge & District Electric Traction Company, the South Staffordshire Tramways (lessee) Company, the Wolverhampton District Electric Tramways, Limited, and the City of Birmingham Tramways Company are all included in the compact. The present authorized capital of the company is £500,000, and this is to be increased to £1,050,000.

The Bath Tramway system was recently opened to the public. The British Westinghouse Company, which has the contract for the equipment of the generating station and rolling stock, has just completed the erection of the former, as well as of the car-shed buildings, in the record time of seven and one-half months. The opening passed off most satisfactorily, every car carrying practically its full complement of passengers. When in full running there will be forty cars at work. The gradients at Bath are excessive, the maximum being 1 in 12. The Bath cars are fitted with the Westinghouse magnetic brake, one of the numerous good features of which is that it will automatically bring the car to rest on the severest gradient, even should the trolley leave the wire. This, as well as its other good points, were repeatedly demonstrated on the opening day, the trolleys being purposely removed from the line when the cars were on a gradient of 1 in 12, and the cars were brought to a stop in a few yards, all the passengers alighting without mishap. This brake has received the approval of the Board of Trade, with the most favorable comments.

In the STREET RAILWAY JOURNAL of Jan. 30 will be found a full description of the electrification of the Liverpool to Southport branch line of the Lancashire & Yorkshire Railway, but as successful trials have recently been made on this installation, it is shortly referred to here. Several schemes of this kind are at present near completion, but it would seem that after all this particular electric railway will be the first to be put in actual service, and the contractors, Messrs. Dick, Kerr & Company, Limited, are certainly to be congratulated on the successful completion of this most important pioneer work.

Successful trials have been made on the new London tube, viz., the Great Northern & City Railway. It will, perhaps, be remembered that the STREET RAILWAY JOURNAL published a full description of this undertaking some two years ago, and further articles on the subject will appear in the near future. At this time it will be sufficient to state that press representatives were invited to travel through this tube on a recent date. The total length is about 3½ miles, and the tube extends from Finsbury Park Station, on the Great Northern Railway to Moorgate Street, although extensions are at present being made to Lothbury. This tube is different from all others, either in operation or in course of construction in London, in so far that it has been made large enough to admit the ordinary rolling stock of the Great Northern Railway. It will be remembered that the contractors for the whole work were S. Pearson & Sons, Limited, under the immediate charge of E. W. Moir. The principal sub-contractors for the electrical part of the work was the British Thomson-Houston Company, which has supplied the whole of the generating plant, and the electrical equipment of the rolling stock. The British Thomson-Houston multiple-unit system has been adopted. The carriages were built by the Electric Railway & Tramway Carriage Works, of Preston, and the Brush Electrical Engineering Company, of Loughborough. It is expected that the formal opening of the line will take place in the course of a week or two.

Out of seventy applications for the position vacated by the resignation of A. L. C. Fell, now the general manager of the London County Council Tramways, the successful applicant is A. R. Fearnley, who has for several years been the general manager of the Birkenhead Corporation Tramways.

Joseph Chamberlain, who is at present busily engaged in an attempt to revise the fiscal policy of Great Britain, has recently appointed a tariff commission for the purpose of a thorough in-

vestigation into the various branches of manufacture and trade which are naturally influenced by the import of manufactured articles from other countries. Mr. Chamberlain has succeeded in putting on this commission representatives of most of the manufacturing trades in this country, and readers of the STREET RAILWAY JOURNAL will be interested to know that only a few days ago George Flett, the managing director of Dick, Kerr & Company, Limited, chiefly through whose influence this company has made such a phenomenal success in the few years of its career as electrical engineers and manufacturers, has been appointed to the commission. It was thought by the other members of the commission that it would be well to have a member representing the very important and growing industry of the manufacture of electrical apparatus. Mr. Flett was selected to fill this position, which, after due consultation with his board, he decided to accept. There is no question that Mr. Flett will bring to bear upon this subject the whole of his large business experience. There is probably no one else in Great Britain who has a more complete and masterful grasp of the whole electrical situation from a business point of view than Mr. Flett, and he will undoubtedly fill his position in the commission with entire success and credit, not only to himself, but to the commission and the electrical industry as a whole.

A. C. S.

PARIS LETTER

(From Our Regular Correspondent.)

The accident which occurred on the Paris Metropolitan Railway in the month of August last is now definitely attributed to the use of salt on the third rail. The temporary substitution of wooden blocks for the present insulators, which latter are, as already reported of exceptionally small insulating thickness, has not yet been carried out. The expenses arising from this accident amount to about f. 2,000,000, which will affect the net receipts for the past year. The Metropolitan situation, however, appears to be very satisfactory from a financial standpoint, and a dividend of f. 15 was decided upon at the last meeting of the company. At the same meeting the results of competition from the proposed North-South line, of which a map was published in the last issue, was discussed. The Metropolitan Company does not anticipate any great falling off of receipts in consequence of the opening of this new road, and is about to issue obligations amounting to f. 50,000,000, and perhaps f. 75,000,000, to cover the equipment of new lines.

Some statistics are now available. The Municipal "Bulletin" has just made up a report of detailed receipts of the Metropolitan traffic during the nine first months of 1903 as follows:

	1902	1903	Increase
Return tickets	6,720,280	12,996,681	6,276,398
First class	5,657,472	9,297,741	3,640,269
Second class	29,027,585	51,292,248	22,264,563
Passes	6,970	7,853	883
Total passengers carried	41,412,410	73,594,523	32,182,113
Gross receipts, francs	7,148,772	12,707,969	5,559,197
Franchise payment, francs	2,372,046	4,191,463	1,810,416

The length of line in actual service was as follows:

On Oct. 7, 1902, 13.329 km; from Oct. 7 to Jan. 30, 1903, 17.335 km; from Jan. 30 to April 1, 1903, 22.912 km; since April 2, 1903, 24.11 km.

The greatest change in operating practice during the past few months is the substitution of seven-car trains for the usual eight-car trains. The composition of these trains is also different, there being two motor cars ahead, instead of one leading and one in the center of the train, or one at each end, as before. The train line is thus reduced to a minimum. Petroleum lamps have been added in the stations, and the backs of the benches have been removed, it having been recognized that they formed an obstacle to free exit from the stations in an emergency. The demand for smoking cars has not gained much headway, mostly on account of the opposition of hygienic societies. Mr. Levy has reported on the sanitary and hygienic conditions of the Metropolitan, which are pretty fair.

Among the plans for new construction which are being discussed before the Municipal Council, M. Pugliesi-Conti is calling attention to proposed line No. 8. According to the plan now being considered, the city would not do the actual construction work of the tunnel, but would lease it together with the operation for a certain number of years, after which the line would become municipal property. Line No. 8 constitutes what is known as the Inner Circle, and embraces the Opera, the principal boulevards the Bastille, Boulevard Henri IV., Boulevard St. Germain and Les Invalides, and terminates at the starting point, the Opera.

The Municipal Council has been requested by one of its members to take up the question of a reorganization of the tramway system, and this plan is now being discussed by the mixed commission recently appointed by the Minister of Public Works and composed mostly of members of the Council and a few engineers and officials. The object in view is to consider the question of omnibus and tramway service in Paris and the Department de la Seine. Two plans are being discussed. One is for the city to lease the concession for tramways and omnibuses within the city limits to one or more operating companies for a short term of years and for the Seine Department to do the same in its territory. The other plan is to divide Paris into a certain number of segments and give a monopoly in each to the suburban tramway company, which enters the city at that side, the same companies also to operate the omnibuses. The concessions for outside lines would then be awarded by the Department of the Seine. It will be noticed that this commission does not encourage the plans of the Cie Generale des Omnibus, which have been mentioned in previous letters. The matter will not, however, be decided upon very quickly, and the outcome of the question will be mentioned in future letters.

Meanwhile the tramway companies are not being allowed to remain idle. The municipality has requested them to equip their cars with illuminating signs and make other improvements.

The Cie de l'Est Parisien has followed the example of the Cie Generale des Omnibus, which has made propositions to the Council of the Seine Department for remodeling its system. The Est Parisien, it will be remembered, has franchises for quite a number of lines which for the most part connect the center of Paris with the suburbs. The Diatto and trolley systems are in use. The proposition is now under the consideration of the Departmental Council, and is worth a short analysis. The company proposes to raise the fares to a uniform 10 centimes and 15 centimes, in place of the zone system now in use, to install the trolley system as far as the Bastille and the Place de la Republique, and also along the left bank of the Seine within the city, also the equipment of a new line consisting of trolley up to the Boulevard Magenta, and thence to the Parc Monceau by the conduit system. The further terminus of the line would be the suburb of Bondy. After inquiry of the various arrondissements of Paris and its environments, the commission threw out these propositions, and agreed only to the principle that the Est Parisien lines would be improved by a reorganization. Further plans are therefore being formulated, and the results will be reported later. It is worthy of note, however, that the changes in fares and the use of the trolley system proposed by the company have been rejected in entirety.

