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Of this issue of the ELECTRIC RAILWAY JOURNAL 9,000 copies are printed.

Semi-Convertible Cars vs. Mixed Equipment

William H. Heulings, in an article which is abstracted elsewhere in this issue, analyzes the relative cost of operating semi-convertible cars and of a mixed equipment consisting of open and closed cars. The carrying capacities of the equipments are assumed to be the same in each case, and a material saving was shown in favor of the semi-convertible outfit. The article is in answer to another by L. H. Parker, which was published last week and in-

icated that the saving would be in favor of the mixed equipment. Mr. Heulings points out that the error in that estimate was in assuming too great an average weight for the semi-convertible cars, and that while certain early cars of this type weighed as much as 58,000 lb., the average weight of cars of the same size now being manufactured is not over 45,000 lb., completely equipped with four motors. This change makes the reduction in initial cost and consumption of power, which turned the scales in favor of the semi-convertible cars. Mr. Heulings' statements are most instructive upon the important topic of selection of rolling stock, and are significant of the interest taken by managers and car builders in the reduction of weight of cars without sacrifice of strength and durability. The figures quoted by Mr. Heulings on power required by the cars correspond to from 1 cent to 1¼ cents per car-mile for each 10,000 lb. of car and load, or, based upon a mileage of 100 per car per day, would equal a cost for power of, say, 3¾ or 4 cents per pound per year. This, of course, is in addition to the effect on track and other items of expense caused by heavy cars. Car builders, as well as managers, realize these conditions, and in the improvements which have been made in car construction during the last few years the question of weight has been given as careful attention as any other.

Direct Current for Pennsylvania Tunnels

The Pennsylvania Tunnel & Terminal Railroad Company has decided to adopt direct-current third-rail for the operation of the Pennsylvania tunnels under New York City. No doubt this decision will be a surprise to many of our readers who have been acquainted with the trials conducted with single-phase locomotives and overhead construction on the 5-mile experimental track on Long Island. The adoption of direct current in this case needs no defense. Neither can it be taken as any reflection on the merits of the single-phase system. This much can be said, that the decision was reached only after a most thorough study and comparison of every point of difference involved between the two systems. There has been ample time for investigation and analysis of operating conditions on other roads, for making exhaustive experiments with both systems and for deliberate consideration of all of their relative advantages and disadvantages. Direct current was selected solely because, in the opinion of the engineers of the railroad company, it was best suited for the service to be performed in the electrified zone. There have been many rumors, as often denied, that the Pennsylvania Railroad would electrify its entire New York division as far as Philadelphia, and even farther west. While it is true that this problem has been studied and that the change from steam to electric operation may ultimately be made, the

ELECTRIC RAILWAY JOURNAL is authorized to state that any plans tentatively considered for this project had absolutely no influence in determining on the system to be employed in the terminal district between Newark and Long Island.

Full details of the equipment for the tunnels have not yet been announced. In general, however, the tunnels will be electrified substantially as an extension of the present suburban electric lines of the Long Island Railroad. Protected top-contact third-rail carrying normally 600 volts will be used and three-phase, 25-cycle current at 11,000 volts will be transmitted from the Long Island City power station to substations located at suitable points. The electric zone will include the present four-track main line from Newark to the Jersey City terminal, the double-track approach to the North River tunnels from the new locomotive terminal to be built at Harrison, N. J., the two single-track tunnels under the North River, the terminal station yards and tracks between Seventh and Tenth Avenues in New York, the four-track crosstown tunnels leading to the four tubes under the East River which emerge in the Long Island City surface yards, such further tracks of the Long Island Railroad as are required to round out the complete electrification of the Long Island suburban territory and the belt line connections to the proposed Ward's Island bridge and to Bay Ridge, Brooklyn. All suburban trains are to be made up of steel motor cars and trailers with multiple unit control and through trains of both the Long Island and the Pennsylvania Railroads will be hauled through the electric zone by electric locomotives of a design not yet fully decided upon.

The experimental overhead trolley line which was built on Long Island for the purpose of testing various designs of overhead construction in the event of the decision being made in favor of that system is described elsewhere in this issue. While the conclusion to adopt direct-current third-rail has caused the termination of the endurance tests which have been carried on here, much valuable information about the performance of the various types of overhead construction and collecting devices has already been obtained. This information has not yet been analyzed and intelligently compiled, so that the results and conclusions are not now available. Undoubtedly much more could be learned if the experiments were continued for a longer period, and it is to be hoped that at some future time they will be recommenced. The test has been conducted with a thoroughness which is characteristic of all of the experimental work which is undertaken by the Pennsylvania Railroad. Even the conditions of clearance in a tunnel were simulated. Such a large sum of money has already been expended on the construction of this line that it would be a distinct setback to the progress of the art of heavy electric traction if the experiments remain uncompleted, or if the results which have already been attained are withheld from the engineering public. It might be said in general, however, that unofficial observances demonstrate the value of an elastic and flexible support for the trolley wire, although the relative merits of the different types of flexible suspension employed during the tests cannot be given. The experiments on Long Island have also shown that with a suitable construction of the overhead line and of the collecting device very large amounts of current can be taken from the conductor at high speeds, with small arcing.

Buying Brake Shoes on a Mileage Basis

The contract made by the Metropolitan West Side Elevated Railroad of Chicago, for the purchase of brake shoes on a mileage basis, which was mentioned in last week's issue of the ELECTRIC RAILWAY JOURNAL, is a new departure in buying this class of equipment, although a similar form of contract has been used by many electric railway companies in the purchase of lubricating oil and car wheels, with results eminently satisfactory to both parties in the agreement. Judging by the records which have been made by the Metropolitan West Side Elevated in the short space of six months, equally good results are possible in reducing brake shoe costs. The three articles mentioned are supplies used in large quantities by railways which are peculiarly adapted to be purchased on a mileage basis. They are actually consumed and dissipated—other things being equal—very nearly in proportion to the car miles run. The results obtained from them all, however, depend on two factors, their quality and the conditions under which they are used or abused. By purchasing on a mileage basis the manufacturer is given a strong incentive to improve the quality of his product, and also to work an improvement in the conditions under which it is consumed or wasted. At best, the employees of the consumer can strive only to improve in the latter respect, and ordinarily they have no particular incentive even in that direction. Therein lies the secret of the success of the mileage basis plan. Other supplies might also be sold on the same basis.

In the case of brake shoes the cost is the difference between the cost new and the value of the scrap shoes removed from service. With a mileage basis contract, the manufacturer endeavors, first, to supply shoes which will show the least wear per 1000 car miles commensurate with the service to be performed and without damage to the wheels. Secondly, the manufacturer endeavors to keep down the scrap weight to the lowest figure consistent with efficient braking; or, in other words, to keep shoes in service until completely worn out, because scrap shoes represent a dead loss. The first is purely a manufacturing problem; the second requires the application of the wide general knowledge of the art of braking cars acquired by the manufacturer in making shoes for all classes of service, coupled with co-operation on the part of the railway company in carrying out recommendations for changes in details of the brake rigging, careful and regular inspection and the keeping of accurate records of performance. Without this co-operation the plan cannot be made a success. It may be remarked, also, that reliable records of former costs and performances of shoes are of the greatest value in fixing a contract price in the beginning. Otherwise the manufacturer can only estimate roughly what the cost should be, and add a percentage for unknown contingencies, which might be saved to the railway company had it had at hand the necessary data.

In this same connection the relative advantages of the car mile as against the ton mile as a basis of unit costs offer opportunities for discussion. Brake shoe wear is strictly proportional to the amount of energy dissipated through friction on the wheels. With a given schedule speed and number of stops the factors of velocity and

friction coefficient remain constant, the only variable being weight. Theoretically, then, the wear of brake shoes in the same service is proportional to the weight of the cars on which they are used. If there are wide variations in the weights of cars, comparisons of brake shoe wear on a straight mileage basis are misleading. On the other hand, comparisons on a ton-mile basis are inaccurate unless the weights of cars and their loading are positively known. Rough guesswork in arriving at the weights of cars introduces chances of error which are multiplied many times in taking the product of weight by distance. Scale weights of cars and close averages of counts of loads are essential to the use of the ton-mile as a unit.

Extravagance in Painting Cars

A large part of the dead time of cars sent to the repair shop for general overhauling is spent in the paint shop where the process of finishing is necessarily slow. Some of this time is used in applying purely ornamental striping and lettering with expensive gold lacquer. This work to look right must be carefully done and usually costs from \$15 to \$20 per car, to say nothing of the value of the extra time the car is out of service. In these days of strict economy in every department it may be questioned whether it pays. Street cars are not objects of art and cannot be made so with a little striping and fancy lettering. The only essential lettering on a car is the number painted in clear figures in a conspicuous place for quick identification. Except in cities where two or more companies operate cars, there is no real necessity for cars being lettered with the name or even a monogram of the company. The cars of the Interborough Company, operating the subway and elevated lines in New York City, were originally lettered and striped with gold and varnished all over. Cars coming from the shop now, however, have not a vestige of ornamentation on them and are not even varnished. The number is painted in white letters on a black ground on the door pocket window sash at each end. Two coats of dark red house paint are applied on the outside and nothing is spent on fancy work of any kind.

Of course, the New York Subway is a special condition. The cars for the most part are operating in a tunnel, where there is less opportunity than under almost any other set of conditions for seeing the exterior of the car. Moreover, the amount of pleasure traffic which would be induced by the use of handsome cars in the subway is small. The example is cited not because exactly the same practice is to be recommended elsewhere, but as an extreme in practice which has been adopted by an experienced management.

We are not arguing in favor of a purely utilitarian car. The appearance of the cars on the street is sometimes considered an indication of the liberality of the policy of the company. The public is certainly entitled to handsome cars when they are to be conspicuous objects on the streets; but a car body can be handsome without being over-ornamented. If good materials in the way of paint and varnish are used in finishing the car, the line can be drawn at the ornate painting which takes the time of an experienced painter to apply. As this ornamentation costs considerable money, it is often an unnecessary luxury.

A Spring-Borne Geared Motor

The first important change for a long time in the standard method of mounting geared motors on a truck is illustrated this week in the account of the single-phase motors which will be used by the New Haven Railroad on its motor-car trains. In the early days, many attempts were made to reduce the dead weight of the motors on the axles. The first motors were connected to the axles by sprocket chains, and after the advantage of direct drive between motors and axles was established, modifications were attempted of mounting the motor with its shaft at right angles to the axles and connecting it to them by bevel gearing, and by Eichemeyer of driving both axles of a single truck by connecting rods from a motor mounted between the axles. These attempts were found to introduce more complications than advantages, so that subsequent efforts were devoted to spring supporting the greater part of the mass of the motor in such a way as not to interfere with the parallelism of the shaft and axle and the rigid mounting of the gear. The introduction of gearless motors in 1891, and later, on a larger scale, in the tube lines in London and in the Baltimore & Ohio Belt Line tunnel, called renewed attention to the question of spring support for motors, but only for those of the gearless type, so that there was no material change in the method of support on motor cars.

The only other application with which we are acquainted of the quill method of suspension to geared car motors was that used on the original motors of the electric division of the Western Railway of France, between Paris and Versailles. This line had an initial equipment of geared and gearless motors, with both of which the axle was encircled by a hollow shaft whose diameter was considerably larger than that of the axle. The shaft was then supported so as to be concentric with the axle by means of spiral springs, whose position in relation to the wheel was that of chords to the wheel periphery; that is, the suspension was somewhat similar to that of the original Short gearless motor. The object of these attempts at spring suspension was primarily, of course, to reduce the hammer blow on the tracks occasioned by that portion of the weight of the motor not spring supported.

The New Haven construction is somewhat different from anything previously tried with geared motors, but is practically identical with that of the gearless motors used on the locomotives of the New Haven Railroad. The most serious disadvantage of the plan is the increase in weight and expense. Whether this is more than overbalanced by the advantages remains to be seen. The weight of each motor, complete with gear case, axle bearings and quill, is about 7450 lb., of which the motor alone weighs approximately 5600 lb. and the quill 1400 lb., so that the additional weight involved by the change is considerable. It should be borne in mind, however, that the all-steel car body is a heavy one, the trucks being designed to support a weight each of 120,000 lb. on the center plates. The axle journals have the unprecedented size of 6 in. x 10 in.

The quill construction requires, of course, the use of a special type of motor and gear, on account of the increased diameter of the gear seat and motor axle bearing over that of the ordinary type.

EXPERIMENTAL OVERHEAD TROLLEY CONSTRUCTION OF THE PENNSYLVANIA TUNNEL & TERMINAL RAILROAD

The Pennsylvania Tunnel & Terminal Railroad Company has just announced that it will adopt direct-current third-rail for the tunnels under the North and East Rivers in New York City. The decision was reached after making careful studies of all of the conditions to be met. These studies involved comparisons of the theoretical efficiencies of both a.c. and d.c. apparatus, an analysis of all the operating data to be obtained from electrified steam roads using both systems and the most far-reaching and costly experimental work ever undertaken for a similar purpose. Something more than \$250,000 has been spent in making comparative performance tests of several types of a.c. and d.c. locomotives on the lines of the West Jersey & Seashore during the past two years. Another expensive piece of experimental work is the overhead trolley test line built on Long Island, which is the subject of this article. Several short articles on this experimental line have been published in previous issues of this paper. Now that the final decision has been reached, an account of this work is of interest.

The experience already gained with third-rail construction and operation on the West Jersey & Seashore, the Long Island, the New York Central and the subway and elevated lines in New York and other cities was sufficient for purposes of comparison of cost of up-keep, danger from derailments and other considerations between different types of construction. With the exception of the New York, New Haven & Hartford, and possibly the Rochester division of the Erie Railroad, however, there have not been long in operation in this country any high-speed lines of exceptionally heavy traffic on which high-tension alternating current was collected from a suspended overhead trolley wire. In order, therefore, to reach some conclusions as to the best type of construction and the probable life and cost of maintenance of a suitable overhead line for the heavy traffic on the terminal lines in the event of adopting alternating current, an experimental track about 5 miles long was equipped last summer with high-tension overhead trolley. This test track is part of a branch line of the Long Island Railroad from Garden City east toward Babylon, over which no passenger trains have been operated for a number of years. There are no stations on this line, which, with the exception of one curve, is straight and nearly level, traversing Hempstead Plains. The track, which is laid with 70-lb. rail, was bonded with 6 bonds, new ties and gravel ballast were laid, and the roadbed put in good condition for running at fairly high speeds. A number of types of overhead line construction were erected in short sections, which may be summarized briefly as follows:

SUMMARY OF TYPES OF CONSTRUCTION

Beginning at a point about 400 ft. east of Hempstead Crossing is a section 5072 ft. long, of Westinghouse standard wooden pole bracket construction of the single catenary type. This section and a similar section 5822 ft. long at the eastern end of the experimental line were erected for the purpose of providing a length of track on which the test trains which are being run back and forth over the line could accelerate and are not, strictly speaking, a part of the experimental line.

Section No. 2 consists of four 300-ft. spans of single catenary construction. The supports are steel strut bridges of the type shown on the opposite page.

Section No. 3 consists of four 300-ft. spans, also of single catenary construction. The supporting structure consists of a guyed lattice pole on each side of the roadway, between which poles span wires of a length corresponding with the width of a four-track roadbed are strung. Only the single catenary messenger is complete with trolley wire over the track, but three dummy messenger wires weighted to a tension corresponding with the weight of the trolley and hangers are strung in their proper positions on the span wires. This reproduces the conditions of four-track span wire construction.

Section No. 4 consists of ten 300-ft. spans of single catenary supported by guyed bracket steel poles, with gooseneck for steady strain wire supports. Four different types of hangers are used on this section.

Sections 4 and 5 are separated by a steel anchor bridge. Section 5 consists of four 300-ft. spans supported by the same type of guyed bracket poles. Instead of the single catenary construction, however, a special secondary catenary construction is used, in which a number of special designs of hangers, clamps and steady strain attachments are employed. Beginning at the last span of Section 5, there is a 1-deg. curve approximately 1800 ft. long. This curve includes the five 300-ft. spans of Section 6.

Section 6 employs a steel bracket pole construction, with a stiff steady strain bracket. The secondary catenary is used on this section with some slight modifications from Section 5, the principal difference being the use of pipe steady strains in place of wire steady strains.

Section 7 consists of four 300-ft. spans, supported by steel poles having self-supporting brackets. The secondary catenary construction is continued over this section with other modifications in the form of secondary clamps, trolley clamps and sway hangers. This section also includes a novel section break construction, with automatic tension device.

Section 8 includes at each end a short span of secondary trolley construction and in the center a dummy tunnel 900 ft. long, in which the clearances of the crosstown and river tunnels of the Pennsylvania Tunnel & Terminal Company have been reproduced.

Section 9 consists of eight 300-ft. spans and one 250-ft. span of secondary catenary construction, supported by double-track steel bridges designed by the Archbold-Brady Company.

Section 10 includes ten 300-ft. spans of secondary catenary construction, supported by stiff steady strain bracket poles of the same design as the poles in Section 6.

At the end of Section 10 is a steel anchor bridge, beyond which is Section 11, about 5800 ft. long, on which wooden pole construction with 150-ft. spans is used. This section is standard Westinghouse single catenary construction, similar to that employed on Section 1.

DETAILS OF CONSTRUCTION

The accompanying drawings and illustrations from photographs show the principal features of most of the special types of construction employed on Sections 2 to 9, inclusive. In more detail the various types of construction will be taken up in their consecutive order.

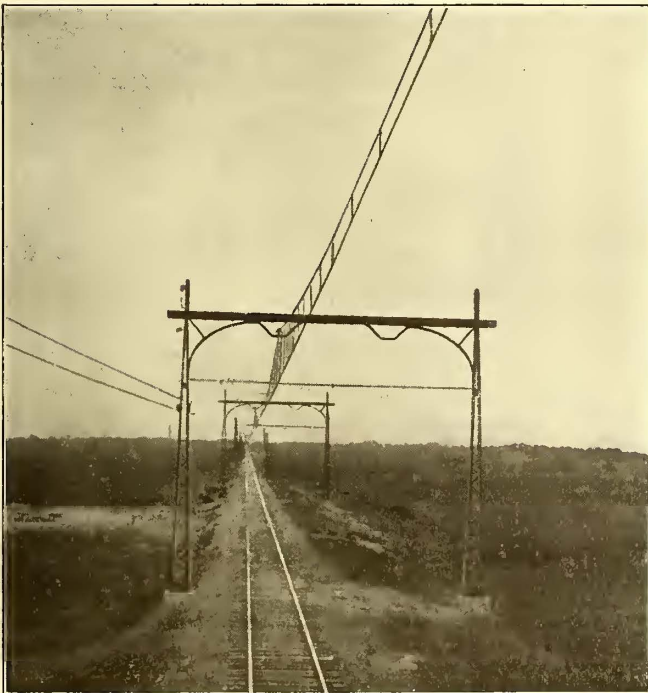
STRUT BRIDGES

At the end of Section 1 and the beginning of Section 2 a special type of wooden construction has been used to dead-end the messenger wires of Sections 1 and 2. A longer and larger pole is used, provided with two brackets, one above the other. Two brackets are necessary, because

the 300-ft. span to the east has a greater sag than the 150-ft. span to the west, and consequently the point of support of the messenger is higher. The messenger wire from each section is attached to a bridle guy in which G. E. strain insulators are inserted, and the ends of these bridle guys are attached to two wooden poles on each side of the double-bracket pole.

The strut bridges used in Section 2 have a span suitable for a double-track roadway, and consist of two latticed columns mounted on concrete foundations, with a strut across the top stiffened with knee braces. The construction is shown in one of the accompanying photographs. The columns are built up of two 12-in. 25-lb. channels, 35 ft. 6 in. long, which are placed back to back 18 in. apart at the bottom and close together at the top. The two channels are latticed with light angles for a distance of 22 ft. 7 in. above the base plate. The cross strut consists of two 10-in. 20-lb. channels, 38 ft. 6 in. long, placed back to back with the webs vertical and latticed with $2\frac{1}{2}$ -in. x $5/16$ -in. bars across both the top and bottom flanges of the channels. Angle iron knee braces are used to stiffen the attachment of the strut to each post. The messenger wire insulator is carried on a U-shaped hanger made of two 3-in. x 3-in. x $3/8$ -in. angles bolted to the bottom flanges of the cross strut. While these strut bridges have been built to span two tracks and two insulator supports are provided; only one trolley wire, however, is strung over the single track. The center line of the messenger cable in place on the insulator is 29 ft. 3 in. above the top of the rail.

The single steel messenger cable used on Section 2 is $7/16$ -in. stranded high-tension steel wire. The hangers are of the flat bar type, furnished by the Ohio Brass Com-



Experimental Trolley Line—Strut Bridges and Single Catenary in Section 2

pany, and they are spaced 10 ft. apart. At each strut bridge a wire steady strain is strung between the two posts and attached to the trolley wire with disk insulators inserted on each side.

SPAN WIRE

The span wire construction used in Section 3, with its single trolley line and three weighted dummy messenger

wires, is shown in another of the illustrations. The spans are again 300 ft. long and single catenary construction is used. The span wire posts are 36 ft. $10\frac{1}{2}$ in. high above the foundations; they are spaced 59 ft. 6 in. wide, center to center, which is the spacing required for spanning four tracks. The posts are made up of four 3-in. x 3-in. x $3/8$ -in. angles latticed on all four sides with $2\frac{1}{2}$ -in. x $1\frac{1}{4}$ -in. x



Experimental Trolley Line—Span-Wire Construction for Four Tracks in Section 3

$1/4$ -in. angles. Each pole is guyed on the outside with two stranded high-strength steel wires $7/16$ in. in diameter, carried back to anchorages capable of withstanding a strain of 8 tons. The trolley and messenger wires are supported from hangers dropped from two $7/16$ -in. steel span wires, which are put up with a sag in the center of 4 ft. 6 in. The center line of all four of the messenger wires is 1 ft. 6 in. below the center of the span wires. Both the messenger cables and the trolley wires are stiffened laterally with $1/4$ -in. steel steady strain wires attached to the posts on each side. Insulators are inserted in these steady strain wires between each pair of messenger and trolley wires and between the outside wires and the pole. These insulators are necessary if it is required to cut out one line of the four for repairs. All four of the messenger wires have been strung, but the trolley is suspended only over the track. The other three messenger wires of each span are each weighted with three concrete blocks spaced equal distances apart, the total weight of these blocks being equal to the estimated weight of the trolley wire and hangers. This subjects the span wires, the poles and the pole guy wires to the same stresses which they would have to resist if all four trolley wires were in position. The messenger wires which do not have the trolley suspended from them are anchored at the western end to three guyed wooden poles with Westinghouse anchor insulators interposed. At the eastern end of Section 3 the wires are all fastened to a steel anchor bridge similar to that shown in one of the illustrations. Ohio Brass Company's standard flat bar hangers are used on two of the spans of this section, and the same company's standard rod hangers on the other two spans.

GUYED BRACKET POLES

On Section 4 guyed bracket poles are used. The appearance of the poles on this section is shown in one of

the illustrations from a photograph which, however, shows one of the poles on Section 5, where the secondary catenary is used. The poles are 36 ft. 10½ in. high and are made up of four 3½-in. x 3½-in. x ¾-in. angles latticed on all four sides with 2¼-in. x ¼-in. bars and 2¼-in. x 1½-in. x ¼-in. angles. They are set on concrete foundations close to the track. The bracket arms are long enough to span two

opportunity for testing the relative merits of two types of rigid hangers, a telescope hanger and a spring hanger on single catenary construction.

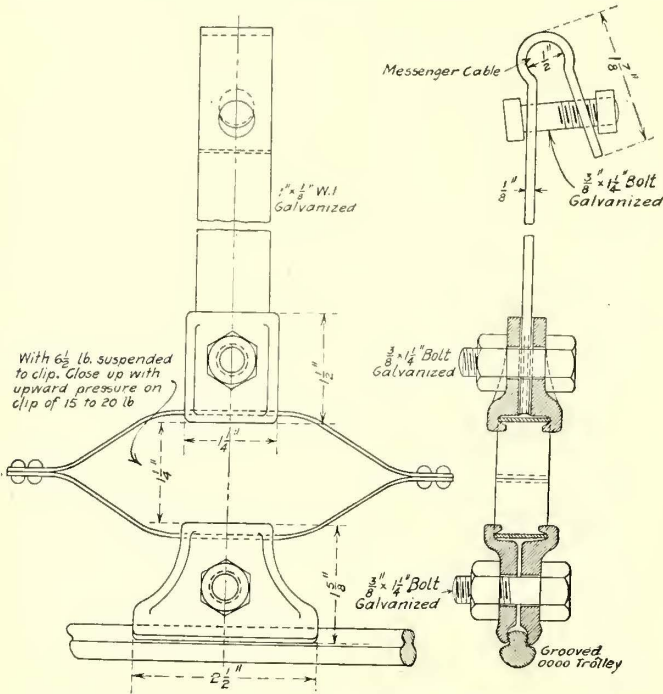
ANCHOR BRIDGE

The anchor bridge separating Sections 4 and 5 and the single catenary from the secondary catenary construction is shown in one of the illustrations from a photograph. It consists of two latticed A-frame towers and a box truss made of heavy angles across the top. The installation of secondary catenary begins on Section 5 at this anchor bridge. The spans are 300 ft. long and the same type of guyed bracket posts are used as in Section 4.

SECONDARY CATENARY

The secondary catenary construction employed on this section is a modified form of the construction employed on some of the German lines using high-tension a.c. trolley. The main messenger is 9/16-in. stranded high-tension double-galvanized steel wire; the secondary messenger is No. 2 double-galvanized solid steel wire and the trolley is 0000 grooved copper. The main hangers supporting the secondary catenary from the messenger cable are spaced 21 ft. 5⅛ in. apart. The messenger cable is put up with a normal sag of 5 ft. 8½ in. in a 300-ft. span. At the center of the span the trolley wire is only 9½ in. below the main messenger. The accompanying sketch shows the details of the clamp used for attaching the secondary catenary hanger wires to the main messenger cable. The clamp is made of galvanized malleable iron in three pieces and can be quickly removed or adjusted, either along the messenger wire or up and down on the hanger rod by loosening the ½-in. clamp bolt. At the points of support of the secondary cable on each side of the center of the span a special form of clamp is used which fastens the secondary catenary to the messenger cable without the use of a hanger rod.

The grooved trolley wire is supported from the secondary



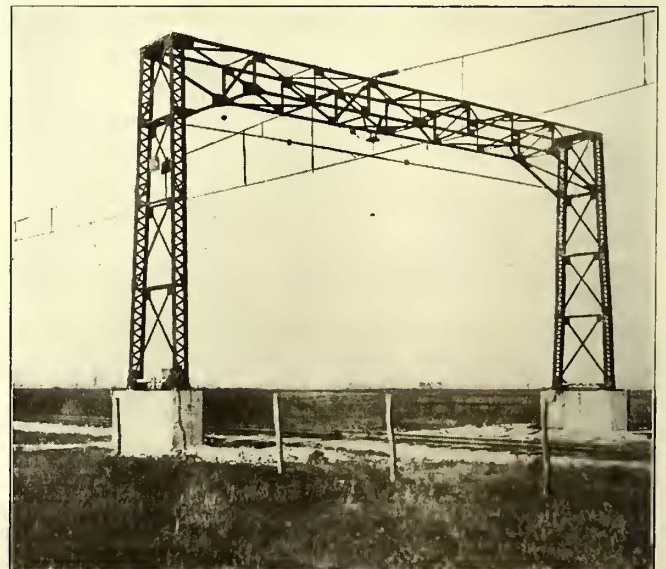
Experimental Trolley Line—Flat Spring Hanger for Single Catenary

tracks, but the trolley has been suspended only from the inside insulators which are over the one track in use. The bracket arms are made up of four 3-in. x 3-in. x 7/16-in. angles latticed with flat bars and are mounted on the posts at a height of 28 ft. 6 in. above the rail. A guy rod is attached to the bracket arm midway between the messenger insulators and is carried up to the top of the pole. The messenger insulators are mounted on top of the bracket arm. In the type of construction used on Section 4 a goose-neck extension to the bracket arm is used for attaching the steady strain wire on the side opposite the pole.

SPRING HANGERS

The first three spans of Section 4 have the trolley wire supported from the messenger wire with a special design of flat spring hanger, which is shown in the accompanying drawing. This hanger consists of a flat wrought-iron galvanized bar, 1 in. x ⅛ in., which is bent over and clamped to the messenger cable and which carries on its lower end a single leaf full elliptic spring. The bar is made in lengths varying from 5 ft. 9 9/16 in. to 2 5/16 in. The spring is attached to the lower end of the bar by a two-part clamp and 3/8-in. bolt and a similar two-part clip with bolt is used to attach the grooved trolley wire. The elliptic spring is ¾ in. wide and has a total arch of 1¼ in. under a load of 6½ lb. suspended from the lower clip. The spring will close up solid with an upward pressure on the clip of from 15 lb. to 20 lb.

Spans 4, 5 and 6 of Section 4 are equipped with a special design of telescoping pipe hanger which, however, has not been entirely successful in providing vertical movement for the trolley wire. The last four spans of this section have Ohio Brass Company's standard rod and flat bar hangers, so that in this length of 3000 ft. there is a good



Experimental Trolley Line—Steel Anchor Bridge Separating Sections 4 and 5

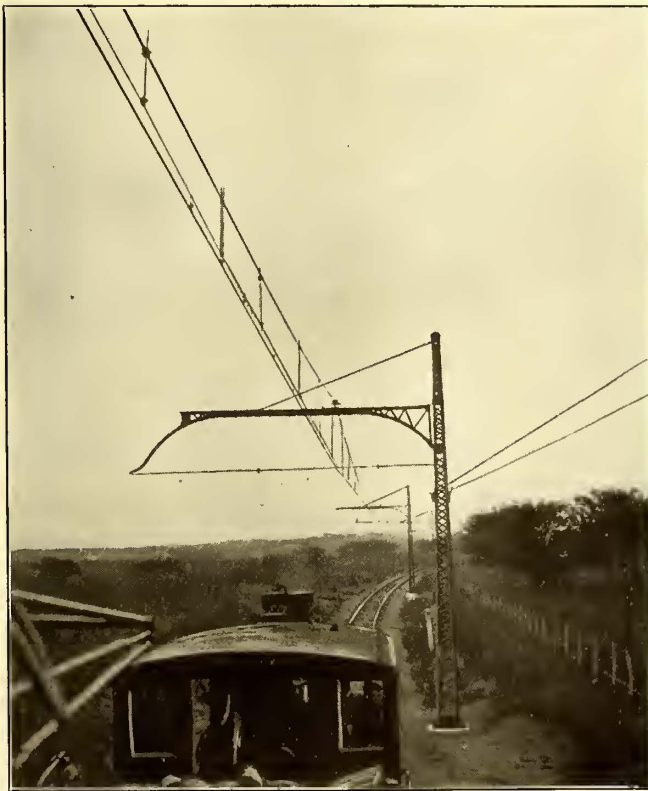
catenary at intervals of approximately 10 ft. 9 in. The special form of hanger and clip used is shown in the drawings. This consists of a 1¼-in. x 3/16-in. strap bent over on itself, but having the two ends staggered. A two-part clamp is used for gripping the trolley wire and each of the two bolts fastens one end of the bent clip to the clamp. This hanger has a fixed drop of 3¾ in. from the center of the

secondary catenary wire to the center of the trolley wire. It is so designed that there is 2 in. of possible vertical movement of the trolley wire.

Between the fourth and fifth main messenger cable hangers on each side of the points of support of the messenger cable a special form of sway hanger is put on. This consists of a 1¼-in. x 3/16-in. strap bent double on itself and enclosing the main messenger wire. At its lower end it is clamped to the trolley wire, but not to the secondary catenary.

Section 6 is on a 1-deg. curve and while in general both the type of poles and catenary construction are the same as on Section 5 some variations in the form of bracket arms and steady strains employed are found. The same type of guyed bracket is used on the poles, but in place of the goose-neck extension on the end of the bracket to which the steady strain wire is attached, as mentioned in the description of Section 5, a rigid strain bracket hung between the center lines of the two messenger cables is used. The trolley wire is held with a pipe steady strain attached to an insulator on this bracket. This construction can be seen in the same photograph which shows the goose-neck bracket arm.

In Section 7 the same type of steel post is used, but a self-supporting bracket arm is substituted. This bracket arm is made up of four 6-in. x 3½-in. x 3/8-in. angles. The top angles are straight, but the bottom angles are curved to a 42-ft. radius at their inner ends and the space between is

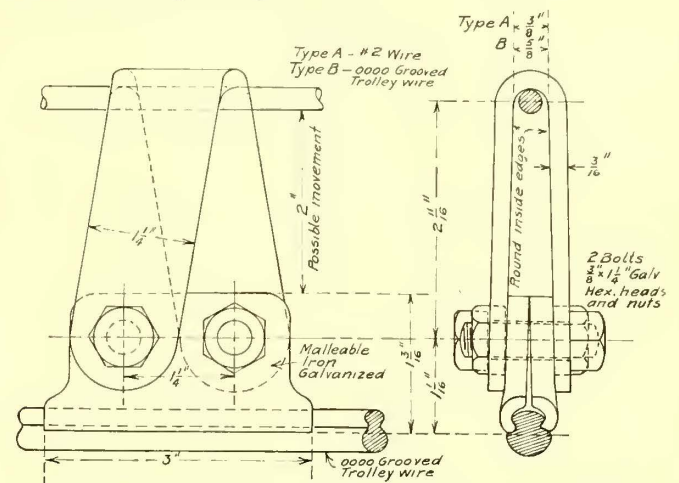


Experimental Trolley Line—Guyed Bracket Pole and Secondary Catenary Construction, Section 5

laced with 2½-in. x 2-in. x 5/16-in. angles. This bracket arm is 27 ft. 6 in. over all from the inside face of the post. At its outer end is attached a pipe bracket made of 1½-in. pipe, to which the steady strain wire is attached. This construction is also shown in one of the photographs. The post required is only 31 ft. 6⅞ in. high as against 36 ft. 10½ in. high for the guyed bracket construction.

SECTION BREAK

In Section 7 occurs the transition from the single trolley wire with secondary catenary to the double trolley wire with secondary catenary, which is extended up to and carried through the dummy tunnel in Section 8. The section break employed for this purpose is novel and has been found to work perfectly under test.



Experimental Trolley Line—Trolley Clip and Hanger for Secondary Catenary Construction

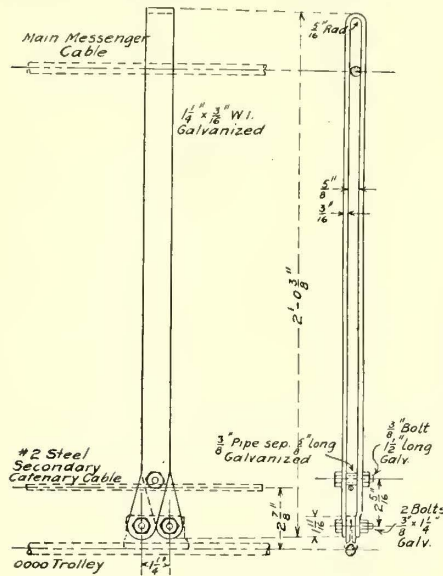
An automatic tension adjuster for the trolley wire has also been put in at this point. The section break utilizes the full length of one span or 300 ft. At pole 64, which is at the east end of the section break, the trolley wire from the east is over the center line of track and at the standard height of 22 ft. 9 in. above the rail. The trolley wire from the west, which ends at pole 64 by passing around a sheave on the bracket arm and down the pole to the tension adjusting device, is 8¾ in. above the trolley from the east and is 2 ft. 6 in. to one side nearer the pole. At pole 63, at the other end of the span, this order is reversed so that there is a vertical transition in each wire of 8¾ in. and a horizontal transition from the center line of track of 2 ft. 6 in. At the center of the span both wires are 23 ft. 1⅜ in. above the top of rail and each is 15 in. to one side of the center line of track. This easy transition from one wire to the other insures contact at all times and eliminates all sparking. The position of the trolley wire is regulated by the position of the main messenger cable, the length of hangers on both lines being maintained the same as for standard spans.