We have referred above to the general rapid transit scheme in Paris, part of which has already been carried out by the Metropolitan Company, with the co-operation of the city. The lines proposed by the city for future operation have a greater length than those already in operation. A few figures of the actual status may be of interest. The total cost of construction of the existing lines will exceed f. 295,000,000, and the length of lines in operation is 42 km. The amount actually spent on construction by the city is f. 130,000,000. A new loan has been voted amounting to f. 170,000,000 at 3½ per cent. repayable in seventy-five years. There are eight lines either in operation or projected, as follows:

Line No. 1, Vincennes-Porte Maillot, the first line to be put into operation, and running east to west through the city.

Line No. 2, the Circular line, running around the city on the outer boulevards. This road is for the most part in operation, and a small portion only remains to be completed.

Line No. 3, Courcelles-Menilmontant, is almost completed, and is now being equipped. Several months will yet elapse before the line will be ready for public service.

Line No. 4, or transversal line. This has been called the backbone of the whole Metropolitan system. It cuts the circular line No. 2 at about its middle in the North and South. This line has been delayed owing to the question of the passage over the Seine and the passage around the Institute of France.

Line No. 5 has also been delayed by reason of a modification of the route.

Line No. 6, Place d'Italie-Cours de Vincennes. This line is being pushed, and the serious tunnelling work will be commenced in the spring.

Line No. 7, Place du Danube-Palais Royal. This has not yet been commenced, nor has—

Line No. 8, Auteuil-Opera. This is the last line at present decided upon, and will not be commenced for a year or two, depending upon the progress of the other lines.

The Massachusetts Railroad Commission has refused to grant a petition to compel the Worcester & Connecticut Eastern Railway Company to lower its fares between Oxford and Worcester.

ANNUAL MEETING AND BANQUET OF THE NEW ENGLAND STREET RAILWAY CLUB

The annual meeting and banquet of the New England Street Railway Club was held this year at the Hotel Brunswick, Boston, on the evening of Jan. 28. The banquet, which was scheduled for 7 o'clock, was preceded by an informal reception in the parlors of the hotel, lasting about an hour. When the attendants gathered in the dining hall of the hotel, it was found that about 400 were present. Among the guests at the head table were members of the State Railroad Commissions from practically all the New England States.

As the banquet was coincident with the annual meeting of the club, President Farrington, after the repast was finished, announced as the first order of business the election of officers for the coming year. The following were unanimously elected:

J. H. NEAL

J. J. LANE

President, J. H. Neal, chief of department of accounts, Boston Elevated Railway, Boston.

Vice-Presidents:

Maine—I. L. Meloon, superintendent Sanford & Cape Porpoise Railway, Sanford.

New Hampshire—H. A. Albin, superintendent Concord Street Railway and Concord & Manchester Street Railway, Concord.

Vermont—C. K. Jones, manager Brattleboro Street Railway, Brattleboro.

Massachusetts—John T. Conway, superintendent Division 1, Old Colony Street Railway, Quincy.

Rhode Island—D. F. Sherman, treasurer Providence & Danielson Railway, Providence.

Connecticut—J. K. Punderford, general manager Fair Haven & Westville Railway, New Haven.

Secretary— John J. Lane, editor Street Railway Bulletin, Boston.

Treasurer—Nathan L. Wood, with the Frank Ridlon Company, Boston.

Executive Committee—H. E. Farrington, master mechanic, Boston & Northern Street Railway, Chelsea, Mass.; C. F. Baker, superintendent motive power and machinery, Boston Elevated Railway, Boston; W. D. Wright, superintendent of equipment, the Rhode Island Company, Providence; E. A. Sturgis, superintendent motive power and machinery, Worcester Consolidated Street Railway, Worcester; Louis Pfingst, street railway supplies, Boston; R. W. Conant, street railway supplies, Cambridge; D. E. Manson, assistant manager the Westinghouse Electric & Manufacturing Company, Boston.

Finance Committee—J. H. Neal, president; James F. Wattles, secretary, Rand Avery Supply Company, Boston; Fred. F. Stockwell, Barbour-Stockwell Company, Cambridgeport.

After the election of officers Mr. Neal was installed as president and introduced the toastmaster of the evening, Hon. Russel A. Sears, counsel of the Boston Elevated Railway Company. The following speakers were then called upon in turn by the toastmaster; Henry M. Whitney, Gen. William A. Bancroft, president Boston Elevated Railway Company; George W. Bishop, of the Massachusetts Railroad Commission; George G. Crocker, of the Boston Rapid Transit Commission; Luther C. Smith, of the Vermont Railroad Commission; H. M. Putney, of the New Hampshire Railroad Commission; Edward C. Spring, manager Dayton, Covington & Piqua Traction Company, and Representative Guy W. Ham, of Boston.

J. H. Neal, president of the New England Street Railway Club, although a young man, has for over fifteen years been identified with the street railways in Boston, and at the present time fills the responsible position of chief of department of accounts for the Boston Elevated Railway Company. He has always taken great interest in his work, and has reached a most enviable position as an expert accountant. He started in the business as a clerk, and has been advanced several times, until he assumed his present responsible position. Mr. Neal has invented several railway appliances, which have attained prominence in the street railway world. He is a very active member of the New England Street Railway Club, and has been its secretary and treasurer during the past two years.

John J. Lane, the newly elected secretary of the New England Street Railway Club, has been engaged in the newspaper business, as proprietor, publisher, editor or special correspondent for twenty-eight years, and during the last two years has been editor of the Club's official publication, "The Street Railway Bulletin." He was, for many years, special correspondent for the Boston Globe and Boston Herald, with headquarters at Laconia, N. H., and during that time established and managed several daily and weekly newspapers. About nine years ago, he came to Boston to accept an editorial position with the Associated Press, and remained with that organization until he resigned to become editor of the official publication of the New England Street Railway Club.

Y. M. C. A. IN MEMPHIS

The Memphis Street Railway Company, of Memphis, Tenn., has donated $1,000 toward establishing a railroad branch of the local Y. M. C. A., and will furnish the organization with club rooms. These rooms will be fitted up with athletic paraphernalia for developing the physical man, while suitable reading matter will be kept on file and social entertainment provided properly to administer to the mental man. The Y. M. C. A. of Memphis will co-operate with the railway company in establishing the new organization.

THE NEW YORK TO PORT CHESTER ELECTRIC RAILWAY PLANS

The New York, Westchester & Boston Railway Company, the rival of the New York & Port Chester Electric Railway, for the construction of a four-track, third-rail electric railway from New York to Port Chester, was given a hearing before the Railroad Committee of the Board of Aldermen of New York on Jan. 25, on its application for a franchise to cross the streets and avenues on its proposed route in the Borough of the Bronx. Counsel for the company stated that the road, as projected, is to be a four-track line of high speed and frequent service, two tracks for express and two for local traffic, having a main line running from the Borough of the Bronx to Port Chester, and a branch from Pelham to White Plains, midway between the New Haven and the Harlem railroads, and also one to Throgg's Neck, via Clason's Point, a total of 32 miles. The route covered is substantially that of the New York & Port Chester, which recently applied to the Board of Aldermen for a similar franchise, which has not yet been granted.

An opinion by John G. Johnson and Geo. S. Graham, of Philadelphia, and William B. Hornblower and Charles E. Hughes, of New York, was read, holding that the company now is "a valid and subsisting corporation," and has the right to construct and maintain its proposed road; also a letter from Dick & Robinson, bankers of New York, saying that they have agreed (subject to the assent of the city) to provide $13,125,000 to purchase rights of way and construct the road, having associated with them other financial interests in New York and Philadelphia.

The checkered career of the company has already caused doubt in many minds as to the sincerity of its latest move. Organization was perfected in 1872, and in 1875 the company was placed in the hands of William T. Tomlinson as receiver. By a recent order of the Supreme Court Mr. Tomlinson transferred the assets of the company to George T. Forster, of New York, representing the new banking interests. The claim is made that under chapters 620 and 627, of the Laws of 1903, which exempts the time during which the road is in receiver's hands from the ten years in which a railroad company is required to complete its road, the company has fully seven years more to build its line; also that having been incorporated before such requirement became a law, it may construct its road without obtaining the consent of the city authorities.

The persistent refusal of the New York Aldermen to act on the petition of the New York & Port Chester Company has resulted in the introduction in the Legislature, in the interest of that company, of a bill vesting the right to grant franchises to cross streets in New York in the authorities of the immediate borough involved. A public hearing on this bill is to be held Feb. 10.

An instance of the policy of the Aldermen toward the company is shown by the questioning of the financial resources of the company by one of the members of that body, after the company has demonstrated its ability to build the road to the satisfaction of the State Railroad Commission and the Supreme Court.

ANNUAL MEETING OF THE SOUTH SIDE ELEVATED RAILROAD COMPANY, CHICAGO

The South Side Elevated Railroad Company held its annual stockholders' meeting at Chicago, Jan. 28. The following financial report was made:

RECEIPTS

Dec. 31—	1902	1903
Receipts	$1,433,828	$1,629,360
Other earnings	48,477	49,477
Miscellaneous receipts	1,538	473
Totals	$1,483,843	$1,679,310

EXPENSES

Maintenance way and structure	$57,443	$64,325
Maintenance equipment	107,145	132,847
Conducting transportation	364,736	422,857
General expenses	*149,957	158,160
Loop rental	183,057	216,183
Totals	$862,338	$994,375
Net earnings	621,505	684,934
Bond interest	33,750	33,750
Balance	$587,755	651,184
Dividends	409,124	409,133
Surplus for year	$178,631	$242,051

BALANCE SHEET

Assets		
Cost of property	$12,006,657	$12,350,880
Stock in treasury	92,390	92,400
Material and supplies	24,931	41,416
Current assets	25,726	49,446
Due from companies and agents	.....	11,283
Cash on hand	8,814	7,720
Totals	$12,158,522	$12,553,146
Liabilities		
Capital stock	$10,323,800	$10,323,800
Funded debt	750,000	750,000
Current liabilities	†183,814	‡386,387
Profit and loss	850,908	1,027,959
Depreciation	50,000	65,000
Totals	$12,158,522	$12,553,146

* Includes taxes. † Includes reserve for taxes: ‡ The items are:

Operating expenses for December	$74,697
Reserve for taxes, due in April	73,975
Construction expenses for new lines	237,715
Total	$386,387

The item of construction and expenses for new lines will be ultimately paid out of the construction fund when the plans for providing money for the new lines are carried out.

The gross receipts during the year were 13.1 per cent above the previous year. The Chicago City Railway strike in November, which lasted two weeks, swelled the gross receipts for the year above the normal increase. During this strike the daily average of passengers carried suddenly rose from 85,788 to 206,000.

President Leslie Carter, in his report, outlined the plans which the company has for extensions and the improvement of the service, and also for the raising of $7,000,000 necessary to make these extensions. In regard to extensions, he said:

"In March last the privilege was granted by the City Council to your company to operate lines until 1938 to the Union Stock Yards and packing houses; Forty-Second Street, near Lake Michigan; Englewood, westward to a point between Center and Ashland Avenues; Englewood, southward to a point between Sixty-Eighth and Seventy-Second Streets; to build a third track from Twelfth Street to Forty-Third Street. To do these things will require the building of 3.8 miles of single track and 6.8 miles of double track, practically doubling your mileage. This work must all be completed by March 16, 1907.

"The addition of your lines will extend your service into as well or better populated territories than are now reached. The distances between terminals are no longer than on the present line. There will be new crosstown lines, affording entirely new business in the rush hours, which will not come on the northern and more crowded part of the road.

"The third track from Twelfth Street to Forty-Third Street will enable the company to establish an express service, reduce the running time of such trains ten minutes, and attract business from a wider territory.

"Reliable estimates of the traffic to be derived have been made, and justify the belief that the completed system will be as profitable as the present line, with increased probabilities of growth, and an increased certainty of holding business acquired.

"The advantages to the public, among others, are:

"A comprehensive service to all parts of the South Side, which have a population justifying the expense of constructing and operating an elevated railroad.

"On express trains a reduction of ten minutes in time from all districts served south of Thirty-Ninth Street.

"An improved service in rush hours to points north of Thirty-Ninth Street.

"Crosstown service from Englewood to the south parks.

"Crosstown service to the Union Stock Yards and packing houses.

"The line to the Union Stock Yards and to Lake Michigan will be leased to your company perpetually, with twenty years' privilege of purchase, at cost. The Englewood lines will be consolidated with your present lines, under the statute relating to railroad consolidations.

"The new Fortieth Street line will be financed by the Chicago Junction Railway Company, by an issue of bonds not to exceed $2,240,000, bearing interest at 4 per cent, secured on that company's property, the contracts for the work to be subject to the supervision of the officers of your company. The rest of the work must be financed by ourselves.

"The directors have always unanimously favored plans to accomplish this with stock and not by mortgage. In this they have been promptly supported by the assent of a majority of those stockholders with whom they have been able to communicate personally, and to such an amount of stock that they have substantial reasons to believe that it will be supported by a large proportion of all stockholders. As the amount, $7,000,000, is large, and as it is not certain that all the stockholders will take and complete the payment for the new stock, it is necessary to arrange for an underwriters' agreement, wherein it will be provided that each stockholder who takes and pays for his new stock shall receive back from the underwriters all the commission which the underwriters are entitled to under this agreement on such stock so taken by stockholders. Such commission will be not less than $7 a share. That is to say, each stockholder will be asked whether he will agree to take new stock to the extent of 70 per cent of his holdings, payment to be made, say one-third April 30, 1904, one-third April 30, 1905, one-third April 30, 1906, each stockholder to receive through the underwriters' agreement a credit equal to their commission on such stockholders' amount of stock, but not less than $7 per share.

"For all stock payments negotiable receipts will be issued, bearing interest at the rate of 4 per cent per annum. Full paid stock will be issued in exchange for receipts on making the final payment. A circular letter containing this plan will be addressed to all stockholders, asking each one whether he is willing to subscribe for the respective proportion of stock falling to him. If this plan meets with the same general approval of those whom we cannot personally see that it has with those whom it has been our good fortune to meet, the financing of the property will be accomplished at the least possible expense to the company."

W. B. Walker, W. R. Linn and Leslie Carter were re-elected directors for four-year terms. Officers were elected after the meeting of shareholders. On account of ill health, John H. Glade, who has been secretary of the company, resigned, much to the regret of the board. He was succeeded by Horace F. Hardy, auditor of the company. The officers and directors now are as follows:

President—Leslie Carter.
Vice-President—T. J. Lefens.
General manager—Marcellus Hopkins.
Secretary and Treasurer—Horace F. Hardy.
Directors—Byron L. Smith, William B. Walker, C. H. Wacker, Joseph Leiter, George E. Adams, C. J. Blair, T. J. Lefens, William R. Linn, Leslie Carter.

REPORT OF THE TORONTO RAILWAY COMPANY FOR YEAR ENDING DEC. 31, 1903

The report of the Toronto Railway Company for the year ending Dec. 31, 1903, shows gross earnings of $2,172,088, an increase of $337,179 over the same period of 1902. The net earnings were 18½ per cent more than the net of 1902. Out of the net profits there were declared four quarterly dividends of 1¼ per cent each, amounting to $326,548. After deducting pavement charges paid

to the city, and transferring $50,000 to the contingent account, there remained a surplus of $180,629. There was expended for general purposes and charged to capital account the sum of $379,615. This expenditure includes extensive alterations and additions at the power house, new motor equipments, additional track and overhead construction, new rolling stock and buildings necessary for the increased business. The boilers of No. 1 power house are being replaced by boilers of much larger capacity and two additional direct-connected engines of 1600-hp capacity each, and generators are being erected, which it is anticipated will be sufficient to take care of all increases in business until the company is receiving power from Niagara. As an additional safeguard, a storage battery having a capacity of 3000 amp.-hours is now rapidly approaching completion. The city of Toronto received from the company under the terms of the franchise the sum of $298,839, as compared with $255,551 the previous year.