TUNNEL SECTION

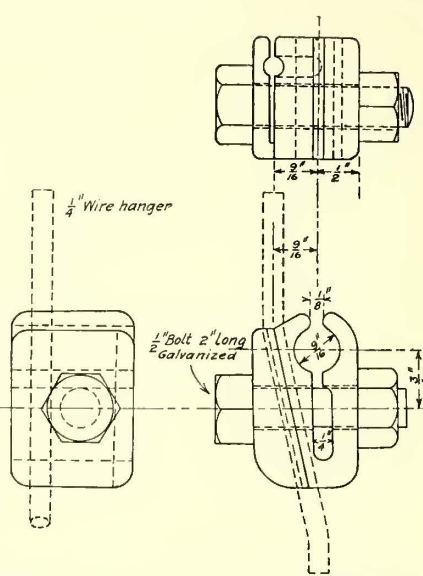
The tunnel section is 900 ft. long and is made up of wooden bents framed of 6-in. x 6-in. timbers. The exact clearances of the river tunnels have been reproduced in this section by lining a part of the roof with sheet iron bent to the radius of the tunnel and located the same height above the rails as the roof of the actual tunnel will be above the rails. The river tunnels are 19 ft. in internal diameter, and making allowance for the depth of ballast, ties, height of rail, etc., the clearance from the top rails in the tunnel to the roof is 16 ft. 2 in. The bottom of the trolley wires is 6⅜ in. below the roof of the tunnel and the net clearance, therefore, between the trolley wires and the top of the rail is 15 ft. 5⅝ in. The catenary construction has been continued through the tunnel and two forms of flexible hangers for the double trolley wire are used both of special Westinghouse design. In one, two flat steel bars mounted on the messenger hanger at right angles to the trolley wires act as springs. In the other type each trolley

wire is supported by clamps fastened to the centers of square hickory sticks about 15 in. long, which are mounted at their ends to cross pieces hung from the messenger cable. The messenger cable in the tunnel is supported on insulators mounted on the roof at intervals of 10 ft., and

the principal difference being in the form of steady strain attachments. Three of the spans in this section have pipe steady strains, while the other spans have wire steady strains.



Experimental Trolley Line—Sway Hanger for Secondary Catenary



Experimental Trolley Line—Hanger Clip for Main Messenger Cable

the trolley hangers are attached to the messenger cables in the center of the spans.

STEEL BRIDGES

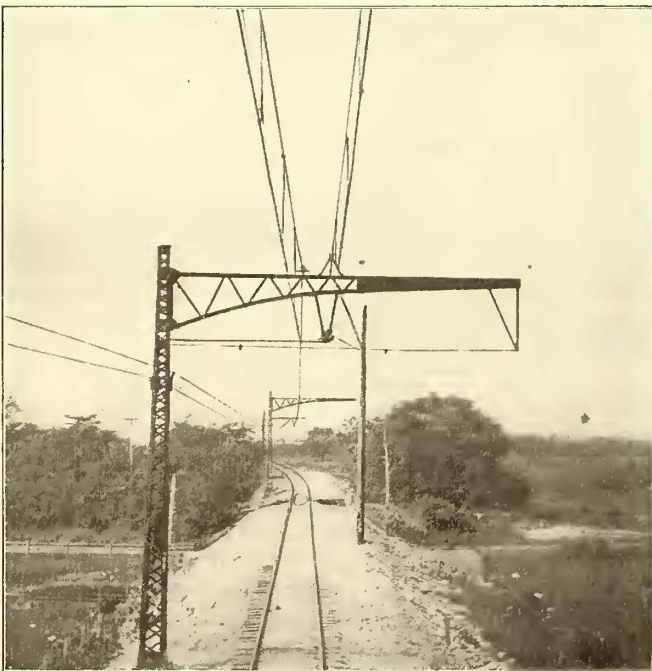
The eight 300-ft. spans of Section 9 are supported by steel bridges designed and built by the Archbold-Brady Company, Syracuse, N. Y. These bridges were originally intended for the Syracuse, Lake Shore & Northern, but were

messenger cable is supported. The end of the bracket is turned up so that if the messenger cable for any reason slips off of the insulator it cannot be pushed off the end of the bracket and drop to the ground. Stick-steady strain insulators are used on every bracket. The messenger cable is 7/16-in. stranded steel, and the hangers are spaced 13 ft. 7 1/2 in. apart, or 13 to each 150-ft. span.

The 10 spans of Section 10 are supported by the stiff strain guyed bracket posts already described for Section 6. The only important change in this section is the use of a 0000 steel secondary catenary wire for five spans in place of No. 2 steel wire. This section contains a siding on which the secondary catenary construction is also employed. On the siding the secondary wire is No. 2 steel and the trolley wire is 0000 steel. East of the siding the steel trolley wire is transposed and is used for the secondary catenary wire over the main track for the remainder of the section.

WOOD BRACKET POLES

The standard wooden pole bracket construction employed on Sections I and II consists of a T-iron bracket arm guyed from the top of the pole and carrying near its outer end a brown porcelain insulator on which the



Experimental Trolley Line—Self-Supporting Steel Bracket Arm



Experimental Trolley Line—Dummy Tunnel with Double Trolley and Secondary Catenary

erected here without any modifications in their design. These bridges were fully described in the STREET RAILWAY JOURNAL of Feb. 15, 1908.

The catenary construction on Section 9 is substantially the same as that already described for Sections 6 and 7,

GENERAL FEATURES

On the wooden pole sections a 1/4-in. stranded steel ground wire is carried on top of each bracket arm near the pole. At every fifth pole this wire is grounded to the track rails. The ground wire is omitted on the sections built with steel

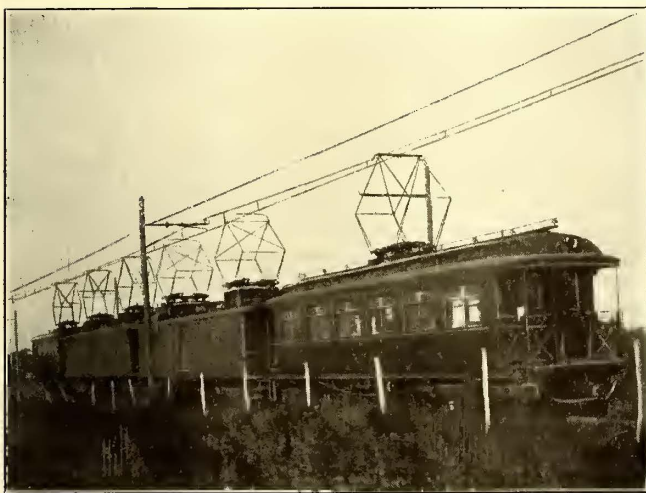
poles or bridges which are bonded to the track. Two telephone wires are also strung on the poles from one end of the line to the other.

The position of the trolley wire with relation to the track is uniform throughout the entire length of the test section. The wire is supported 22 ft. 9 in. above the top of the rail. It is staggered at alternate poles, an average of $8\frac{1}{2}$ in. each side of the center line of track on the 300-ft. spans, or a total side displacement of 17 in. The messenger wires on all of the sections were strung with sufficient tension and initial sag to give a horizontal trolley wire at a temperature of 60 deg. Fahr. The lengths of all hangers were determined before erection and the trolley wire was erected by closely adhering to these calculated lengths.

WIRE SPECIFICATIONS

Five kinds of wire were used in the construction of the line. These grades of wire were purchased under the following specifications:

(1) Messenger cable for secondary catenary construction with 300-ft. spans: high-tension steel, $9/16$ in. external diameter, seven strands, double galvanized, with an ultimate strength of 21,000 lb. and an elastic limit of 16,800 lb.



Experimental Trolley Line—Test Cars and Locomotive

(2) Messenger cable for single catenary construction with 300-ft. spans: high-tension steel, $7/16$ in. external diameter, seven strands, double galvanized, with an ultimate strength of 15,000 lb. and an elastic limit of 12,000 lb.

(3) Messenger cable for single catenary construction with 150-ft. spans: Siemens-Martin steel, $7/16$ in. external diameter, seven strands, double galvanized, with an ultimate strength of 9,000 lb.

(4) Secondary messenger wire on 300-ft. spans: high-tension solid steel No. 2 B & S gage, double galvanized, with an ultimate strength of 6500 lb. and an elastic limit of 4550 lb.

(5) Copper trolley wire: special grooved section, 0000 B & S gage, hard-drawn copper, with an ultimate strength of 8100 lb. and an elastic limit of 4050 lb.

SUBSTATION

Current for operating the test trains over the line is supplied from a temporary substation located just east of the Hempstead Crossing and connected to the high-tension transmission line of the Long Island Railroad which supplies three-phase current at 11,000 volts and 25 cycles. Inasmuch as the experimental test locomotive and motor car which comprised the motive power of the experimental line

were designed for 11,000-volt, 15-cycle, single-phase operation, the substation was required to perform the double function of changing the frequency and splitting the phase. There have been installed in the substation three step-down transformers connected on the Long Island transmission line and delivering three-phase current at 2000 volts to a 2000-hp Westinghouse synchronous motor which is direct connected to a 1500-volt, 1000-kw, 15-cycle, single-phase generator. The generator current is stepped up again with static transformers to 11,000 volts, at which potential it is fed into the western end of the trolley line. A Tirril voltage regulator is supplied as part of the equipment. The single-phase generator is separately excited with a small dynamo driven by a d.c. motor supplied with current from the third-rail of the Long Island Railroad. A d.c. motor, also fed from the third-rail, is installed with a belt connection to the shaft of the motor-generator for starting up.

TEST TRAIN

The test-train equipment which has been used consists of the single-phase locomotive No. 10,003, built by the Westinghouse Electric & Manufacturing Company and the Baldwin Locomotive Works (see STREET RAILWAY JOURNAL, July 20, 1907) for the experimental use of the Pennsylvania Railroad Company; a special test motor car owned by the Westinghouse Electric & Manufacturing Company, which has a two-motor, single-phase equipment and two work cars on which were mounted two sets of pantagraph trolleys. In addition to this equipment the Long Island Railroad furnished 10 or 12 passenger coaches, which were made up in trains of various lengths to supply a suitable load for the operation of the locomotive.

The motor car and the locomotive are each supplied with one pantagraph trolley similar in design to the trolleys used on the New Haven locomotives and operated by compressed air. Each of the two work cars is equipped with two pantagraphs of the same type. Both trolleys on each car are connected to a common busbar through switches and the busbar is connected with a jumper to the main motor leads of either the locomotive or the motor car. In this way one, two or three trolleys can be used simultaneously for collecting current from the line.

RESULTS OF TESTS

The line was in operation from Oct. 1 to Dec. 1, when the tests were discontinued after a decision in favor of direct-current third-rail was reached. During that time, however, continuous endurance tests were carried on. No attempt was made to test the operation of the locomotive or motor car, as this work had already been done in connection with the tests made on the West Jersey & Seashore. The performances of the collecting devices when in contact with the various types of overhead construction were very closely observed, however, and comparative data were obtained as to the relative life of various forms of collector bows, their relative abilities to collect large amounts of current, their tendency or freedom from sparking, and their action in case of encountering defects in the overhead line. The locomotive with a train of from 8 to 12 cars was run continuously during the daytime back and forth along the track. One of the work cars was usually included in the train immediately behind the locomotive, and runs were made with from one to three of the pantagraph trolleys in contact with the wire. The pantagraphs on the work cars afforded a convenient means of comparing both the mechanical and electrical wear on the same or different types of trolley bows. While the results

of these tests are not yet available, it may be said that up to the conclusion of the tests there had been a total of more than 3000 trips made by a single pantagraph over the line.

ORGANIZATION

The test line was designed and built and the tests carried out under the general supervision of George Gibbs, chief engineer of electric traction of the Pennsylvania Tunnel & Terminal Railroad Company, and the designs for the entire construction were made in the electric traction office of that company, under the direction of E. R. Hill, assistant to the chief engineer of electric traction. The entire work of erection was carried out by the forces of the Long Island Railroad Company, under the direction of Hugh Pattison, assistant engineer, electric traction, who has also conducted the tests made since the line was completed.

EXPERIENCE WITH TRANSMISSION CABLES IN MASSACHUSETTS

At a recent meeting of the Boston branch of the American Institute of Electrical Engineers, during a discussion on high-tension cable operation, M. V. Ayres, electrical engineer, Boston & Worcester Street Railway, gave a brief account of the work of his road in this field. The Boston & Worcester has about 2½ miles of three-phase lead-covered, paper-insulated cable in three sections, hung up on poles like telephone cable, for 13,200-volt transmission. One of these lengths of cable has been up since the spring of 1903. The company has had very little trouble with them and what defects have occurred in operation have been due mainly to the fact that the cables are run through trees and thus are subject to various kinds of accidental injury. The company had one breakdown during a lightning storm, but this was probably due to bad workmanship. The latest trouble with the cable is typical. A trolley wire broke and pulled over in such a way that it charged the iron bracket supporting the trolley wire and the current leaked to the cable sheath. The sheath was grounded. Enough current passed to burn a piece out of the lead. The experience of the company shows how many small injuries can happen to a cable without resulting in transmission trouble. If a hole is burned in the cable a temporary patch is made on it and a wipe of lead is later put on at the first opportunity.

G. W. Palmer, Old Colony Street Railway, stated that his road has had some very gratifying experience in connection with the maintenance of high-tension cables underground. They have had some 15 miles or 16 miles of 13,200-volt cables through which is transmitted almost all the power necessary to feed the entire Old Colony system from the main station at Quincy Point. In some cases the energy is transmitted some 50 miles or 60 miles. Since the cable was installed there has been no instance of disturbance of operation; in fact, the cable has been the most reliable part of the equipment. There was one instance, and that did not affect operation, where a joint blew out. No disturbance was noted at the main station or at the substations and the occurrence of the fault was not known until the manhole was visited. Although the conductor was bared until one of the phases was visible, the cable continued operating at 13,200 volts just as well as if it had recently come from the factory. The cable was built to stand a factory test of 40,000 volts, although that test was never applied to it.

THE REASONS FOR INCREASED FARES ON MASSACHUSETTS STREET RAILWAYS—III

In the final analysis, the justification for an increase of fares is found in the earnings of the company. The main causes why the earnings of many Massachusetts railways have been unsatisfactory were outlined in the introductory article of the present series, published in the *ELECTRIC RAILWAY JOURNAL* of Nov. 28. These causes may be restated in brief as follows:

Construction of mileage that is probably excessive in comparison with the population; slow increase in population of communities served; dilution of average rate of fare by extension of the transfer system; and increases in the costs of labor and materials due to economic causes, and not preventable.

These causes, as was shown, have brought about a condition of unprofitable operation, revealed by the failure to earn returns on the capital investment in the properties.

The objections that might have been urged against the publication of financial and operating figures by the Newton properties prior to the establishment of fare and transfer changes were that they would be subject to the analysis of a populace of more than the average intelligence. Such objections, if they were raised, were not influential with the management of the lines. The first presentation of the case of the company, it will be understood, was to the public. If the announcement of changes had been introduced by either argument or figures alone, instead of by both, as was the fact, the case of the companies would have appeared to be less strong. The present article treats of the statistical material submitted to the public and given later to the Board of Railroad Commissioners, amplified by other data.

The appraisal of all the properties comprised in the Newton system, made by G. M. Tompson, showed a valuation within 2 per cent of the book value. Mr. Tompson, as stated previously, is not connected directly or indirectly with any of the properties.

NEWTON STREET RAILWAY

The Newton Street Railway, which is the largest company in the group controlled by these interests, showed gross earnings during the fiscal year ended Sept. 30, 1907, of \$357,588, with operating expenses of \$268,531, or 75.10 per cent, leaving net earnings applicable to interest, dividends and surplus of \$89,057. Of this sum \$68,643, or 77.08 per cent, was required for fixed charges and interest on floating debt, so that the net divisible income applicable to dividends was \$20,414, from which dividends of 2½ per cent on the stock were paid, leaving a nominal surplus of \$2,364.

During the 18 years of operation of the Newton Street Railway ended Sept. 30, 1907, its capital stock has risen from \$50,000 to \$722,000 and its notes payable from \$1,260 to \$450,280; the bonds have increased from nothing to \$575,000. That is, there was an increase from \$51,260 to \$1,747,280 in the total of these items. The principal changes in capitalization have taken place, as shown by the statement reproduced herewith, in recent years, and have therefore been made under the supervision of the Railroad Commission, acting under the law which assures capitalization of proper expenditures only. During the period the total debt and capitalization increased 3309 per cent; this figure takes into account, however, only the capitalization existing on Sept. 30, 1889, when the property had been in operation but 43 days. By the end of the ensuing fiscal year,

Sept. 30, 1890, the outstanding stock and notes payable amounted to \$184,121. The increase from that figure to the total stock and bond capitalization and notes payable as of Sept. 30, 1907, was 849 per cent. The gross earnings during the short period of operation in the fiscal year ended Sept. 30, 1889, amounted to \$1,817, but during the following 12 months the total reported was \$16,920. The increase from the latter figure to the gross earnings of \$357,588 shown during the fiscal year ended Sept. 30, 1907, was 2013 per cent.

During the entire period the percentage of gross earnings required for operating expenses has varied materially, but in no instance beyond the extremes of 58.68 per cent and 84.57 per cent, shown by the reports for the fiscal period and year ended Sept. 30, 1889, and Sept. 30, 1890, respectively. The average in the entire period was 70.49 per cent. After the year ended with Sept. 30, 1892, dividends of 8 per cent per annum were paid on the stock for eight years, but since that time as well as in the early years of the enterprises, the return was limited to smaller amounts.

The gross earnings per car-mile have extended from 34.24 cents in the fiscal year ended Sept. 30, 1890, to 20.58 cents in the year ended Sept. 30, 1898, but the average per year during the entire period of operation was much nearer the lower than the higher figure, being 24.96 cents. It will be observed, however, that this average was made thus high because of the record during the early years of operation. The average indicated is higher than any figure that has been attained since 1896; and from the year concluded with Sept. 30, 1896, until the 12 months ended Sept. 30, 1907, the average per annum was 22.74 cents. In the year ended Sept. 30, 1890, the car-mile operating expense was 28.95 and in the year ended Sept. 30, 1898, the figure reported was 13.83 cents, but so extreme a variation was probably due more to changing expenditures for maintenance than to changing efficiency in operation. The average for the entire period was 17.60 cents, which is close to the figure reported for the fiscal year ended Sept. 30, 1907, 17.45 cents.

The number of miles of track owned and operated on Sept. 30, 1889, was 3.401; by the end of the next fiscal year the figure had increased to 5.78. From the latter figure the mileage increased until on Sept. 30, 1907, it stood at 44.514. The percentage of increase from 5.78 to 44.514 is 670 per cent. During the year ended Sept. 30, 1890, the number of passengers carried was 348,597, or 60,311 per mile of track owned or operated. The total number of passengers carried in the year ended Sept. 30, 1907, was 7,625,394, an average of 171,303 per mile owned or operated, showing a large increase in the density of traffic. The percentage of increase in this period in the total number of passengers carried per year was 2.087 per cent.

The foregoing figures indicate that the percentages of increase in the number of passengers carried and in the gross earnings were close together and greatly exceeded the increase in the total stock and bond capitalization and outstanding notes payable. During the same period the average number of passengers carried per car-mile decreased from 7.05 in the 1890 fiscal year to 4.96 in the 12 months ended Sept. 30, 1907, indicating improvement in the service during a time when the unit of revenue underwent no change.

Detailed analysis is made of the operations of the Newton Street Railway Company because it is the most pros-

perous line in the system controlled by the Boston Suburban Electric Companies. The Wellesley & Boston Street Railway and the Commonwealth Avenue Street Railway, the operations of which are shown in the tables on page 1555, were absorbed by the Newton Street Railway Company in 1904.

Comparison of the results of operations of the Newton Street Railway with those of other roads in the system shows that its revenues were not so badly in need of improvement as those of the other lines.

NEWTON & BOSTON STREET RAILWAY

The showing of the Newton & Boston Street Railway was extremely unsatisfactory. During the period of operation ended Sept. 30, 1907, aggregating 15 years and one month, the dividends paid averaged about 0.79 per cent per annum on the outstanding stock. Not only have no dividends whatever been paid since the fiscal year ended Sept. 30, 1899, but no earnings applicable to the stock have resulted from the operations of the company in the period intervening between that year and Sept. 30, 1907. Beginning with the year ended Sept. 30, 1900, a deficit after the payment of operating expenses and charges has been shown in each fiscal year up to and including the 12 months ended Sept. 30, 1907, beginning with \$3,983, and becoming larger; in this period the annual deficit ranged from \$18,704 to \$56,891. In three of the years since operation was started gross earnings fell below even the amounts required to meet operating expenses. It may be stated that these years had been preceded by the payment of dividends which may have been possible because the charges to operating expense accounts were below normal and therefore permitted a surplus to be reported that would not have existed if provision had been made for expenses that evidently had to be met in the ensuing three years.

Gross earnings per car-mile have ranged from 14.24 cents to 21.68 cents, with an average per year for the entire period of operation of about 16.62 cents. The car-mile operating expense ranged from a low point of 10.20 cents in the year ended Sept. 30, 1898, to a high mark of 22.39 cents in the year ended Sept. 30, 1901, the average per year in the entire period being 14.88 cents. The number of miles of track owned and operated has increased from 5.11 in the year ended Sept. 30, 1893, to 15.443 miles as of Sept. 30, 1907, representing an increase of 202 per cent.

Gross earnings have increased from \$26,708 in the earlier year to \$74,005 in the latter year, or 177 per cent.

NEWTON & BOSTON STREET RAILWAY.
Years ending Sept. 30

	Net divisi- ble income	Passengers carried	Car- miles operated	—Per car-mile—		Miles of track
				Earn- ings	Operat- ing ex- penses	
*1893.....	\$52.51	452,238	145,684	\$0.1833	\$0.1606	5.11
1894.....	539.35	494,718	154,408	.2168	.1636	5.17
1895.....	504.44	565,958	169,593	.1777	.1328	5.50
1896.....	2,898.36	610,765	175,949	.1877	.1248	5.50
1897.....	8,752.66	678,836	228,043	.1953	.1153	10.130
1898.....	8,538.08	1,098,486	456,530	.1432	.1020	14.655
1899.....	891.38	1,699,586	499,941	.1474	.1206	16.877
1900.....	†3,982.77	1,855,290	534,676	.1509	.1309	16.954
1901.....	†46,360.77	1,638,882	413,415	.1570	.2239	14.008
1902.....	†27,473.71	1,721,650	492,505	.1437	.1598	15.220
1903.....	†56,890.66	1,618,353	448,380	.1497	.2199	14.008
1904.....	†27,941.00	1,404,020	372,495	.1666	.1602	13.846
1905.....	†18,704.24	1,273,025	375,582	.1686	.1365	11.370
1906.....	†26,699.62	1,387,143	446,879	.1424	.1281	16.030
1907.....	†30,358.77	1,682,098	454,534	.1628	.1537	15.443

*Thirteen months.
†Deficit.

It is thus indicated that the construction of additional mileage, undertaken with the expectation that improvement in revenue would follow, failed to effect the material results that had been anticipated. The gross earnings per

mile of track owned or operated, which amounted to \$5,227 in the first year of operation, declined to \$4,792 in the latest year of the period under review. The number of passengers rose from 452,238 in the first year of operation to 1,682,098, an increase of 272 per cent. The number of passengers per mile of track owned or operated was 88,501 in the first 13 months of operation and 108,923 in the year concluded Sept. 30, 1907.

The same character of statistical material that was published regarding the Newton Street Railway was made public in reference to the Newton & Boston Street Railway, and from the table that was compiled for this purpose the figures given on page 1553 are taken.

SOUTH MIDDLESEX STREET RAILWAY

The South Middlesex Street Railway, which has been in operation since 1891, increased its gross earnings from \$17,483 in the 11 months ended Sept. 30, 1892, to \$76,705 in the fiscal year ended Sept. 30, 1907, or an aggregate of 339 per cent. During the same period the net increase in miles of track owned or operated was from 6.785 to 16.067, or 137 per cent. The percentage of increase in gross earnings receives a different significance, however, when it is stated that the gross earnings per mile of track amounted during the period of 11 months ended Sept. 30, 1892, to but \$2,576. This figure was poorer than any shown in the following years, when the average ranged from \$3,108 to \$5,495.

In the first full fiscal year of operation, ended Sept. 30, 1893, the number of passengers carried per mile of track was 87,433, and in the 12 months ended Sept. 30, 1907, the density of traffic had increased somewhat, amounting to 95,321 passengers per mile owned or operated. This is a very small increase for so long a period; development in that time in a community where the population increased at a normal rate would have been rapid. The average number of passengers carried per car-mile in the year ended Sept. 30, 1893, was 3.96, and but slight improvement over this result has developed; by the fiscal year 1907 the average number of passengers carried per car-mile had increased to 4.62.

The results of operation of this property, so far as the stockholders were concerned, were not bad during the early years. Up to and including the fiscal year ended Sept. 30, 1901, the average dividend was 5.05 per cent, although in the last year in that period full fixed charges were not earned and in the previous year only about one-half of the dividend declared was shown as applicable to the stock after provision had been made for interest. Beginning with the fiscal year 1902 vicissitudes had to be met and in that 12 months the net earnings from operation were \$10,536, while interest charges aggregated \$22,381, leaving a net deficit of \$11,845. The company passed into the hands of a receiver on May 3, 1903, and remained under the jurisdiction of the courts until Aug. 14, 1907. At the time of the appointment of the receiver the outstanding notes amounted to \$182,672.20, but interest on these was not paid during the receivership. In compiling the statement for the Railroad Commission, this interest was calculated as a proper charge, and the propriety of thus including it has been upheld by the commission in later proceedings respecting another matter. Including this interest as a charge on the surplus from operation, each year of operation during the receivership showed a deficit.

The car-mile gross earnings have varied from 18.55 cents in the fiscal year ended Sept. 30, 1902, to 23.91 cents in the fiscal year ended Sept. 30, 1906, but it was not until the

fiscal year 1906 that the figure rose above 23 cents. The average car-mile revenue per year since operation started is 21.07. Operating expenses per car-mile have ranged from 12.21 cents to 16.60, reaching the highest figure in the last two years indicated in the statistical table which was prepared to justify the increase in fares. The average in the entire period has been 15.31 cents.

The following statistics, taken from the material submitted, show some of the results of operation:

SOUTH MIDDLESEX STREET RAILWAY,						
Years ending Sept. 30						
	Net divisi-	Passengers	Car-	Per car-mile		Miles
	ble income	carried	miles	Earn-	Operat-	of
			operated	ings	ing ex-	track
				\$0.2123	\$0.1413	
*1892.....	\$5,790.67	352,311	82,356			6.785
1893.....	3,748.42	537,100	135,500	.2002	.1591	6.143
1894.....	2,023.17	504,798	125,080	.2005	.1522	6.143
1895.....	5,007.04	847,227	182,701	.2298	.1612	13.51
1896.....	6,264.31	1,016,782	249,277	.2046	.1386	13.51
1897.....	11,361.20	1,934,399	254,122	.2049	.1221	13.51
1898.....	11,815.03	1,134,670	269,181	.2122	.1339	13.513
1899.....	11,190.05	1,195,879	279,898	.2153	.1410	13.545
1900.....	4,024.02	1,263,117	282,683	.2245	.1609	13.828
1901.....	73,360.85	1,416,232	339,775	.2043	.1636	19.65
1902.....	†11,844.66	1,445,338	379,489	.1855	.1578	19.668
†1903.....	‡5,333.77	1,473,712	361,000	.2000	.1610	19.668
1904.....	77,491.24	1,397,548	364,813	.1908	.1606	13.828
1905.....	78,051.14	1,408,219	328,025	.2159	.1638	16.123
1906.....	†1,279.51	1,722,112	369,225	.2391	.1660	16.067
†1907.....	‡5,269.83	1,531,520	331,794	.2312	.1660	16.067

*Eleven months.

†Deficit.

‡Ten months, 14 days.

†Operated since May 3, 1903, to Aug. 14, 1907, by a receiver, who did not pay any interest charges on the notes outstanding when he was appointed. These amounted to \$182,672.20. This statement includes interest on said notes.

NATICK & COCHITUATE STREET RAILWAY

The Natick & Cochituate Street Railway has had a less consistent career from a financial standpoint than the other properties in this group of companies. In one year, that ended Sept. 30, 1892, dividends aggregating 53 per cent were paid, although the earnings applicable to the stock aggregated only about 13 per cent. This high rate of dividend was paid before the present management assumed control of the properties. Except for this instance, the highest rate of dividend paid in any one year was 8 per cent. Leaving out of the computation the one year when the dividend of 53 per cent was paid, the average per annum was 5.5 per cent. During the first six years of operation the total number of miles of track owned or operated was 3.20; earnings per car-mile, which were 36.86 cents in the first year and averaged 32.33 cents per year for the first five years of operation, declined materially and for the ensuing period of 14 years averaged 19.80 cents. The car-mile operating expense, however, was correspondingly larger during the early years, averaging 23.30 cents per year in the first five-year period. In the following period of 14 years the average was 15.65 cents, which was close to the figure shown in the fiscal year ended Sept. 30, 1907, 15.78 cents.

In the full period of operation the increase in annual gross earnings was 558.03 per cent. The increase in operating expenses was 736.45 per cent. The number of miles of track owned and operated increased 486.2. The changes in the gross earnings per mile of track were affected in some years by increase in the mileage, but the final result for the entire period reported was an increase of 12.26 per cent in gross revenue per mile of track, comparing with an increase of 42.69 per cent in operating expenses per mile of track. During the same time the aggregate of the outstanding stock and unfunded debt was increased 1075 per cent. The increase in the number of car-miles operated was 1179.6 per cent. The average number of passengers carried per car-mile in the earliest fiscal year of operation was 5.76, but in the year ended Sept. 30, 1907,

WELLESLEY & BOSTON STREET RAILWAY COMPANY.

YEARS ENDING SEPTEMBER 30th.

Table with 25 columns: Capital Stock, Notes Payable, Bonds, Gross Earnings, Operating Expenses, Net Earnings, Fixed Charges, Net Divisible Income, Per Cent Dividends Paid, Amount Dividends Paid, Surplus for Year after Dividends, Surplus for all Years to Date, Passengers Carried for Year, Car Miles Operated, Earnings per Car Mile, Operating Expense per Car Mile, Average Operating Expense per Car Mile in State, Average Operating Expense on Operating Roads as below, Per Cent of Operating to Gross, Miles of Track Owned and Operated, Gross Earnings per Mile of Track Owned and Operated, Operating Expenses per Mile of Track Owned and Operated, Equipment (Cars, Motors), Number Employed, Rate of Pay Conductors and Motormen, Rate of Fare.

COMMONWEALTH AVENUE STREET RAILWAY COMPANY.

YEARS ENDING SEPTEMBER 30th.

Table with 25 columns: Capital Stock, Notes Payable, Bonds, Gross Earnings, Operating Expenses, Net Earnings, Fixed Charges, Net Divisible Income, Per Cent Dividends Paid, Amount Dividends Paid, Surplus for Year after Dividends, Surplus for all Years to Date, Passengers Carried for Year, Car Miles Operated, Earnings per Car Mile, Operating Expense per Car Mile, Average Operating Expense per Car Mile in State, Average Operating Expense on Operating Roads as below, Per Cent of Operating to Gross, Miles of Track Owned and Operated, Gross Earnings per Mile of Track Owned and Operated, Operating Expenses per Mile of Track Owned and Operated, Equipment (Cars, Motors), Number Employed, Rate of Pay Conductors and Motormen, Rate of Fare.

NEWTON STREET RAILWAY COMPANY.

YEARS ENDING SEPTEMBER 30th.

Table with 25 columns: Capital Stock, Notes Payable, Bonds, Gross Earnings, Operating Expenses, Net Earnings, Fixed Charges, Net Divisible Income, Per Cent Dividends Paid, Amount Dividends Paid, Surplus for Year after Dividends, Surplus for all Years to Date, Passengers Carried for Year, Car Miles Operated, Earnings per Car Mile, Operating Expense per Car Mile, Average Operating Expense per Car Mile in State, Average Operating Expense on Operating Roads as below, Per Cent of Operating to Gross, Miles of Track Owned and Operated, Gross Earnings per Mile of Track Owned and Operated, Operating Expenses per Mile of Track Owned and Operated, Equipment (Cars, Motors), Number Employed, Rate of Pay Conductors and Motormen, Rate of Fare.

* Commenced operation August 19, 1889. † Consolidated Newton Street Railway Company. ‡ Except Boston Elevated, Boston & Worcester, Worcester Consolidated and West End. § Includes premium on bonds and stock.

Note - Many of the public, doubtless, have had an idea that the present actual value of the property belonging to the Newton Street Railway Co was less than what it was being carried for on the books of the company, and, also, that a substantial amount of the earnings of the company is being paid out as salaries to its officers.

This certifies that we have examined the annual returns, which are made to the Board of Railroad Commissioners under oath by the officers of the above companies, covering each of the years stated and have compared the figures in the above tables with the statements in said returns.

Signed, G. M. COX, Assistant Treasurer. March 14, 1908.

We have also verified all of the computations. We therefore certify that the figures in the tables as set forth above are correct and are in agreement with the said sworn returns and in accord with the facts to the best of our knowledge and belief.

HARVEY S. CHASE & COMPANY, Public Accountants and Auditors.

March 17, 1908.

Tables Prepared by the Boston Suburban Electric Companies to Indicate the Financial Condition and Operating Results of the Three Properties Mentioned. Similar Statistics for the Other Companies in the System Were Compiled and Printed.

the average was but 3.77, indicating that the public had the benefit of improvement in the service.

The following figures show some of the results of operation:

NATICK & COCHITUATE STREET RAILWAY
Years ending Sept. 30

	Net divisible income	Passengers carried	Car-miles operated	Per car-mile		Miles of track
				Earnings	Operating expenses	
1889.....	\$5,250.22	237,702	41,262	\$0.3686	\$0.2413	3.20
1890.....	4,824.58	246,847	41,256	.3600	.2432	3.20
1891.....	2,820.02	208,210	43,302	.2999	.2317	3.20
1892.....	3,370.10	204,281	41,994	.3189	.2386	3.20
1893.....	3,037.88	266,766	53,022	.2690	.2103	3.20
1894.....	2,850.03	262,710	52,980	.2547	.1887	3.20
1895.....	6,609.23	398,061	76,740	.2644	.1689	9,500
1896.....	7,553.91	754,408	189,767	.2005	.1569	9,500
1897.....	7,675.12	908,362	208,461	.2194	.1745	11,500
1898.....	6,273.84	1,089,877	257,772	.2153	.1821	11,500
1899.....	9,515.45	1,277,803	297,710	.2162	.1700	18,000
1900.....	9,170.34	1,364,883	405,654	.1696	.1334	18,000
1901.....	8,326.29	1,428,991	450,815	.1602	.1299	18,154
1902.....	8,437.73	1,611,446	461,879	.1727	.1406	18,800
1903.....	8,197.53	1,741,937	514,018	.1730	.1400	19,084
1904.....	1,345.95	1,742,254	527,618	.1695	.1460	19,084
1905.....	*1,722.41	1,771,486	511,197	.1763	.1544	18,758
1906.....	8,389.88	1,994,652	527,677	.1904	.1483	18,758
1907.....	2,013.51	1,990,992	527,988	.1895	.1578	18,758

*Deficit.