The results for four years past and the balance sheet of Dec. 31 follow:

	1903	1902	1901	1900
Gross earnings	$2,172,088	$1,834,908	$1,661,017	$1,501,001
Operating expenses	1,200,823	1,015,361	857,612	775,981
Net earnings	$971,265	$819,547	$803,405	$725,020
Fixed charges	342,101	313,105	292,679	321,818
Dividends paid (5%)	326,548	302,439	270,000	240,000
Cost of paving	71,986	70,275	68,000	64,000
Contingent account	50,000	.....	.....	.....
Total	$790,635	$685,819	$630,679	$625,818
Surplus	180,630	133,728	172,726	99,202
Passengers carried	53,055,322	44,437,678	39,848,087	36,061,667
Transfers	18,654,344	15,974,220	13,750,038	12,570,704

BALANCE SHEET, DEC. 31

Assets	1903	1902
Road and equipment	$11,184,499	$10,835,767
Stores on hand	139,459	108,555
Accounts receivable	623,102	362,304
Cash in bank	11,388	97,152
Cash in hand	162,274	22,167
Total	$12,120,723	$11,425,946

Liabilities	1903	1902
Capital	$6,600,000	$6,268,414
Bonds outstanding	3,473,373	3,473,373
Mortgages	70,000	70,000
Loan on bonds	100,000	.....
Accrued interest	64,029	61,577
Accounts and wages	166,140	113,710
Unredeemed tickets	18,936	12,925
Injuries fund	8,319	.....
Dividends	82,113	77,438
Contingent account	83,675	75,000
Profit and loss	1,454,136	1,273,507
Total	$12,120,723	$11,425,946

ANNUAL MEETING IN WASHINGTON

The Washington Railway & Electric Company and its subsidiary street railway and electric lighting companies held their annual meetings a few days ago. It had been expeeted that the annual reports of the companies would be ready for the stockholders, but with the exception of the City & Suburban Company the figures had not been compiled. It is expected that they will be ready in a few days, however, when they will be sent to Congress.

The City & Suburban Railway report shows the company to be paying operating expenses and fixed charges and a small surplus in addition. The company went into the hands of a receiver some time ago because of its inability to pay its fixed charges, in the shape of 5 per cent interest on the issue of $1,750,000 City & Suburban bonds. President Allan McDermott, of the Washington Railway & Electric Company, which owns the controlling interest in the City & Suburban, was appointed receiver. In the first year after the appointment of the receiver the company continued its failure to meet its fixed charges. In the year 1903, for the first time, a surplus over fixed charges of $6,000 was earned.

The total receipts of the eompany from passenger traffic rentals and other sources were $301,000. The expenses of operation were $207,500, and the interest on the City & Suburban bonds was $87,500, making a total of expenditures of $295,000.

The following figures, though not official, are believed to closely approximate in round numbers the earnings of the entire Washington Railway & Electric system. The exact figures, as has been stated, are not yet available:

Gross receipts	$1,400,000
Operating expenses	750,000
Net earnings	$650,000
Fixed charges	350,000
Surplus	$300,000

The gross earnings of the allied companies increased for the year, and the operating ratio was reduced from 56 per cent to a trifle over 53 per cent. The fixed charges were 4 per cent on about $8,750,000 bonds, or $350,000. The surplus for the year increased nearly $100,000, the surplus for the preceding year having been $201,000. It will be seen that the surplus of $300,000 is equal to 3.5 per cent on the $8,500,000 preferred stock of the company.

The directors elected for the coming year are as follows: For the Washington Railway & Electric Company, George Truesdell, George W. Young, George H. Harries, James B. Lackey, S. L. Shober, Jr., A. L. McDermott and R. T. W. Duke, Jr. The directors of the subsidiary companies were the same, except that of W. F. Ham and H. W. Fuller were added. The officers of the main company and of the subsidiary companies are as follows: Alan L. McDermott, president; George H. Harries, vice-president; W. F. Ham, treasurer; James B. Lackey, secretary.

ANNUAL MEETING AND REPORT OF THE DETROIT UNITED RAILWAY

The annual meeting of the Detroit United Railways Company was held in that city a few days ago. The detailed operating report was presented and directors were re-elected as follows: Henry A. Everett, E. W. Moore, R. A. Harman and H. R. Newcomb, of Cleveland; R. B. Van Cortland, of New York; Arthur Pack, of Pontiac and Detroit; H. S. Holt, of Montreal, Que., and J. C. Hutchins, of Detroit. At a subsequent meeting of the board of directors these officers were re-elected: H. A. Everett, chairman board of directors; J. C. Hutchins, president; Arthur Pack, vice-president; Geo. H. Russel, of Detroit, treasurer; Edwin Henderson, of New York, secretary, and A. E. Peters, of Detroit, assistant secretary.

The report shows that the gross earnings for the year amounted to $4,386,974, an increase over 1902 of $425,572, while the net earnings for 1903 were $1,772,997, as against $1,700,616 for 1902. The surplus amounted to $311,860, as against $282,961 in 1902. The falling off in net earnings is accounted for by the increased cost of eoal, labor and materials. The interest on the funded and floating debt for the year amounted to an even $1,000,000, as against $948,902 in 1902. An expenditure of $870,070 for additions and betterments, was provided for by proceeds from the sale of bonds. During the year there were retired $16,000 of 5 per cent bonds, the balance of the issue of $275,000 of the Detroit Suburban Railway, and $200,000 of 6 per cent bonds of the Wyandotte & Detroit River Railway. To provide for these bonds there were taken out of escrow $216,000 of the Detroit United Railway 4½ per cent bonds.

A synopsis of the annual report is given below:

On Jan. 1, 1903 the number of miles of street railway operated was 513.9. There has since been added 19.9 miles, making a total of 533.858 miles.

DETROIT UNITED

Gross earnings		$3,842,868
Operating expenses, including taxes		2,246,947
Net earnings from operation		$1,595,921
Income from other sources		22,076
Gross income from all sources		$1,617,997
Deductions—		
Interest on funded and floating debt	$868,113	
Dividends	500,000	
		$1,368,113
Surplus income		$249,884

RAPID RAILWAY SYSTEM

Gross earnings	$454,946
Operating expenses, including taxes	310,049
Net earnings from operation	$144,897
Income from other sources	4,669
Gross income from all sources	$149,566

Deductions—	
Interest on funded debt	$125,050
Surplus income	$24,516

SANDWICH, WINDSOR & AMHERSTBURG RAILWAY

Gross earnings	$89,160
Operating expenses, including taxes	56,980
Net earnings from operation	$32,180
Income from other sources	12,117
Gross income from all sou ces	$44,297
Deductions—	
Interest on funded debt	$6,837
Surplus income	$37,459

DETROIT UNITED RAILWAY, RAPID RAILWAY SYSTEM AND SANDWICH, WINDSOR & AMHERSTBURG RAILWAY

	1903	1902	1901
Gross earnings	$4,386,974	$3,961,402	$2,919,171
Operating expenses, including taxes	2,613,976	2,260,786	1,596,765
Net earnings from operation.	$1,772,997	$1,700,616	$1,322,405
Income from other sources...	38,863	31,247	23,066
Gross income from all sources.	$1,811,860	$1,731,864	$1,345,472
Deductions—			
Interest on funded and floating debt	$1,000,000	$948,902	$675,343
Dividends	500,000	500,000	500,000
	$1,500,000	$1,448,902	$1,175,343
Surplus income	$311,860	$282,961	$170,129

The total number of passengers carried on all lines during the period was 110,100,650, as against 98,378,427 in 1902. The average revenue from each passenger paying fare was 4.9 cents, but the transfers and deadheads brought the average for all passengers carried down to 3.8 cents.

The car mileage for the year was 21,730,898, and the net earnings per car-mile, .0816.

The tracks, rolling stock and other property have been efficiently maintained during the past year.

There has been charged out on the balance sheets under the head of "Additions and Betterments" as follows:

Organization expenditures	$5,000
Tracks	218,059
Electric-line construction	59,261
Additional feed-wires.	
Cars	240,976
Fifty modern double-truck closed cars; the assembling of 200 motors and additions to 20 open cars.	
Miscellaneous equipment	5,693
Two concrete mixers, additional snow-plows and stone crushers.	
Motor equipment	129,823
Two hundred new 40-hp motors.	
Air-brakes and compressors	32,293
The instalment of ninety-five air-brake equipments and four air-compressing stations.	
Power stations	104,214
The completion of one 1500-kw and two 1000-kw generators, and one Filer & Stowell compound engine, also complete coal and ash-handling machinery in Station B.	
Monroe Avenue shops	59,545
Additions to this company's general shops.	
Car houses	29,769
Additions to the Jefferson Avenue, Woodward Avenue and Michigan Avenue car houses, and the building of a new car house and yard on Gratiot Avenue.	
Harper Avenue property	16,792
Additional buildings for the track department.	
Michigan Avenue crossings	6,845
Separation of grades of the Michigan Central and Grand Trunk Railways.	
Wyandotte Division	13,388
Extensions to car houses and additional feed-wire.	
Orchard Lake Division	4,103
Track work in Pontiac.	
Pontiac Division	2,466
Side tracks.	
Flint Division	41,842
New car house and track work in the city of Flint.	
	$870,070

In addition to the above, there has been expended on the Rapid Railway system and on the Sandwich, Windsor & Amherstburg Railway as follows:

Rapid Railway system	$140,723
The building of 3.227 miles of main and side tracks; the addition of six modern double-truck cars with air-brake equipment, including compressor station; additional feed and trolley wire, and extensions to several car houses.	
Sandwich, Windsor & Amherstburg Railway	315,267
The completion of 13.132 miles of track (Amherstburg extension); standardizing of tracks on London Street, Windsor; two new double-track cars, and extensions to lighting plant in city of Windsor.	

NORTHWESTERN ELEVATED REPORT, CHICAGO

The report of the Northwestern Elevated Railroad Company, of Chicago, for the year 1903 shows that property to be prospering, although a raise in wages twice during the year and an increase in taxes has reduced the net income below what the natural increase would make it. The figures in detail are as follows:

	1903	1902
Passenger earnings	$1,246,473	$1,167,529
Other earnings (including loop net earnings)	295,566	243,469
Total earnings	$1,542,039	$1,410,998
OPERATING EXPENSES		
Maintenance of way and structure	$56,427	*$58,063
*Maintenance of equipment	66,415	51,261
Conducting transportation	370,366	306,143
General expenses	52,037	48,934
Net earnings	$996,792	$946,597
CHARGES		
Loop account, 1½ cent per passenger carried	$124,666	$116,774
Taxes	109,591	86,309
Interest on bonds	560,000	554,091
Surplus for year	$202,534	$189,432
Previous surplus	471,729	282,297
Surplus forwarded	$674,263	$471,729
STATISTICS		
Ratio of operating expenses, including maintenance reserve, to earnings		42.59 %
Ratio of operating expenses, including maintenance reserve, loop account and taxes, to earnings		60.76 %
Daily average of passengers carried in 1900		47,594
Daily average of passengers carried in 1901		55,690
Daily average of passengers carried in 1902		63,986
Daily average of passengers carried in 1903		68,310

Increase in 1903 over 1902, 6.76 per cent.

* Includes $36,000 charged into operating expenses and set aside for future needs.

ANNUAL REPORT OF THE CROCKER-WHEELER COMPANY

The annual report of the Crocker-Wheeler Company, Ampere, N. J., for the year ending December 31, 1903, shows a decided gain over the preceding year. The results of the year's operation must be highly gratifying to the officers and stockholders, and it is certainly an encouraging showing for all interested in electrical development. While this company is widely known as one of the leading manufacturers of large generators and power motors, it will come as a surprise to those who have not followed closely the course of electrical development to learn that last year its gross business amounted to more than $2,000,000; in other words, it turned its capital over twice in twelve months. The gross profit for the year's operations was $519,781, and, after paying fixed charges, dividends, reserves, etc., a balance was carried to surplus of $167,994, making the total surplus to date $408,868. At the time of the report orders amounting to more than a half million dollars were passing through the works, which, though recently enlarged, are now crowded to their capacity. President Wheeler, under whose able management this institution has grown up, is to be congratulated on this evidence of stability and prosperity.

FAVORABLE DECISION FOR THE COMPANY IN THE NEW YORK TRANSFER CASE

On Friday, Jan. 29, the Court of Appeals dismissed the appeal of James S. Lenmaier from a decision of the lower courts denying him a mandamus to compel the Interurban Street Railway Company, of New York, to give free transfers at Eighth Avenue and One Hundred and Twenty-Fifth Street.

Justice O'Brien, writing the opinion, declares that this is not the proper remedy, and suggests that the statute provides a penalty of $50 in favor of any individual who has been refused a transfer where one should legally be issued, and that in addition he may institute an action for damages, to which he may have been subjected in consequence. In addition, Justice O'Brien says, the Attorney-General is authorized to bring action to vacate the charter of any railroad company that violates the law, and a refusal to give transfers in certain cases would doubtless bring a corporation within the scope of that statute.

Provision is also made, it is added, by the law for the investigation by the Railroad Commissioners of complaints of neglect of duty by railroad corporations, and their recommendation is enforceable by mandamus. A mandamus, it is held, is not the proper remedy until after action by the commissioners. The case of Mr. Lehmaier, representing the Transit Reform Committee of One Hundred, was passed upon by Justice O'Gorman, of the Supreme Court, and came up in the Appellate Division on June 19, last.

A RADICAL BILL IN MASSACHUSETTS

A radical bill has been introduced into the Massachusetts Legislature by Dr. Julius Garst, one of the representatives from Worcester. The bill provides that the selectmen of a town, or the aldermen of a city shall, in granting a franchise for a street railway company, include the payment of such sum as they deem proper by the grantee; that all existing locations expire July 1, 1924, and that all grants of locations shall be for a period of not more than twenty years. It is provided that the city or town may take over the property of the street railway on the payment of the cost of duplication, less depreciation, of the property. In case of a disagreement the price shall be fixed by the Railroad Commission. A two-thirds vote of the citizens at an election is required before a city or town may purchase a street railway. Provision is also made for a new grant of a location after the twenty years limit has expired, either to the original grantee or to a new party. In case a new grantee comes in he shall take over the property of the original grantee at the cost of duplication, less the depreciation. There is also provision for approval by popular vote of any grant, provided it is requested by 5 per cent of the citizens of the city or town.

Dr. Garst has introduced a similar bill relative to gas and electric light companies. He represents one of the most intelligent constituencies in Worcester, but his propositions have never been given the approval of his constituents.

THE FAMOUS CROSSING CASE IN NEW JERSEY

The famous Yardville crossing case is expected to be settled at an early date. The Mercer County Traction Company (a subsidiary company to the Trenton Street Railway, of Trenton, N. J.), having won again in the Court of Chancery, it is believed that there will not be any great delay in the higher courts. Once the case is finally decided in favor of the Traction Company, the local cars can run to Crosswicks and Allentown, and it is possible that the line would be continued toward the seashore. The fight, which has been reviewed at length in the STREET RAILWAY JOURNAL, has been a lesser rival of the famous Croydon entanglement, the scenes of which were laid a dozen miles away in Pennsylvania. In both cases the Pennsylvania Railroad Company has been the opponent, and the fight has been bitterly contested. The Croydon fight included a dozen railroad charters, a dozen legal battles and several personal encounters. It was finally settled, after seven years, by a shrewd move upon the part of Wilbur F. Sadler, Jr., who came into control of the Philadelphia, Bristol & Trenton Street Railway. The Yardville fight has been devoid of personal encounters, but it has bristled with legal technicalities. Owing to an oversight in not accepting an ordinance in the earlier days of construction the Trenton Street Railway Company has been deterred from crossing the Pennsylvania's single track at Yardville, and three times the case has been fought through all the courts of the State. The Traction Company always won in the lower courts, and lost in the higher. It is believed that every loophole has been closed, and that the end is in sight. In the vicinity of the proposed crossing public sympathy has been unanimously with the Traction Company.

COMPLIMENTS FOR LAKE STREET ELEVATED MANAGEMENT

The motormen and conductors of the Lake Street Elevated Railroad at Chicago, at a recent meeting, decided not to reopen the matter of wages this year, and incidentally said some very complimentary things about the fair and considerate treatment they are receiving from the management of that road and Superintendent C. A. Gage in particular.

A THIRD-RAIL LINE TO COMPETE WITH NORTHERN SECURITIES ROADS

Prominent interests in the West are arranging for the organization of a company to build a third-rail electric railway between Duluth and Minneapolis. The plans of the promoters have progressed so far that the statement has been made that the Minnesota Central Railway Company has been selected as the title of the new company. As at present outlined, the road will be standard gage, 135 miles long, or 17 miles shorter than the Great Northern or Northern Pacific lines, between the points named. The new line, with its shorter haul between the cities and the advantages that will accrue to it from the use of electricity, is expected to be a formidable competitor of both of the steam lines mentioned. Among those reported to be interested in the company are: John J. Allen, J. Inist, of Minneapolis, and F. B. Rossom, of Virginia, prominent in iron land matters on the Mezaba.

RECEIVER FOR CHICAGO & SOUTH SHORE

The Royal Trust Company, of Chicago, and A. G. Ambler, as trustee, have made an application in the Federal Court for the appointment of a receiver for the Chicago & South Shore Railroad Company. This company operates the interurban line between La Porte and Michigan City, Ind. Application is also made for the foreclosure of a mortgage securing an issue of bonds for $282,000. Judge Anderson at La Porte issued a temporary restraining order forbidding the officers of the company from disposing of the property, pending the hearing of the receivership application Feb. 4.

AN IMPORTANT NEW COMPANY IN OHIO

The incorporation at Columbus, Ohio, on Jan. 28 of the Ohio Union Traction Company is thought to presage an important impending electric railway deal. The capital stock of the company is for the present only $10,000. The incorporators are: Richard Emory, W. A. Morgan, Otto F. Ebring, George E. Thomas and Harry L. Doud. Mr. Emory is superintendent of the Appleyard lines at Columbus. He said the company had already organized with A. E. Appleyard, of Boston, as president; Richard Emory, vice-president; C. F. Coaney, of Philadelphia, secretary; W. L. Pomerene, of Coshocton, Ohio, assistant secretary; G. B. Appleton, of Boston, treasurer. These officers and J. S. Harshman and C. A. Alderman, of Springfield, compose the board of directors.