WESTBORO & HOPKINTON STREET RAILWAY

The poorest showing made by any of the properties was that of the Westboro & Hopkinton Street Railway. This company began operations on Aug. 16, 1902, with 6.360 miles of track; except for fractional changes the mileage has not been altered materially and stood on Sept. 30, 1907, at 6.431 miles. The company has paid no dividends and has shown a surplus after meeting fixed charges in but two out of six fiscal periods. The first of these periods was that of one month and a half, covered in the fiscal year ended Sept. 30, 1902, when, the property being new, expenses were light; the other was the fiscal year ended Sept. 30, 1907, when the surplus applicable to the stock was \$540.48. The accumulated balance sheet deficit in the latter year was \$3,629. Operating expenses have been high, ranging from 79.89 per cent to 92.96 per cent of gross earnings in the full fiscal years.

The following table gives other statistics relating to this property:

WESTBORO & HOPKINTON STREET RAILWAY
Years ending Sept. 30

	Net divisible income	Passengers carried	Car-miles operated	Per car-mile		Miles of track
				Earnings	Operating expenses	
†1902.....	\$1,441.95	46,062	10,176	\$0.2232	\$0.0815	6,360
1903.....	*176.59	281,230	79,003	.1787	.1531	6,416
1904.....	*1,807.91	269,733	76,701	.1774	.1649	6,439
1905.....	*723.34	250,398	80,421	.1592	.1342	6,532
1906.....	*902.02	255,493	79,185	.1648	.1474	6,431
1907.....	540.48	272,773	79,015	.1761	.1407	6,431

*Deficit.

†Commenced operating Aug. 16.

In November of the present year the Railroad Commission approved the consolidation of the Middlesex & Boston Street Railway, the Westboro & Hopkinton Street Railway and the Natick & Cochituate Street Railway, the first-named company acquiring the property of the two other roads.

(To be continued)

The city of Liverpool (England) will apply to the Board of Trade for a provisional order for the construction of six auxiliary railways. It is the intention of the Council to adopt the trackless railway if after investigation of this system in Continental cities it is found to be as successful as has been reported.

NORTH CENTRAL ASSOCIATION OF RAILROAD COMMISSIONERS

A permanent organization, to be known as the North Central Association of Railroad Commissioners, was formed in Chicago on Dec. 3 and 4 at a meeting of members of the Railroad Commissions of the States of Ohio, Indiana, Michigan, Illinois and Wisconsin. The following officers were elected, each to serve two years: President, C. L. Glasgow, chairman, Michigan Railroad Commission; vice-president, W. H. Boys, chairman, Railroad Commission of Illinois; secretary, William Kilpatrick, secretary, Railroad Commission of Illinois. As outlined at a preliminary meeting, held in Chicago on June 12 and 13, 1908, it is the object of the newly formed association to discuss questions of mutual interest to the public and the commissions of the various States. It was announced that all future meetings of the commission will be held in Chicago, subject to the call of the president, and that the Railroad Commissioners of other States will be admitted to membership on application to the president.

At the June meeting of the commissioners, which was reported in the ELECTRIC RAILWAY JOURNAL for June 20, page 122, the following committees were appointed to prepare reports for presentation on Dec. 3: Grade crossings, J. C. Morris, Ohio; W. J. Wood, Indiana; B. A. Eckhart, Illinois; George W. Dickinson, Michigan; J. M. Winterbotham, Wisconsin. Trespassing on railroad property, W. J. Wood, Indiana; O. H. Hughes, Ohio; J. H. Willoughby, Illinois. Both of these committees made reports at the meeting last week.

The committee on grade crossings in its report emphasized the necessity for the separation of grades where such construction would not work hardship on the railroad companies. It was stated that the elimination of grade crossings was "as expensive as it was desirable." It corrected the mistakes made when the railroads were constructed, for which the railroads, counties, cities and villages were responsible. Each State has some legislation upon the subject, but the matter is left largely in the hands of the railroads, and the major portion of the expense for the separation of grades is imposed upon the railroads. In the Eastern States much good had been accomplished in the separation of grades, and this was made possible because the State participated in paying for the work. In New York State a sum of money is appropriated each year, out of which the State pays a fixed proportion of the cost of eliminating such grade crossings as may be abolished during that year. The committee also urged the securing of legislation which would clothe the commissions with the necessary authority to hear and determine applications for the separation of grades, and likewise to fix the division of the expense within certain limits. Specific recommendations as to legislation were not made, because of the variation in the statutes of the different States. It was, however, recommended that any amendments to statute laws should include two things: "First, that the division of expense should be so made as not to make the burden too great upon any of the parties. Second, a statute requiring railroads to separate a certain percentage of grades each year. The power to determine the question of grade crossings of highways with steam and electric roads should be conferred upon the Railroad Commission * * *."

The committee on trespassing on railroad property cited that about 50 per cent of the people killed annually on the railways in this country were killed while trespass-

ing on railway property, and that since the State supervised and regulated the tolls of operating lines it also seemed to be its duty to protect the companies against trespassers. The committee favored the passage of statutes making it unlawful "to walk upon, or stand upon, or go upon railway track or bridges, except at such crossings and places as the public has a right to use." The committee recognized that it would be difficult to enforce such statutes, and yet that it might be feasible to give police power to the section foreman as it is now given to railway train crews. It was suggested by this committee that copies of such statutes as might be passed on this subject should be posted in the stations and along railroad rights of way.

SPUR GEARING ON HEAVY RAILWAY MOTOR EQUIPMENTS

Norman Litchfield, engineer of car equipment, Interborough Rapid Transit Company, New York, presented an interesting paper during the meeting in New York last week of the American Society of Mechanical Engineers, on the gear practice of the Interborough Rapid Transit Company. An abstract follows:

During the evening rush hours in the New York subway the total load per gear is about 35 tons and this weight has to be accelerated at the rate of 1.25 m.p.h.p.s. every third of a mile. Through its operation of the Manhattan Elevated Railway the company was able to conduct some tests of gears before the installation of the equipment in the subway. The initial gearing on the 125-hp motors used on the elevated cars consisted of wrought-steel pinions and solid cast-steel gears of 3-diametral pitch, this pitch being adopted on account of the economical current consumption thereby obtained. The pinions at once began to fail at the rate of about 15 per month. The failures continuing, it was decided to withdraw all of the gearing then in service and replace it with 2½ pitch on account of the greater tooth section thereby obtained, although, as before stated, this meant some loss in economy of current consumption. This change practically ended the failure of the pinions, but not entirely of the cast gears, and it was decided that greater reliability could be obtained by adopting a composite type of gear consisting of a cast-steel center on which a wrought-steel rim was shrunk. This combination of a wrought-steel pinion and wrought-rim gear of 2½ pitch has proved generally satisfactory for the elevated service, and the improvement to be looked for is therefore in the line of greater wearing life.

On the subway division the motors are of 200 hp each and the original gearing equipment consisted of solid cast-steel gears with wrought-steel pinions, diametral pitch 2½, and teeth of the Brown & Sharpe standard 14½-deg. involute. The experience on the subway was similar to that on the Manhattan division. It soon became evident that the design was not proper, but in contrast to the Elevated it was the gears which first caused the trouble. The cast-steel gears, therefore, were all scrapped and replaced by the wrought-rim type. Mr. Litchfield, in this connection, stated that the idea of these composite gears was induced by the experience of the Interborough company, although they were first brought out in connection with the proposed electric motor car equipments for the New York Central lines.

This improvement practically ended the gear breakage, but unfortunately the pinions began to go, the breakages averaging over one a day, and, furthermore, it was found to be unsafe to run a pinion the teeth of which measured less than 3/16 in. at the top. The company has therefore been compelled to scrap material which should be available for wear.

Three suggestions have been advanced by the gear manufacturers to overcome this trouble:

(a) Diametral pitch less than 2½.

(b) Steel with elastic limit of 90,000 lb. per square inch and over as compared with the present 45,000.

(c) Twenty-degree stub teeth.

The first suggestion the company has been unable to accept on account of some local conditions, but the combination of the other two seems to have possibilities of success and the Interborough company is now replacing all its gearing with specially treated carbon steel with stub teeth.

The force which can be safely transmitted by the teeth has been estimated by the method outlined by Wilfred Lewis in a paper before the Pennsylvania Engineers' Club in 1903. This method consists in assuming that all the load is carried by one tooth over its entire face, but at the extreme top, so that the tooth is considered as a beam loaded at one end (the crest) and supported at the other (the base). Mr. Lewis states that the force which can be safely transmitted lessens as the speed is increased and gives figures which may be used as safe working stresses at various speeds. These values when plotted give a curve which may be closely represented by the equation

$$S' = S \frac{600}{600 + V} \text{ in which}$$

S = safe working stress in pounds per square inch at no velocity.

S' = safe working stress in pounds per square inch at velocity, feet per minute.

V = velocity of pitch circle in feet per minute.

Under the conditions existing on the subway the fiber stress at the period of maximum torque is 13,370 lb. per square inch in the standard 14½-deg. involute tooth, and at this instant the train is running 17.3 m.p.h., with a corresponding gear speed of 1168 ft. per minute. On account of this speed, therefore, a material is required which will permit the use of a safe working stress at no speed, according to the formula of 39,400 lb. per square inch. The elastic limit of the material is nearly 45 lb. per square inch so that the factor of safety is only 1.1. The elastic limit of the material rather than its ultimate strength is considered on account of the dynamic character of the load, as each pinion receives nearly 1800 blows per minute. The greater the ratio, therefore, between the fiber stress and the elastic limit of the material (the other physical properties remaining of proper value), the greater the life, and some relief should therefore be obtained by the adoption of the special 20-deg. stub tooth, which reduces the fiber stress nearly 30 per cent and increases the minimum factor of safety from 1.1 to nearly 1.6.

A much greater relief, however, may be looked for by the use of steel with a high elastic limit, say 90,000 lb. per square inch, which, used in conjunction with a design of stub tooth, increases the minimum factor of safety to 3.2 as compared with the present 1.1.

These calculations are based on the assumption that the teeth bear across the whole face, but in practice it is not always possible to maintain perfect alignment between the gear and the pinion owing to the necessarily rough design of the motor and its assembly on the truck. The effect of a disalignment is to bring unusual stress against a part of the teeth, causing them to crack. The break ordinarily starts at the inner face of the pinion, due to the natural tendency of the armature to cock that way, but in some cases starts at the outside, probably caused by running a new pinion with a gear which has previously worn taper.

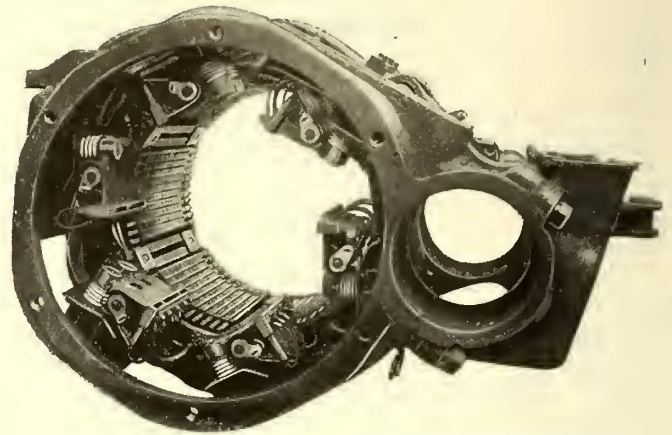
This condition leads to the suggestion that if only a short bearing was being obtained on the teeth it would be better to assure this bearing being at the center of the face rather than at the end, and this might be accomplished by the use of a tooth in which the central portion is left the standard outline and the balance tapered off both ways toward the ends. No investigation has been made as to the practicability of cutting such a tooth or of its desirability, and it is suggested for consideration merely as one possible way of compensating for the lack of alignment occurring in railway motor gearing.

SPRING-SUPPORTED QUILL FOR GEARED SINGLE-PHASE RAILWAY MOTOR

A very interesting feature of the single-phase motors which the Westinghouse Electric & Manufacturing Company is building for the motor car trains of the New York, New Haven & Hartford Railway Company will be the suspension of the motors entirely on springs. This feature will reduce the wear on the track and roadbed to a minimum, and should give to the cars exceptionally easy riding qualities. One of the Westinghouse No. 156 motors, which is to form a part of these car equipments was exhibited at the recent Atlantic City convention, but as the spring supports are essentially parts of the trucks rather than the motors, these were not in evidence at that time. The accompanying diagram shows the arrangement of the spring supports, as well as the principal dimensions of the motor.

As will be seen from this drawing, the essential element of the arrangement is a quill similar to those on which the armatures of the gearless motors for the locomotives are mounted. This was described and illustrated in the *STREET RAILWAY JOURNAL* for April 14, 1906. In the present instance, however, the quill encloses the axle, instead of forming the armature shaft, and is carried from each wheel by means of four pins located in spring pockets in the wheel, and surrounded by eccentrically wound helical springs. The motor and gear are mounted upon this quill. By this arrangement the gear centers are rigidly maintained, while at the same time a spring support

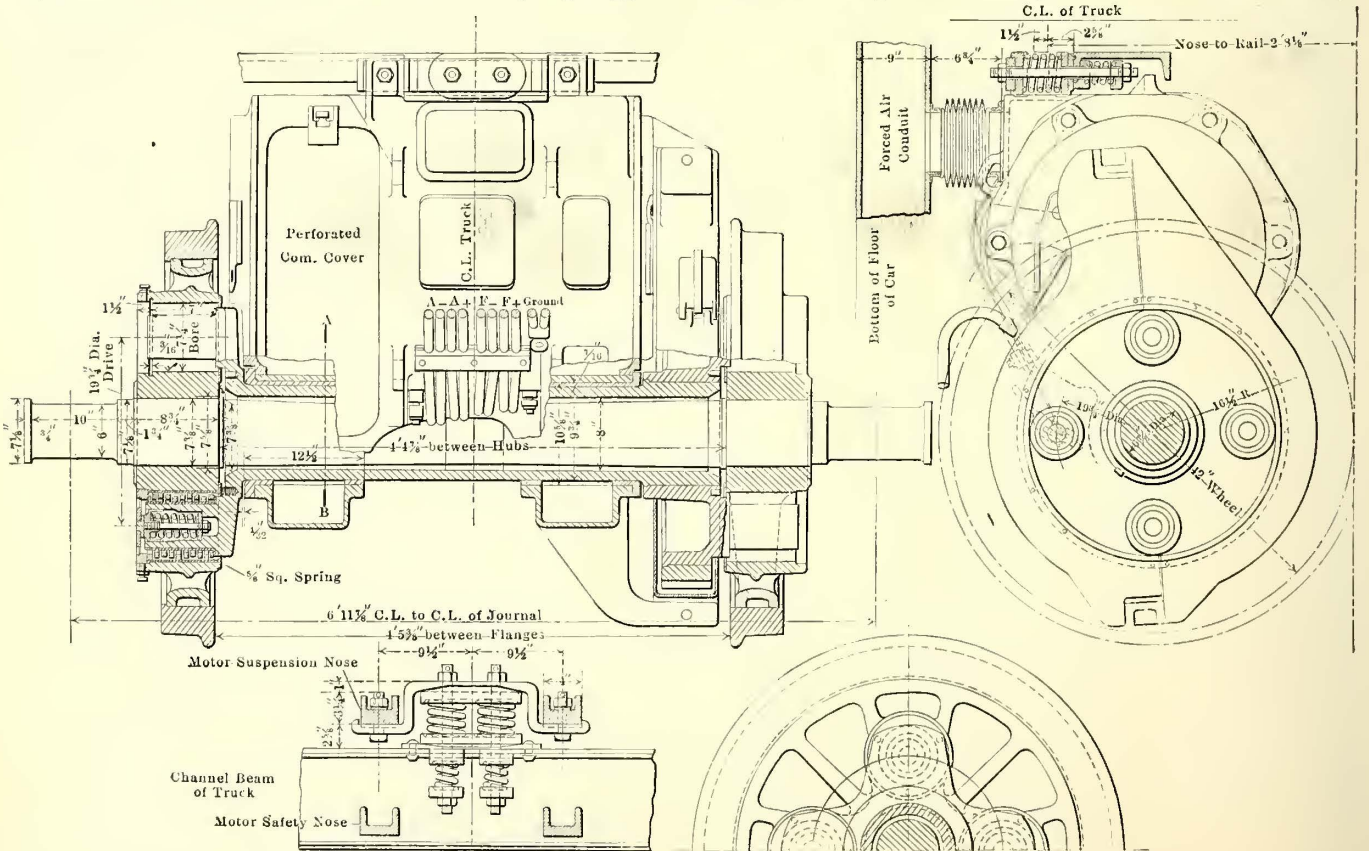
The general appearance of the motor frame is illustrated in the second engraving. The motor, known as No. 156, has six poles and six brush arms. Each brush arm carries four brushes measuring $\frac{3}{8}$ in. x $2\frac{1}{4}$ in. each. The motor has a nominal rating of 150 hp on the one-hour rating, and is arranged for forced ventilation. Especial



New Haven Quill Supported Motor—Field Frame

care has been taken to locate the ventilating ducts or passages so as to secure easy passage and even distribution of air. As a result, the motor may be operated continuously at approximately 75 per cent of its one-hour current rating, with a remarkably small volume and low pressure of air.

The field winding is of the compensated-series type, and the armature is provided with preventive leads. The design



New Haven Quill Supported Motor—Details of Suspension on Axle

is secured for that part of the motor weight which is usually carried directly on the axle. The remainder of the motor weight, which is ordinarily carried by means of the motor nose and supported solidly from the transom of the truck, in this case is carried on a spring cradle as shown. Thus the entire motor is spring-borne.

is similar to that being made standard by the manufacturers. Use is made of partially closed slots in the armature core and an especially rigid commutator construction. The leads have been brought out on the axle side instead of the bolster side of the frame, so that they may be secured without interference from truck parts or brake rigging.

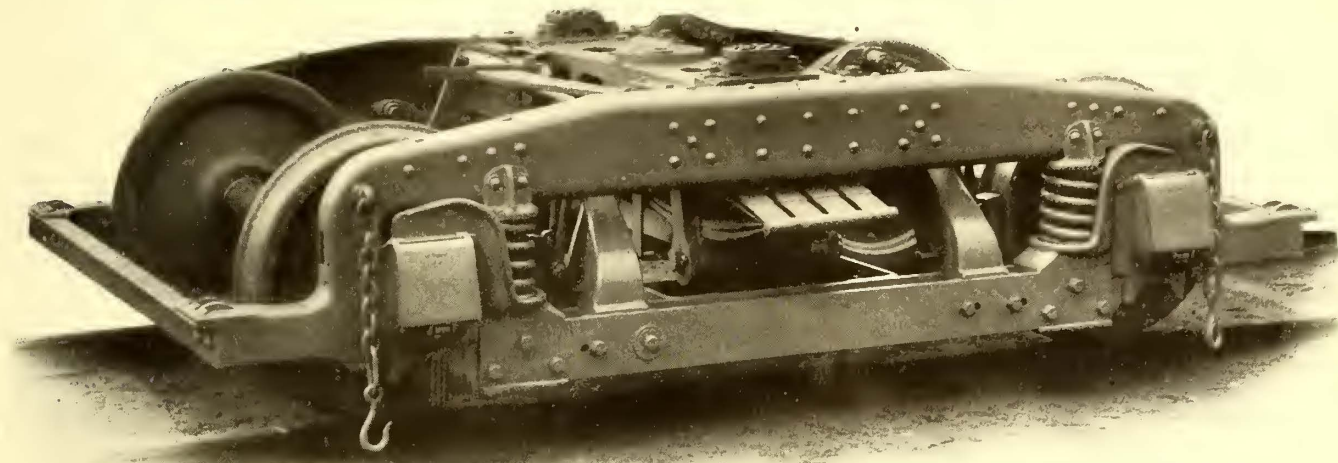
The weight of the motor, complete with gears, gear case, axle bearings and quill, is approximately 7450 lb., and of the motor only, approximately 5600 lb. The quill complete weighs about 1400 lb.

These motors will be mounted on a special design of all-steel truck made by the Standard Motor Truck Company, Pittsburg, Pa., and designated as C-100-A high-speed "trunk-line" truck. They have axles with journals 6 in. x 10 in. and have a carrying capacity of 120,000 lb. on the king pins. The accompanying illustration shows one of these trucks before mounting the motors. The truck shown in the illustration is fitted with 33-in. wheels; as furnished to the New Haven Railroad, the trucks will have 42-in. steel-tired wheels with M.C.B. tread and flange. The side frames and transoms of these trucks are pressed-steel channels. The pedestals are of cast steel, machine fitted, and are then pressed and riveted to the pressed-steel side frames. Cast-steel journal boxes are used. No brake-beams are used as the brake hangers are carried on the equalizer bars and are adjustable in position to allow for varying diameters of wheels. All holes in the brake rigging are bushed with hardened steel and all wearing bolts and pins are case hardened. Coil springs are used on the brake rigging bolts to prevent chattering and wear. The bolster is

HEARINGS ON THROUGH ROUTES AND JOINT RATES IN NEW YORK

The hearing before the New York Public Service Commission, First District, regarding the proposed order requiring the exchange of transfers between the Central Park, North & East River Railroad and the receiver of the Third Avenue Railroad was resumed on Nov. 24.

Frederick W. Whitridge, receiver of the Third Avenue Railroad, was recalled for further examination. He said that the same transfer system was in vogue at all the transfer points of the system, except that on the Third Avenue line and some branches of the Forty-second Street line more hours are allowed for transfer than on other lines. He did not know why so much time was allowed for transferring, but thought the theory was that a sufficient interval should be given for a car to reach its terminal so that another car could be secured without fail. The general system had not been changed from that in force when the Third Avenue Railroad was part of the Metropolitan system. Mr. Whitridge said that the cost of everything in the world of which he knew had increased in the last five years; he had raised wages on some of the lines since his appointment as receiver.



Steel Truck for New Haven Motor Cars

of cast steel and the sides are protected from wear by detachable chafing plates of high-carbon steel. Wear plates of low-carbon steel are also bolted to the transoms. The bolster hangers have hardened-tool steel saddles at their upper ends which rock on hardened-tool steel pins pressed into the transoms. The bolster springs are full elliptic, 37 in. long with six leaves. These are divided into sets of three leaves to reduce the dampening effect and to ensure easy riding. The trucks are fitted with roller side bearings mounted on the bolsters inside of the truck frames.

There were 91,540,688 passengers carried on the Liverpool Corporation's railways during the nine months ended Sept. 30. The gross receipts were over \$2,000,000, the car mileage run being 9,266,521.

The Russian Government has approved the contract whereby the Société Anonyme des Tramways d'Odessa (a Belgian company) receives the right to operate an electric railway in Odessa, the new service to begin operation by the summer of 1911. "Horse wagons" are at present the archaic means of transportation.

John M. Bowers, of counsel for the Central Trust Company of New York, asked Mr. Whitridge about his statement that under certain conditions the last new money, in his opinion, which would be invested in the surface roads of New York City for many a long year would be the proceeds of the receiver's certificates that he is now expending. Mr. Whitridge said that what he meant was that if the system of orders which is outlined by the zone system applied to the Metropolitan lines and the through route system which has been suggested for the Third Avenue, the Forty-second Street and the Fifty-ninth Street lines are to be continued, capitalists would be unable to form opinions as to the earning power of the property. He had asked the commission, and would continue to ask for a reasonable time until he received an answer, whether he was justified in undertaking to introduce self-propelling motor cars in place of some of the horse car lines now operated by the Third Avenue Railroad. He thought it was uncertain, if such improvements should be made, whether the commission would turn the lines over for the equal use of passengers on the Metropolitan system by ordering through routes or transfers. As such orders would

probably double the number of passengers to be carried, twice the number of cars for service would be required. Mr. Whitridge thought that the most important and beneficent function of the Public Service Commission was the supervision of capital issues.

A question was asked by Chairman Willcox in relation to the offer made by Mr. Whitridge to the Fifty-ninth Street line to exchange transfers. Mr. Whitridge said his offer was a good business proposition, but it was an experiment. He was inclined to think that the Third Avenue road needed another crosstown line, and he was prepared to go to considerable expense in experiments to ascertain the effect of an exchange of transfers. In speaking of the result of transfer changes, Mr. Whitridge said that the revenues of the Dry Dock, East Broadway & Battery Railroad, a subsidiary line, were materially less than in the previous year, and he could not learn the reason, whether it was due to hard times or the abolition of transfers.

RIVAL OF METROPOLITAN SYSTEM

When asked why transfers between various lines comprising the Third Avenue Railroad system should not be discontinued, Mr. Whitridge said he thought it would probably be profitable for these roads to continue to exchange transfers with each other. He thought it would be profitable to build up the Third Avenue road as a complete rival of the Metropolitan system.

Mr. Whitridge said that if the commission had not issued its order he would probably have been able to acquire the Fifty-ninth Street road. He wanted that road, but the commission, he thought, gave it to the Metropolitan system by issuing the order for through routes and joint transfers. Commissioner Eustis suggested that the Metropolitan receivers had not accepted the arrangement, and Mr. Whitridge replied that of course they could not accept a precedent of that character, because the commission had adopted the zone system, which, in his opinion, was impracticable in connection with a straight 5-cent fare. Mr. Whitridge was asked why he did not experiment by exchanging transfers with the Fifty-ninth Street line after the order of the commission had been issued, and he answered that he was bound to assume that the order would establish a precedent for 4000 more orders of the same character, and that reduced the entire situation to an impossible condition. Orders for through routes, in his opinion, would reduce the street car service in New York City to universal disorder or it would bring about universal transfers. He believed that the people in New York were accustomed to a straight 5-cent fare, and that any attempt to set up the zone system would result in great trouble.

Mr. Whitridge felt that the subject of transfers was a puzzle. He had no doubt that to a certain extent transfers were profitable, but unlimited transfers were ruinous. He did not consider himself wise enough to lay down a dividing line between those two conditions, and he did not think any one else could do it. Mr. Whitridge thought that the only way in which the best service could be secured was to allow the companies, if there were different companies, to experiment on whatever basis they could, because self-interest was bound to control them.

EXCESSIVE TAXES

The examination went into other channels, and Mr. Whitridge said he would be glad to have the opportunity to state what he had already written to some of the city authorities, that the taxes on the Third Avenue road

amounted to 22.5 per cent of its net income, which he believed to be the largest percentage of taxes that had ever been assessed on "anybody in any country in time of peace." He included in that the amount of the franchise tax, which is in litigation.

During the hearing Mr. Whitridge uttered several caustic remarks, and he made this explanation: "If I seem to criticise your commission, it is not because I do not believe, as I have said, in the principle which underlies the law you are administering. I think it is wise. I think your functions are beneficial, and I should be sorry if I should be misconstrued in that, but I do think you would get far better results if, in these matters, you allowed the companies to work out their own salvation."

In responding to a question regarding the action of the commission in issuing orders to him to make repairs in cars, Mr. Whitridge said: "I never thought it was an impertinence on the part of the commission to suggest that anything was wrong with the cars. I think it was a wonderful piece of stupidity to make an order directing us to do something up there that you were told not only once, but twice and three times, that we were going to remedy as soon as we could remedy it; and also it was equally as stupid to make general orders in respect to things about which there was no definite information, as was proved in the case of the Forty-second Street cars. When I asked for a specific report in respect to specific cars, I was sent a report by an inspector, who stated that he had examined the cars on such and such a date, and went on to give a detailed statement as to how bad they were, and then, in a second report, which was sent after the first order of the commission, he said that the condition was very much improved and better, whereas, as a matter of fact, during that interval not a single one of the cars had been touched. That shook my faith in the value of the inspection, and I thought the whole performance silly."

LIFE OF PROPERTY

At the hearing on Nov. 25, Milton G. Starrett, engineer, was called as a witness. He described the construction of the track and roadway of the Third Avenue Railroad. The average annual depreciation in track and roadway of a system like that of the Third Avenue Railroad, in his opinion, was about 8 per cent. He included all the elements entering into the construction of track and roadway, subsurface work as well as surface work. The average life of the tram rails was about 10 years, and of the slot rail perhaps from 12 to 14 years. The average life of the pavements along the railway tracks, between the tracks and just outside of the tracks would be 10 years. The life of special work under hard service was placed at about 5 years. It was difficult to say, Mr. Starrett thought, what the average life of tracks in a car house might be; it might be 50 years, or it might be the length of time the property was used as a car house.

The average life of the conduit yokes which are embedded in concrete would be 25 years. He would limit the life of the concrete to the life of the yoke. With very slight repairs, the life of the ducts, in his opinion, would continue indefinitely. The life of the feeders depended a good deal on the use to which they were subjected, and was limited, not by the copper conductor, but by the condition of the insulation surrounding the copper conductor and the condition of the lead covering outside that insulation. When the lead covering was destroyed the feeder was practically out of service and, in Mr. Starrett's opinion, the lead covering would not last more than about 30

years under conditions existing in New York. The depreciation of feeders, then, was practically determined by the life of the covering. Such conductors as had been renewed in New York would indicate that the average life was about 10 years.

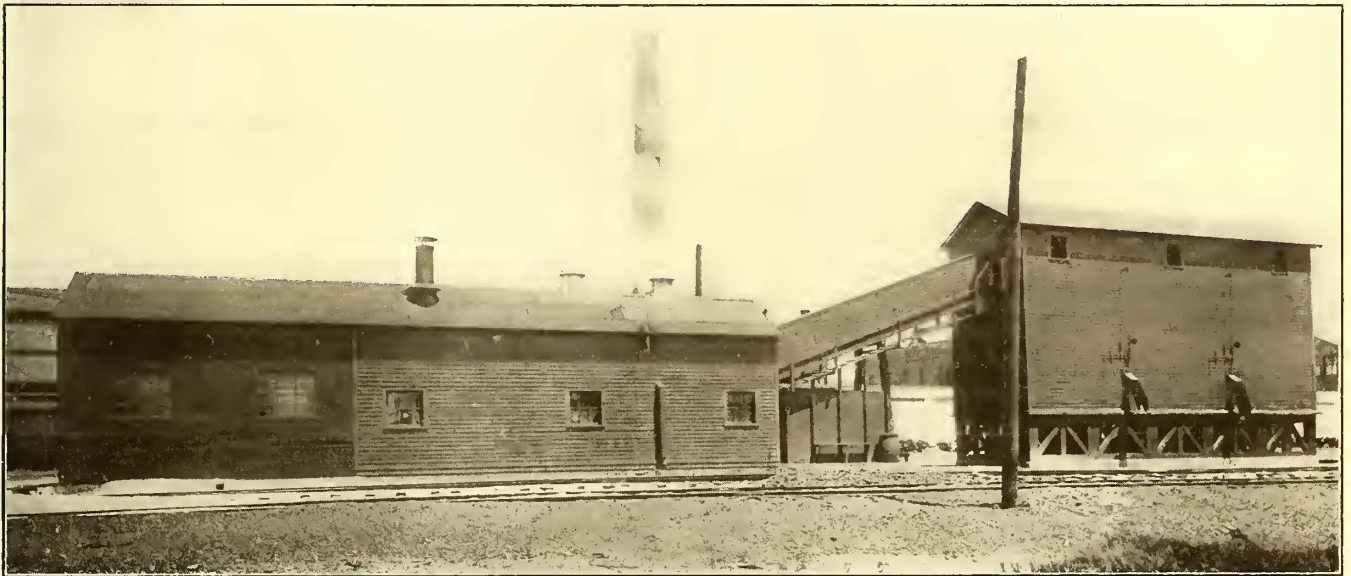
The average life of the machinery in a power plant like that at Kingsbridge would be about 25 years, assuming that it was kept in repair. By ordinary repairs Mr. Starrett meant keeping the machinery in adjustment and making current repairs, but not including the replacement of parts. The replacement of parts by reason of wear or breakage he would consider part of the renewals. Assuming that such a plant be kept in repair and parts renewed from time to time as might be necessary, the machinery at the end of the assumed life of 25 years should be in good operative condition, Mr. Starrett thought, but of course it would not be a new set of machinery or as valuable as if new. It was Mr. Starrett's theory that at the end of the 25 years there would have been expended on the machine, in addition to ordinary repairs, as much as the original cost of the machine.

Mr. Starrett gave it as his opinion that the average life of the buildings used for car houses and for power

SAND DRIER PLANT OF THE CHICAGO CITY RAILWAY

The Chicago City Railway Company has just put into service a well-designed sand-drying plant. The new installation, which automatically dries, screens and distributes the sand to a large storage house, is located in the yards of the main repair shops at Seventy-eighth Street and Vincennes Road. The plant includes a house enclosing the drying machinery and an enclosed storage bin. A conveying system connects the two buildings. Dry sand is delivered in supply cars from this plant to all car houses of the company.

The general arrangement and appearance of the new drier house, conveyors and storage bins are illustrated. The drier house is a single-story structure 57 ft. 9 in. long by 13 ft. wide, built of wood resting on concrete piers. Sand is received at the west end of the house through a large door or through windows. There are trolley tracks along both sides of the building. As the wet sand is received it is deposited on a concrete floor 20 ft. long by 6 ft. 3 in. wide. It is shoveled next into the hopper of a Robbins belt conveyor, which delivers the wet sand to a chute leading to the mouth of a revolving drier. A 10-hp, d.c. motor drives the



Sand Drier and Storage at Seventy-eighth Street Shops of Chicago City Railway

plants on the Third Avenue line might be assigned as 50 years, which was merely an estimate.

The average life of the cars and other electrical equipment of the Third Avenue line Mr. Starrett estimated at 25 years. The figures given by Mr. Starrett did not take into consideration, with respect to the machinery, the fact that there might have been improvements in the art, and that, although at the end of 25 years the machinery might be in good working order, it might be practically obsolete, while, as a matter of economy, the most desirable course might be to scrap the machinery.

At the hearing on Dec. 1 George W. Linch, general manager, Central Park, North & East River Railroad, testified that the company was operating on the Fifty-ninth Street Crosstown line 15 cars ordinarily; in rush hours and in stormy weather 18 cars are operated; 7 cars are held in reserve. These cars are under lease from the receivers of the Metropolitan system. The lease provided for 40 cars, but the receivers relieved the Central Park line of part of the requirement, and payment is made for only 25 cars now. The reimbursement is \$350 a year per car.

belt of the wet sand conveyor and also revolves the sand drier. For drying the sand coal is burned in a bricked-in furnace, the exhaust gases from which pass through a cylindrical oven and out through an iron stack. The cylinder of the drier is 15 ft. long and 36 in. in diameter. Its exterior is lagged with asbestos.

Inside of the cylinder are five angle-iron baffles which, as the drier revolves, serve to distribute the sand so that all of it may be dried and passed through from end to end. At the discharge end a chute leads to the hopper of a second belt conveyor. This conveyor is of the same type as the first and also is driven by a 10-hp motor. The sand as delivered from the drier falls on this rubber belt and is carried upward through a covered passageway to the sand storage house, where it is distributed in a large bin.

The storage house is a frame structure with concrete foundations. It stands 28 ft. east of the drying plant. The belt conveyor connecting the two buildings elevates the sand to a height of about 20 ft. above the level of the nearby tracks before it is delivered to the storage bin. The bottom of the sand bin is about 6 ft. above the track level.

PUBLIC SERVICE COMMISSION STATISTICS OF RAILWAYS IN NEW YORK CITY

Volume II of the report of the Public Service Commission, First District, New York, covers statistics for the year ended June 30, 1907, compiled by the bureau of statistics and accounts of the commission. A. F. Weber, chief statistician, under whose direction the volume was prepared, states in the preface that in the absence of a prescribed uniform system of accounts it should not be inferred that the commission accepts the accuracy of the returns.

Thirty-one operating companies reported to the commission for the year ended June 30, 1907, and these reports included the operations of 30 leased lines, which as lessor properties made financial reports only. In addition 16 non-operative companies reported capitalization, assets, liabilities, etc., most of these having road under construction. There were also five companies owning, but not operating, lines in New York City. The companies operating these lines under lease are under the jurisdiction of the commission of the Second District.

All of the traffic between points within the city is not recorded because of certain conditions. Some roads are operated by the Long Island Railroad, which reports to the commission of the Second District. Traffic between certain towns in Westchester County, lying north of New York City, is recorded, however, because it is carried on lines that are under the jurisdiction of the commission of the First District. The suburban travel on the lines of the Long Island Railroad, the New York, New Haven & Hartford Railroad and the New York Central & Hudson River Railroad is included in the reports to the Commission of the Second District. The travel to the suburbs of New Jersey escapes record by either commission. The only commuters included, therefore, are those on State Island. Subject to these limitations, the following condensed report, including the main figures of many statistical tables, is presented by the commission:

	1906.	1907.	Increase or decrease (D).
Length of road.....miles	(?)	763	7.3
Length of track.....miles	(?)	1,612	16.7
Passenger cars.....	11,856	10,009	(D)1,847
Transfer points.....	1,463	1,540	77
Fare passengers.....	1,264,997,186	1,330,776,165	65,778,979
Fare passengers per day.....	3,465,746	3,645,962	180,216
Transfers.....	310,050,614	368,777,369	58,726,755
Miles run by cars.....	245,599,885	254,927,285	9,327,400
Passenger earnings.....	\$62,823,836	\$66,017,303	\$3,193,467
Total car earnings.....	63,929,550	67,256,271	3,326,721
Total operating revenue.....	65,204,976	68,736,468	3,531,492
Operating expenses.....	34,403,521	38,117,364	3,713,843
Operating ratio, per cent.....	52.76	55.45	2.69
Net revenue from operation..	\$30,801,454	\$30,619,104	(D)\$182,350
Taxes.....	3,613,420	3,445,455	(D)\$167,965
Interest.....	12,229,755	12,857,588	627,833
Dividends.....	14,319,147	15,415,142	1,095,995
Capital stock.....	263,314,250	272,417,350	9,103,100
Funded debt.....	263,114,864	260,778,763	(D)2,336,101
Book assets.....	634,804,937	633,128,329	(D)1,676,608
<i>Per car mile.</i>			
Gross earnings.....cents	25.8	26.1	0.3
Operating expenses.....cents	13.3	14.1	0.8
Net earnings.....cents	12.5	12.0	(D)0.5
Average number of officers and employees.....	34,511	34,113	(D)398
Aggregate salaries and wages.	\$23,416,318	\$24,219,352	\$803,034

CITY'S PROPORTION OF STATE TRAFFIC

The report says that New York City, with one-half of the population of the State, accounts for four-fifths of the traffic conducted by the street railways of the State. The number of car rides per capita is stated at 317 in the fiscal year 1907, "a larger figure than that of any other American city, with the possible exception of San Francisco."

Of the 763 miles of line operated on June 30, 1907, by railroads and street railways under the jurisdiction of the commission 22 miles comprised underground electric,

67 elevated electric, 24 surface steam, 603 surface electric and 47 surface animal.

A summary of the traffic statistics shows the following results:

Boroughs or lines.	Transfers.	Employees, etc.—free.	Regular fare passengers.	Total persons carried.
Subway.....	—	—	166,363,611	166,363,611
Elevated (Manhattan)...	—	—	282,924,273	282,924,273
Manhattan surface lines..	194,820,920	—	377,017,192	571,838,112
Bronx surface lines.....	24,795,679	—	59,452,821	75,373,350
Brooklyn.....	142,460,218	2,878,849	408,082,363	553,541,184
Queens.....	4,994,139	449,787	28,514,743	34,022,828
Richmond.....	1,706,413	155,797	17,421,162	19,296,317
Total.....	368,777,369	3,484,433	1,330,776,165	1,703,359,675

The daily average total number of passengers is 4,666,739. The Interborough Rapid Transit Company, operating the subway and the Manhattan Elevated Railway, keeps no record of transfers, "which on the subway at least," the report admits, "assume large proportions."

FARE AND TRANSFER TRAFFIC

While the net increase in the number of regular fare passengers was 5.2 per cent over the previous year, the increase on the subway was 20.62 per cent and on the elevated lines it was 9.75 per cent. There was a decrease of 3.75 per cent on the Manhattan surface lines. Discussing the figures of fare and transfer traffic the report states:

While the number of regular fare passengers was 5.2 per cent larger in 1907 than in 1906, the number of transfer passengers increased at a rate (18.9 per cent) nearly four times as great.

Of the total increase in transfer passengers recorded last year (58,700,000 in round numbers), seven-tenths was in Brooklyn, but the prevalence of transfers in Brooklyn's traffic is still less than that of the Manhattan surface roads. On the latter there are 51 transfer passengers to each 100 fare passengers, while in Brooklyn the ratio is only 35 per 100. The Brooklyn statistics include both elevated and surface roads.

The gross receipts per passenger declined from 4.14 cents in 1906 to 4.04 cents in 1907, but the railways in their entirety suffered no loss in the compensation which they obtained for service rendered. It appears that the total number of miles run by their cars increased only 3.8 per cent in 1907, as compared with an increase of 5.2 per cent in the number of fare passengers and 7.9 per cent in the number of all passengers. The result is an increase in the average passenger car earnings from 25.58 cents per car-mile in 1906 to 25.89 cents in 1907. (Gross earnings increased from 26.55 cents to 26.91 cents per car-mile.) The inference therefore is that the increased use of transfers was not at the expense of the railways, but rather at the expense of the comfort of the passengers who crowded the cars in a degree that enabled the carriers to increase the revenue for every mile run by a car, notwithstanding the more liberal giving of transfers privileges.

The number of passengers per car-mile is often taken to represent the density of travel or of crowding. For the entire city the ratio in 1906 was 6.41 and in 1907 6.67. This increase in the density of traffic might result from the introduction of new cars with increased carrying capacity; but the records do not indicate that the changes in rolling stock made by the companies last year were sufficient to make any material difference in the figures regarding passengers per car-mile. The number of passengers per car-mile is therefore a rough index of the crowding of cars, whether due to the lengthening of the average journey or the collection of more fares and transfer tickets from persons traveling the same average distance as heretofore.

If the transfer passengers be excluded and the comparison limited to the regular fare passengers, the density per car-mile would be 5.22 in 1907, as compared with 5.15 in the preceding year. The average in the United States (in 1902) was 4.26, thus indicating the greater profitability of car operation in the metropolis.

SPEED OF CARS

Discussing the subject of speed, the report says that

the time consumed is part of the cost of the ride to the passenger, and presents the following data:

The greatest speed reported by any street railway is 35 m.p.h. on the Brooklyn elevated roads; but the average speed of trains on those lines is only 13 m.p.h., as compared with an average of 15 miles on the Manhattan elevated lines and of 18 miles on the subway. The Manhattan surface cars average slightly more than 7 m.p.h. and those of the Bronx about 7.5 miles. In Queens Borough, which is not so thickly settled, the surface cars run at an average speed of 9.5 m.p.h. and at times attain a speed of 25 miles. For the entire city the average speed on surface, elevated and underground railways was 9.5 m.p.h.; excluding the Interborough Rapid Transit Company's lines, it was somewhat under 8 m.p.h. There was an increase in the speed of the subway from 16.73 m.p.h. in 1906 to 17.66 m.p.h. in 1907. The requirement of the lease is for a minimum speed, including stops, of 14 m.p.h. for locals and 30 m.p.h. for expresses.

AVERAGE SPEED.

	1907.	1906.
Interborough Rapid Transit Company: Subway Division...	17.66	16.73
Manhattan Elevated Division.....	14.75	15.65
Surface Lines: Manhattan.....	7.08	6.49
Bronx (with part of Westchester).....	7.69	7.27
Brooklyn (including part of Queens) (a).....	7.92	8.19
Queens.....	9.35	10.07
Richmond.....	11.58	14.43
Total.....	9.58	9.42

(a) Elevated and surface lines together.

ACCIDENTS

The figures of accidents show a total of 345 persons reported killed and 2704 reported injured. Payments for damages aggregated \$2,431,280 and for legal expense incident thereto \$1,077,352.07. "The sum of these two items," the report states, "is over 9 per cent of the operating expense and is greater than the amount paid for fuel, is nearly equal to the maintenance of way and structures and, in the case of the New York City Railway, is nearly equal to the wages of conductors. There were 20.31 persons killed per 100,000,000 passengers carried on all lines in 1907. On the Interborough Rapid Transit system there were 8.26 persons killed per 100,000,000 passengers carried, while on all other lines the rate was 24.48.

TAXES

While a decrease is shown in the amount of the taxes paid, the report calls attention to the fact that this item is subject to large adjustment entries year after year. The roads in Bronx, Queens and Richmond boroughs paid 19.08 per cent, 20.89 per cent and 15.16 per cent, respectively, of their gross income as taxes. The average of all companies was 6.61 per cent.

The fact that operating revenues increased a slight percentage more than the number of fare passengers is shown to be due to an increase in the revenue from other sources of 18.43 per cent.

COST OF POWER

From the sale of electric power \$121,528.13 was received as compared with \$9,645.53 in the previous year, representing an increase of 1160 per cent. This increase is stated to be due presumably to sales to consumers other than railways. The report continues:

There is no direct way of showing from the data reported by the street railway companies that this produc-

POWER ACCOUNT OF INTERBOROUGH RAPID TRANSIT COMPANY.

	1907.	1906.
Operation of power plant.....	\$1,973,762.42	\$1,841,114.07
Power sold.....	107,774.89	9,471.37
Net cost of power consumed.....	\$1,865,987.53	\$1,831,642.70
Car mileage.....	93,792.770	93,654.185
Cost per car mile.....cents	1.8887	1.9557

tion and sale of surplus power reduced the cost of producing, but it can be shown that the expense for power plant per car-mile was reduced in at least one important in-

stance. The Interborough Rapid Transit Company has a very efficient power plant and its power cost per car-mile is low. Taking into consideration the receipts from power sold, the company reduced this expense still lower in 1907.

OPERATING EXPENSES

The analysis of operating expenses in the report extends to calculation of the percentages required for each primary account and a similar distribution per car-mile. The report contains the following statement in relation to the operating expenses:

The bad showing for the year in the operating account is due to increase in expense. Revenue increased faster than car-mileage, but expense increased twice as fast as revenue. A superficial explanation of this increase would be that it was caused by the general rise in prices.

Wages and salaries constituted a very large part of expense, but these items are not responsible for the abnormal increase. A comparison of the amounts paid with the number of employees reveals that, though there was a decrease in the number of employees, the average rate of wages increased 4.6 per cent. The reports do not enable one to determine what proportion labor is of the total expense. The items which are specifically for labor, as wages of conductors, etc., amount to 43 per cent of the expense account. Several of the other items, such as maintenance of track and roadway, must contain a large element of wages. It is under rather than over the mark to estimate the wages and salaries at one-half the expense.

Of materials there was probably an increase in quantity as well as in price, but there is no direct way of proving either. The index number of the United States Bureau of Labor shows that there has been a continuous rise in average prices for the last 10 years. The average price of metals and implements in 1905 was 11.8 per cent higher than in 1904 and in 1906 it was 10.4 higher than in 1905. The rise in the average price of copper was 16.4 per cent in 1905 and 22.4 per cent in 1906. This upward tendency continued through the fiscal year ended June 30, 1907. If we assume (1) that all the items of expense other than labor were for materials and (2) that the quantities increased the same per cent as the car-mileage, 3.77 per cent, then the increase in price was 17 per cent. Neither assumption is quite true. There are some items of expense which are neither labor nor material; on the other hand, the materials used increased faster than the car-mileage. Expense tends to increase as the road grows older whether the traffic continues to increase or not. For example, the surface lines of Manhattan had a decrease in car-mileage of 3½ per cent, yet their expense went up 3 per cent. The Richmond roads had a decrease in car-mileage of 13 per cent with an increase in expense of 18½ per cent. This is due apparently to insufficient maintenance in the earlier years.

The increase is least, proportionately, in those accounts which are largely labor accounts, viz.: Operation of power plant and operation of cars. Maintenance of equipment is heavier than maintenance of way and structures for two reasons. First, the bad effect of insufficient maintenance in the past would be greater in the case of the comparatively fragile cars and the complicated electrical mechanism than that on the simpler and more substantial track. Second, the materials used for replacements are more expensive and have increased in price to a greater degree.

General expense once more makes the worst showing of any item. The responsibility for the decrease in net earnings for the year must be charged against this account. Over half of this account in both years is for damages and legal expense in connection with damages.

MAINTENANCE AND COST OF PLANT

While it is not usual to make the comparison of maintenance with the cost of the plant, it is not without value. There ought to be some relation between the two. There is a constant deterioration in plant that is independent of the service performed, and while an increase in work produces more wear, the value of the part worn must be multiplied into quantity of wear to determine the depreciation. The table on the next page shows that the ratio

of maintenance is so low that were it not obvious that the book value of the roads and equipment is excessive,

AN OPERATING ENGINEER'S VIEW OF SINGLE-PHASE RAILWAY WORK

BY SIDNEY SPROUT

RATIO OF MAINTENANCE TO BOOK VALUE

	Reported cost of road and equipment.	Maintenance of way, structures and equipment.	Percentage maintenance to cost.
Interborough Rapid Transit System..	\$165,397,643.43	\$2,702,145.79	1.63
Surface lines:			
Manhattan	180,289,370.92	2,572,333.20	1.43
Bronx (with part of Westchester) ..	20,406,835.90	318,569.11	1.56
Brooklyn (includ. part of Queens) a ..	123,968,329.97	2,871,433.77	2.32
Queens	11,201,285.33	290,434.12	2.59
Richmond	12,490,980.18	530,770.26	4.25
All roads	\$513,754,445.73	\$9,285,686.25	1.81

a Elevated and surface lines together.

we should conclude that maintenance is utterly inadequate.

OPERATING ACCOUNT

From a distribution of the operating accounts in the different boroughs the following is taken:

	All roads.	Surface lines.					
		Interborough Rapid Transit System.	Manhattan.	Bronx (with part of Westchester).	Brooklyn (with part of Queens).	Richmond.	
Per car mile.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
Operating revenue....	26.74	23.18	33.51	19.31	27.43	22.59	31.80
Operating expense....	14.83	9.71	19.68	14.73	16.73	18.17	26.39
Net operating earnings	11.91	13.47	13.83	4.58	10.70	4.42	5.41
Per fare passenger.							
Operating revenue....	5.16	5.10	5.15	4.87	5.11	4.998	9.73
Operating expense....	2.86	2.14	3.02	3.71	3.11	4.020	7.98
Net operating earnings	2.30	2.96	2.13	1.16	2.00	0.978	1.75

(a) Elevated and surface lines together.

The Manhattan surface system had the largest gross and net earnings, larger even than the Interborough Rapid Transit System. The cars on the latter system have much greater capacity, but this is more than offset by the difference in length of average ride, which is short on the surface lines and long on the subway and elevated lines. This is shown statistically by the number of passengers per car mile. The Manhattan surface system carried 6.54 passengers per car mile, while the elevated and subway system, despite its larger cars, carried only 4.55. Obviously the good showing of the Interborough Rapid Transit Company is due to its low expense account; that of the surface system to its high receipts.

THE FUTURE FOR WOODEN POLES AND TIES

"The enormous and steadily increasing demand for wooden poles and ties has exhausted the northeastern forests of cedar and chestnut, and also the scant supply of southern cedar or juniper. The chestnut that is left east of the Mississippi River is jealously guarded for local consumption by the large railroads along which it stands, who have locked it up by excessive freight rates. The future supply of ties and poles must come from the southern forest, and over 75 per cent of it now comes from there. Southern yellow hard pine, because of its hardness, pitch and rosin, is the choice of all steam railroads and of many standard electric railways for ties and octagonal poles, especially of the heart quality, which brings the highest price, as being the most durable under all conditions. Railroads are learning the folly of specifying sawed ties, as thereby they raise the market price to that of sawed lumber, whereas if hewn on four sides by negroes the cost is about 10 cents less per tie. Sawed octagonal poles are very popular as a substitute for iron poles in city work and cost about one-fifth as much. Their life is greatly increased by protecting them at the ground level by a slight concrete casing at small cost.

"The cypress round pole is the future round pole. To make up for lack of strength, it is specified about 1 in. larger at the top than chestnut or cedar, the butts averaging smaller and the taper being more gradual. Cypress is very porous and when used in a cold climate great care should be taken to house and seal the tops thoroughly."

In common with all pioneers, the single-phase system of operating an electric railway has received its share of criticism. The Vallejo, Benicia & Napa Valley road, of Napa, Cal., while not the first single-phase installation, has, perhaps, been more severely criticised than any other. The critics of this method of operation imply that the single-phase system includes such defects and disadvantages as increased cost of motors, poor starting torque, slow acceleration, excessive weight of car equipment and, in fact, so many other faults that when mentioned collectively one might think he was warranted in neglecting further consideration of single-phase methods. The writer's purpose will be to emphasize the good points of the single-phase system and present the so-called "troubles," "deficiencies," etc., from the viewpoint of one who has been privileged to study at first hand under favorable conditions several single-phase installations. Among these may be mentioned the Vallejo, Benicia & Napa Valley, earlier referred to; the Exeter & Lemon Cove road; the Spokane & Inland Empire and the Indianapolis & Cincinnati line.

It may be well to preface these few notes with the positive statement that but few of the difficulties attributed by the critics to the single-phase method of operation have any existence except in theory. Take, for instance, the question of cost of motors. During my connection as electrical engineer with the Ocean Shore Railway, an 80-mile double-track interurban road, 500-volt, direct-current equipment was purchased which at that time was considered the best that could be had. Single-phase apparatus was just then coming into use and 1200-volt apparatus hardly was on the market. Owing to the San Francisco earthquake delivery of the 500-volt equipment was delayed and in the meantime advancement in the alternating-current equipment was so marked as to make it advisable to consider this type in connection with that already ordered. As a result of careful study, it was found that we could buy a duplicate set of alternating-current motors for repairs, if necessary, and then, by allowing nearly 100 per cent more for maintenance still be enabled to effect a saving of over \$40,000 per annum in operating expenses if alternating current were used. On the following page will be found the details of the estimate and comparisons of alternating and direct current as considered for the Ocean Shore Railway.

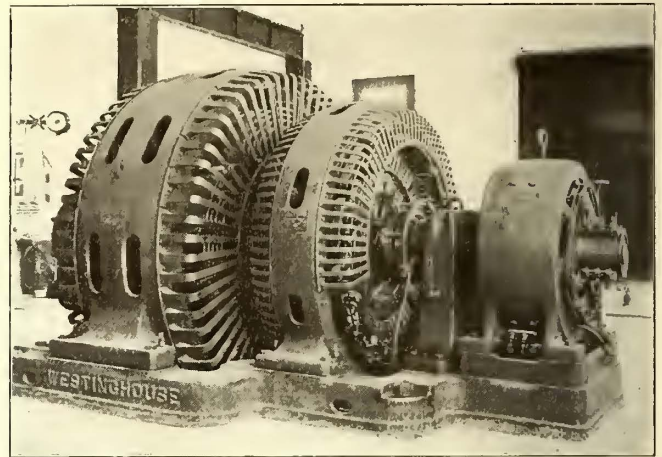
If these comparisons are fair the direct-current system would have a first cost of \$475,652 and a yearly operating cost of more than \$40,000 greater than the alternating-current railway.

Much has been said concerning the "low" starting torque and "slow" acceleration of the alternating-current railway motor, which, if it were true, would be a serious setback. While visiting a large manufacturing plant, I had the pleasure of a trip over its test track, which was in close proximity to the plant's source of power. Combination a.c.-d.c. equipment was used for exhibition purposes, being run under trolley wires fed by both kinds of current. Much to my surprise, the acceleration when on the 3000-volt trolley was greater than when the motors were fed from the 500-volt trolley. This condition was called to the attention of those in charge of the car, who admitted the fact and stated that the higher rate of acceleration on the a.c. section was because of a large drop in the 500-volt trolley circuit.

This is a condition that, if the reader will stop to consider, exists on any direct-current road that an engineer would seriously consider as suited for the alternating-current apparatus. In practice it will be found that the alter-

ordinary direct-current type. Considering the two types equal in efficiency, we have a simple problem of feeding each type at its normal voltage. Efforts to accomplish this with direct-current result in a tendency to raise the motor voltage, which is a condition that the operator accepts, not

CONSTRUCTION		
	D.C.	A.C.
Power house—		
Complete as planned (3 units, 2000 hp each).....	\$719,710	\$719,725
Substations—		
One in power house and nine on line, 1000-kw capacity each; one on Park branch, 500-kw capacity; one portable 500-kw.....	364,685	
Transformer stations—		
Six stations of 1500-kw capacity installed complete with system of controlling substations from power house (9000 kw).....		94,000
Transmission line—		
82 miles d.c.....	156,237	
72 miles a.c.....		136,800
Overhead construction—		
6600-volt catenary in both cases as planned.....	225,394	225,394
Trolley wires—		
196 miles No. 0000, d.c., and No. 000, a.c.....	198,895	157,400
Feeder copper—		
1,410,000 lb., including branch.....	435,600	
Bonding—		
Each joint to 500,000 circ. mil for d.c.....	85,633	
Each joint to No. 000, a.c.....		68,000
Rolling stock—		
As planned, including 56 quadruple equipment of 500-hp each.....	1,057,630	1,364,630
Difference in favor of alternating current.....	\$475,652	
OPERATING		
Maintenance—		
56 car equipments.....	\$16,100	\$28,400
Substations.....	3,300	1,000
Overhead (6600-volt catenary).....	7,000	9,000
Wages—		
Substation attendants.....	36,000	
Power—		
To haul additional weight of passenger car equipments and additional weight on locomotive necessary for same tractive power.....		4,600
Depreciation—		
8 per cent on \$307,000 additional, cost of car equipments.....		24,560
6 per cent on substations.....	21,900	5,640
5 per cent on transmission line.....	7,800	6,840
1 per cent on feeder copper.....	4,360	
3 per cent on trolley wire.....	5,970	4,730
Interest—		
At 5 per cent on \$460,000.....	23,000	
Annual saving, alternating current.....	\$40,660	



Visalia Single-Phase Railway—Motor-Generator Set

nating-current equipments do accelerate with all the rapidity necessary. The conditions under which alternating-current equipments would be considered for use would include the factor that there would be so few stops per mile that the difference in acceleration which is supposed to exist would not interfere with any reasonable schedule. In fact, in practice there is not a single case of alternating-current equipment (where good engineering judgment has been used) where the cars do not make better schedule time

expecting that his motor repairs will be decreased, but knowing that his copper investment can be less. This statement does not antagonize the 1200-volt motor as wired for series-coupled operation.

To feed current at normal voltage to motors on an alternating-current system the line voltage may, if necessary, be increased, while the motor voltage is decreased. The ease with which alternating current may be manipulated with transformers leaves no doubt of the possibility to give any required voltage to an alternating-current equipment. In so doing, however, there arises a trouble that seems to be a big "bugaboo," namely, power factor. A motor that will run on alternating current or direct current and produce a given output will require approximately the same amount of actual power; but on alternating current, owing to the choking effect of the windings it requires at starting approximately twice as much apparent volt-amperes. Consequently, more copper must be used or the voltage must be increased if the alternating-current motor is to equal the direct-current motor at starting. It, therefore, is evident that if it is to have any advantage over the standard direct-current system the alternating-current system must distribute at a much higher voltage—a simple principle which, if taken into account by the original engineers who designed the Napa Valley road, would have eliminated many of the disadvantages under which they were working. Under the direction of succeeding engineers who have changed the line voltage to 3000 volts, the acceleration has been a surprise to those who had expected that slow acceleration would be shown.



Visalia Single-Phase Railway—Car

than direct-current equipments would under similar conditions.

It is an admitted fact that the alternating-current motor is very nearly as efficient as the direct-current motor. In fact, I believe one manufacturer claims to have an alternating-current railway motor that is more efficient than the

Some new features are shown in the accompanying engraving of a motor-generator set on the Visalia Electric Railroad in which the exciter and generator seem abnormally large in comparison with the motor as shown in the middle of the set. This set was designed for a 40 per cent power factor on account of the few but heavy equipments necessary to follow the steam road practice, of which system they are a part. This large generator would seem to call for an expenditure that would handicap seriously the alternating-current system, but, on the contrary, it is found upon analyzing the design that a saving is effected, due to the liberal use of copper and other materials that are far from objectionable to the operating engineer.

CONDENSATION OF OPERATING EXPENSE ACCOUNTS FOR NEW YORK STATE LINES.

A list of the primary accounts in the system prescribed by the New York Public Service Commission, Second District, for street railroad corporations was published in the *ELECTRIC RAILWAY JOURNAL* of Nov. 14, 1908, page 1373. This list included the complete operating expense accounts prescribed for lines with annual operating revenues of \$500,000 or more. A separate order containing a condensation of the classification of operating expenses for the use of lines with annual revenues of \$100,000 or more, but less than \$500,000, has been issued and is published herewith. The condensation of accounts applies to the operating expense accounts only. Another condensation, of operating expense accounts only, will be issued for lines with revenues of less than \$100,000.

OPERATING EXPENSE ACCOUNTS FOR ROADS WITH REVENUES OF \$100,000 OR MORE, BUT LESS THAN \$500,000.

I. MAINTENANCE OF WAY AND STRUCTURES.

- Superintendents of way and structures.
- Roadway and track repairs.
- Cleaning and sanding track.
- Removal of snow, ice and sand.
- Other repairs of way.
- Repairs of electric power line.
- Repairs of buildings and structures.
- Other operations—Dr.
- Joint way and structures—Dr.
- Other operations—Cr.
- Joint way and structures—Cr.
- Depreciation of way and structures.

II. MAINTENANCE OF EQUIPMENT.

- Superintendence of equipment.
- Repairs of power plant equipment.
- Repairs of substation equipment.
- Repairs of cars and locomotives.
- Repairs of car and locomotive electric equipment.
- Miscellaneous equipment expenses.
- Other operations—Dr.
- Maintaining joint equipment—Dr.
- Other operations—Cr.
- Maintaining joint equipment—Cr.
- Depreciation of equipment.

III. TRAFFIC.

- Traffic expenses.

IV. CONDUCTING TRANSPORTATION.

- Superintendence of transportation.
- Group I—Power:*
- Power plant labor.
- Substation labor.
- Fuel for power.
- Water for power.
- Lubricants for power.
- Miscellaneous power plant supplies and expenses.
- Substation supplies and expenses.
- Horse-power—revenue car service.
- Power purchased.
- Jointly produced power—Dr.
- Power exchanged—balance.
- Other operations—Dr.
- Other operations—Cr.
- Jointly produced power—Cr.
- Group II—Operation of cars:*
- Passenger motormen, conductors and trainmen.
- Freight and express motormen and other trainmen.
- Miscellaneous car service employees and expenses.
- Station employees and expenses.
- Car house employees and expenses.
- Operation of signal and telephone systems.
- Express and freight collections and delivery.
- Loss and damage.
- Other transportation expenses.
- Joint operation of cars—Dr.
- Joint operation of cars—Cr.

V. GENERAL AND MISCELLANEOUS.

- General officers and general office clerks.
- General office supplies and expenses.
- General law expenses.
- Miscellaneous general expenses.
- Insurance.
- Relief department and pensions.
- General amortization.
- Other operations—Dr.
- Joint general expense—Dr.
- Other operations—Cr.
- Joint general expense—Cr.
- Accidents and damages.
- Law expenses connected with damages.
- General stationery and printing.
- Store expenses.
- Stable expenses.
- Undistributed adjustments—balance.

The Victorian Railways Commissioners are said to have decided to recommend that Parliament carry out the scheme for the electrification of the suburban lines of Melbourne as outlined by its engineer, Charles Merz.

COST OF LIGHT AND HEAVY CARS IN RAILWAY OPERATION

W. H. Heulings, The J. G. Brill Company, has contributed to the December issue of the *Public Service Journal* a criticism of the comparison in the October issue of that paper on the cost of operation of light and heavy cars. An abstract of this comparison was published on page 1504 of the issue of this paper last week. Mr. Heulings says that the weights quoted for the semi-convertible cars (from 28 tons to 30 tons light for a car which will seat 52 passengers and stand 48 additional) are extreme. A fair average for a Brill 33-ft. 4-in. car, which corresponds to that cited, is 45,000 lb. complete with equipment and it can be bought for \$6,000. Other changes are suggested in the comparison by Mr. Heulings, who then submits the following as a substitute for the table criticized by him:

Investment

Equipment consisting of 50 semi-convertible cars for all-year-round service. Each car seats 52 and can carry 100 with standing load.	Equipment consisting of 50 summer open cars (12 bench) and 72 25-ft. body closed cars, seating 34 and carrying 70 passengers, including standing room.
Power Station. 2500 kw @ \$150.....\$375,000	Power Station. 2000 kw @ \$150.....\$300,000
Car House, 30,000 sq. ft. @ \$2.50..... 75,000	Car House, 30,000 sq. ft. @ \$2.50..... 75,000
Cars, fifty semi-convertible cars completely equipped with two 75-hp or four 40-hp motors, heaters, air brakes, etc., @ \$6,000..... 300,000	Car House, 25,000 sq. ft. @ \$1.50..... 37,500
	Cars, fifty 12-bench open cars, each equipped with two 30-hp motors @ \$2,500 each..... 125,000
	Seventy-two 25-ft. body box cars, each equipped with two 30-hp motors @ \$3,500 252,000
Total\$750,000	Total\$789,500

Yearly Cost of Power, Wages, Maintenance, Depreciation and Fixed Charges

Power Cost, 7,300,000 kwh at cars @ 1.5c. per kwh.....\$109,500	Power Cost, 4,790,625 kwh at cars @ 2c. per kwh..... \$95,812
Maintenance of Cars and Elec. Equip., 1,825,000 car mi. @ 1c..... 18,250	Maintenance of Cars and Elec. Equip., 1,916,250 car mi. @ 1.5c. 28,743
Maintenance of Power Plant, 2500 kw @ \$2..... 5,000	Maintenance of Power Plant, 2000 kw @ \$2..... 4,000
Wages — Conductors and Motormen, 1,825,000 car mi. @ 4½c. 82,155	Wages — Conductors and Motormen, 1,916,250 car mi. @ 5c..... 95,812
Depreciation, an average of 5% on all items of above investment 37,500	Depreciation, an average of 5% on all items of above investment 39,475
Fixed Charges, 7% of investment.... 59,500	Fixed Charges, 7% of investment.... 55,265
Total\$304,905	Total\$319,107
Difference 14,202	
	Total\$319,107

Mr. Heulings then points out the traffic advantages of the semi-convertible car and states his belief that his figures are more nearly correct than those advanced by the previous table, or a large number of electric railway managers have erred and erred badly.

The Thamshavn Electric Railway, the first electric railway in Norway, is now in operation. It is equipped with the Westinghouse single-phase system, using catenary construction and copper trolley wire of 65 sq. mm. cross-section. The line is 20 miles long.

CONFERENCE WITH OHIO RAILROAD COMMISSION ON ACCOUNTING SYSTEM

At a conference between accounting officers of Ohio electric interurban railways and the Railroad Commission of Ohio, on Dec. 1, at Columbus, Ohio, the date on which the new classification of accounts, as prescribed by the Interstate Commerce Commission, shall go into effect on Ohio roads not under the jurisdiction of the Interstate commission was not definitely settled. A special committee of electric railway officials was appointed at the close of the conference, at the suggestion of Howard D. Manington, secretary of the Railroad Commission, for further conference, the committee to meet with the commission at Columbus on Dec. 7.

The notices sent out on Nov. 5, calling the conference, announced the commission's approval of the classification of operating expenses, operating revenues, and expenditures for road and equipment of electric railways of the State prescribed by the Interstate Commerce Commission, to take effect Jan. 1, 1909, the date on which the classification is to be operative for Interstate reports.

During the discussion, Secretary Manington said that the commission would require the first reports under the new classification to be filed as of June 30, 1909, and this brought up the question whether it would be advisable to have the companies redistribute their accounts for the first six months of the current fiscal year in accordance with the new classification, or whether it would be preferable to file two separate reports for the two half periods of the fiscal year. This raised the question whether the companies, as well as the commission, would not wish the next report to permit comparison with previous years, in which case it was suggested that it might be desirable to defer the opening of the books under the new accounting system until July 1, 1909.

F. W. Sweney, special examiner for the Interstate Commerce Commission, was present at the meeting. During the discussion he said the Interstate commission would undoubtedly require Interstate lines to redistribute, as far as possible, the accounts for the first six months of the fiscal year and to present one uniform report for the year, in accordance with the new classification.

A count was taken of the roads represented at the meeting, and it was found that a large majority ended their fiscal years Dec. 30. Only about eight of the roads represented announced that they opened their books as of July 1. It is therefore considered probable that the new classification will go into effect as of Jan. 1.

The classification of accounts prescribed by the Interstate Commerce Commission leaves the question of whether the roads shall be required to keep depreciation accounts to the option of the State commissions. This subject received considerable attention during the conference, and on a roll call it was disclosed that but one road out of the 27 represented has been maintaining a depreciation account. That road was the Ohio River Electric Railway & Power Company, Pomeroy, Ohio.

Mr. Sweney was called upon to place an interpretation upon many features of the new classification. He said that although his interpretations could not be considered as strictly official, he thought he would be upheld in his statements by the Interstate Commerce Commission. Many questions asked by the officials were answered by him, and confusing points were cleared up. In the course of this discussion it was stated that each carrier was at liberty to

keep its operating expense accounts in accordance with the classification prescribed for a higher class of roads, and to renumber its accounts to suit its own convenience. It was not sufficient for a carrier to keep its accounts as heretofore, even though it is able to furnish the Interstate Commerce Commission with required reports, but the accounts must be kept in accordance with the classifications which become effective on Jan. 1, 1909. The use of the various operating expense accounts, "other operations—Dr." and "other operations—Cr.," was explained, as well as the reason for the "undistributed accounts" under "general and miscellaneous."

The special committee appointed to meet with the Ohio commission was composed of the following:

S. C. Rogers, treasurer and auditor, Mahoning Valley Railway Company and two other roads.

Charles Lehr, Akron, auditor, Northern Ohio Traction & Light Company.

H. S. Swift, Toledo, treasurer, Maumee Valley Railway.

W. A. Shirley, secretary, Wheeling Traction Company.

H. P. Cavanaugh, auditor, Cleveland, Southwestern & Columbus Railway.

F. K. Young, Columbus, auditor Scioto Valley Traction Company.

A. F. Elkins, Delaware, auditor, Columbus, Delaware & Marion Railway.

MEETING OF DEC. 7

At the conference held Dec. 7 the subject was again considered, and, with but few minor changes, the general orders adopted by the Ohio Railroad Commission at its session of Oct. 31, providing for a uniform classification of accounts for the interurban railway companies of the State in accordance with the act of the Legislature, passed April 2, 1906, were approved.

In view of the fact that but one or two companies in Ohio have been maintaining depreciation accounts, it was decided not to require such accounts at the present time, but that the Commission should recommend that some plan for taking care of depreciation be adopted by the companies. It was also decided to require the companies to redistribute their accounts in accordance with the new classification for the first six months of the fiscal year, in order to make one uniform report to the Commission at the close of the year, June 30, 1909.

The text of the orders, and the letter of explanation, also adopted at the joint meeting on Monday, sent out with the orders under date of Dec. 9, are as follows:

TEXT OF ORDER

The subject of a uniform system of annual reports from electric interurban carriers, to be made to the Commission as required by statute, being under consideration, and the statute requiring that such reports shall conform as nearly as practicable to the forms prescribed by the Interstate Commerce Commission, and said Interstate Commerce Commission, by its order of June 1, 1908, having prescribed a uniform system of accounts to be kept by said interurban carriers, upon which said reports are to be based, for said annual reports from said carriers, to be made to this Commission in the future:

It is ordered that the classification of operating expenses, operating revenues and of expenditures for road and equipment of electric railways and the text pertaining thereto, prepared under direction of Interstate Commerce Commission by Henry C. Adams, in charge of statistics and accounts, and embodied in printed form, to be hereafter known as First Issue, a copy of which is now before this Commission, be and the same is hereby approved and made applicable to electric railways in the State of Ohio; that a copy thereof, duly authenticated by the secretary of the Commission, be filed in its archives; and that said copy so authenticated and filed shall be deemed the original record thereof.