The purpose of the company as set forth in the articles is to acquire or build and operate an electric railway from Cincinnati to Toledo, with a branch to Columbus and Cleveland. The main line will run from Cincinnati to Toledo, passing through Hamilton, Warren, Montgomery, Clarke, Champaign, Logan, Hardin, Hancock, Wood and Lucas Counties. The other line is to pass through Warren, Montgomery, Clarke, Madison, Franklin, Licking, Muskingum, Coshocton, Tuscarawas, Stark, Summit and Cuyahoga Counties.

There is an electric railway now operating between Cleveland and New Philadelphia, and it is proposed to build from the latter city to Zanesville, there to connect with the Columbus, Buckeye Lake & Newark line, now almost completed to Zanesville. The Appleyard line from Columbus through London to Springfield is now in operation to Dayton. From Dayton to Cincinnati the Cincinnati, Lebanon & Dayton line will be used. It is completed and in operation between Cincinnati and Lebanon. All told, it will be necessary to construct about 75 miles of additional track to make a continuous line from Cincinnati through Columbus to Cleveland.

The line from Cincinnati to Toledo may be completed for less money. The Findlay, Toledo & Bowling Green Road, connecting Toledo and Findlay, is in operation, and the Urbana, Bellefontaine & Northern runs from Dayton to Bellefontaine, so that a gap of only about 40 miles of road needs to be filled in.

ROCHESTER COMPANY TO INCREASE STOCK

A special meeting of the stockholders of the Rochester Railway Company, of Rochester, N. Y., is to be held Feb. 10 for the purpose of considering and authorizing an increase in the capital stock of the company from $5,000,000 to $5,500,000, and for the purpose of making such part of the issue of such increase of stock, preferred stock, and such part common stock as the stockholders may determine, and to transact such other business as may properly come before the meeting. The money will be used in continuing the improvements started some time ago. It is the purpose of the company to place the road in the best condition possible. A rumor has been current that the company is planning to absorb the Rochester & Eastern Company, and eventually to purchase the Rochester Gas & Electric Company.

BIDS FOR NEW SUBWAY IN NEW YORK

Formal application was renewed last week in a communication sent to the Rapid Transit Commission by August Belmont, embracing a report made by John B. McDonald, the subway contractor, for permission to build various extensions to the subway system in Manhattan and the Bronx. Again permission is asked to construct what is called the Broadway extension. Mr. McDonald says that he is not in favor of abandoning this line from Forty-Second Street to the Battery.

In Mr. McDonald's report, which, Mr. Belmont writes, meets with his entire approval, it is pointed out that this extension would make it possible to build a subway from Thirty-Third Street to the new Pennsylvania Railroad station.

It is also recommended that a three-track tunnel be built on Lexington Avenue from Forty-Second Street to and under the Harlem River, and on through Third Avenue to 149th Street.

This is taken as an indication that the Interborough Company, which controls the now nearly completed subway system, will be a rival bidder for the Lexington Avenue extension, which was some time ago suggested by Thomas F. Ryan on behalf of the Interurban Street Railway Company. The Interurban suggestion was not only to build an extension along Lexington Avenue, but through a cross street between Thirty-Fourth and Forty-Second Streets to the West Side and along the North River front to the Battery.

These extensions, in Mr. McDonald's opinion, will meet the most pressing demands for the subway service.

PRUSSIAN PUBLIC WORKS MINISTER ON THE HIGH-SPEED ELECTRICAL RAILWAY

Before the budget committee of the Prussian Diet, Jan. 26, Minister of Public Works Budde, discussing the recent electrical rapid transit experiments, said:

"The studies are still in their preliminary stages. We cannot undertake the transportation of the general passenger public electrically. It is still uncertain whether such roads can be economically profitable. The experiments will be continued with necessary precautions. The operation of the suburban road from Berlin to Grosslichterfelde gives the most favorable results, and we shall soon see the practical introduction of electricity on the Hamburg Elevated Railroad. The Prussian Railroad administration will utilize the results of all these experiments."

CLEARING THE WAY IN CHICAGO

At last some little effort is being made in Chicago to stop unnecessary delay of cars by teamsters, and several arrests have been made. An amusing aspect of the situation is revealed in the following paragraph, which appeared in the Chicago "Inter-Ocean":

Ingratitude is what the union teamsters are charging the union street car men with. The Keg Beer Drivers' Union has appointed a committee to visit the unions of the street car men, and ask them why they have so soon forgotten past favors. The trouble comes as a result of the crusade now being carried on against teamsters who get on the tracks and refuse to move out. Time was, the teamsters allege, when the street car men were anxious to have drivers get in the way and impede the progress of cars manned by non-union men. Now matters are different, and the street car men are appearing as witnesses to prosecute their erstwhile allies. Nicholas Funk, who was arrested a few days ago and fined by Justice Caverly for blocking a street car, is a member of the Keg Beer Drivers' Union. Further, he says it was impossible fo .im to get his heavy wagon out of the tracks, and his feelings are hurt. So was his pocketbook to the extent of $5. He wants redress, and he has appealed to his union to get it. The union has decided to take the matter up. "The teamsters have fought and bled for the street car men," said one teamster yesterday who had recollections of his first introduction to a policeman's club during the recent street car strike. "It's a shame that they should turn against us now."

This paragraph, in addition to its mirth-producing qualities, gives an excellent insight into the true workings and effects of unionism. It would not be at all surprising if the "Keg Beer Drivers' Union" should seriously take up the grievances of its "persecuted and prosecuted" member. It is just because such grievances as this are being continuously taken up and considered by unions that managements of large undertakings are so averse to seeing their employees pass under union control.

POLE AND TIE YARDS

Among cedar companies in Michigan it is the custom to ship the poles which are bought from small producers and also those lumbered off their own lands, into different convenient storage yards. There the poles are assorted into their different sizes, receiving usually a second careful inspection, the first being made in the woods. Of course, some companies still endeavor to ship the greater portion of their stock direct from the woods, but this is so apt to cause delay in getting cars and confusion in filling "straight" carloads of some one size from a small stock, that the more experienced companies have abandoned it almost entirely.

The small margin in poles and the fierce competition among the buyers of the different companies in the woods has led to the adoption of every economy possible, but this yard expense is something that must usually be borne, if orders are to be filled promptly and accurately, especially the larger orders.

However far this reform, if it may be called that, has gone in the pole business, it has not yet been very extensively introduced in the cedar tie business. The Maltby Lumber Company, of Bay City, Mich., is one of the few firms that has applied the methods of the pole business to ties.

A railway company is very apt to find itself short a few thousand ties, or possibly but a carload or two. Then the advantage of calling on a section of the country where ties can be and are shipped every month in the year is readily appreciated. High water, poor roads, lack of water, have no effect on the shipment of ties that are concentrated in lots of 10,000 to 15,000, especially when piled in yards located in the same favorable position as regards competing railroads, as the best pole yards.

THE COLUMBUS, GREENSBURG & RICHMOND LINE

The stockholders of the Columbus, Greensburg & Richmond Traction Company are to authorize an increase in the capital stock of the company from $1,000,000 to $2,500,000. Contracts for beginning the construction of the line have been signed with Jeup & Moore, of Indianapolis, engineers of a number of electric roads, and the company expects to be ready to let contracts for material as soon as the specifications have been prepared, which will be early in April. It is the intention of the company to build 96 miles of road from Columbus, Ind., through Greensburg and Connersville to Richmond, double track, third rail, all wires to be laid in vitrified conduits. Representatives of the MacAfee Company, of Philadelphia have just made an inspection in the interest of the bondholders, and pronounce the project a thoroughly stable one. The company is arranging for other lines intersecting in Southern Indiana, with Louisville and Cleveland as objective points. The system will aggregate 325 miles. Bonds in the amount of $2,500,000 have been sold, and construction work will be begun as soon as the weather will permit.

SEATTLE ELECTRIC COMPANY'S EARNINGS

The Seattle Electric Company, on its street railway lines, earned gross $1,492,664 in 1903. Two per cent of this amount has been paid to the city of Seattle. Under the terms of the franchise the city receives 2 per cent of the gross earnings until Jan. 15, 1920, and 3 per cent during the remainder of the life of the franchise Besides the city's percentage of the gross earnings, which amounted to $27,208 last year, the company spent approximately $150,000 in the improvement of streets of direct benefit to the city. On every street paved last year on which there were street car tracks the company paved a strip 18 ft. wide.