It is further ordered that the said classification of operating expenses, operating revenue and expenditures for road and equipment of electric railways, with the text pertaining thereto, be and is hereby prescribed for the use of electric railways, subject to the provisions of the act to regulate railroads in the State of Ohio, passed April 2, 1906, in the keeping and recording of their said accounts; that each and every such carrier, and each and every such receiver, or operating trustee of any such carrier, be required to keep all such accounts in conformity therewith; and that a copy of such First Issue be sent to each and every such carrier and to each and every receiver or operating trustee of any such carrier.

It is further ordered that the rules contain, in First Issue of the Classification of Operating Expenses, Operating Revenue and Expenditures, for Road and Equipment of Electric Railways are, and by virtue of this order shall become, the lawful rules according to which the said expenses are defined; and that each and every person directly in charge of the accounts of any such carrier or of any receiver or operating trustee of any such carrier, is hereby required to see to, and under the law is responsible for, the correct application of the said rules in the keeping and recording of the said accounts of any such carrier; and that it shall be unlawful for any such carrier or for any receiver or operating trustee of any such carrier, or for any person, directly in charge of the accounts of any such carrier, or of any receiver or operating trustee of any such carrier, to keep any account or record or memorandum of any item pertaining to said accounts except in the manner and form in said First Issues set forth and hereby prescribed and except as hereinafter authorized.

It is further ordered that any such carrier or any receiver or operating trustee of any such carrier may subdivide any primary account in said First Issues, established as may be required, for the purposes of any such carrier or of any receiver or operating trustee of any such carrier; or may make assignment of the amount charged to any such primary account to operating divisions or to its individual lines. Provided, however, that a list of such sub-primary accounts, set up or such assignments made by any such carrier or by any receiver or operating trustee of any such carrier be first filed in the office of this Commission, subject to disapproval by the Commission. In case the carrier is also subject to the jurisdiction of the Interstate Commerce Commission, the list of such sub-primary accounts will be first submitted to the Interstate Commerce Commission for approval, and the copy of such approved primary accounts will be filed with this Commission.

It is further ordered that in order that the basis of comparison between the present year and previous years be not destroyed, any such carrier or any receiver or operating trustee may, during the twelve months from the time that the First Issue becomes effective, keep and maintain, in addition to the accounts hereby prescribed, such portion or portions of its present accounts with respect to the several items as may be deemed desirable by any such carrier, or by any receiver or operating trustee thereof, for the purpose of such comparison; or, during the same period, may maintain such groupings of the primary accounts hereby prescribed as may be desired for that specific purpose.

It is further ordered that any such carrier or any receiver or operating trustee of any such carrier may, in addition to the accounts hereby prescribed, keep any temporary or experimental accounts, the purpose of which is to develop the efficiency of operations. Provided, however, that such temporary or experimental accounts shall not impair the integrity of any general or primary account hereby prescribed, and that any such temporary or experimental accounts shall be open to inspection by the Commission. Copies of the First Issue containing the classification of the several accounts can be had of this Commission upon application. Monthly reports required of Interstate Commerce carriers by the Interstate Commerce Commission are not required to be made to this Commission.

It is further ordered that January 1, 1909, be, and is hereby, fixed as the date on which the First Issue shall become effective.

LETTER OF EXPLANATION

The letter of explanation sent out by the Railroad Commission of Ohio to all carriers affected by the order is as follows:

To Carriers Concerned:

This Classification of Operating Expenses, Operating Revenues and of Expenditures for Road and Equipment of Electric Railways, is issued in accordance with an order of the Railroad Commission of Ohio. Copies of the First Issues referred to therein, as issued by the Interstate Commerce Commission, have been furnished you.

Attention is called to two important facts:

First, under the order of the Commission this classification becomes effective Jan. 1, 1909. This does not mean that a change has been made in the date for the closing of the fiscal year (June 30), for which annual reports will be required, its purpose being merely to allow the carriers concerned ample time to adjust their accounts to the rules prescribed. All reports are required to be in the hands of the Commission by Sept. 15 of each year. Carriers will adjust their accounts for the six months ending Dec. 31, 1908, to this classification of accounts in rendering their reports for the year ending June 30, 1909.

Second, for the purpose of this classification, electric railway companies are divided into three classes, designated, respectively, Class A, Class B and Class C. Under Class A are included all companies having annual operating revenues of more than \$1,000,000; under Class B all companies having annual operating revenues of more than \$250,000, but not in excess of \$1,000,000; and under Class C all companies having annual revenues not in excess of \$250,000.

Depreciation Accounts, Nos. 26 and 42, will be disregarded, as the Commission will not prescribe such accounts at this time, but the Commission would recommend to the consideration of the carriers the matter of keeping depreciation accounts.

In the copies furnished you will be found a schedule of accounts for which provision is made in this classification, so arranged as to indicate which accounts are to be kept by the companies of the respective classes. Companies of Class A are required to keep all the primary accounts provided in this classification, which accounts are numbered consecutively. Companies of Classes B and C are to use as primary accounts such groupings of the primary accounts provided for Class A, as are indicated in the schedule. By reference to this schedule, these groupings are clearly shown. For example, under "Maintenance of Roadway and Track," companies of Class B are to include all charges covered by the primary accounts, numbered from 2 to 12, inclusive, and under "Maintenance of Way," companies of Class C are to include all the primary accounts numbered from 2 to 19, inclusive. By this arrangement it is apparent that carriers of all three classes can make use of the text descriptive of the accounts. Carriers of the B and C classes may keep all of the accounts of the higher class, if it so desires, but it will be required to report only of its own proper class.

It is proper to say that this classification was worked out with the co-operation of representatives of the American Street & Interurban Railway Association and the American Street & Interurban Railway Accountants' Association in conjunction with the Interstate Commerce Commission and the State Commissions.

The American Railway Engineering & Maintenance of Way Association has appointed a committee on electrification of steam roads. The work of the committee will be confined within the scope of the association's activities in matters of construction and maintenance of track, working conductors, structures, etc. Subjects already assigned for consideration include transmission line crossings, clearances, insulation and protection, electrolysis, relation of track structures, and maintenance organization. The committee is composed of the following: G. W. Kittredge (N. Y. C.), chairman; J. M. Austin, Jr. (L. I.), vice-chairman; G. A. Harwood (N. Y. C.); F. A. Bagg (F. J. & G.); W. W. Drinker (Erie); H. R. Talcott (B. & O.); C. E. Lindsay (N. Y. C.); E. P. Dawley (N. Y., N. H. & H.); R. D. Coombs (Penna.).

COMMUNICATION

TRANSPORTING POLICEMEN AND FIREMEN

GEORGIA RAILWAY & ELECTRIC COMPANY,
ATLANTA, Ga., Nov. 30, 1908.

To the Editors:

Prior to Jan. 1, 1908, the Georgia Railway & Electric Company transported the members of the police and fire departments free on its cars. An order was passed about that date, however, by the State Railroad Commission, which had recently been given jurisdiction over the electric railways, prohibiting free passes or free transportation of any kind except to the persons covered by the exceptions in the Hepburn Bill, the terms of which were adopted and made applicable to electric railways. This made it illegal for the Georgia Railway & Electric Company to continue to transport policemen and firemen free. The Railroad Commission was asked by the company to make an exception of policemen and firemen, but the commission declined to grant the request. Subsequently the Legislature passed a bill making an exception of policemen and firemen, but the act was vetoed by the Governor. The Governor and the Railroad Commission then stated that if a contract were made between the city and the company for the transportation of policemen and firemen upon a valuable consideration from the city it would be approved. Negotiations between the city and the company resulted in a contract which was approved by the Railroad Commission on Nov. 25 and which is now in effect.

By the terms of this contract the company agrees to transport bona-fide members of the regular paid police department and regular paid fire department of the city without specific charge on its regular local passenger cars for a period from the approval of the contract to Jan. 1, 1910. Persons enjoying this transportation must at the time wear the full uniform of the police department or the fire department and are subject to all rules and regulations of the company with regard to transportation of persons without specific charge; they assume all risk of injury or damage while being transported and agree to relieve the company of any liability to them for injury to person or property, whether caused by the negligence of employees, defect in the condition of the track, equipment or facilities, and are required to yield their seats on the cars whenever necessary to accommodate the regular paid passengers.

Atlanta is divided by railroads spanned at intervals by bridges constructed by the city, across which the company operates, paying a lump sum for the privilege in some cases and in others an annual rental. For the right to operate across the Forsyth Street bridge the company pays a minimum of \$500 per annum and for similar rights on the Mitchell Street bridge it pays \$700 per annum, limited to 10 cars on each bridge; all cars in excess of 10 are paid for at the rate of \$50 per annum. In consideration of the free transportation of the policemen and firemen by the company the city has agreed that it may operate cars without limit on these two bridges during the period of the contract without any payment above the minimum sum specified in the contract.

The company believes that policemen and firemen should be accorded the privilege of transportation on street cars and feels that it derives an additional consideration from such transportation over and above the one named in the contract. It also considers that it is to the interest of

the company to place its facilities, when necessary, at the disposal of the police and fire departments in the interests of the preservation of peace and protection of property in the community.

P. S. ARKWRIGHT, President.

SINGLE TRUCK CARS FOR NEW ORLEANS

The New Orleans Railway & Light Company, New Orleans, La., has recently received from the McGuire-Cummings Manufacturing Company, Chicago, Ill., 35 single-truck city passenger cars. The cars are of a very substantial construction, and were delivered at New Orleans completed and ready for service.

The interior of the cars is finished in mahogany of plain design, with mahogany panels and window sash. The posts and window moldings were designed of embossed wood, and the ceilings are covered with maple veneer. Seven large windows are provided on each side of the car. The window glasses are set with rubber and held into place by a molding.

The following are the dimensions of the car bodies:

Length over buffers.....	30 ft. 8 in.
Length over corner posts.....	20 ft. 8 in.
Length of platform at each end.....	3 ft. 11 in.
Height of car body over all.....	9 ft. ¾ in.
Width over sash rails.....	8 ft.

The framing of the car bodies consists of air-dried oak, excepting the side sills, which are of yellow pine. The entire framework of the bottom of the car is made of oak



Interior of New Orleans Car

and yellow pine secured with heavy tie rods. The second cross sills, to which the platform draft knees are anchored, are plated with ¾-in x 5-in. steel plates extending across and bolted to the side sills. The frame was designed to use trucks with an 8-ft. wheel base.

The roof is of the monitor full-ventilator dome pattern, the monitor deck extending the full length of the car. It is supported by one continuous steel rafter for each side post and secured to the top plate of the car. The four center steel rafters carrying the trolley base were made extra heavy. Five ventilator windows and two Prairie ventilators are provided on each side of the monitor deck of the car, and the end ventilators are hinged and fitted with removable sashes. A running board on the roof, extending the entire length of the car, is provided.

Each car contains 10 cross seats of the "Walkover" type and four longitudinal seats covered with hard enamel

rattan. The first five seats at each side of the car are equipped with receptacles for placing partitions in the cars for the separation of the white and colored passengers. The partition screens extend about 18 in. above the backs of the car seats.

The furnishings throughout the cars are nickel plate over solid bronze. The cars are lighted with 15 16-cp, 110-



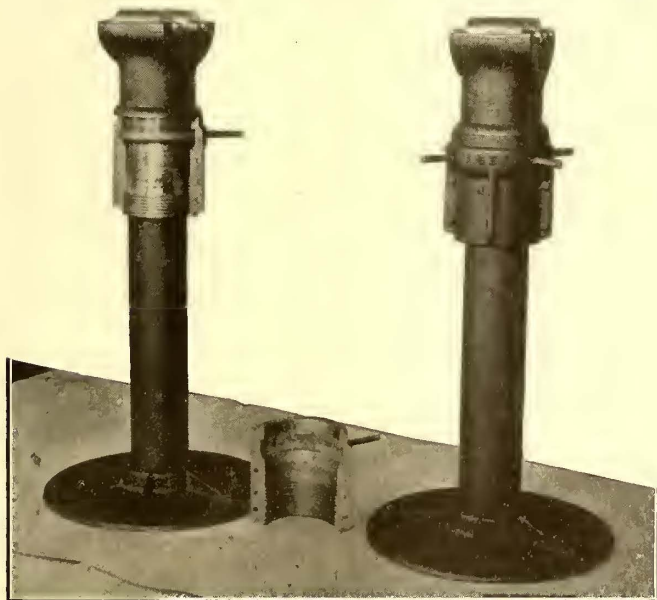
Single-Truck Car for New Orleans

volt Edison base lamps. These are arranged in three clusters of five lamps each. The headlight is connected on a separate circuit.

Some of the special equipment specified for installation on the cars were: Hale & Kilburn seats, Prairie ventilators, telescoping gates, Union Standard D No. 2 trolley bases, Spring radiating and telescoping drawbars, Peacock hand brakes, Kirby-Neal headlights and International registers.

ARMATURE STAND

The American General Engineering Company, of New York, has added to its list of improved machines and devices the A. G. E. improved armature stands shown in the accompanying cut. Among the many improvements are the following features: The sleeve nut is provided with a thread and works on a threaded collar which is securely fastened to the supports by pins engaging both walls. The pins, or handles, which are driven into the



Revolving Adjustable Armature Stands

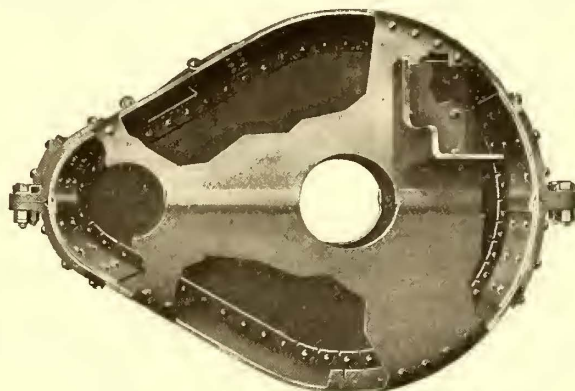
sleeve nuts, allow the operator to adjust the stand with perfect ease by hand to the required height without necessitating the removal of the armature, and further permit the leads to be soldered by the raising of either end to the required height.

The stands are designed to meet the most severe requirements, and the base and entire stand are designed so as to take up little space and allow the winder to work on any part of his armature without inconvenience. The stands are so simple that a boy can adjust them by hand. Crown-faced steel rollers are used as bearings to carry the shaft of the armature and allow it to turn easily.

IMPROVED SHEET-STEEL GEAR CASE

The Electric Service Supplies Company has brought out the improved form of Lyon sheet-steel gear case shown in the accompanying skeleton section. Particular attention is called to the heavy overlapping re-enforcing plates at the end of the case, which give extra rigidity and prevent oil leakage. It will also be seen that the side bracket is re-enforced on the inside of the case by a heavy plate, the latter being made larger than the base of the bracket. The end brackets are fastened by bolts locked both at the heads and at the nuts so that the case will not loosen from vibration. The sides of the case are lapped, the lower half extending above the upper to prevent the oil from dripping out. The illustration also shows the ample riveting of the case; V-shaped slots are cut in the steel between the rivets so that in bending the sheet steel will maintain its original texture.

The wearing qualities of the "Lyon" case have been



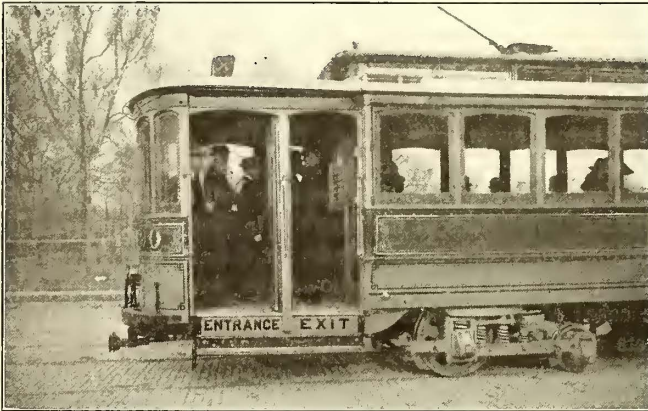
Part Section of Sheet-Steel Gear Case

tried out on many roads and its construction is such that it can easily be repaired in many instances and put back in service for a second time—a feature not possessed by malleable-iron cases.

In installing a sheet-steel gear case care should be taken that the bolts holding the case in position are drawn up tight. The brackets on the motor frame to which the gear case is attached, if worn or broken off, should be lined up by shims in such a way that the gear case is straight. So far as possible equal strain should come on all bolts. A gear case fastened either loosely or unevenly is bound to vibrate, and this vibration, due to the fact that there are unequal strains on the metal, will cause crystallization. Gear cases should be inspected as frequently as any other part of the equipment to see that none of the bolts has become loose and that the case has not been bent by some outside force. Frequently a piece of steel and a few rivets will repair a case that has been damaged and thus put it back into service, or new brackets can be supplied. The yielding sheet-steel case absorbs the blows from obstructions better than a malleable-iron case, thereby lessening the shock to the motor frame or other parts of the car equipment which are expensive to replace if broken.

PAY-AS-YOU ENTER CARS IN COLUMBUS, OHIO

On Dec. 1 the Columbus (Ohio) Railway & Light Company put into service on its State and Oak Street line 10 pay-as-you-enter cars recently built by the Kuhlman Car Company, of Cleveland, Ohio, under license from the Pay-As-You-Enter Car Corporation. In general appearance and dimensions the cars are the same as the standard double-truck cars used by this company on its other lines, the principal changes being in the construction of the extended platforms at each end. The cars are intended for double-end operation and are mounted on maximum-traction trucks.



Rear Platform of Columbus Car

A novel feature of the cars is the use of sliding doors to close the exits at both ends while the cars are in motion. The exit door on the front platform is opened and closed by the motorman and the conductor operates the rear exit door.

For 10 days prior to the placing in operation of these cars on the Oak and State Street line a campaign of education was carried on by the company with special vigor in the section of the city served by the Oak Street line. Folders explaining the operation of the pay-as-you-enter system of fare collection were spread broadcast. These folders were



Front Platform of Columbus Car

illustrated with photographs of the new cars and a diagram showing the proper method of entering and leaving the car. Advertisements were carried in all of the daily papers giving the same instructions, and notices were conspicuously displayed in the cars on all lines in the city.

A few days before the cars were put in regular operation one of them was turned over to a motorman and conductor, inexperienced in their operation, for a test. Officers of the

company and a number of invited guests were present to make the trial of boarding and paying fares under the most difficult conditions. Each person was furnished with either car tickets, transfers or cash fares and frequent stops were made for taking on and letting off the trial passengers. Neither the conductor nor the motorman became confused and handled the car in a very satisfactory way, although neither had ever before had any experience or special instruction.

The regular crews on the Oak and State Street line were taken off of their cars on the Sunday before the inauguration of the pay-as-you-enter service and were given a thorough course of instruction in handling the new cars. On Tuesday morning, Dec. 1, the cars were put in service without any ceremony.

The experiment being made on the State and Oak Street line will be continued until the company comes to a definite decision as to the suitability of these cars for handling the traffic in Columbus. If they prove satisfactory it is said that the company will equip all of its lines as rapidly as new cars can be built.

USE OF TRAIN STAFF ON OHIO ELECTRIC RAILWAY

To meet local operating conditions on the Fort Wayne division of the Ohio Electric Railway there has been installed under the supervision of F. T. Hepburn, district manager, an adaptation of the staff system for assuring train clearance. The portion of track thus protected extends from New Haven to the Fort Wayne city limits, a distance of 5.1 miles. It is said that while this scheme is based on the principle of the English staff system it really is a substitute for a train register or clearance card on a busy single-track line.

The scheme of operation is extremely simple. A staff, which comprises a wire hoop with train numbers on tags attached, is received by the motorman of a westbound car from the agent at New Haven and this motorman deposits the staff or hoop at the siding at the Fort Wayne limits, known as siding No. 20. If, for instance, train No. 101 is due at the siding at 10:10 a.m. on its way to the Fort Wayne station, which it should reach at 10:25 a.m., and an eastbound car leaves Fort Wayne at 10:20 and is due at siding No. 20 at 10:32, it may be that on account of the turning loop in the city and the different streets used by inbound and outbound trains, the crews of the two trains would not see each other. Under such conditions the only safe plan to follow would be that no train should enter the single track leaving the city without asking the dispatcher if the opposing westbound train had passed siding No. 20. For the dispatcher to be certain of this fact it would be necessary that No. 101 report at siding No. 20.

To simplify the conditions here explained the operating department has issued special instructions on its timetable stating that "Train No. 104 must not pass siding No. 20 unless No. 101 has passed that point," and a staff numbered 101 at the siding is evidence that No. 101 has passed. The use of this staff saves the time required for both trains to report and avoids the possibility of a tie-up in case of a failure of the telephone. Bulletins provide that if a train comprises more than one section the last section shall carry the staff between New Haven and siding No. 20. There are several meets similar to that here described throughout the day and it is said that this adaptation of the staff system serves very well to facilitate train movements in perfect safety.

ELECTRIC RAILWAY LEGAL DECISIONS

FRANCHISES AND ORDINANCES

Indiana.—Street Railroads—Road Constituting—Eminent Domain—Street Railway—Occupancy of Street—Nature—Street Railroads—Railroad Crossings—Interlocking Devices—Applicability of Statute—Dedication—Street Across Railroads—Implied Dedication—Effect of Implied Dedication—Irrevocability of Dedication—Nature of Servient Estate—Materiality—Street Railroads—Crossing Other Roads—Street Railways—Crossing Steam Roads—No Invasion of Private Rights.

A road is a street railroad where large double-truck cars are operated over it through contiguous towns, nearly all the lines are within the corporate limits, no interstate cars are run over the line involved, the company is permitted by its franchise to carry mail, persons and property, under Laws 1901, p. 461, e. 207, relating to street railways, passengers are carried only, the company was organized under general street railway laws and uses electricity as motive power, the lines were built throughout on public streets and highways, the cars stop at all street crossings, and between such crossings where the distance is great, or convenience of passengers require it, to take on or let off passengers, the tracks are maintained at a level with the streets, and where 5-cent fares can be charged from any point on the lines to any other point within the State, etc.

The occupancy of streets by a street railway company is not an additional burden upon the fee, so as to prevent the road from crossing a railway right of way until it acquires the right to do so by grant or condemnation.

Under Burns' Ann. St. 1901, sec. 2293, enacted in 1881, locomotive engineers may not run their engines across another railroad track upon which passengers might be transported, without ascertaining if the way is clear. The statute has never been considered to apply to street railway crossings on public thoroughfares. Laws 1897, p. 238, c. 157, sec. 4, provides that, where an electric railroad crosses at a grade tracks of another road, it must interlock the crossing to the satisfaction of the Auditor of State, etc. Burns' Ann. St. 1901, sec. 5468a (Laws 1901, p. 461, e. 207, sec. 1), authorizes street railroads to cross other roads, and provides that in case such street railroad crosses another railroad at any place beyond the limits of a street or highway, if the two roads cannot agree, the compensation and manner of crossing shall be determined as provided by another section. Laws 1903, p. 92, e. 36, and Laws 1903, p. 125, e. 59, provide for crossings of street railroads and steam railroads, and for the installation of interlocking devices, but provide that the right of any street railroad under existing laws to construct its road across any railroad at a street or highway intersection without obtaining the consent of the road to be crossed and without special proceedings shall not be abridged. Held, that the primary purpose of the 1897 act was to enable steam railroads to avoid stopping their trains at crossings without incurring the penalty provided by sec. 2293, and that it does not apply to crossings of electric street railroads within the limits of a street or highway.

Dedication of a strip across a railway right of way as part of a street is shown where the street was platted and dedicated to the public up to and on both sides of the right of way in 1887, and the railway company thereafter opened the street through the right of way, connecting and in line with the street as platted on both sides thereof, where the company built its fences and cattle guards conforming to the lines of the platted street, put in a plank crossing over its track, and built sidewalks connecting with the sidewalks on both sides of the right of way, where the use of the way thus provided was at once accepted by the public and city authorities, and where the strip has been treated in every respect by the company, the public and city authorities as though it has been regularly laid out and established.

Where a railway company has impliedly dedicated a street across its right of way to the public without limitation, and the dedication has been accepted, it may not assert that the public's right in the easement is less than it would have been had the easement been regularly established by express dedication.

A dedication by a railway company of a strip of land across its right of way as a street having been once accepted cannot be recalled.

Where a railway company has dedicated a strip of land across its right of way as a street, it may not object to any proper use of the street, whether it owns the fee or only a right of way.

Since the operation of a street railroad is a proper use of a street, and is a form of passage within the scope of a dedication of a street, a steam railroad company whose

tracks are crossed by a street may no more object to the passage of street cars thereon than to the passage of earriages, omnibuses or any other recognized mode of highway travel.

A steam railroad company may not complain of the excavation of soil, and of the cutting of its rails by a street railroad company in crossing its tracks at a street crossing; such acts not being an encroachment upon its private rights, but an inconvenience and interference incidental to a proper use of the street, which must have been contemplated when the steam railroad company opened the street across its tracks.—(Michigan Cent. R. R. Co. et al. v. Hammand, W. & E. C. Electric Ry. Co., 83 N. E. Rep. 650.)

Kentucky.—Street Railroads—Construction—Excavation—Injury to Abutting Property—Appeal—Harmless Error—Instructions.

Plaintiff not prevented from recovering from a street railway company for injury to his property through an excavation made in an abutting street in the construction of the line, because, when he acquired the property, he knew that the line was to be constructed, and because he did not object to the excavation until it was nearly completed; no waiver of his right to recover being shown.

Though, in an action against a street railway company for injury to abutting property caused by excavating the street, the measure of damages was the difference in the property's value immediately before it was known that the excavation would be made and the line constructed and the value after the excavation and the line was constructed, it was not prejudicially erroneous to instruct that plaintiff could recover the damages sustained through the excavation and construction of the line, but that the jury should deduct therefrom the benefits from the construction of the line.—(Somerset Water, Light & Traction Co. v. Doyle, 107 S. W. Rep., 208.)

Maryland.—Municipal Corporations—Franchises—Power to Grant—Control—Statutes—Title—Constitutional Provision Construed—Municipal Corporations—Street Railroads—Franchise—Power of City—Interurban Road as Street Railway—Eminent Domain—New Use.

Where a Mayor and City Council have power to grant franchises, its exercise cannot be defeated or restrained by any considerations of policy or expediency, or by any mere regard for the preference of property holders.

The title of Laws 1900, p. 453, c. 307, is "An act to change the name" of an electric railway company, "and to grant certain additional powers and privileges to said corporation, and to confirm certain franchises and privileges granted to said corporation by" a city. The act changes the name of the company, and sec. 2 confirms rights, etc., to the company under its new name, and other rights were conferred by other sections of the act. Held, that sec. 10, providing that all rights, etc., thereafter granted by any county or municipality should be as effectual and binding on such county or municipality as if it had been expressly ratified and confirmed by act of assembly subsequent to the granting thereof, is not void as violating Const. art. 3, sec. 29, requiring every act to embrace but one subject to be expressed in the title.

The Mayor and City Council of Annapolis could grant a franchise to an electric street railway company to use streets, etc., where the company's charter under the general laws authorizes it to construct a road through the city, and Laws 1900, p. 457, e. 307, sec. 10, provided that all rights, etc., granted the company by any municipality, should be as binding on the municipality as if it had been expressly ratified by the Assembly, and Laws 1902, p. 514, c. 361, confirmed to the company under a new name all the rights, etc., enjoyed under the old one, and as Code Pub. Gen. Laws, art. 23, sec. 255, authorizes a city to agree upon the terms on which a railroad may occupy streets, etc., and sec. 256 makes sec. 255 applicable to electric roads.

An electric railway is none the less a street railway within city limits, under ordinances authorizing it to use certain streets, etc., because when it leaves the city it becomes an interurban railway.

The use of streets by an electric railway does not impose a new servitude upon the streets so as to entitle abutting lot owners to additional compensation; and hence they may not restrain the construction of such road, the company being liable at law, under the express terms of Code Pub. Gen. Laws, art. 23, sec. 255, for any injury arising in constructing or operating the road.—(Jeffers et al. v. Mayor, etc., of City of Annapolis et al., 68 Atl. Rep., 361.)

Nebraska.—Street Railroads—Charter—Conditions—Rights in Streets—Consent of Electors—Consent—Effect—Judgment—Res Judicata—Matters Determined.

The charter of a street railway company, organized for the purpose of constructing a system of lines in a city of this State under Act Feb. 15, 1877, must fix the termini of

the road and state the street or streets through which it is proposed to construct and operate the same.

The consent of a majority of the electors of the city to the use and occupation of the streets over which the proposed road is to be constructed must be obtained before the construction is commenced; such consent to be given or withheld at an election called for that purpose.

The consent of the electors to the occupation of all the streets of a city by a street railway company, where no termini are mentioned in the notice of election, carries with it no right to the use of any street which is not used for the construction of the road within a reasonable time thereafter. To hold that such blanket consent, where no termini or route is submitted to the electors confers on the company the right to the use and occupation of any of the streets which it might at any time thereafter select as best suited to its interest, would be awarding to a private corporation a power which the people, by their Constitution, have withheld from the Legislature of the State and from the municipal authorities where the streets are located.

The city of Lincoln brought an action against a street-car company to oust it from the possession of certain streets in which its tracks were laid, alleging that its only right in the street was derived from the purchase of the property and franchise of another company that had obtained the consent of the electors of the city to the use of its streets for railway purposes, that such consent was not transferable, and that the tracks of the company were an obstruction in the streets and constituted a public nuisance. On demurrer to this petition judgment went in favor of the defendant, which judgment is still in full force and effect. Held that, if it were conceded that the city represented the State in such action and that the State was bound by the judgment to the same extent as the city, still the force of the judgment as a bar or estoppel in a subsequent action brought by the State could extend no further than to define the rights of the company in the streets then occupied by its tracks, that being the only question litigated, and the right of the company to the use of other streets not being in issue.—(State ex rel. Caldwell v. Lincoln St. Ry. et al., 114 N. W. Rep., 422.)

New Jersey.—Railroads—Purchase of Stock in Other Companies—Authority—Street Railroads—Traffic Agreement—Validity—Interchange of Cars.

Under the express terms of General Corporation Act, sec. 51, every domestic corporation, no matter under what law it may have been organized, may acquire and hold the stock and bonds of any other corporation, domestic or foreign, even to the extent of acquiring a controlling interest; and hence a corporation organized under the general railroad law may acquire bonds of, and a controlling interest in the stock of, a corporation organized under the street railway law.

Though only such vehicles may be used upon street railway tracks as their special charters or the general laws under which they are organized permit, a traffic agreement whereby one company operates cars of another company of the same kind as those the first company is entitled to use over its lines is valid.—(State v. Atlantic City & S. R. Co., et al., 60 Atl. Rep., 468.)

New York.—Municipal Corporations—Franchise to Use Streets—Street Railroads—Construction and Maintenance—Selling Street Railway Franchise—Right of Bidders.

A street railroad may be constructed and maintained only by a railway corporation with power to build and maintain a road in the city. If its charter does not cover the proposed streets, there must be filed in the office where the certificate of incorporation is filed a statement of the names of the streets upon which it is proposed to build the road, and the consent of the local authorities and property owners must be obtained.

Laws 1898, p. 373, c. 182, sec. 19, as amended by Laws 1906, p. 88, c. 52, relating to the government of cities of the second class, provides that the city under proper regulations for its protection, may sell a franchise at public auction to the highest bidder upon due notice, which sale must be approved by the board of estimate and apportionment. Held, that the personnel of the bidders is immaterial, but, if there is a compliance with the terms of the sale, the bids must be acted upon, and the highest bid accepted, subject to the approval of the board; and hence, where an individual was the highest bidder, he was entitled to the franchise, though he was himself unable under the law to construct and maintain the road, and he could either organize a corporation to construct and maintain it, or could assign his bid to another, who would do so.—(Trojan Ry Co. v. City of Troy et al., 109 N. Y. Sup., 779.)

LIABILITY FOR NEGLIGENCE

Illinois.—Street Railroads—Injury to Person on Track—Question for Jury.

In an action against a street car company for injuries to a person on the track, whether plaintiff was in the exercise of ordinary care in attempting to cross the track in front of the car, and whether defendant's employees negligently ran the car against him, are questions for the jury.—(O'Leary v. Chicago City Ry. Co., 85 N. E. Rep., 233.)

Illinois.—Carriers—Carriage of Passengers—Liability of Carrier—Injury to Passengers—Actions—Evidence—Instructions—Trial—Issues.

While a carrier of passengers is not required to exercise the highest degree of care for their protection against dangers not ordinarily incident to the operation of the road, a carrier as to known perils must exercise the highest degree of care, having in view the character of conveyance and consistent with its practical operation.

In an action for injuries to a passenger in a collision, evidence held to warrant a finding that the collision was not caused by an act of God, but resulted from the negligence of the carrier, authorizing a recovery.

A carrier is liable for injuries to a passenger though the immediate cause thereof was an act of God, where the negligence of the carrier concurred in any degree in causing the injuries.

Where, in an action for injuries to a passenger in a rear-end collision, the evidence showed that a heavy fog prevailed which prevented the motorman of the rear train from seeing the forward train in time to prevent the collision; that the fog had existed for about two hours; that the superintendent of the carrier had observed it, and, concluding that it was unsafe to run trains as was the custom under ordinary conditions, took extra precautions to avoid accidents by giving orders to disregard the schedule and to run safe by posting extra men at different points, and by directing the motormen to run their cars at such speed that they could be stopped within the length of their vision—instructions that a carrier of passengers must do all that human vigilance could reasonably do to avoid injury to a passenger, having in view the character and mode of conveyance, consistent with the practicable operation of the road, and that, if the carrier did not exercise such degree of care and plaintiff was injured, a recovery was authorized, etc., was not erroneous.

Where, in an action for injuries to a passenger in a rear-end collision, the court informed the jury before the case was submitted that plaintiff had withdrawn counts of the declaration leaving counts charging negligence in the operation of the trains, instructions authorizing a recovery if the carrier was guilty of negligence as charged, and authorizing the jury to find the carrier guilty, if plaintiff was injured as alleged because of the failure of the carrier to exercise the degree of care required, were not objectionable for failing to state that the jury could consider only the negligence charged in the counts remaining in the declaration.—(Sandy v. Lake Street Elevated Ry. Co., 85 N. E. Rep., 300.)

Kentucky.—Street Railroads—Injury to Traveler—Collision with Vehicle—Negligence—Question for Jury—Duty of Motorman—Contributory Negligence—Change of Course by Traveler—Anticipation—Damages—Personal Injuries—Street Railroads—Operation—"Ordinary Care"—Duty of Traveler on Street—Street Railroads—Injuries to Travelers—Use of Street—Instructions.

In an action against a street railway company for injuries to a traveler in a collision, evidence held to require submission to the jury of the question whether defendant's motorman was negligent in keeping a lookout and in taking steps to prevent the collision.

It is the duty of a motorman of a street car to keep a lookout, and, as soon as he discovers a traveler on the track in a position of apparent danger, to sound the gong and exercise ordinary care to prevent injury.

If the driver of a wagon injured in a street car collision failed to exercise ordinary care in the control and operation of his wagon, and such failure was the cause of the collision, or so far contributed thereto that but for the driver's negligence the collision would not have occurred, the driver cannot recover.