In 1903 there were 31,400,000 paid fares, and 41,953,967 passengers were carried. The population of Seattle in 1900 was 80,671, and it has been growing rapidly since then. It will thus be seen that the earnings per capita of population are high, as the hills in Seattle are conducive to riding. Further than this, there is not so much the disposition to save the small price of car fare as in Eastern cities.

REMOVAL OF SNOW IN NEW YORK

The government reports show that the January record for snowfall in New York city was phenomenal, and this, combined with the continued cold weather, has taxed the facilities of the railway companies in the city to their uttermost. Most of the companies purchased a large equipment of snow sweepers and plows a little over a year ago, and had little use for them during the mild winter of 1902-03. The apparatus, however, has been in almost continuous service during the last thirty days, and by their use the companies have thus kept their lines in operation when practically all of the steam railroads entering the city were blockaded. According to President Vreeland, the weather conditions have been the worst experienced during his connection with street railway service in New York city.

Considerable unwarranted criticism has appeared in the daily papers, during the last two or three weeks, directed against the Interurban Street Railway Company, because during the storms, certain fenders were temporarily removed from a number of the company's cars. It was assumed from this fact that the company intended partially to discontinue the use of fenders, but nothing is further from the truth. Owing to the large amount of snow which has fallen, the sides of the streets have been blockaded, and drays and other vehicles have been driven onto the tracks in the center of the street, where the electric cars have often been compelled, in self-defense, to assist the overworked horses by pushing the drays from behind. The Providence fender, which is used on the lines of the company, is designed with an elastic cushion over the car buffer to prevent injury to persons caught in the fender, and it was considered desirable by the managers of the company to remove the entire fender on some of the lines until the exigencies of the situation should pass over. President Vreeland states that a number of these fenders have already been replaced, and it is not the intention to take a backward step and abandon either fenders in general, or change the type of fender employed.

NEW PUBLICATIONS

Air-Brake Catechism. By Robert H. Blackhall; 312 pages; two large educational charts printed in colors. Price $2. Published by Norman W. Henley Publishing Company, New York.

This is practically a new book, as it is a complete revision and rearrangement of the work of this title as published in 1898 and revised in 1900, and is brought down to date in this, the eighteenth, edition. It comprises a complete study of the Westinghouse air-brake equipment, and includes the latest devices and inventions used in connection with this system. All parts of the air-brake, their troubles and peculiarities, are considered, and a practical way is suggested to find and remedy them. The book describes in detail the principal features of the Westinghouse air-brake system, and gives some very valuable information to those who are in charge of these equipments. The matter is presented in the form of 1500 questions and answers.

Locomotive Breakdowns, Emergencies and Their Remedies. By George L. Fowler; 250 pages. Price $1.50. Published by Norman W. Henley Publishing Company, New York.

As the title indicates, this work treats of accidents that are likely to happen to locomotive engines while in operation, and remedies are suggested in almost every possible contingency. The author discusses the parts of the locomotive and the several types of compound locomotives, and furnishes some valuable information and suggestions as to the tools and appliances needed for making engine repairs and their use.

L'État actuel de l'Électroculture. By E. Guarini. Brussels, 1903. Published by Ramlot, Fréres et Soeurs. Paper, 24 pages, illustrated. Price, 1 fr.

This is a brief review of the effect on plants of electric currents. This subject is attracting considerable attention among agricultural associations in Europe, and the writer gives views and observations which seem to show that electrical treatment has a stimulating effect on certain kinds of plants, due, probably, to chemical changes in the soil, but nothing is said of the commercial aspects of this form of electrolytic treatment.

Elektrisch Betriebene Strassenbahnen Taschenbuch. By S. Herzog. Munich and Berlin, 1903. Published by R. Oldenberg. Morocco, 475 pages and 377 illustrations. Price, 8 m.

This is the first hand-book on electric railway work published in Germany, so far as we know, and shows a conscientious study of the development of the industry. Mr. Herzog does not confine his subject to the electrical and mechanical departments of his subject. He discusses also specifications, prospectuses and operating accounting, and gives a table of average prices of different railway apparatus, the standard German underwriters' rules, the operating regulations of the Munich tramways, part of the German railroad law, etc. The book is well illustrated by diagrams, and has also a set of tables of squares, cubes, logarithms and trigonometrical functions.

PERSONAL MENTION

MR. WILLIAM G. EVANS, president of the Denver City Tramway Company, has been spending some time in New York.

MR. ARTHUR WARREN, who created and organized the Westinghouse Companies' Publishing Department, and has managed it from the beginning, resigned his position on Feb. 1.

MR. WILLIAM W. PATTERSON has resigned as superintendent of the Tarentum Traction Passenger Railway Company, of Tarentum, Pa., and Mr. A. W. Hargett, of Pittsburg, has been elected as his successor. Mr. Hargett has been connected with street railway work for the past sixteen years, and was in the employ of the Mellons, of Pittsburg, six years. He formerly was the superintendent of the Hilltop Division of the Pittsburg & Birmingham lines.

MR. OSCAR T. CROSBY, of Washington, D. C., who was formerly prominently connected with the electric railway industry, has recently returned to Paris from a private exploring expedition in Central Asia. Starting from St. Petersburg last May, Mr. Crosby, in turn, visited Russian Turkestan, Chinese Turkestan and Little Thibet. Mr. Crosby has been invited to deliver lectures before the London and French Geographical Societies on some of the places visited.

MR. H. C. HARTLEY has tendered his resignation as superintendent and purchasing agent of the Lincoln Traction Company after nearly ten years' service. Mr. Hartley said the resignation was prompted by business reasons, and that he will remain in Loncoln, which has been his home for eighteen years. Mr. Hartley was employed by the company as consulting engineer in February, 1894 and June 1, 1894, he took charge of the mechanical and engineering end of the business. He has been in that position up to the present time.

MR. J. H. VAN BRUNT, general manager of the St. Joseph Railway, Light, Heat & Power Company, of St. Joseph, Mo., has been elected vice-president of the company, and hereafter will perform the dual duties of vice-president and general manager. In order to relieve Mr. Van Brunt of the details of his managerial duties, the position of general superintendent has been created, to which place Mr. Charels F. Hewitt has been appointed. Mr. Hewitt is at present with the South Bend & Elkhart Electric Railway & Light Company, of South Bend, Ind.

MR. R. A. AMMAN was recently noted in the STREET RAILWAY JOURNAL as having been appointed to the position of master mechanic of the Columbus, Delaware & Marion Electric Railroad Company. In making this statement an error was inadvertantly made. No appointment of that kind has been made, and Mr. G. G. Crane still is master mechanic of the company. Mr. Amman was considered for appointment to the position of assistant master mechanic of the company, but later other arrangements were made. Since then Mr. Amman has severed his connection with the company.

MR. ALBERT H. STANLEY, assistant general manager of the railway department of the Public Service Corporation, of New Jersey, under Mr. Walter W. Wheatly, who recently resigned, has been appointed to the position of general superintendent of the railway department of the company, in which position he will have charge of the practical operation of the street railway lines. Mr. Stanley came on to the East from Detroit, where he was connected with the Detroit United Railway, shortly after the Public Service Corporation took over the New Jersey properties and therefore is thoroughly familiar with the local conditions. The position of general manager, which Mr. Wheatly held, has really been abolished, but in its place has been created the position of assistant to the president. Col. Edwin W. Hine, who has been executive agent of the corporation, has been appointed to this new position to represent the president in all matters pertaining to the street railway department. His headquarters will be in Jersey City. Col. Hine has been conneeted with the street railways of Northern New Jersey for a number of years, and because of his business and social connections, is particularly well known throughout the entire territory served by the company.

TABLE OF OPERATING STATISTICS

Notice.—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. * Including taxes. † Deficit. *a* Including all lines operated.

Company	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Available for Dividends
AKRON, O.	1 m., Dec. '03	71,654	41,290	30,363	23,266	7,098
Northern Ohio Tr. & Light Co	1 " " '02	64,155	35,650	28,505	17,984	10,521
	12 " " '03	882,276	482.575	399,701	268,132	131,669
	12 " " '02	745,044	410,793	334,251	205,068	129,183
AURORA, ILL.	1 m., Dec. '03	35,583	23,143	12,439	9,256	3,184
Elgin, Aurora & Southern Traction Co.	1 " " '02	34,980	21,871	13,109	9,050	4 060
	6 " " '03	242,261	140,030	102,231	55,118	47,112
	6 " " '02	223,877	125,710	98,167	54,298	43,870
BINGHAMTON, N. Y.	1 m., Dec. '03	19,158	9,669	9,489	------	------
Binghamton Ry. Co.	1 " " '02	18,282	9,656	8,627	------	------
	6 " " '03	128,187	64,191	63,997	38,141	25,856
	6 " " '02	116,617	63,466	53,152	31,219	21,933
BUFFALO, N. Y.	1 m., Nov. '03	314,006	------	------	------	------
International Trac. Co.	1 " " '02	292,878	------	------	------	------
	5 " " '03	3,649,543	------	------	------	------
	5 " " '02	3,143,194	------	------	------	------
CHICAGO, ILL.						
Aurora, Elgin & Chicago Ry. Co	1 m., Dec. '03	24,020	15,964	8,057	------	------
	7 " " '03	285,310	133,040	152,269	------	------
Chicago & Milwaukee Elec. Ry. Co.	1 m., Dec. '03	24,085	10,318	13,767	------	------
	1 " " '02	12,859	6,580	6,280	------	------
	12 " " '03	292,247	98,627	193,620	------	------
	12 " " '02	190,110	79,364	110,746	------	------
Metropolitan West Side Elevated R. R. Co	6 m., Nov. '03	1,051,639	496,004	555,635	214,935	340,700
South Side Elevated R. R. Co	12 m., Dec. '03	1,679 310	994 376	684,934	442,883	242,051
	12 " " '02	1,483,843	862,338	621,505	442,874	178,631
CLEVELAND, O.	1 m., Dec. '03	33,418	21,709	11,709	------	------
Cleveland & Southwestern Traction Co	1 " " '02	24,711	17,650	7,061	------	------
	12 " " '03	445,168	264,232	180,936	------	------
	12 " " '02	300,846	171,615	129,231	------	------
Cleveland, Painesville & Eastern R. R. Co	1 m., Dec. '03	15,620	10,172	5,448	6,568	+ 1,120
	1 " " '02	14,371	10,333	4,038	6 293	+ 2,255
	12 " " '03	214,631	127,149	87,482	78,007	9,475
	12 " " '02	189,187	105,669	83,518	74,551	8,967
DETROIT, MICH.	1 m., Dec. '03	357,022	227,631	129,398	87,110	42,288
Detroit United Ry *a*	1 " " '02	341,283	201,052	140,231	82,595	57,636
	12 " " '03	4,425,836	2,613,976	1,811,860	1,000,000	811,860
	12 " " '02	3,992,650	2,260,786	1,731,864	948,902	782,962
DULUTH, MINN.	1 m., Dec. '03	51,467	30,718	20,749	10,834	9,915
Duluth Superior Traction Co	1 " " '02	48,769	28,699	20 070	10,054	10,016
	12 " " '03	622,045	345,327	276,717	126,590	150,128
	12 " " 02	538,031	288,373	249,658	116,275	133,382
HAMILTON, O.	7 m., Dec. '03	327,954	173,384	154,570	112,511	42,059
Cincinnati, Dayton & Toledo Traction Co	7 " " '02	302,668	155,951	146,717	113,860	32,857
	12 " " '03	514,778	289,245	225,533	192,924	33,209
HANCOCK, MICH.	1 m., Nov. '03	15.094	10,391	4,703	2,827	1,875
Houghton County St. Ry. Co	1 " " '02	13,240	9,236	4,005	2,604	1,400
	12 " " '03	189,449	121,937	67,511	34,840	32 671
	12 " " '02	170,009	109,277	60,732	33,924	26,809
HAZLETON, PA.	1 m., Dec. '03	11,092	5,984	5,108	------	------
Lehigh Traction Co.	1 " " '02	9,553	5,216	4,337	------	------
	12 " " '03	142,770	77,095	65,675	------	------
	12 " " '02	100,950	58,505	42,445	------	------
HOUSTON, TEX.	1 m., Nov. '03	30,736	25,689	5,047	8,109	+ 3,063
Houston Electric Co.	1 " " '02	37,597	21,668	15,929	6,250	9,679
	12 " " '03	416,834	272,582	144,252	82,797	61,455
	12 " " '02	358,313	202,160	156,153	------	------
JACKSONVILLE, FLA.	1 m., Nov. '03	24,936	14,473	10,463	3,188	7,275
Jacksonville Electric Co	1 " " '02	19,542	12,542	7,000	2,667	4,333
	12 " " '03	245,341	162,986	82,355	36,151	46,205
MILWAUKEE, WIS.	1 m., Dec. '03	327,147	133,956	193,191	75,376	117,815
Milwaukee El. Ry. & Lt. Co.	1 " " '02	282,484	118,747	163,738	71,257	92,480
	12 " " '03	3,096,324	1,526,910	1,569,414	871.685	697,730
	12 " " '02	2,776,294	1,286,035	1,490,258	803,546	686,713
MINNEAPOLIS, MINN.	1 m., Dec. '03	359,184	157,655	201,528	61,020	140,507
Twin City R. T. Co.	1 " " '02	331,331	151.456	179,875	60,518	119,357
	12 " " '03	4,063,938	1,878,051	2,185,888	731,041	1,454,847
	12 " " '02	3,612,211	1,630,170	1,982,041	711,718	1,270,324
MONTREAL, QUE.	1 m., Dec. '03	189,266	128,032	61,234	17,273	43,961
Montreal St. Ry. Co	1 " " '02	177,367	113.917	63,450	17,406	46,044
	3 " " '03	585.428	355,350	230,078	52,367	177,711
	3 " " '02	531,645	313,965	217,680	49,474	168,207
MUNCIE, IND.						
Muncie, Hartford & Ft. Wayne Ry. Co.	1 m., Dec. '03	12,738	5,393	7,345	------	------
	10 " " '03	115,399	56,261	59,139	------	------
PEEKSKILL, N. Y.	6 m., Dec. '03	60,660	*33,397	27,263	14,375	12,888
Peekskill R. R. & Lighting Co	6 " " '02	56,546	*33,817	22,729	12,500	10,229
	12 " " '03	106,757	*63,605	43,152	27,215	15,937
	12 " " '02	86,795	*56,392	30,403	23,125	7,277
PHILADELPHIA, PA.	1 m., Dec. '03	110,311	------	------	------	------
American Railways	1 " " '02	96 431	------	------	------	------
	6 " " '03	753,639	------	------	------	------
	6 " " '02	640,377	------	------	------	------
ST. LOUIS, MO.	1 m., Dec. '03	600,703	------	------	------	------
St. Louis Transit Co.	1 " " '02	550,551	------	------	------	------
	12 " " '03	7,259 460	------	------	------	------
	12 " " '02	6,438,788	------	------	------	------
SAO PAULO, BRAZIL.	1 m., Dec. '03	120,500	35,300	85,200	------	------
Sao Paulo Tramway, Light & Power Co., Ltd	1 " " '02	105,187	33,699	71.488	------	------
	12 " " '03	1,303,813	394,462	909,351	------	------
	12 " " '02	1,123,285	417,916	705,369	------	------
SAVANNAH, GA.	1 m., Dec. '03	44,855	22,760	22,095	10,452	11,643
Savannah Electric Co	1 " " '02	41.179	21,571	19,608	9.583	10,025
	12 " " '03	516,882	307,465	209,417	118,456	90,962
	12 " " '02	475,193	275,509	199,683	------	------
SEATTLE, WASH.	1 m., Dec. '03	178.024	142,211	35,813	22,873	12,940
Seattle Electric Co	1 " " '02	174,313	121,136	53,178	23,469	29,709
	12 " " '03	2,084,625	1,513,597	571,029	287,913	283,115
	12 " " '02	1,842,736	1,277,277	565,459	264,575	300,884
TERRE HAUTE, IND.	1 m., Nov. '03	41,491	27,400	14,092	8,549	5,543
Terre Haute Elec. Co.	1 " " '02	33,921	22,420	11,501	6,471	5,030
	12 " " '03	464,104	305,363	158,741	84,319	74,422
	12 " " '02	324,335	262,770	61,565	76,104	†14,539
TOLEDO, O.	1 m., Dec. '03	154,494	75,336	79,158	39,292	39,866
Toledo Rys. & Lt. Co.	1 " " '02	139,608	63,889	75,719	38,756	36,963
	12 " " '03	1,663,794	856,526	807,268	488,200	319,068
	12 " " '02	1,459,091	726,779	732,312	459,037	273,275
Lake Shore Electric Ry. Co	1 m., Dec. '03	46,415	35,314	11,102	20,371	+9,269
	1 " " '02	38,962	30,185	8.777	20,370	+11,593
	12 " " '03	616,484	395,772	220,713	240,746	+20,033
	12 " " '02	466,051	305,878	160,173	240,746	†80,572
YOUNGSTOWN, O.	1 m., Dec. '03	45,645	*25,602	20,043	------	------
	12 " " '03	511,814	*303,041	208,773	------	------