A street railway motorman is not bound, in the exercise of ordinary care, to anticipate that a traveler on the street will change the course of his wagon and drive on the track in front of an approaching car and is not therefore required to check the speed of the car with a view of avoiding a collision, until he sees, or by the exercise of ordinary care should discover, the traveler's peril.

In an action for injuries in a street car collision, plaintiff may recover such damages as the jury believe from the evidence would fairly compensate him for pain and suffer-

ing, mental and physical, directly resulting from the injury, and from any impairment in his power to earn money caused thereby, and for any doctor's bills necessarily incurred by him by reason of the injury, the whole not exceeding the amount claimed in the petition.

"Ordinary care," as applied to the motorman of an electric street car, means the degree of care which men of average prudence and skill, engaged in operating street cars by electric power in the city in question and on the street on which the accident occurred, usually exercise under similar circumstances.

"Ordinary care," as applied to the driver of a wagon on street car tracks injured by collision with a car, means the degree of care which a man of average prudence, driving a wagon in the city and on the street where the accident occurred, usually exercises under similar circumstances for his own safety.

The only duty imposed on travelers or persons using streets that are occupied and used by street cars is to exercise ordinary care for their own safety, they being entitled, in the exercise of such care, to change their course in any way they please and to use any part of the street necessary for that purpose.

In an action for injuries to a traveler in collision with a street car, a request to charge that it was plaintiff's duty in driving on the street to use ordinary care for his own safety, to exercise all his senses as persons of ordinary care usually do under the same or similar circumstances to ascertain whether or not a car was approaching, and not to change his course and turn across the track without exercising ordinary care to discover whether he was in danger of collision with street cars or other vehicles, etc., was properly refused, as improperly pointing out the particular things with reference to which it was plaintiff's duty to exercise ordinary care.—(Louisville Ry. Co. v. Boutellier, 110 S. W. Rep., 357.)

Massachusetts.—Carriers—Carriage of Passengers—Street Railroads—Duty to Passengers—Time to Board Cars—Reasonable Time for Boarding—Question for Jury—Actions or Injuries—Evidence—Sufficiency—Negligence—Assumption of Risk—Trial—Refusal of Instructions—Instructions Inappropriate in View of Issues.

While a street railway company as a common carrier is not an insurer of the safety of passengers, it is held to a high degree of care, and, after stopping for those who desire to take passage, should allow a sufficient time for them to get safely aboard before the car is started; and it is the duty of the conductor to use reasonable diligence to ascertain if passengers are safely on before signaling to go ahead.

If a street car platform is crowded, or there are a number of passengers to board the car, more time may be necessary than where the number is small or the ingress unobstructed, and what constitutes a reasonable time is ordinarily a question for the jury.

Whether plaintiff had been afforded a reasonable opportunity to board a street car before it was started held, under the evidence, for the jury.

In an action against a street car company for injuries to one thrown off by a sudden jerk while boarding the car, evidence held to support a finding of defendant's negligence.

Whether plaintiff assumed the risk of a sudden jerk while standing on the step of a street car held for the jury, in view of the evidence tending to show that she did not intend to remain on the step, and that the car started prematurely, for the risk of a premature start while boarding a car is never assumed.

Where there was evidence tending to show that plaintiff did not intend to remain on the step of a street car and that it started prematurely, an instruction that upon all the evidence there was no unusual or unnecessary jolt or jerk in starting the car was properly refused, since it was inapplicable to the issues, even though the jerk in starting was not unusual.—(Rand v. Boston Elevated Ry. Co., 84 N. E. Rep., 841.)

Minnesota.—Continuance—Absence of Witnesses—Privileged Communications.

Held, in this, a personal injury action, that the trial court did not abuse its discretion in denying the defendant's motion, made on the trial, to continue the case over the term on account of the absence of a witness, and, further, that the court did not err in excluding the testimony of the plaintiff's physician on the ground that it was privileged and that she had not waived the privilege by testifying as to her condition while under treatment by her physician.—(McAllister v. St. Paul City Ry. Co., 116 N. W. Rep., 918.)

Missouri.—Death—Actions for Causing Death of Passenger—Pleading—Pleading—Waiver of Defects—Pleading—Repugnancy—"Felo De Se"—Carriers—Actions for Causing Death—Defenses.

A petition in an action against a carrier for the death of

a passenger, founded on Rev. St. 1899, section 2864 (Ann. St. 1906, page 1637), authorizing recovery where death is "occasioned by the negligence * * * or criminal intent" of defendant's servants, which charges both negligence and criminal acts, is sustained by proof of either.

A petition in an action against a carrier for the death of a passenger, based on Rev. St. 1899, section 2864 (Ann. St. 1906, page 1637), authorizing recovery where death is "occasioned by the negligence * * * or criminal intent" of defendant's servants, which charges in one count that the acts causing death were done negligently and with criminal intent, though objectionable as stating a single cause of action doubly and inconsistently, is not so contradictory as to be self-destructive, and, if defendant answers and goes to trial on the issue of criminal intent, the objection that two causes of action are stated in one and the same count is waived.

The doctrine of *felo de se* is operative only where one cause of action stated is destroyed by another, which shows that no cause of action exists in fact, and does not apply where petition states that deceased was negligently shot, if as a fact he was shot with criminal intent.

That a passenger brought on the altercation in which he was shot and killed by the conductor in charge of defendant's street car will not preclude a recovery against the carrier under Rev. St. 1899, section 2864, for the passenger's death.—(O'Brien v. St. Louis Transit Co., 110 S. W. Rep., 705.)

New Hampshire.—Damages—Personal Injuries—Expenses Incurred for Medical Treatment—Recovery—Trial—Evidence—Rebuttal—Argument of Counsel.

The jury in a personal injury action may award a recovery for medical attendance and services of physicians on proof of their employment by plaintiff and of the nature and extent of the treatment, though there is no evidence of the value of the services, the jury having the right to avail themselves of knowledge common with men in general as to the charges ordinarily made by physicians.

Where, in a personal injury action, plaintiff proved the employment of physicians to treat her for the injuries and the nature and extent of the treatment, but did not prove the value thereof, defendant might prove such value.

The fact that plaintiff in a personal injury action, who proved the employment of physicians to treat her for the injuries and the nature and extent of the treatment, failed to prove the value thereof, is legitimate ground for argument that probably the physicians' bills were of small amount.—(Moran v. Dover, S. & R. St. Ry. Co., 69 Atl. Rep., 884.)

New Jersey.—Street Railroads—Injury to Pedestrian—Contributory Negligence.

The plaintiff alighted from a street car, passed around the rear platform, and was struck by the corner of the fender of a car approaching at excessive speed on the other track just as he reached the nearest rail of that track. He looked for the approaching car just as he was struck. Held, that he was guilty of contributory negligence in failing to wait for the car from which he alighted to move on, so as to enable him to look with effect along the other track, and that the fact that the approaching car was running at an excessive speed did not relieve him of the charge of negligence.—(Shuler v. North Jersey St. Ry. Co., 69 Atl. Rep., 180.)

New Jersey.—Death—Grounds of Action—Proximate Cause of Death—Negligence—"Proximate Cause" Defined—Death—Intervening Cause—Question for Jury.

The wrongful act, neglect, or default must have been the proximate cause of death in order to give a right of action therefor.

The proximate cause is the efficient cause; the one that necessarily sets the other causes in operation.

If the deceased, acting in good faith, and without negligence on her part, attended to such household duties as he thought she might prudently perform, and in so doing produced a hemorrhage from the original wound which she had received as a result of the negligence of the defendant, from which death ensues, the defendant is not thereby relieved of the consequences of its wrongful act.

If the act of the deceased in attending to her household duties did cause the hemorrhage which was the immediate cause of death, the question whether, considering the situation and surroundings of the deceased, it was such a negligent act as to defeat recovery, was for the jury.

Where there is any evidence tending to show pecuniary injury resulting from death to the next of kin of the deceased, the question of damages should be submitted to the jury.—(Batton v. Public Service Corporation of New Jersey, 69 Atl. Rep., 164.)

New York.—Street Railroads—Collisions—Care Required for Protection of Travelers—Contributory Negligence.

Where a traveler's attempt to cross a street with a car

approaching one-half to three-quarters of a block away becomes apparent, the duty of the operators of the car to exercise care and the traveler's right to rely on the performance of that duty attaches.

A traveler is not negligent in making use of a street with reliance on the observance of ordinary care by the operators of street cars thereon, though an approaching car is coming rapidly from a more or less distant point; he having a right to expect that care will be exercised in the operation of the car.—*Frank J. Lennon Co. v. New York City Ry. Co.*, 108 N. Y. Sup., 996.)

New York.—Carriers—Street Railways—Status as "Passenger" Not Lost—Assault on Passenger—Liability.

Where a passenger on a crowded street car alighted from the front platform at a transfer point to go to the rear platform, where the conductor was standing, to procure a transfer, he did not lose his status as a passenger, defeating recovery from the company for an assault by the motorman and the conductor.

In an action against a street railway company for assault by its employees upon a passenger, who alighted from the front platform of a crowded car at a transfer point and walked to the rear platform to procure a transfer, the company may not defeat recovery because the passenger fails to show that the company operated the car to which he desired a transfer, on the theory that he ceased to be a passenger when he alighted, since he was entitled to be carried to the end of the line, or so far in that direction as he saw fit to remain on the car, and the company became an absolute guarantor of his safety against unjustifiable assault by its employees while the control of carriage was in force, and since, if the conductor had refused a transfer, the passenger could have remained on the car and continued his ride to the end of the line.—(*Miller v. Brooklyn Heights R. Co.*, 108 N. Y. Sup., 960.)

New York.—Carriers—Carriage of Passengers—Setting Down Passengers.

A street railway company is not liable for injuries sustained by a passenger in alighting, where the signal to the motorman to start was given by another passenger.—(*Wagner v. New York City Ry. Co.*, 107 N. Y. Sup., 807.)

North Carolina.—Street Railroads—Operation—Duty to Stop at a Certain Distance from Vehicle on Track.

It cannot be said as a matter of law that it is the duty of a motorman to stop his car when within 35 or 40 feet of a vehicle on the track.—(*Wright et al. v. Fries Mfg. & Power Co.*, 61 S. E. Rep., 380.)

North Carolina.—Carriers—Street Railroads—Collision of Cars—Negligence—Effect of Proof—Company's Duty—Words and Phrases—"Act of God"—Injury to Passenger—Question for Jury—Duty to Maintain Headlights—Collision.

While proof that a street-car passenger was injured in a collision between two cars moving in opposite directions shows prima facie negligence, entitling the passenger to go to the jury in an action against the company for his injury, it does not create an irrebuttable presumption of negligence, such proof merely shifting the burden to defendant to prove that the collision resulted from an accident which reasonable prudence and foresight could not have prevented.

A street railway company must exercise a high degree of care, skill and diligence in operating its cars, as far as is consistent with the practical operation of its business, but it is only liable for negligence, and is not an insurer of the safety of its passengers.

A common carrier as well as an individual is excused from responsibility for injuries caused by an act of God.

Any accident due directly and exclusively to a neutral cause without human intervention which, by no human foresight, pains, or care, reasonably to have been expected, could have been prevented, is an accident caused by an "act of God."

In an action against a street railway company for injury to a passenger in a collision of cars, whether the company was negligent, held, under the evidence, a question for the jury.

Electric railway cars should be provided with headlights.

Where, if the conductor of a street car caused his car to leave a passing switch knowing that, under weather conditions, the steadiness of the current could not be relied on, in consequence of which the car was frequently unlighted, and if in the circumstances reasonable prudence and due care for the safety of his passengers required the car to remain at the switch, it was his duty to hold it there, and a failure to perform such duty amounted to actionable negligence if it caused a collision.—(*Briggs v. Durham Traction Co.*, 61 S. E. Rep., 373.)

Pennsylvania.—Carriers—Injuries to Passenger—Evidence.

In an action by a passenger against a street railway company for injuries received by being struck by a pole of a wagon in a collision between the car and the wagon, a nonsuit held properly entered under the evidence.—(*Downey v. Pittsburg Rys. Co.*, 69 Atl. Rep., 71.)

Utah.—Street Railroads—Regulations and Operation—Care Required in Operation of Road—Right of Way Over Tracks—Collision with Vehicles—Negligence—Questions for Jury.

The public, in entering on street-car tracks, are not trespassers, nor mere licensees, but are there as a matter of right, and may remain therein until a car approaches, and while the cars have the preferential right of passage, the operatives thereof must exercise ordinary care for the rights of others; and where a collision between a car and a vehicle on or near the track occurs, the question of whether either or both parties exercised under the particular circumstances the degree of care required by law is ordinarily one of fact for the jury.—(*Loofbourow v. Utah Light & Ry. Co.*, 94 Pac. Rep., 981.)

Virginia.—Master and Servant—Duty to Furnish Safe Appliances—Evidence—Opinion Evidence—Qualification of Expert—Action for Death of Servant—Sufficiency of Evidence—Master and Servant—Doctrine of Fellow-servants—Street Railways—Constitutional Provisions—"Railroad Company."

The law only imposes upon the master the duty of using ordinary care to provide the servant with reasonably safe and suitable appliances, and the right of selection among adequate and safe methods and instrumentalities rests wholly with the master, who is not required to furnish the newest and best appliances.

A witness who had been a conductor and motorman on electric cars off and on for eight years, but had never had any experience in superintending the construction of cross-over trolleys, was not qualified to give an expert opinion as to whether a cross-over trolley would be a simple and inexpensive device for promoting the safety and convenience of an electric railway company and its employees at a certain point.

In an action for the death of a street railway employee, where a count of the declaration alleged that defendant company negligently failed to adopt and promulgate adequate rules for the protection of its employees in crossing a "latch," and the only evidence on the subject was that of a witness for plaintiff that employees were instructed to look out, when using the "latch," to see that there was nothing approaching, the count should have been withdrawn from the jury for lack of evidence.

Const. art. 12, sec. 162 (Code 1904, p. 259), abolishing the doctrine of fellow-servant so far as it affects the liability of the master for injuries to his servant, etc., as to every employee of a "railroad company," etc., effects only railroads proper or commercial railroads, and does not apply to street-car companies.—(*Norfolk & Portsmouth Traction Co. v. Ellingston's Adm'r*, 61 S. E. Rep., 779.)

Washington.—Carriers—Injury to Passengers—Obstruction on Track—Liability—Res Ipsa Loquitur—Specific Allegations—Effect—Witness—Cross-examination—Questions Tending to Degrade Witness.

A railway company may not escape liability for injury to a passenger in a collision, caused by an obstruction on the track, merely because the obstruction was caused by an agency over which it had no control. In addition it must show that it could not, by the highest degree of care and diligence, consistent with the practical operation of the road, have discovered and removed the obstruction prior to the collision.

In an action against an electric railway company for injury to a passenger in a collision, caused by an obstruction on a track, she did not waive her right to rely upon a presumption of negligence arising from the fact of the injury she sustained by particularly alleging the cause of the accident.

In an action for personal injury received in a street car accident, a former motorman, who testified as to the proper method of stopping a car on a grade such as where the accident happened, and on cross-examination stated that since ceasing to be a motorman he had been discharged as a policeman because of charges preferred against him, could not be compelled to state what the charges were, since the matter could not affect his credibility as a witness to the particular fact under consideration, and in such circumstances a witness may decline to answer questions whose only purpose is to degrade him or expose him to disgrace or infamy.—(*Walters v. Seattle R. & S. Ry. Co.*, 93 Pac. Rep., 419.)

News of Electric Railways

Cleveland Traction Situation

Warren Bicknell and F. A. Scott, receivers of the Municipal Traction Company, requested A. B. duPont, president of the company, on Dec. 3, to act in the capacity of an advisory expert on electrical matters at a salary of \$500 a month, which is a reduction of \$750. Under this arrangement Mr. duPont's connection with the receivers is indefinite. C. W. Stage has resigned as assistant secretary of the company. The receivers have reduced the office expenses of the company about \$3,500 a month by retrenching generally. Of course, the remuneration of the receivers will have to be added to the regular expenses.

New cars are needed to increase the service, but Mr. Bicknell states that he has no intention of asking the court for permission to make purchases at this time. When the park season opens and travel incident to summer must be taken care of, the receivers will decide the matter of equipment.

Residents of Villa Beach have asked the receivers to restore the Collinwood and Euclid Beach service over the Euclid Avenue line, so that they may send their children to school. The cars were taken off during the controversy with the village of East Cleveland. All Euclid Beach cars are now turned off Euclid Avenue and run on the 105th Street line to St. Clair and thence to Collinwood and Euclid Beach. Mr. Bicknell favors this plan because the cars pick up people from the main lines east, but he will probably arrange for a service over the old route.

The receivers have established a 15-minute service on Clifton Boulevard instead of the 20-minute schedule. This line passes through a residence district on the West Side not thickly settled except on the lake front, but as the Lake Shore Electric Railway operates into the city over the line, additional facilities are furnished to the residents by that company.

The question of fare has been a subject for general discussion recently, because it is thought that the present service can not be maintained on the 3-cent rate. Officials of the Municipal Traction Company say that the rate on the lines whose franchises call for 3 cents can not be advanced, although a charge of 1 cent may be made for transfers from these lines to those originally owned by the Cleveland Electric Railway. No charge for a transfer can be exacted from one of the original lines of the Municipal Traction Company to another, however. The receivers will depend upon the court's advice regarding rates of fare, when that matter comes up.

The trailers on St. Clair and Superior Avenues will no longer be used as smoking cars, because of the comparatively small number of men who care to smoke on the cars. Moreover, ladies are forced to use the trailers when the motor cars are crowded.

The operating report of the Municipal Traction Company for October is not yet available. The November report of the receivers is nearing completion, and the report for December will probably be issued about Jan. 15.

The receivers are arranging to furnish additional service during the day for the benefit of lady shoppers and to this end are co-operating with the retail board of the Chamber of Commerce, which is urging people to shop early, and hope to carry the shoppers between the rush hours and so prevent excessive crowding in the evening. The schedules on the St. Clair Street, Wade Park, Cedar Avenue, Scoville-West Twenty-fifth, Lorain-Woodland and West Fourteenth Street lines will soon be increased during the day. The evening rush hour service on these lines is now a maximum. In fact, the receivers are running within 8 per cent of the capacity of the system, having placed in service every car that is available.

The receivers of the company conferred with Mayor Johnson on Dec. 7 regarding the advantages of pay-as-you-enter cars and the fare boxes that Mr. Johnson and Mr. duPont are manufacturing. The receivers have had an engineer in New York, Buffalo and other Eastern cities recently examining the pay-as-you-enter system, and his report has been completed and presented to them. A Brill fare box has been examined by the receivers with a view to its use if they conclude to adopt the pay-as-you-enter system.

Judge Tayler, of the United States Circuit Court, will consider the claims against the Municipal Traction Company some time this week and decide what shall be done toward paying them. The receivers will, of course, follow the advice of the court regarding the claims, and requests for payment of claims will be treated accordingly.

Councilman Robert Koch is circulating a petition for a cross-town line on West Sixty-fifth Street, between Clark Avenue, S. W., and Detroit Avenue, N. W. Mr. Koch believes a line is needed to connect the West Side lines running east and west, the same as on the east side.

Calumet & South Chicago Improvements

At a conference of city and railway officials in Chicago on Dec. 5 to discuss the condition of the Calumet & South Chicago Railway as operated by the Chicago City Railway; it was announced that considerable new work would be done immediately. To supply power for the southern district connections have been made with the substation of the Chicago City Railway at Sixty-third Street and Wentworth Avenue, thus increasing the power supply of the Calumet & South Chicago Railway approximately 25 per cent, or sufficient to handle the traffic during the winter satisfactorily. During the spring new substations will be erected in the South Chicago, Grand Crossing and Roseland districts so that power thereafter can be supplied by the Commonwealth Edison Company under its contract with the Chicago City Railway, mention of which was made on page 1291 of the ELECTRIC RAILWAY JOURNAL for Oct. 31, 1908. Twenty additional double-truck cars are being operated in the Calumet district by the Chicago City Railway and eight more cars are being reconstructed at the shops of that company. It was stated that plans are being prepared for remodeling the remainder of the cars of the Calumet & South Chicago Railway. The snow-fighting equipment of the company has been overhauled and larger motors installed. With regard to track work, nine important intersections have been rebuilt and new special track work has been installed at eight other locations. This will facilitate the handling of traffic over the old lines and over the new track built this fall. It was announced that civil engineers are surveying new routes to Riverdale and to Hegewisch, and that plans for grade separation are being carried out. In all future T-rail construction a special brick will be laid under the head of the rail. The Calumet & South Chicago Railway is agreeable to making connection with the lines of the Chicago & Southern Traction Company at 103d Street so as to permit funeral cars to be operated to the cemeteries during the coming year, and will build the necessary funeral cars for the transportation of this class of traffic as soon as the connections have been made.

Westinghouse Receivers Discharged

The receivers of the Westinghouse Electric & Manufacturing Company and the Securities Investment Company were discharged in the United States Circuit Court at Pittsburg shortly after noon on Dec. 5, by Judge James S. Young.

Petitions for the discharge of the receivers were presented to the court by George Gordon, representing the various consenting interests. The debts of the company, as previously stated in the ELECTRIC RAILWAY JOURNAL, have been arranged for, with the exception of unassenting creditors with claims to the amount of \$700,000, who will at once be paid in cash. The company has cash on hand amounting to about \$15,000,000. The cash of the Securities Investment Company on hand is about \$17,000,000, with unassenting creditors representing only about \$15,000. As the receivers had reported the condition of the plant from time to time to the company, the court did not deem it necessary that they file another account as it would interfere with the work of the company.

The newly elected directors of the company organized on Dec. 7. Practically the only change in the management, as it stood before 1907, was the election of E. C. Converse as temporary chairman in place of Brayton Ives, the former chairman of the board. The officers of the company are George Westinghouse, president; E. M. Herr, first vice-president; L. A. Osborne, second vice-president; Charles A. Terry, secretary and attorney, and T. W. Siemon, treasurer. G. W. Hebard and W. M. McFarland were also elected vice-presidents.

Boston Elevated Exhibit at New England Food Fair

One of the prominent exhibits at the recent New England Food Fair, which was held for a month in the Mechanics' Building, Boston, was that of the Boston Elevated Railway

Company. Space was rented by the company in a conspicuous location for the entire period of the fair, the exhibit being planned to stimulate traffic on the various parts of the system, especially pleasure travel and the visiting of historic and famous literary landmarks in the metropolitan district. The central features of the display were large maps of the present street railway system in the Boston territory contrasted with the Boston of 1775; colored photographs of historic spots reached by Boston Elevated cars; views from the top of Lincoln power station chimney; albums, folders and a set of large moving photographs of historic shrines. The latter attracted widespread attention, and the pictures were arranged to be slowly revolved by a 1-hp 110-volt motor. The space occupied by the exhibit was well illuminated by tungsten lamps. The company gave away a limited number of large maps of the elevated system, showing subway, tunnel and surface lines, power houses, cars and stations, and in addition folders advertising "Historic Boston Trolley Trips" were distributed. On one Saturday over 18,000 folders were given away, and throughout the duration of the fair a special effort was made to answer all of the numerous questions asked about the system, which now covers over 400 miles of track.

Master Car Builders' and Master Mechanics' Association Conventions to be Held at Atlantic City

The executive committees of the American Railway Master Mechanics' and the Master Car Builders' Associations met in New York City recently and decided to hold the annual conventions of these two associations in Atlantic City, N. J., June 16 to 23, 1909.

The executive committee of the Railway Supply Manufacturers' Association meeting at the same time decided upon Young's Million-Dollar Pier for the location of the convention meetings and the exhibits.

At the request of the executive committees of the Master Mechanics' and the Master Car Builders' Associations action was taken by the executive committee of the Railway Supply Manufacturers' Association forbidding the distribution of souvenirs at the conventions.

Cleveland Conductor Sentenced for Stealing Fares.—William H. Bartlett, a conductor of the Municipal Traction Company, Cleveland, Ohio, pleaded guilty to embezzling fares before Judge Chapman at Cleveland on Dec. 5 and was sentenced to serve a term in the workhouse.

Arbitrators Selected to Settle Boston Wage Schedule.—Bishop William Lawrence of Boston, who was suggested by the National Civic Federation as the third member of the board of arbitration to decide the questions at variance between the Boston & Northern Street Railway and the Old Colony Street Railway, Boston, and their employees, has decided to accept. The companies selected a representative and the men selected one, but the two thus selected could not agree upon a third member.

Meeting of National Civic Federation.—The annual meeting of the National Civic Federation will be held in New York City, Dec. 14-15, in the assembly rooms of the Hotel Astor. Monday afternoon, Dec. 14, will be devoted to the discussion of the subject of trade agreements as a means of promoting industrial peace and commercial prosperity, the session beginning at 2 o'clock. Tuesday will be devoted to the discussion of industrial insurance, pensions and allied topics, the program arranged by the Welfare Department to open at 10 a. m. The annual dinner will be held at 6:30 o'clock Tuesday evening at the Hotel Astor.

Franchises Revoked in Yonkers.—All the franchises granted to the Yonkers (N. Y.) Railroad in 1899 and 1907, which the city is trying to have declared forfeited, were formally revoked by the Common Council of Yonkers on Dec. 1 on the advice of Charles E. Otis, corporation counsel. Shortly after Leslie Sutherland was appointed receiver of the company he discontinued the joint fare between New York and Yonkers over the lines of the Yonkers Railroad and the Union Railway, New York, and the action by the Council is in retaliation. The question of fare is now before the Public Service Commission for adjustment.

Boston & Eastern Electric Railway Files Tunnel Petition.—The Boston & Eastern Electric Railway has filed a petition with the Secretary of State of Massachusetts for the passage of an act by the Legislature to enable it to build a tunnel under Boston harbor from East Boston to the city proper. The company recently received a favorable expression of opinion from the Railroad Commission in regard to the necessity for the construction of its proposed road, but was denied a certificate pending legislative sanction of a tunnel route leading to a probable terminal in Post Office Square, Boston. The tunnel question will be presented to the legislature of 1909.

Meeting of the A. I. E. E.—The paper announced for the regular meeting of the American Institute of Electrical Engineers on Dec. 11 was "The Log of the New Haven Electrification," by W. S. Murray, electrical engineer of the New York, New Haven & Hartford Railroad. The paper gives the author's experience from April 1, 1905, to Nov. 1, 1908, in equipping and operating the New York, New Haven & Hartford Railroad between New York and Stamford, Conn., with 11,000-volt, 25-cycle, single-phase alternating current. It was announced that W. J. Wilgus, George Gibbs, B. J. Arnold, N. W. Storer, B. J. Lamme, Calvert Townley, L. B. Stillwell and Ralph D. Mershon would take part in the discussion.

Interurban Magazine in Texas.—The closer relation of the public with the electric railways than with the steam railroads is indicated by the number of interurban railway magazines published in different parts of the country. The latest is the "Official Interurban Magazine," printed in Dallas, Tex., by J. H. Reynolds & Company. Like other magazines of the character, its pages are devoted partly to short stories, partly to serious discussions on topics of general interest, and partly to news of the interurban lines radiating from the city in which the magazine is published. The first number contains a short article entitled "Our Hats Are Off to Men Who Make Texas Greater," and refers to the owners and managers of the recently constructed Texas Traction Company.

Trans-Niagara Bridge for Electric Railway Service.—Preliminary work is to be commenced soon on the bridge to be built across the Niagara Gorge by the Trans-Niagara Bridge Company at an estimated cost of \$1,000,000, to be used for electric railway service and for the carrying of power transmission lines. On the completion of the bridge the International Railway, the Niagara, St. Catharines & Toronto Railway and the Hamilton, Grimsby & Beamsville Railway will, it is said, arrange for an extension of their lines to Toronto and begin a through service between Rochester and Toronto. The site for the bridge selected by the New York State and Canadian Commissioners is about 300 ft. below the present steel arch bridge over which the International Railway now operates. The existing bridge will, upon the completion of the new bridge, be given over to foot passengers, automobiles and other vehicles.

Conference in Chicago on Terminal Electrification.—On Nov. 30 J. T. Harahan, president of the Illinois Central Railroad, Lewis Fritch, assistant to the president, A. S. Baldwin, chief engineer, and F. J. Sprague, New York, independent consulting electrical engineer, held a conference with Mayor Busse of Chicago, relative to the proposed electrification of the terminal of the Illinois Central Railroad in Chicago. The representatives of the company outlined the difficulties with which they are confronted and announced that the immediate plan of electrification only embraces a change of motive power as far as Kensington. It was explained that experiments will be made with oil-burning locomotives soon and that they may afford some measure of temporary relief from the smoke nuisance. Experiments will also be made to ascertain whether coke can be used satisfactorily as a fuel in the suburban service, but it was stated by President Harahan that these are to be temporary measures only.

Ohio Supreme Court Interprets Grade Crossing Laws.—An important decision was rendered by the Supreme Court of Ohio recently regarding grade crossings, which will enable both steam and electric railways to avoid complications in the future and the expense of making changes to comply with the statutes. The decision was made in the cases of the Toledo Railway & Terminal Company against the Lima & Toledo Traction Company and the Toledo, Fostoria & Findlay Railway against the Pennsylvania Railroad. The syllabus by Justice Shauck follows: "The act of Apr. 23, 1904 (97 O. L. 548, Sections 3333-1 and 2 R. S.), in the cases to which it applies defines the policy of the State to be that the tracks of steam and electric cars may cross at grade only in cases of necessity. The junior company may not defeat the operation of the act by voluntarily choosing a place of crossing at which the grades cannot be separated when there is a practicable place of crossing at which the grades may be separated. The act requires that the cost of construction and the expense of maintaining the crossing defined by the court shall, by its order, be equitably apportioned among the parties interested. Although this court will not consider the weight of evidence in such case, it will in a proceeding in error to the circuit court examine the record to see that the order of the circuit court is in accordance with the proper interpretation of the statute."

Financial and Corporate

New York Stock and Money Markets

DECEMBER 8, 1908.

The course of the stock market during the past week has been decidedly negative. It has neither been active nor has it been extremely dull. It has neither advanced nor declined to any appreciable extent. On alternate days there were slight advances and declines, but the net gains for the week are about evenly divided. The absence of public buying is the most serious drawback to the present situation and, under ordinary circumstances, would cause a sagging market. The presence, however, of the strong clique which began 10 months ago to engineer the wonderful advance movement which has continued to the present time, is always an assurance against any serious decline. As long as these powerful interests are determined to hold the market at a high level, any attempt on the part of bears to depress it will be extremely dangerous. There are reports current that prices will be advanced in January by these insiders and that there will then be a final unloading. Union Pacific and Steel common continue to be the market leaders, and each is up near the record mark.

The public apathy with regard to stocks does not extend to the bond market. This indicates that there is still plenty of money for investment and that the only consideration is convincing the public that the investment is all that it should be.

The money market is a trifle stronger than it has been recently, owing in some measure to the better demand at home and in a large measure to the demand from Europe, created by the liquidation in this market of American securities which had been held abroad. This liquidation has made it necessary during the past week to export some gold, but there is no uneasiness felt over the situation as the banks are still overstocked with cash. Rates to-day for money were 2 to 2½ per cent for call loans and 3 to 3¼ per cent for 90-day paper.

Other Markets

In a week of rather active trading in the Boston stock market traction securities played but little part. Boston Elevated was the most active in this list and closed at 131, an advance of two points during the week. There was little trading in Massachusetts Electric.

In the Chicago stock market, the Chicago Railway issues continue to be the leading features of the trading. These securities are not, however, in as active demand as they were a few weeks ago, and prices are a shade lower. There has been some trading in Subway stock and the price has advanced two or three points. A few shares of South Side Elevated also found their way into the market at about 61.

In the Philadelphia market, Rapid Transit continues to be the leading issue. It is actively traded in at prices ranging from 22 to 23. Union Traction, too, has come to life, and considerable blocks are changing hands at from 50 to 52, which is slightly in advance of quotations prevailing the week previous.

In Baltimore, United Railway bonds continue to be the only features of interest. Some of these find their way into the market every day, although there is little fluctuation in prices. A few Baltimore Traction 5s have been sold recently at 111.

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

	Dec. 1.	Dec. 8.
American Railways Company, Philadelphia.....	46½	*46
Boston Elevated Railways.....	129	131
Brooklyn Rapid Transit Company.....	56	55½
Chicago City Railway.....	185	185
Cleveland Railway.....	—	75
Consolidated Traction Company of New Jersey.....	a76	a76
Consolidated Traction Company of New Jersey, 5 per cent bonds.....	a104½	a104½
Detroit United Railway.....	55	*54½
Interborough-Metropolitan Company.....	14¾	15½
Interborough-Metropolitan Company (preferred).....	35½	36½
Manhattan Railway.....	147	151½
Massachusetts Electric Companies (common).....	12¾	12
Massachusetts Electric Companies (preferred).....	60	58
Metropolitan West Side Elevated Railway, Chicago (common).....	a15	a17
Metropolitan West Side Elevated Railway, Chicago (preferred).....	a44	a50
Metropolitan Street Railway.....	31	*27
North American Company.....	76½	76¾
Philadelphia Company, Pittsburg (common).....	43¾	43½
Philadelphia Company, Pittsburg (preferred).....	43¾	44
Philadelphia Rapid Transit Company.....	22½	22½
Philadelphia Traction Company.....	90	90
Public Service Corporation, 5 per cent collateral notes.....	a98	a100
Public Service Corporation certificates.....	a75	a75¾
Twin City Rapid Transit Company, Minneapolis (common).....	94¾	94
Union Traction Company, Philadelphia.....	49¾	51½

* Asked.
* Last sale.

Annual Report of the Massachusetts Electric Companies for 1908

The pamphlet report of the Massachusetts Electric Companies for the year ended Sept. 30, 1908, has just been made public. The statement of profit and loss of the companies for the year follows:

INCOME	
Dividends on stocks owned.....	\$880,841
Interest on notes and bank balances.....	107,961
Total income.....	\$988,802
EXPENSES	
Salaries—General officers and executive committee... ..	\$11,000
Printing and stationery.....	567
Legal and miscellaneous expenses.....	7,828
Total expenses.....	19,395
Net income for the year.....	\$969,407
CHARGES	
Interest on coupon notes.....	157,500
Surplus for the year.....	\$811,907
Surplus, Sept. 30, 1907.....	1,566,884
Surplus, Sept. 30, 1908.....	\$2,378,791

The general balance sheet of the companies as of Sept. 30, 1908, shows:

ASSETS	
Sundry stocks, etc., in treasury.....	\$33,360,934
Stocks deposited under indenture of trust, July 1, 1905, to secure issue of coupon notes.....	4,375,000
Notes receivable with operating companies.....	2,150,000
Cash.....	25,770
Dividends due from operating companies payable Oct. 1, 1908.....	860,584
Cash deposited to pay dividends and coupons.....	1,944
Total assets.....	\$40,774,232
LIABILITIES	
Preferred shares.....	\$20,557,400
Common shares.....	14,293,100
Coupon notes.....	3,500,000
Vouchers payable.....	3,622
Accrued interest on coupon notes.....	39,375
Dividends and coupons uncalled for.....	1,944
Surplus.....	2,378,791
Total liabilities.....	\$40,774,232

The consolidated statement of profit and loss of the operating street railway and electric light companies for the year ended Sept. 30, 1908, follows:

Earnings.....	\$7,809,010
Expenses.....	5,001,518
Net earnings.....	\$2,807,492
Interest, rentals and taxes.....	1,784,437
Net divisible income.....	\$1,023,055
Dividends.....	880,773
Surplus for the year.....	\$142,282
Surplus, Sept. 30, 1907.....	212,924
Total.....	\$355,207
DEDUCTIONS:	
Injuries and damages prior to 1899.....	\$127
Premium on bonds redeemed.....	1,239
Adjustment of accounts.....	27,023
*Reconstruction.....	105,930
Depreciation of Hyde Park Elec. Lt. Co. Property.....	5,000
Depreciation fund, Hyde Park Elec. Lt. Co.....	5,000
Total deductions.....	144,319
Surplus, Sept. 30, 1908.....	\$210,888

* This sum represents the entire amount, for which capital has not been allowed, of reconstruction passed upon by the Board of Railroad Commissioners up to Sept. 30, 1908.

The consolidated balance sheet of the operating street railway and electric light companies for the year ended Sept. 30, 1908, shows assets of \$43,350,871 and liabilities of \$43,350,871.

Gordon Abbott, president of the Massachusetts Electric Companies, in presenting the report said:

"The results of the whole year are a small but, under the circumstances, satisfactory increase of \$50,499 in gross, and \$49,634 in net. Fixed charges increased \$81,814, but as a considerable part of this increase was interest on money advanced by the Massachusetts Electric Companies, the net income of the latter increased \$23,195 over that of a year ago. It seems probable, in spite of the increasing activity in general business, that the decreases in gross will continue until the early spring, but they are likely to be in whole or in part offset by savings in expenses. These savings, however, have not been, and will not be, made at the expense of the physical condition of track, power plants or equipment; in fact, the trustees are able to report, as a result of their usual personal examination, that the actual condition of the property has improved during the past year.

"Owing to the generally unsettled financial conditions of the early part of the year, your trustees decided not to approve any considerable amount of work, either on recon-

struction or betterment, but the sum of \$662,977 has been expended.

"One and one-half miles of new track have been built, 13½ miles of old track rebuilt and 16¾ miles of new wire strung. Four express cars, four coal cars, three snow plows and 16 motors have been bought. The installation of new machinery in the Salem and Haverhill stations, alluded to in last year's report, has been finished. The Boston & Northern Street Railway is now hauling its own coal from tide-water to the stations at Lowell, Lawrence, Essex Falls and Gloucester. A considerable saving in the cost of fuel should result from this change.

"The earnings of the companies are still almost entirely from passenger traffic, for while the express and freight business shows most satisfactory results in those parts of the system where it has been started, the difficulties which were mentioned in last year's report still persist, and a general enlargement of that branch of the business has not proved practicable, although much attention is still being devoted to it.

"The Boston & Northern Street Railway and Old Colony Street Railway, upon application to the Railroad Commissioners, have received the right to issue 6 per cent preferred stock, to be sold at not less than \$110 per share. Seven thousand two hundred and thirty-six shares of this stock may be issued by the Boston & Northern Street Railway and 3727 shares by the Old Colony Street Railway. The proceeds of the sale of these shares, together with those of the \$883,000 bonds in the treasuries of the above mentioned companies, should be sufficient to retire all but a very small portion of the floating debt of the operating companies, outside of that now held by the Massachusetts Electric Companies. Under these circumstances the trustees have felt justified in resuming the payment of dividends upon the preferred shares of the Massachusetts Electric Companies, but deem it better, in view of the uncertainty of future conditions of the business, to begin an initial distribution of only 1 per cent on Jan. 1, 1909."

Hearing on Application of Boston Elevated Railway to Increase Stock

A hearing was held by the Massachusetts Railroad Commission on Dec. 2, on the proposed increase in the stock of the Boston Elevated Railway from \$13,300,000 to \$19,950,000, to provide for the building of the Main Street subway in Cambridge, the East Cambridge extension of the elevated system, the equipment of these lines, and the construction of a tunnel connection from Park Street to the Cambridge bridge. The company desires to offer this stock to its stockholders at \$110 per share. F. E. Snow, counsel for the company, made a statement regarding the situation. The estimated cost of the Cambridge subway exclusive of rolling stock and power stations is about \$6,000,000, and the estimated cost of the East Cambridge extension \$4,500,000. During the next five years the company will have to raise approximately \$18,000,000 in addition to the amount now desired, to meet rapid transit developments. This means an increase of \$2,200,000 in annual charges over the present charges. There was a surplus of \$42,000 last year after paying fixed charges and dividends, but the earnings of the last 11 years have not been sufficient to result in a large available surplus. The company has found that the increase in traffic does not correspond financially with the burden of subway operation. In the last 10 years the average increase in revenue passengers has been only 9,181,000. Already a total rapid transit expenditure of \$39,760,000 is in prospect, and the need of providing for this by a policy of encouragement to investors is apparent. The Board took the case under advisement.

Chicago (Ill.) City Railway.—The Chicago City Railway has sold to the Illinois Trust & Savings Bank, Chicago, \$6,000,000 of its first mortgage 5 per cent. bonds. The company has previously issued \$12,000,000 of bonds.

Chicago & Milwaukee Electric Railroad, Chicago, Ill.—Judge Grosscup, of the Court of Appeals, has reappointed the receivers of the Chicago & Milwaukee Electric Railroad with enlarged duties and has consolidated the foreclosure suits. He says that the reorganization plans will probably be drafted immediately. The holders of the \$8,500,000 of the \$10,000,000 bonds have approved the reorganization.

Chicago (Ill.) Consolidated Traction Company.—The receivers of the Chicago Consolidated Traction Company have been authorized to borrow \$200,000 for rehabilitation, pledging receipts until 1910. The Harris Trust & Savings Bank, Chicago, has formed a bondholders' protective committee for the company's underlying bonds and deposits are requested of such issues as the Chicago Electric Transit Company, North Chicago Electric Railway, North Side

Electric Street Railway, Chicago North Shore Electric Street Railway.

Columbia Power, Light & Railway Company, Bloomsburg, Pa.—The Columbia Power, Light & Railway Company has been organized to hold the stock and bonds of the Columbia & Montour Electric Railway, the Danville & Bloomsburg Street Railway, the Irondale Electric Light Company, the Berwick Electric Light Company, the United Gas & Electric Company, the Standard Gas Company and the Standard Electric Company, embracing all the electric and gas companies in Columbia and Montour counties on the North Branch of the Susquehanna River. It is the purpose to generate part of the current needed by the new company at the plant of the Irondale Electric Light Company at Bloomsburg and the rest will come from the plant of the Harwood Electric Company at Hazleton, Pa. Edward R. Sponsler, Harrisburg, Pa., H. W. Hamblin, formerly of the Paxtang Electric Company, Harrisburg, and A. W. Duy of the United Gas & Electric Company, Bloomsburg, arranged for the merger. The Columbia Power, Light & Railway Company will issue a total of \$2,500,000 in bonds, preferred stock and common stock.

Dominion Power & Transmission Company, Hamilton, Ont.—The directors of the Dominion Power & Transmission Company decided on Dec. 2 not to pay the half-yearly dividend, but to use the money as a fund for bettering the street railway system and other properties which the company controls. The company has been paying semi-annual dividends of 3 per cent on its preferred stock and in 1907 paid two dividends of ½ of 1 per cent on its \$4,698,900 limited preferred stock. There is also \$2,600,000 of common stock.

Interborough Rapid Transit Company, New York, N. Y.—Application has been made to the New York Stock Exchange by Interborough Rapid Transit Company to list \$25,000,000 3-year convertible 6 per cent notes. Lee, Higginson & Company offer \$500,000 of 5 per cent bonds of the company of 1952 at 102¾ yielding 4.85 per cent.

Metropolitan Street Railway, New York, N. Y.—The suit of the Guaranty Trust Company, New York, to foreclose its mortgage on the property of the Metropolitan Street Railway because of a default on the payment of interest on the collateral trust bonds came up before Judge Lacombe in the United States Circuit Court on Dec. 3. Under a clause of the mortgage if the default in interest continued for 90 days, the principal was to fall due. Julien T. Davies asked permission to amend the complaint to include the principal, now due. Judge Lacombe reserved decision.

Mexico (Mex.) Tramways.—The directors of the Mexico Light & Power Company, at the request of 25 per cent of the stock, have called a meeting of the stockholders for Dec. 30, to vote to lease the property to the Mexico Tramways. The lease would provide a rental sufficient to cover 4 per cent dividends on the common stock of the Mexican Light & Power Company and 7 per cent on the preferred stock and interest on the bonds; any surplus would be divided between the companies on a specified basis.

Nebraska Traction & Power Company, Omaha, Neb.—The Nebraska Traction & Power Company has filed a mortgage for \$1,330,000 in favor of the Midland Guaranty & Trust Company, Omaha, as trustee, to secure a proposed bond issue.

Pennsylvania & Maryland Street Railway, Elk Lick, Pa.—A mortgage has been filed in favor of the Farmers' Loan & Trust Company, New York, as trustee, by this company, to secure an issue of \$1,000,000 of 5 per cent 20-year gold bonds, limited to \$18,000 per mile of road built, equipped and in operation.

Third Avenue Railroad, New York, N. Y.—Judge Lacombe, of the United States Circuit Court, in an opinion handed down on Dec. 1 referred to a special master for settlement the claims presented by and against the receivers of the Third Avenue Railroad, the New York City Railway and Metropolitan Street Railway. The first two sets of claims were preferred by the Third Avenue Railroad against the other two companies and their receivers as officers. One claim was based on the terms of the lease of the Third Avenue Railroad to the New York City Railway in 1880, providing for the maintenance and return at the time of the abrogation of the lease all property not worn out or destroyed. The other asks compensation from the New York City Railway for the use of the Third Avenue Railroad from Sept 24, 1907, until Jan. 11, 1908, the period during which Messrs. Joline and Robinson acted as receivers. The third group of claims was presented by Receiver Ladd, of the New York City Railway, against Frederick W. Whitridge, receiver of the Third Avenue Railroad, for various items of personal property valued at \$49,036. Coal and other supplies, the property of the New York City Railway, it is alleged, were supplied to the Third Avenue Railroad for its operation and repair.

Traffic and Transportation

Brooklyn Company to Supply Information About Accidents to the Press

The Brooklyn (N. Y.) Rapid Transit Company has recently issued the following official order, over the signature of J. F. Calderwood, vice-president and general manager, to its employees regarding the opportunities to be extended to duly accredited representatives of the press to obtain information about accidents:

In the event of any serious accident on lines, or in shops or power-houses of this company, properly authorized newspaper representatives shall be given an opportunity to obtain facts and details and to take photographs under the following regulations:

1. Upon request each newspaper representative shall exhibit to inspectors or other officers of the company in charge his police card of the current month, signed by the commissioner and stating his name and the name of the newspaper represented.
2. The newspaper representatives must not delay, obstruct or in any way interfere with the employees engaged in and about the accident, nor in any way disturb or interfere with the apparatus or appliances of the company involved.
3. The official in direct charge at the scene of trouble will answer with discretion and courtesy all reasonable questions concerning the accident, giving the facts immediately involved to the best of his ability, with the exception that the names and addresses of persons injured or claiming injury shall not be given.
4. Flashlight photographs must not be permitted in cars or in the company's buildings, it being of first importance that passengers or others should not unnecessarily be alarmed by such action.
5. Any abuse of the privileges extended must be duly reported to the vice-president and general manager, giving necessary information.
6. Any lack of courtesy on the part of the official in charge will be reported by the newspaper representative to the vice-president and general manager.
7. Any statement made by the official in charge at the scene shall in no sense be considered an official statement of the company, for such statement inquiry should be made of the vice-president and general manager at the main office of the company by telephone.

Passenger Traffic on Chicago Elevated Railways for November

The elevated railway companies of Chicago report the following statistics of passengers carried:

NORTHWESTERN ELEVATED RAILROAD.			
	1908.	1907.	
January	100,302	88,682	
February	102,182	88,435	
March	103,130	89,347	
April	103,569	90,134	
May	105,001	94,204	
June	109,107	99,051	
July	99,463	91,542	
August	100,307	93,174	
September	105,700	97,447	
October	118,010	108,806	
November	116,954	106,801	
SOUTH SIDE ELEVATED RAILROAD.			
	1908.	1907.	
January	112,702	92,411	
February	111,927	96,094	
March	114,801	100,226	
April	117,885	103,152	
May	119,313	109,880	
June	125,876	115,686	
July	114,362	111,966	
August	112,665	113,847	
September	116,490	118,256	
October	121,590	126,670	
November	117,809	120,594	
METROPOLITAN WEST SIDE ELEVATED RAILWAY.			
	1908.	1907.	
January	141,564	150,165	
February	145,427	154,446	
March	145,339	154,000	
April	146,638	156,275	
May	145,117	151,423	
June	144,361	148,518	
July	131,152	135,779	
August	128,678	136,517	
September	131,354	149,979	
October	143,226	157,080	

Accidents in Pennsylvania for Quarter

The Railroad Commission of Pennsylvania has issued the following summary of accident reports received and tabu-

lated by the commission for the quarter ended Sept. 30, 1908:

	Killed.	Injured.	Total.
Railroads	253	2,039	2,292
Street railways	49	1,475	1,524
Total	302	3,514	3,816

ACCIDENTS CLASSIFIED AS TO EMPLOYEES, PASSENGERS, TRESPASSERS OR OTHERS

STREET RAILWAYS					
	Killed.	Per cent.	Injured.	Per cent.	Total.
Employees	2	4.08	50	3.39	52
Passengers	13	26.56	1,051	71.25	1,064
Trespassers	10	20.40	40	2.71	50
Others	24	48.96	334	22.65	358
Total	49		1,475		1,524

Massachusetts Company Seeks Additional Freight Rights.—The Lexington & Boston Street Railway, Boston, Mass., has petitioned the Massachusetts Railroad Commission for authority to carry baggage and freight in Billerica.

Signs on P. A. Y. E. Cars in Newark.—The signs on the pay-as-you-enter cars in Newark have the following inscription: "Put exact fare, except transfer, in fare box; conductor not permitted to do so," and "Hand transfers to conductor unfolded."

Regular Express Service Replaces Combined Service on Pennsylvania Road.—The Citizens Traction Company, Oil City, Pa., has discontinued the carrying of express and baggage on its passenger cars and is operating an express service. Two round trips are made daily.

Slot Machines in the New York Subway.—The Public Service Commission of the First District of New York held a hearing on Dec. 2 on the question of slot machines at subway stations. The machines are in the recesses of the supporting steel columns and passengers who patronize them and those who through vanity stop to use the looking glasses with which they are fitted are said to interfere with other passengers, especially at express stations. The commission will report later.

Campaign Against Accidents in Florida.—Hardy Croom, general manager of the Jacksonville (Fla.) Electric Company, recently used the letter on the prevention of accidents addressed by W. H. McGrath, manager of the Houghton County Traction Company, Houghton, Mich., to the *Houghton Gazette* and printed in the Nov. 21 issue of the *ELECTRIC RAILWAY JOURNAL*, page 1433, as the subject of an interview in the Jacksonville papers. Both of these roads are under the management of Stone & Webster, Boston.

Southern Interurban Railway Liable for Not Operating "Jim Crow" Cars.—The Court of Appeals at Frankfort, Ky., in an opinion handed down on Dec. 2, holds that the Louisville (Ky.) Railway has not the right, under its charter, to operate cars outside of Louisville, but that it is liable for failure to provide separate coaches for negroes on a line which it is operating to Orell. The opinion was written by Judge Settle, and under it the Louisville Railway must pay a fine of \$500, which was assessed against it in the Jefferson Circuit Court. The Louisville & Interurban Railway, which leased its line to the Louisville Railway, and which was also fined, is relieved of liability for failure to provide the separate coaches.

Operation of Important Connecting Line Authorized.—The Railroad Commission of Massachusetts has approved the operation of an extension of the Shelburne Falls & Colrain Street Railway from River Street, Shelburne Falls, across the Deerfield River to the Shelburne Falls station of the Boston & Maine Railroad in Buckland. The total length of the extension is only 1700 ft., but it provides a service not previously existing between Colrain, Adamsville, Lyonsville, Griswoldville, Shattuckville and Shelburne Falls station, facilitating passenger traffic and the present combination car express business of the company. It is probable that a connection will ultimately be made with the Boston & Maine Railroad to expedite freight handling.

Legality of Massachusetts Half Fare Law in Question.—The constitutionality of the law enacted by the General Court of Massachusetts in 1908 which provides that street railways shall grant half fares to pupils in the day and evening schools will probably be carried to the courts for determination as a result of the refusal of the Boston & Northern Street Railway to sell half fare tickets to pupils in the evening schools of Haverhill, Mass. On petition of Superintendent Gay of the Haverhill schools, the Railroad Commission brought the matter to the attention of the company with the result that R. S. Goff, general manager of the company, replied by letter to the effect that the company refuses to sell tickets at reduced rates to pupils of evening schools because it does not believe Chapter 530 of the Laws of 1908 constitutional. The case has been referred to Attorney Malone by Chairman Hall of the Commission for further action.

Personal Mention

Mr. J. E. Wayne has resigned as general manager of the Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.

Mr. Julian Dubois, for the last seven years superintendent of the Amsterdam division of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., has resigned to become general manager of the Concepcion (Chile) Electric Railway.

Mr. S. L. Nelson has resigned as vice-president and general manager of the Peoria (Ill.) Railway, effective on Dec. 31. On that date the office will be abolished and the property thereafter operated as a subsidiary of the Illinois Traction System under the jurisdiction of Mr. H. E. Chubbuck, general manager.

Mr. F. J. Southerland has been appointed purchasing agent and assistant manager of the Monterey County Gas & Electric Company and Monterey & Pacific Grove Railway, Monterey, Cal., following a two-year period of reorganization of the manufacturing and distributing departments of the companies.

Mr. W. E. Moore, consulting engineer of the American Water Works & Guarantee Company, Pittsburg, Pa., and other Kuhn properties, is, in addition, now looking after the details of operation of the properties of the West Penn Railways & Electric Company, Connellsville, Pa., with the title of operating manager.

Mr. Robert N. Wallis, president of the American Street & Interurban Railway Accountants' Association, has appointed Mr. F. E. Smith, comptroller of the Chicago Railways Company, a member of the classification committee to succeed Mr. C. N. Duffy, resigned. The other members of this committee are Mr. W. F. Ham, Mr. H. L. Wilson, Mr. W. B. Brockway and Mr. W. H. Forse, Jr.

Mr. G. E. Tripp, vice-president Stone & Webster Management Association, Boston, Mass., has been retained as special advisor to the joint committee on reorganization of the Metropolitan Street Railway, New York. Mr. Tripp will make his headquarters at the new office of Stone & Webster, 45 Cedar Street, New York, which is in charge of Mr. Eliot Wadsworth, who was connected with the company in Boston.

Mr. Daniel Royle, formerly editor of the *Street Railway Review*, has been appointed assistant to Mr. W. V. S. Thorne, director of purchases of the Harriman lines, with office in New York. Mr. Royle joined the staff of the *Street Railway Review* in 1896; in 1901 he succeeded Mr. H. H. Windsor as editor of the *Review* and remained in that capacity until 1905. In 1906 he became assistant editor-in-chief of the *Railway Age*, serving until the consolidation of that journal with the *Railroad Gazette* in 1908.

Mr. James G. Nellis has been appointed division superintendent of the Amsterdam division of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., to succeed Mr. Julian Dubois, who has accepted the position of general manager of the Concepcion (Chile) Electric Railway. Mr. Nellis entered railway work in 1893 as an assistant in the office of the superintendent of the Cayadutta (N. Y.) Electric Railway, which is now a part of the Fonda, Johnstown & Gloversville Railroad. He was promoted to clerk in 1896, but in the year 1897 resigned from the company to become secretary to Mr. T. C. Frenyear, manager of the Buffalo office of the Westinghouse Electric & Manufacturing Company. Mr. Nellis re-entered the service of the Fonda, Johnstown & Gloversville Railroad as clerk in the office of the division superintendent at Gloversville in 1898. In 1904, he was appointed superintendent of the Adirondack Lakes Traction Company, which is controlled by the Fonda, Johnstown & Gloversville Railroad.

Mr. F. P. Maize, formerly master mechanic of the Rochester (N. Y.) Railway, has been appointed mechanical inspector of the Public Service Corporation of New Jersey in general charge of the repair shops of the company throughout New Jersey. Mr. Maize will, in fact, be a traveling master mechanic and will make recommendations for improvements in shop practice in the various plants operated by the Public Service Corporation and as far as possible conduct the work of standardizing their equipment. Mr. Maize began his railway career in the shops of the Carlisle Manufacturing Company, locomotive builders, with which he was connected from 1885 to 1893. In the latter year he became foreman of the machine shop of the Atlantic Avenue Railroad, Brooklyn, and in 1894 accepted a similar position with the Scranton (Pa.) Traction Company. In 1896 he accepted the position of foreman of repair shops of the second division of the Union Traction Company, Philadelphia. Two years later he became master

mechanic of the New York & Queens County Railway, and in 1900 was made superintendent of power houses and equipment of that company. In 1903 he was appointed master mechanic of the Rochester Railway.

Mr. Norman McD. Crawford has been elected president of the Mahoning & Shenango Railway & Light Company, Sharon, Pa., to succeed Mr. E. N. Sanderson, and has entered upon the duties of his new office. Mr. Crawford was formerly vice-president of the Ohio Electric Railway, which controls 790 miles of street and interurban electric railways in Ohio and operates a number of electric light and power companies. Previously for a long time he was general manager of the Hartford (Conn.) Street Railway. As a contractor, he built the Glastonbury line of the Hartford Street Railway in 1891 and was afterward retained by the company as engineer. In 1894 he was made general manager of the company, which position he held until the Hartford Street Railway was taken over by the Connecticut Company acting for the New York, New Haven & Hartford Railroad. The Mahoning & Shenango Railway & Light Company owns and controls street railways in Youngstown, Warren, Niles and other cities in Ohio, and New Castle, Sharon, Wheatland, Sharpville in Pennsylvania, and the lighting properties in Youngstown, New Castle, Sharon and Sharpville. In all, the company operates 145 miles of electric railway. In 1906, Mr. Crawford spent six months in Europe, investigating street railway conditions there for the Committee on Public Ownership and Operation of the National Civic Federation.

OBITUARY

Henry E. Woods, formerly purchasing agent of the West End Street Railway, Boston, Mass., is dead. Mr. Woods was at one time manager of the Cambridge Street Railway and later was manager of the Charles River Street Railway, Boston. When these companies were taken over by the West End Street Railway he became purchasing agent of that company.

James W. Leahy, recently connected with the engineering staff of the Hudson & Manhattan Railroad, New York, is dead. Mr. Leahy was born in Philadelphia on Sept. 12, 1860, and went to Jersey City in 1893 as engineer of maintenance of way for the Jersey City & Bergen Street Railway. When this company was taken over by the Consolidated Traction Company, Mr. Leahy continued as engineer of maintenance of way and subsequently became connected with the Public Service Corporation of New Jersey.

E. F. C. Young, a director of the Public Service Corporation of New Jersey and several of its subsidiary companies, and president of the Joseph Dixon Crucible Company, Jersey City, N. J., died at his home in Jersey City on Dec. 6. Mr. Young was born near Morristown, N. J., on Jan. 5, 1835, and removed to Jersey City when nine years old. He attended the public schools there and entered business in 1852 as a clerk in the Hudson County Bank, Jersey City. In 1864 he became connected with the Mechanics & Traders Bank, Jersey City, and in 1870 was elected president of that institution. Mr. Young and the late Charles B. Thurston financed the Jersey City & Bergen Street Railway, which formerly operated the street railways in Jersey City, and in 1893 with the late B. M. Shanley, Mr. Young organized the Consolidated Traction Company, which leased the North Jersey Street Railway operating at the time the electric railways of Jersey City, Newark, Elizabeth and other cities in Northern New Jersey. Mr. Young relinquished his active connections with the electric railways of New Jersey upon the organization of the Public Service Corporation, which took over the properties in which he was interested, but became a director of the Public Service Corporation. He was financially interested in many enterprises and was a director in several trust companies and banks in New Jersey and several insurance companies and industrial corporations.

NEW PUBLICATIONS

Electric Railway Map of Ohio, Indiana and Michigan, 1908.

Price Publishing Company, Lima, Ohio. Paper cover. Price 25 cents.

This is a large scale map of all the interurban railway lines in the three States mentioned, folded into a cover of vest-pocket size. Printed on the margin and on the back of the map are the names of all of the electric railway lines operating in these three States, as well as the names of all of the towns and cities reached by these lines, with figures of their population. Unlike many of the electric railway maps published, this edition shows only the lines in actual operation, and for this reason is especially valuable to persons contemplating journeys. The same company also publishes a map of electric railway lines in Illinois and Wisconsin, which is sold for 15 cents.

Construction News

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

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

FRANCHISES

***Helena, Ark.**—J. W. Burks has applied to the City Council for a franchise for a street railway system.

Smyrna, Del.—J. W. Endean, chief engineer of the Diamond State Rapid Transit Company, has submitted a petition to Smyrna's Council asking for an extension of time with some other modified changes in his franchise. Similar requests are being made of all towns through which the proposed electric railway will pass between Wilmington and Rehoboth.—[S. R. J., March 28, '08.]

East St. Louis, Ill.—The City Council has adopted a bill giving the Southern Traction Company, of Illinois, an extension of a year to finish the construction of its electric railway between East St. Louis and Belleville.—[E. R. J., Dec. 5, '08.]

Dowagiac, Mich.—The Dowagiac Railway has been granted a franchise by the City Council. The rate of fare is fixed at 5 cents anywhere within the city limits and it is agreed that the tracks shall be laid and the road in operation by Jan. 1, 1910, or the franchise shall be void. The franchise is to run for 30 years. The promoters of this line are identified with the Benton Harbor-St. Joe Railway & Light Company, which operates a line from Benton Harbor to Eau Claire. [E. R. J., Nov. 7, '08.]

Auburn, N. Y.—Request has been made by the Cayuga, Waterloo, Seneca Falls & Cayuga Lake Traction Company of the town boards of Seneca Falls, Cayuga and Aurelius for a date on which it can make formal request for a right of way through the respective towns with the object in view of extending the line to Auburn.

Schenectady, N. Y.—The Schenectady Railway has been granted a franchise for a branch line through Vley Road to the Boston & Maine Railroad station in Scotia. Track laying has been commenced, the poles have already been set and it is expected the line will be ready for operation by the first of the year.

Springfield, Ohio.—The City Council has granted the Springfield & Washington Railway, South Charleston, Ohio, a franchise for the construction of its lines in this county.

***Martinsburg, W. Va.**—The Common Council of Martinsburg has granted to the Berkeley Traction Company a franchise for an electric railway over the streets of the city, and work will be commenced not later than April 1 of next year. The company is composed of capitalists from New York, Brooklyn, Wheeling and Norfolk, Va., and it is expected to have cars running within one year after the construction of the line is commenced. It is said the line in the city will cost about \$750,000, and practically all the stock has been subscribed. Plans are being formed by the same company to construct a line from Martinsburg to Shepherdstown, Charlestown and Winchester. The interurban line will be about 60 miles in length.

RECENT INCORPORATIONS

South San Diego & Imperial Beach Railway, San Diego, Cal.—Incorporated to construct an electric railway from the south end of the bay of San Diego to Imperial Beach. Franchises for about 3 miles of this proposed road have already been granted by the supervisors and nearly 2 miles of the road have been built. Capital stock, \$25,000, of which \$15,000 has been subscribed. Incorporators: G. Y. Gray, E. W. Peterson, R. B. Thomas and R. A. Smith. [S. R. J., Feb. 1, '08.]

***De Kalb Midland Railway, De Kalb, Ill.**—This company has been incorporated to construct an electric railway from De Kalb to Sandwich. Capital stock, \$150,000. Incorporators: John W. McQueen, Herbert J. Burdick and William G. Wilcox, Elgin, Ill., and O. Fred Cole and John F. Pearce, Chicago.

***Freeport Interurban Railway, Freeport, Ill.**—Incorporated in Illinois to construct an interurban electric railway from Freeport to South Freeport, thence to Polo, thence to Dixon. Capital stock, \$2,500; incorporators, Owen T. Smith, W. A. Hance, Edward Courtney, F. A. Read, N. Hettinger, and A. Bidwell; board of directors, Owen T. Smith, W. A. Hance, and A. Bidwell.

Consolidated Railway & Power Company, Fayetteville, N. C.—This company has been incorporated in North Carolina for purpose of purchasing the Fayetteville Street Railway & Power Company, and the Little River Power & Transportation Company, with the object of completing the

street railway to Hope Mills and of completing the power plant at Manchester, bringing the current to Fayetteville to be used by the street railway, and also for furnishing electric power for the municipal light plant. Capital stock, \$200,000, of which \$105,000 has been paid in. Incorporators: W. D. McNeill, J. Sprunt Newton, Mrs. M. B. McRae, Mrs. M. C. McArthur, Fayetteville; A. G. Bishop, New York, and H. A. Haines, Elizabeth, N. J.

Scott Township Street Railway, Pittsburg, Pa.—Chartered to build a five-mile electric railway in Scott Township, from the intersection of Washington Avenue and the Hope Hollow Turnpike Road, to the line dividing Scott and Baldwin Townships. Capital stock, \$30,000. Directors: W. E. Kusen, Pittsburg, president; A. J. Schmidt, C. August Stuetz, W. P. Heckman and J. D. C. Miller. The company has the consent of the Library and West Liberty Street Railway to use a portion of the latter's line. J. T. Barr, 237 Fourth Avenue, Pittsburg, chief engineer. [E. R. J., Dec. 5, '08.]

***Burlington & Vergennes Traction Company, Burlington, Vt.**—This company has been incorporated to construct an electric railway from Burlington to Vergennes. Incorporators: John J. Flynn, A. O. Humphrey, C. W. Brownell, Elias Lyman, L. E. Woodhouse, W. B. McKillip, Burlington; Edward P. Hatch, New York, and E. F. Gebhardt and C. M. Russell, Shelburne.

TRACK AND ROADWAY

Bakersfield & Ventura Railroad, Oxnard, Cal.—T. B. Blackburn, general superintendent, writes that it is expected to build 2 miles of track in the city of Oxnard, fulfilling terms of a franchise recently granted to the company.

Americus Railway & Light Company, Americus, Ga.—This company, which plans to build a belt line in Americus, reaching the park, depot, college and railroad shops, has announced that active work on the system will be begun about Jan. 1, 1909. A new power station is being built and will be equipped with two 300-kw Parsons turbines. Trolley poles are now being placed in position. Five miles of track will be built. The company will operate the entire gas and electric business in Americus. Capital stock, \$250,000. Headquarters: Americus. Officers: A. N. Walker, president; W. A. Dodson, vice-president; J. L. Rawlson, secretary and treasurer; J. H. Hagerty, general manager, all of Americus. [S. R. J., April 18, '08.]

Cairo & St. Louis Railway, Cairo, Ill.—This company has filed \$250,000 in 5 per cent bonds to be used for construction of the new interurban line between Cairo and St. Louis. The mortgage is given to the Portland Trust Company, Portland, Maine, which is financing the road.

East St. Louis, Columbia & Waterloo Railway, Columbia, Ill.—An officer writes that this company has completed its surveys and secured most of the rights-of-way for its proposed electric road, which is to be built from East St. Louis through Dupo, Bixby, East Carondelet, Columbia and Waterloo, Ill. The company plans to start construction work in the spring of 1909. It has been decided to use the overhead trolley system. Headquarters, Columbia, Ill. Officers: E. F. Schoening, president; J. W. Warnock, vice-president; H. Reichenbach, secretary and treasurer, all of Columbia. Baxter Brown, Merchants-Laclede Building, St. Louis, Mo., chief engineer.

Joliet & Southern Traction Company, Joliet, Ill.—The ELECTRIC RAILWAY JOURNAL is advised by H. A. Fisher, president of this company, of the new work which this company proposes to complete during the coming year. The Fisher Construction Company, Joliet, which owns the Joliet & Southern Traction Company and the Bloomington, Pontiac & Joliet Electric Railway, will build a line south from Joliet to Wilmington and Dwight, under the charter of the latter named company and with this company's securities. During the past year the Joliet & Southern company has been building directly east from Joliet through New Lenox, Frankfort and Matteson to Chicago Heights. It is stated that within the next 60 days cars will be in operation over this line between Joliet and Chicago Heights. This new line is about 26 miles long. The Bloomington, Pontiac & Joliet Electric Railway has been operating between Dwight and Pontiac for the past three years and during 1908 the Fisher Construction Company has extended the track south from Pontiac toward Bloomington. It is confidently expected that finances can be arranged for completing the line between Pontiac and Bloomington and Dwight and Joliet. Plans contemplate the complete operation of the different routes between Bloomington and Joliet within the coming year. With the completion of this line there will be established electric railway connection between Chicago and St. Louis, the new line connecting at Joliet with the Chicago & Joliet Electric Railway and at Bloomington with the Illinois Traction System oper-

ating limited trains by way of Decatur and Springfield to St. Louis.

Rock Island Southern Railroad, Monmouth, Ill.—Active construction work is now in progress on this road, which will connect Rock Island with Monmouth and Galesburg, Ill., and Burlington, Ia. The present plans contemplate new and reconstruction of track to the extent of about 90 miles, all to be operated by high-voltage alternating current fed from a catenary-supported trolley wire. From Rock Island, on the Mississippi River, the new road will operate 20 miles south over a division of the Chicago, Rock Island & Pacific Railroad, which the Rock Island Southern has leased for a period of 25 years. The southern terminus of this leased track is at Preemption. From Preemption a new single-track line will be built about 30 miles south to Monmouth. An electric line now operating from Monmouth to Galesburg will be reconstructed so that it may handle the heavy traffic of the new road; and extending west from Monmouth, Ill., to Burlington, on the Mississippi River, a new line about 25 miles long will be built. At the present time the P. T. Walsh Construction Company, of Rock Island, is handling the earthwork for the grade at the rate of 3000 cu. yd. a day. The construction forces include 300 laborers, with two steam shovels and five construction engines. It is expected that the entire line will be put in operation about July 1, 1909. Until electric locomotives can be completed the heavy coal traffic which will pass over this road will be handled by steam engines. The management contemplates the early purchase of 18 cars for passenger service. The new line will connect the main lines of the Chicago, Rock Island & Pacific, the Chicago, Burlington & Quincy and the Atchison, Topeka & Santa Fé railroads. Along the route of the new line are several coal mines, and contracts are said to have been completed which will assure sufficient coal traffic at once to place the road on a paying basis. The overhead equipment for this new line, for which material has been purchased from the Ohio Brass Company, is designed so that current may be fed to the cars at 11,000 volts. No. 0000 grooved trolley will be supported by standard fittings of the manufacturer, including T-bar brackets with 1/2-in. supporting rods; porcelain insulators suitable for 11,000 volts potential; 1/2-in. catenary hangers with sister hooks, and type MW clamps. The trolley will be supported from the messenger every 15 ft. and the 45-ft. wooden poles will be spaced 150 ft. apart. Plans have not yet been completed for the power supply, but it is stated that the transmission system will be designed for 44,000 volts. The track rails are being bonded with the Ohio Brass Company's GD No. 0000 bonds soldered to the head of the rail.

New Castle, Ind.—Suit has been filed by the Moore-Mansfield Construction Company, Indianapolis, Ind., to foreclose a mechanic's lien against the Indianapolis, New Castle & Toledo Electric Railway and for an order to sell the property to satisfy a balance due for construction work done by the company. The company was organized in 1906 to build an electric railway from Indianapolis to New Castle, and through the New Castle-Indianapolis Construction Company, incorporated by the same interests, contracted with the Electrical Installation Company, Chicago, for construction. This company sublet to the Moore-Mansfield Company the building of the bridges, culverts, etc.

Des Moines & Sioux City Railway, Des Moines, Ia.—The American Engineering Company, Indianapolis, Ind., has been awarded a \$4,700,000 contract for the construction of this company's projected line from Des Moines through Adel and Perry to Sioux City, a distance of 196 miles. Work is to begin on or about Dec. 20. The contracts call for standard construction and the estimated cost is \$25,000 per mile, including equipment. It is stated that the road, when constructed and connecting the two Iowa cities, will be only the first link of the proposed system. A branch line will be built to Fort Dodge; then a line from Sioux City to Council Bluffs and Omaha, a distance of 60 miles, and also a line from Council Bluffs to Des Moines, a distance of about 150 miles. [E. R. J., Nov. 21, '08.]

Kansas City, Olathe, Ottawa & Iola Railway, Olathe, Kan.—The Standard Engineering Company, Cleveland, Ohio, has been appointed construction engineer for this proposed electric railway which is to extend from Kansas City, Kan., to Iola, a distance of 115 miles. The company plans to carry on both a passenger and freight business. The single-phase system will be adopted and it is probable that the company's power station will be equipped with gas engines. F. A. Little, of the Standard Engineering Company, is establishing an office in Kansas City, Mo.

Kent Traction Company, Chestertown, Md.—Negotiations are said to be under way for the financing and building of this company's proposed electric railway. The stock

issue of the company will be \$200,000, and there will be issued 5 per cent first mortgage bonds to the same amount. The road will haul both freight and passengers. The first link to be built will be between Tolchester and Chestertown, touching Fairlee and Georgetown. Eventually it is planned to extend the system clear to the Virginia line. Communication will be established between Tolchester and Baltimore, either by ferry or other boat. The road will be built with 70-lb. rails, with an overhead trolley, with the power plant at Fairlee. Officers: F. G. Upsilton, president; J. D. Bacchus, vice-president and treasurer; Alva A. Lamkin, secretary and general manager. [S. R. J., April 6, '07.]

Salisbury, Md.—W. B. Miller, Salisbury, who is interested in a plan to construct an electric railway from Salisbury to Nanticoke, writes the *ELECTRIC RAILWAY JOURNAL* as follows: "The project of building an electric railroad from Salisbury to Nanticoke, a distance of about 25 miles, is still in the initial stage. We have the matter now up in a tentative way with some Chicago contractors, but have not completed an organization." [E. R. J., Dec. 5, '08.]

***Battle Creek, Mich.**—It is reported that William V. Jacobs, Battle Creek, is endeavoring to interest capital in Battle Creek, Kalamazoo and Grand Rapids for an electric road between Grand Rapids and Battle Creek through new territory.

***Tupelo, Miss.**—A meeting has just been held at the Court House, Tupelo, for the purpose of promoting the Tupelo, Pontotoc & Fulton Electric Railway. This proposed road has been discussed for the past two months, and on subscription lists circulated by V. C. Kincannon, liberal amounts have been placed by the leading business men. Committees representing all the towns interested were appointed at the meeting to solicit subscriptions. These committees will report at a meeting to be held the second Monday in January.

Billings & Cooke City Railway, Billings, Mont.—It is stated that the merchants and business men of Billings have taken up the proposition to build an electric railway to Laurel, 16 miles west of Billings, and have agreed to secure subscriptions for \$100,000 in stock of the Billings & Cooke City Railway in order to build the line. Power for the line will be furnished by plants on the Yellowstone River, and by a trunk line run from the Madison River power plant to the eastern section of the State. It is said that \$40,000 has been subscribed by eight business men of Billings, and a committee of five, consisting of C. Yegen, Bert Shorey, J. C. West, W. A. Selvidge and J. M. Walker, has been appointed to solicit the balance. [E. R. J., Sept. 26, '08.]

Kansas City, St. Joseph & Excelsior Springs Electric Railway, Kansas City, Mo.—O. F. Stifel, St. Louis, Mo., is reported to have subscribed for \$200,000 worth of stock in the electric railway which this company plans to build from Kansas City to St. Joseph and Excelsior Springs. Capital stock, \$1,600,000. J. J. Heim, Kansas City, president. [S. R. J., March 28, '08.]

Missouri Valley Traction Company, St. Joseph, Mo.—H. G. Krake, secretary of this company, which contemplates building a standard electric railway from St. Joseph through Lathrop, Lawson, Mirabile, Kingston to Excelsior Springs, writes that the project is still in a preliminary stage. The system will have about 68 miles of single track. The overhead trolley will be used. Headquarters: St. Joseph, Mo. Officers: F. B. Campbell, St. Joseph, president; L. S. Frost, Mirabile, Mo., vice-president; H. G. Krake, St. Joseph, Mo., secretary; A. M. Bates, Excelsior Springs, Mo., treasurer; C. W. Campbell, St. Joseph, chief engineer. [S. R. J., Jan. 25, '08.]

Dover, Somersworth & Rochester Street Railway, Rochester, N. H.—The extension of this company's system, which has been under construction between Rochester and East Rochester, has been opened for traffic.

Rochester-Corning-Elmira Traction Company, Rochester, N. Y.—A mortgage for \$6,000,000, to secure an issue in gold bonds, has been filed in the county clerk's office by this company, with the Carnegie Trust Company, New York City, as mortgagee. The bonds will be in denominations of \$1,000, \$500 and \$100 at 5 per cent interest, payable semi-annually, on Oct. 1 and April 1. The company proposes to build an electric railway between Rochester and Elmira. John Hofman, Rochester, president. [E. R. J., Oct. 3, '08.]

Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y.—An engineering corps has just completed the final survey for the extension of this company's line from Port Byron to Syracuse. This road has been in operation as far as Port Byron. It connects at Port Byron with the Auburn & Northern Electric Railroad, which in turn connects at Auburn with the Auburn & Syracuse Electric Railroad.

Utica Southern Railroad, Utica, N. Y.—The *ELECTRIC*

RAILWAY JOURNAL is informed that construction work on this proposed electric railway will be commenced next spring. The road will extend from Clinton to Norwich, running through New Hartford, Franklin Springs, Oriskany Falls, Madison, Madison Center, Hamilton, Earlville, Sherburne, North Norwich and Plasterville. It is also proposed to build a spur from Deansboro to Waterville. The road will have trackage arrangements over the Utica & Mohawk Valley Railway, from Clinton into Utica and return. The entire system will comprise about 50 miles of single track. The overhead trolley system will be adopted. The line will reach three amusement parks situated along the route. Headquarters, City National Bank Building, Utica, N. Y. Officers: Edwin H. Risley, Utica, secretary; Frederick G. Mott, Hamilton, N. Y., treasurer; Francis K. Baxter, Utica, chief engineer. [S. R. J., Aug. 11, '06.]

Turkeyfoot Traction Company, Akron, Ohio.—Thomas L. Childs, promoter of this road, has filed a mortgage in Akron, Ohio, in favor of the Youngstown Dollar Savings & Trust Company, Youngstown, Ohio, to cover a bond issue of \$400,000. This money is to be used in building an electric railway between Akron and Turkeyfoot Lake, a pleasure resort. [E. R. J., Oct. 24, '08.]

Hamilton & Dundas Street Railway, Hamilton, Ont.—It is announced that work will commence shortly upon the double tracking of this company's line.

Altoona, Everett & Bedford Springs Railway, Altoona, Pa.—A meeting in the interest of this projected electric railway was held at Altoona last week. It was attended by all the local members of the committee and these out-of-town members: H. Frank Gump and A. H. Whetstone, Everett; J. H. Brown, Loysburg; Dr. A. L. Garver, Roaring Spring; J. H. Shope, Hollidaysburg, and George Z. Replogle, Woodbury. Frederick W. Patterson, Pittsburg, who is working on the project in the interest of the company, explained the route of the new line as he had outlined it and read his prospectus. A committee of five was appointed to secure the needed right of way for the line. [E. R. J., Oct. 24, '08.]

Philadelphia, Pa.—Plans showing the depth and course of the proposed Delaware River tunnels to be built by the Delaware Tunnel Railroad and Camden Tunnel Railroad, between Philadelphia and Camden, have been filed with the United States Government by Stern & Silverman, engineers. Morris Wolf, counsel. [E. R. J., Nov. 28, '08.]

Pittsburg, McKeesport & Connellsville Railway, Pittsburg, Pa.—This company has been given authority to build a 2500-ft. extension in McKeesport. L. H. Conklin, general superintendent.

Galveston (Tex.) Electric Company.—This company is in the market for a few tons of Pennsylvania Steel Company's Sec. 209, 6-in., 60-lb. T-rail, for use in brick paving. The company contemplates using this rail new or in first-class relayer.

POWER HOUSES AND SUBSTATIONS

Michigan United Railways, Detroit, Mich.—This company is building at De Witt on its Lansing-St. Johns division a combination substation and passenger station. The building is of attractive design built of brick and concrete. It will replace a substation which was burned during the past season.

Third Avenue Railroad, New York, N. Y.—This company has contracted with the Westinghouse Electric & Manufacturing Company to equip the new substation being constructed at Webster and Brook Avenues, the Bronx. The installation will include four 1500-kw rotaries and 12 550-kw air blast transformers.

United Railways, Portland, Ore.—This company, which is building a line down the Linnton road and eventually seeking a line into Washington County, has filed on extensive water rights along East Dairy Creek. The filing covers the use of the stream for irrigation and power and for energy for electric lighting and all other purposes. The headgate is to be at Denny Ford, 15 miles north of Hillsboro. It is said that the company intends to use this site for its new power station.

Scranton (Pa.) Railway.—Bids have been asked for the building of a new power station for this company. The new plant will cost about \$250,000. It will occupy the site in the rear of the present plant on Providence Road. The boiler room will be 240 ft. x 75 ft. and the whole building, 180 ft. x 60 ft. It will be built so as to allow for future extensions.

SHOPS AND BUILDINGS

Iola (Kan.) Electric Railroad.—The car house of this company, together with all its contents, with the exception of two cars, was recently destroyed by fire. The loss is estimated at \$30,000.

Manufactures & Supplies

ROLLING STOCK

Missouri River & Northwestern (Steam) Railroad, Rapid City, S. D., will buy on Feb. 1, 1909, two gas-electric motor cars and one Mogul engine.

Fisher Construction Company, Joliet, Ill., is in the market for six center-dump construction cars, each to have a capacity of about 21 cubic yards.

Clinton Street Railway, Clinton, Ia., will receive this month two semi-convertible cars ordered in September from the American Car Company, St. Louis, Mo.

Chicago (Ill.) Railways will order 550 more pay-as-you-enter cars early next year for 1909 delivery, making a total of 1250 new cars ordered since March, 1908.

Chicago & Joliet Electric Railway, Joliet, Ill., is reported to be planning, through the American Railways Company, Philadelphia, Pa., for the purchase of five interurban cars.

Washington, Alexandria & Mt. Vernon Railway, Washington, D. C., has ordered from The J. G. Brill Company, Philadelphia, Pa., six large double-truck semi-convertible cars.

Aurora, Elgin & Chicago Railway, Chicago, Ill., has ordered from the G. C. Kuhlman Car Company, Cleveland, Ohio, three interurban cars of the standard type in use by that company.

Johnson City Traction Company, Johnson City, Tenn., has ordered three new cars for service on its city line. The company has recently extended its line into the suburbs, adding one mile of track.

Milwaukee Light, Heat & Power Company, Milwaukee, Wis., is said to be in the market for 10 new cars to be delivered immediately. It is also reported that the next year the company will buy at least 100 new cars.

Iola Electric Railroad, Iola, Kan., through Lee Massengale, general manager, is seeking to buy for rush delivery four or five cars to replace those destroyed when the company's car barn burned on Nov. 28.

Philadelphia Rapid Transit Company, Philadelphia, Pa., has placed an order with the Curtis Motor Truck Company, Decatur, Ill., for 15 sets of double trucks, which are intended to be used in replacing a type of truck which has been discarded.

Ithaca Street Railway, Ithaca, N. Y., is asking for bids on 10 28-ft. city cars. The specifications call for 6-ft. platforms and the cars are to be of the Pay-As-You-Enter type. It is announced that in the spring the company will be in the market for 10 cars in addition to the present requirements.

Calumet & South Chicago Railway, Chicago, Ill., will build several funeral cars early next year. These will be used in carrying caskets to the cemeteries which will be made available by the completion of the proposed connection between the lines owned by this company and those of the Chicago & Southern Railway at 103d street, Chicago.

Interurban Company, Burlington, N. C., which is now in course of construction under the direction of C. J. Winslow, 25 Broad Street, New York City, is asking for prices on cars and other equipment. The road will be eight miles long and will not be completed for six months, but it is expected that equipment will be ordered for delivery at the time the road is finished.

Buffalo, Lockport & Rochester Railway, Buffalo, N. Y., is preparing specifications for 15 interurban cars and two express and baggage cars. The company has been authorized by the Public Service Commission of the Second District of New York to issue bonds to the extent of \$200,000 to pay for this equipment as was published in the ELECTRIC RAILWAY JOURNAL of Oct. 17, 1908. The company is now about ready to ask for bids.

Joliet & Southern Traction, Joliet, Ill., has placed an order with the American Car Company, St. Louis, Mo., for five 47 ft. three-compartment interurban cars. The Fisher Construction Company, Joliet, Ill., through which this order was placed, will purchase for the traction company during the next year about 25 additional cars for service on the extensions which are now being made to the Joliet & Southern's lines.

Calumet & South Chicago Railway, Chicago, Ill., has had four of its cars rebuilt in the shops of the operating company, the Chicago City Railway. These cars will be put in service about Dec. 20. Plans are completed for the re-

building of all the other cars owned by the company. Since this company's lines were placed under the jurisdiction of the City Railway 20 double-truck cars have been added to the rolling stock equipment.

Rochester & Manitou Railroad, Charlotte, N. Y., announces that it is in the market for three semi-convertible car bodies and trucks to be used in connection with the present motor equipment. Reference to the fact that this company was about to order equipment was made in the *ELECTRIC RAILWAY JOURNAL* for Dec. 5. The company is also ready to purchase air brake equipments for the three cars referred to above and desires to buy six trail cars.

Kansas City, Olathe, Ottawa & Iola Railway, Olathe, Kan., a new line of 120 miles which is now under construction, will soon be in the market for a full equipment of both passenger and freight cars. These equipment orders will be passed on by the Standard Engineering Company of Cleveland, Ohio, which has taken the contract for constructing the road. Hugh A. Holmes, president of the Union Finance Company, of Kansas City, Mo., is financing the new road.

Accomac Traction & Power Company, Onancock, Va.—A new line being constructed from Onancock, via Tasley and Accomac to Wetomkin Bay in eastern Virginia will soon be prepared to place orders for equipment. These orders will be placed by the Railway & Electric Construction Company, 30 Church Street, New York. The specifications call for two combination express cars, equipped with two 35-hp motors and one combination motor car equipped with four 35-hp GE motors.

Rock Island Southern Railroad, Monmouth, Ill., is reported to have completed arrangements for leasing 1000 coal cars from the Chicago, Rock Island & Pacific Railroad. These cars, it is said, will be used in hauling coal over the extension which is now being built from Monmouth to Rock Island. This company, which as reported in the *ELECTRIC RAILWAY JOURNAL* of Dec. 5 is in the market for 22 interurban cars, will place the order for these equipments about Jan. 1. The cars are to have an over-all length of about 58 ft. and are to weigh complete about 110,000 lb.

Detroit United Railways, Detroit, Mich., has placed the order for 25 new cars, referred to in the issue of the *ELECTRIC RAILWAY JOURNAL* for Dec. 5, 1908, with the G. C. Kuhlman Car Company, Cleveland, Ohio. The cars are of the standard type, double truck city cars now in use upon the company's lines. An order has been placed with The J. G. Brill Company for its type 27-F-1 trucks and with the Westinghouse Electric & Manufacturing Company for motor equipments. Each car will be provided with A-35-hp motors. The length of the cars over all will be 41 ft. 4 in.; width over all, 8 ft. 5½ in. Body and under frame are to be made of wood; trimmings, solid bronze metal. In addition to this the special equipment is as follows: Curtain fixtures, Keeler eccentric type; curtain material, Pantasote K.2; gongs, 12-in. pedal alarm; hand brakes; headlights, 585 Dayton Manufacturing Company; interior finish, quarter-sawed white oak; motors, 2 Westinghouse 93-A-2; roofs, monitor deck pattern; seats, 12 transverse and 4 longitudinal, rattan.

TRADE NOTES

W. T. Van Dorn Company, Chicago, Ill., reports that the 60 cars recently ordered from the St. Louis Car Company by the Seattle Electric Company will be equipped with Van Dorn couplers.

Babcock & Wilcox Company, New York, N. Y., has purchased from the Rust Boiler Company its patents and plant, located at Midland, Pa., and will continue the manufacture, at that point, of the Rust water-tube boiler.

Pantasote Company, 11 Broadway, New York, N. Y., reports that Agasote headlinings were specified for use in the construction of the 25 cars recently ordered from the G. C. Kuhlman Car Company, Cleveland, Ohio, by the Detroit United Railway.

Chas. F. Etter, Harrisburg, reports that the Public Service Railway, New Jersey, has provided all its conductors with Etter change carriers for use in its pay cars. The company gives conductors \$20 every day when they start out, as it uses the Coleman fare box on these cars.

John C. Dolph has recently severed his connection with the Standard Varnish Works, New York City. Mr. Dolph has been with this company for the past eight years, and has done much toward developing the insulating department and securing the introduction of its insulating varnishes and vacuum compounds. He is not prepared to announce as yet his plans for the future. Mr. Dolph's pres-

ent address is Room H5, Produce Exchange, New York City.

John F. Ohmer, of the Ohmer Fare Register Company, Dayton, Ohio, has recently been granted a patent on an improved fare register. The valuable feature claimed for Mr. Ohmer's most recent invention comprises means for registering, recording and indicating a maximum number of fares of different classifications with a minimum mechanism and space occupied thereby. Thus far Mr. Ohmer has been granted upward of 100 patents, many of which cover basic inventions and principles.

American Blower Company, Detroit, Mich., reports large sales of apparatus during the month of November, among which may be noted forced draft apparatus to the Columbus Light, Heat & Power Company, Columbus, Neb.; Lincoln Traction Company, Lincoln, Neb., and the Consolidated Power & Light Company, Pluma, S. D. "ABC" engines were also sold to the Westinghouse Electric & Manufacturing Company, Pittsburg, Pa., the Fort Wayne Electrical Works, and to the Westinghouse Company of Canada.

Meyer Safety Guard Company, Omaha, Neb., has arranged with the Omaha & Council Bluffs Street Railway to place some of its safety appliances on the Omaha cars for a trial. The Meyer company has received applications from over 100 Eastern cities for a demonstration as to the efficacy of this new life-saving device, but has decided to give it a trial in the home city of the company. A demonstration will be made on the closed cars at once, and as soon as the time comes for the use of open cars the devices will be applied to that class of cars.

G. M. Basford, assistant to the president of the American Locomotive Company, has been appointed acting secretary of the recently organized Railway Business Association, which is conducting a campaign having for its object the restoration of activity among transportation interests. Mr. Basford will direct the movement, a feature of which will be requests to business men everywhere to petition their representatives in the National and State capitals to favor helpful railroad legislation and a fair adjustment of rates. Mr. Basford was formerly editor of the *American Engineer and Railroad Journal*.

Ohio Brass Company, Mansfield, Ohio, has closed a contract with the Rock Island Southern Railroad, Monmouth, Ill., for overhead material for approximately 80 miles of railroad. This includes material to be used in rebuilding the existing 20 miles of line now operated by the company. The Murray Iron Works, Burlington, Ia., have also received an order from the company for furnishing the boilers for its power house on Edwards River, from which power will be furnished for operating cars over the line between Monmouth and Rock Island. J. A. Roebbling's Sons Company, Trenton, N. J., will furnish the trolley wire for the company's 80 miles of railway.

Atlas Car & Manufacturing Company, Cleveland, Ohio, has received an order from the Panama Canal Commission for 12 electric locomotives. These are 6½ tons each and are equipped with two 25-hp motors, operating on 550 volts d.c. The current is taken from a third-rail with an underrunning contact. Each locomotive is intended to draw two flat cars of special construction. The company is furnishing 24 flat cars. In addition to this it will furnish 30 automatic dump cars of 3 cu. yd. capacity each. These cars are operated by two 3-phase induction motors of 7½ hp each. The cars are intended to operate on a circuit of track about a mile long, and this operation is entirely automatic. No attendant is required on the cars. They automatically pick up their load of sand, gravel, concrete, etc., travel over the circuit and dump it. It will be about six months before these cars are completed and installed.

Western Electric Company has completed the replacement of the destroyed Paris telephone switchboard. The work was finished Nov. 30. The \$600 daily penalty clause in the contract, for every day over 60 required in building this switchboard, was thus rendered inoperative. The Chicago plant of the company started work on the big switchboard Oct. 3, shipped it to New York on Oct. 23 and it arrived in Paris on the steamship *La Provence* Nov. 6. This is the second record made within a year by the Western Electric Company for rapid telephone exchange replacement, the other being that of the Antwerp exchange—the oldest in Europe—for which a 5000-line equipment was manufactured and installed in 30 days. The Paris contract covered a 10,000-line equipment and while apparently involving but twice the labor of the other, in reality meant several times more. The fast time made stands as another triumph for American skill and enterprise.

ADVERTISING LITERATURE

Warren Webster & Company, Camden, N. J.—This company has issued a private illustrated postal card of the Union Station, Washington, D. C., in which the Webster system of steam circulation is installed.

Scully Steel & Iron Company, Chicago, Ill.—The new Blue Book and stock lists of this company have just been sent out. The price lists are complete and cover in detail everything that the company carries in stock.

Western Electric Company, New York, N. Y.—This company has devoted Bulletin No. 5370 to steam turbines. The Rateau turbine, which is especially the leader of those manufactured, is fully described and illustrated.

C. A. Manufacturing Company, Austin, Texas.—This company has ready for distribution its 1909 booklet relating to its C. A. Wood Preserver (Carbolineum America). The booklet contains a number of views showing how this product is applied.

Columbia Incandescent Lamp Company, St. Louis, Mo.—This company has recently issued a bulletin discussing the question of train lighting. The bulletin was prepared especially for the Association of Car Lighting Engineers, which recently held its convention in Chicago.

Pathé Frères, New York, N. Y.—The weekly Bulletin of this firm for Dec. 7 illustrates a number of interesting films which have recently been added to its stock. During the month of November, 15 new subjects were put upon the market, and it is promised that during December, 16 will be sent out.

Northwestern Expanded Metal Company, Chicago, Ill.—A publication recently sent out by this company describes the roof and floor slabs which it manufactures, and sets forth the virtues of this material in adding to the fireproof qualities of buildings. Tables are arranged furnishing the specifications for various characters of construction.

Rooke Automatic Register Company, Providence, R. I.—The Norton & Taunton Street Railway, Norton, Mass., has issued an instruction book to conductors who are using the Rooke registers. The instructions are very explicit, and the Rooke company says that unless they are violated the use of the register will insure the recording of every fare.

Albert & J. M. Anderson Manufacturing Company, Boston, Mass.—This company's catalog on automatic time switches will interest the many to whom Anderson line material is so favorably known. The time switches described operate electrically and should be found a convenience and a saving in several features of electric railway service.

Westinghouse Electric & Manufacturing Company, Pittsburg, Pa.—Circular No. 1157, which has just been issued by this company, devotes its space to the Westinghouse Type S distributing transformer. The bulletin is profusely illustrated and the operation of the apparatus is thoroughly discussed. Every feature of its make-up, and full instructions as to its installation, are set forth.

Watson-Stillman Company, New York City.—Catalog No. 69 of this company, which is now being sent out to the trade, is a comprehensive list of all the makes of hydraulic tools for which the concern is well known. Minute details and price lists accompany illustrations and diagrams, so that all the information that a prospective purchaser might desire can be easily found.

Association of American Portland Cement Manufacturers, Philadelphia, Pa.—This association has issued bulletin No. 18, on reinforced concrete chimneys. It contains a report of an investigation made for the association by Sanford E. Thompson, consulting engineer, of Newton Highlands, Mass. Several of the most notable reinforced concrete chimneys of the United States are illustrated.

Western Electric Company, Chicago.—This company in an interesting little booklet just issued describing the value of its cables for telephone use, states that it is the largest manufacturer of such cables in the world, and that its product insures comparative safety and freedom from accidents to those who use it. The plant in which the cables are manufactured is shown by numerous illustrations.

Pettingell-Andrews Company, Boston, Mass.—“How to Prevent the Theft of Current, and How to Simplify the Testing of Meters” is the topic of the latest publication being sent out by this company. It contains much valuable information for the central station man and also for the meter department. It explains devices that are designed to cure the evil of current theft and also to secure correct recording.

Lord & Burnham Company, Irvington-on-Hudson, N. Y.—Catalog No. 6 describing the sash operating apparatus manufactured by this company is being sent out to the trade. It is a handsome, comprehensive publication, well

illustrated with half-tones and filled with descriptive matter concerning the appliances made by this company. There are many line drawings showing the operations of sash adjusting devices.

Joseph Dixon Crucible Company, Jersey City, N. J.—The December number of *Graphite* contains many interesting features. A little sketch of the history of the Dixon Company for the past 10 years is the introductory article. Among the interesting papers is “Preventing Corrosion of Steam Machinery,” by W. H. Wakeman, and “Retrospection,” by W. J. Coane, manager of the Philadelphia office of the Dixon Company. Another interesting feature is five illustrations showing “The House that Dixon Built.” These portray the plant in Jersey City at its present great extent.

Bausch & Lomb Optical Company, Rochester, N. Y.—This company, of which George N. Saegmuller, formerly sole proprietor of Fauth & Company, of Washington, D. C., is now a member, announces its “Hand Book of Engineers” for 1909. This book, of vest-pocket size, contains the Solar Ephemeris for 1909 and also directions for using the Saegmuller solar attachment, now extensively employed. There are directions, with diagrams for using and adjusting the engineers' wye level, the dumpy level and the transit instrument, as well as other useful information. The book will be sent at once upon request.

Westinghouse Companies, Pittsburg, Pa.—The publishing department representing the Westinghouse interests in the United States and Canada has just issued the 1909 edition of the Westinghouse diary. This is the fifth edition of this convenient book, its publication having been begun in 1905. The 1909 edition contains more information of interest to engineers and users of power apparatus than in any of the former editions. Besides the blank spaces for daily entries and maps, the diary gives data on: High pressure steam turbines, Leblanc condensers, low pressure steam turbines, mechanical stokers, mercury vapor lamps, meter testing, storage batteries, single phase railway systems, tungsten lamps, turbo-pumps and blowers and Westinghouse-Nernst lamps.

General Electric Company, Schenectady, N. Y.—Bulletin No. 4630, recently issued by this company, contains a description of its direct current portable instruments, type DP, which have been designed for laboratory and general testing purposes. These instruments are so constructed as to be easily portable, well protected from mechanical injury and from the effect of stray fields. They comprise ammeters, voltmeters, mil-ammeters and milli-voltmeters. A bulletin is also being sent out devoted to a description of the automobile accessories manufactured by this company, which will be of interest to automobile owners. The apparatus described consists of charging panels of various types, automobile instruments, automobile incandescent lamps, motor-generator sets, automobile motors and controllers, battery-charging rheostats, low tension magnetos, air compressor outfits, etc.

National Brake & Electric Company, Milwaukee, Wis.—Publication No. 386, entitled “Air Compressors for Industrial Service,” is being distributed by this company. In this attractive 24-page pamphlet are described compressor equipments for a variety of services. Practically all of these equipments are applicable to electric railway use. The extreme simplicity, reliability and flexibility, combined with the cleanliness of pneumatically operated tools is resulting in the rapid extension of the use of pneumatic apparatus in repair shops and manufacturing plants. The new publication describes the more common types of motor-driven enclosed compressor units and several types of air pumps arranged for direct or for belt driving. Probable air-compressor units of various capacities with and without water-cooled cylinders are illustrated and described. These portable units are built for driving with either alternating or direct current and are provided with manually operated unloaders. The water-cooling feature assures that these compressor units may withstand severe continuous service. The type 3-VS compressors with large vertical cylinders in line with a common shaft arranged for direct driving by motors, are described in detail. It is stated that the motors for driving these large compressors are particularly adapted to the peculiar characteristics of air-compressor loads. In connection with the motors for the large compressors a special form of resistance is furnished as a part of the combined automatic controlling device. With this device, which is controlled electrically, in the event of the power going off the controlling device as a whole returns to its normal starting position, thus eliminating the possibility of motor burnouts and entirely overcoming the necessity of having an attendant to re-start the pumps. These controlling devices permit of starting the d.c. compressors on not to exceed one-half full-load current and of starting the a.c. compressors at not to exceed full-load

current. A late type of air compressor and water-pump unit combined on a single frame for driving by a common motor, forms the subject of one division of the pamphlet. The air compressor and water pump are operated independently of each other and the change from one to the other is readily effected by throwing a single switch. The driving power is transmitted from the motor to the pump through the medium of electric clutches. Such pumping units have become valuable in connection with automatic sprinkler systems where both compressed air and water underpressure are needed. The new pamphlet, besides describing these various types of standard and new machinery, includes tabular matter descriptive of the capacities and dimensions of the various pumping units listed.

ELECTRIC RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED DEC. 1, 1908.

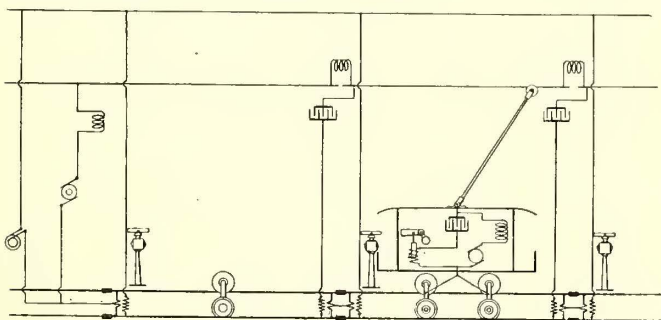
Car Fender, 905,178; Edward T. Hardin, Hot Springs, Ark. App. filed March 23, 1908. Relates to that type of fender having a tripping member in advance thereof.

Fare Register, 905,218; John F. Ohmer and Charles W. Kettelman, Dayton, Ohio. App. filed July 10, 1907. Increases the capacity for registering and indicating the fares in a machine of given capacity. Has two series of banks of fare counters for registering fares of major and minor values, both series of counters being utilized in registering the fares of major values, a single auxiliary dial upon which the fares of both series of counters are indicated, and individual setting mechanism co-operating with the auxiliary dial in selecting the fares to be registered on either series of counters.

Railway Tie, 905,285; Rimmon J. Carr, Petoskey, Mich. App. filed Feb. 7, 1908. A metallic rail tie having rail supporting members thereon, removable holding members disposed longitudinally above the tie and extending through and removable from the supporting members, and a pair of rail engaging devices upon each end portion of the holding members, one member of each pair being removable from the bar.

Automatic Railroad Signal, 905,308; W. H. Harris, Stark, Mont. App. filed Dec. 16, 1907. An arm on the cab hits against pivoted rods arranged at intervals along the track. This closes an electric circuit, which is broken as the train leaves the block by the train hitting a second pivoted rod. These operations set the signals.

Electric Signaling System, 905,327; Edward E. Kleinschmidt, New York, N. Y. App. filed Aug. 7, 1907. A signal system for direct-current trolley roads. Alternating current is used for the signals. A transformer in each track section receives alternating current and delivers induced current to a signal device in the car through connections between the other transformer member, the track and the section behind of a sectional conductor.



Electric Signaling System—Patent No. 905,327

Trolley Retriever, 905,351; C. Norland, Los Angeles, Cal. App. filed March 7, 1907. A spring drum with a connection to the trolley rope automatically draws the trolley down when it is disengaged from the wire. Keeps proper tension on the trolley rope at all times.

Truck for Railway and Tramway Vehicles, 905,354; Edgar Peckham, Westminster, London, Eng. App. filed May 22, 1906. A suspension device for a car truck, consisting of a link or hanger depending from the journal box and supporting at its lower ends a spring plank or independent member, the connection between the link and plank being such that an independent lateral or radial or lateral and radial movement of the axle is allowed.

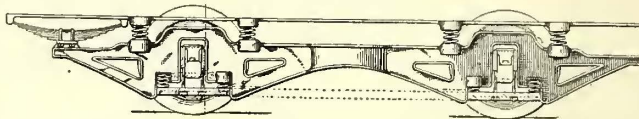
Car, 905,359; Charles K. Pickles, St. Louis, Mo. App. filed April 21, 1908. A semi-convertible car. Relates to means for storing the window sashes.

Pleasure Car, 905,391; James D. Walsh, St. Louis, Mo. App. filed March 25, 1908. Relates to detail improvements on the construction of a pleasure car forming the subject-matter of a prior patent.

Brake Mechanism for Railway and Like Vehicles, 905,444; Edward S. Luard, London, Eng. App. filed July 6, 1908. The push or pull-rod by means of which the brake blocks are actuated, in lieu of being hinged to the oscillating crank arm and to the brake-block arm or lever, is formed at its end with ratchet teeth on its upper and lower faces. With these two racks there engage respectively a pawl and a detent, the pawl and detent being held in engagement with their respective ratchet teeth by means of gravity or by springs.

Switch-Point Lock, 905,499; Arthur D. Cloud, Chicago, Ill. App. filed May 23, 1908. Comprises an endwise movable lock-rod adapted for connection at one end with switch points and provided at its other end with a locking projection, and a latch block movable transversely of the lock-rod and provided with oppositely facing laterally offset shoulders adapted for separate engagement with the locking projection.

Signal System, 905,513; J. L. Hall, Schenectady, N. Y. App. filed Jan. 30, 1908. A plurality of receiving magnets, each with a plurality of magnet windings, are supplied from a plurality of current sources. An independent lead connects each source and one of said receiving devices. A group of leads are common to the receiving devices, the several magnet windings being connected to different leads of the group, and a switch for each source is arranged to connect the source to any lead of the group.



Truck for Railway and Tramway Vehicles—Patent No. 905,354

Tie-Rod for Railroad Rails, 905,530; Henry Herden, Wellsboro, Pa. App. filed Sept. 5, 1907. The tie-rod consists of an elongated metal body having spike members at each end, the heads of the spike members being adapted to engage the inner base flanges of the rails.

System for Controlling Motors, 905,589; David E. Ross, Brookston, Ind. App. filed May 18, 1907. Relates to means for controlling a plurality of motors of any character by fluid pressure.

Automatic Switch Thrower, 905,656; Frank P. Cook, Spokane, Wash. App. filed Dec. 11, 1907. Details of construction.

Passenger Car, 905,665; Samuel M. Curwen, Haverford, and Warren N. Smith, Moores, Pa. App. filed May 7, 1908. A car of the "pay-as-you-enter" type. Doors inclosing one side of the platform, one door being a sliding door and the other a pivoted door, and means connecting the sliding door to the pivoted door so that they will open simultaneously. Also provides means whereby the steps of the car can be thrown into and out of operative position by the movements of the doors.

Railway Rail Support and Fastener, 905,688; George Gates, San José, Cal. App. filed April 29, 1908. A concrete tie reinforced with barbed wire and having means for attaching rails thereto.

Motor Control System for Electric Vehicles, 905,697; M. R. Hanna, Schenectady, N. Y. App. filed March 16, 1908. Avoids the "flash over" or arcing from brush to brush on street railway motors when the wheels slip by interrupting all the controlled circuits, except those which lead to the switches, which connect the motor circuits to the source of current supply, and those which arrange the motors in the series of starting position.

Railroad Brace, 905,763; Fred J. Taber, Garfield, Ky. App. filed Nov. 21, 1907. A rail-joint brace comprising a bridge, clamps adapted to secure the bridge to the rails, a truss carried by the clamps and provided with a standard and spring means for yieldingly holding the standard in engagement with the truss and bridge.

Mounting for Trolley Heads, 905,784; J. J. Bennett, Pittsfield, Mass. App. filed Aug. 6, 1906. Particular construction of mounting to permit the trolley wheel to follow the wire at all times.

Railway Rail Bond, 905,810; A. Gething, Enterprise, W. Va. App. filed Jan. 9, 1908. For bonding rails to be used as signal circuits. Comprises a flat metallic bar of special construction secured between the fishplate and the rails.