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Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1907 to date, 411,250 copies, an average of 8225 copies per week.

The Cleveland Situation

Under this caption the STREET RAILWAY JOURNAL has chronicled in almost every issue of the paper for more than a year the events each week in the contest waged between the Cleveland Electric Railway Company and Mayor Johnson, of Cleveland. We doubt whether any private corporation has ever engaged for so long in so unequal a struggle. Various compromises were possible earlier in the history of the conflict, but they involved what the company considered was an infringement of its rights, and so long as there was reasonable expectation that the people in Cleveland would support the efforts of the company to provide a good service, free from politics and at a low fare,

the company considered its duty lay in continuing on the defensive. The last election—carried, it is true, by a small majority—was in favor of the tactics pursued by Mayor Johnson, and the indications are now that the company no longer considers it necessary to prolong the fight for good government without the complete support of the citizens of Cleveland. The first steps to be taken in the appointment of a board of arbitration for the appraisalment of the railway lines in Cleveland were outlined in a speech made last week to the mayor and aldermen by Mr. Goff, a stockholder in the company, and reported elsewhere in this issue. The details are yet to be worked out, but the final compromise, if accepted, will involve no loss of honor. Mr. Andrews and his associates can retire from the direction of the Cleveland transportation system with the thanks of the street railway fraternity and of the conservative element in Cleveland for the resources which they have exhibited under tremendous odds in the defence of their property.

We imagine, however, that success will be not without its disadvantages for the victors. It is easy to criticize, but much less easy to give universal satisfaction. Heretofore the mayor has been an obstructionist, and his political capital has consisted largely of what might be called political promissory notes to the disaffected. We wonder whether he welcomes the suggestion of compromise as cordially as his political followers look forward to the operation of a municipal railway in Cleveland. Promise and performance in political matters have been found in the past to differ considerably from each other, and it remains to be seen to what extent this condition will apply in this case. Another serious question is the effect upon investors of public utility properties in general, and of those in Ohio in particular, of the events which have recently transpired in Cleveland. The growth of many of our cities depends upon the maintenance and extension of their local transportation systems, but capitalists will find little encouragement for investment if their enterprises are to be liable to such attacks as those to which they have recently been subjected in Cleveland. The result, so far as the investment of capital in the city itself is concerned, is still more doubtful.

In one respect encouragement can be found in the Cleveland episode. Up to the present street railway companies in this country have had to be on the defensive, as there have been no municipal roads in this country. At one time it seemed as if the experiment was to be tried in Chicago, but wiser counsels prevailed. Cleveland will now, under Mayor Johnson, attempt to prove that a municipal road can be made a success. We sincerely trust that such will be the case, but the odds are certainly very much against any satisfactory results from a transportation system operated for any length of time from the City Hall of any American city.

What Constitutes High-Tension Lines?

A prominent railway company has asked us "What voltage do steam railroad companies designate as high-tension lines," and further, "What requirements do they insist on for protecting crossings?"

The first question brings out some interesting facts. We use the phrase "high tension" daily, yet cannot define it. It is employed in drawing up franchises, contracts and other agreements by parties who, no doubt, have only a vague idea of what voltage constitutes "high tension."

All will agree that the ordinary railway voltage is not, and we have never heard the 1200-volt railway circuits referred to as high tension. The 2300-volt a. c. lines employed in commercial lighting carry practically the next commercial voltage, but we do not believe that they are generally classed under this head. A 6600-volt line is, no doubt, generally accepted as a high-tension line. The average person would probably place the dividing line between 6600 and 2300 volts. But this leaves the 4000-volt distributing circuits in several of the larger cities and the 3300-volt power circuits in the doubtful region.

It is possible that some of the States may have passed acts designating in definite terms what shall constitute high-tension lines. If so, it would be interesting to make a comparison and note any variations in the opinions of legislators. Any differences in State laws would certainly be embarrassing to a corporation doing business in several States. To remove all ambiguity, one of the prominent societies, the N. E. L. A. or the A. I. E. E., might take the matter up and specify what voltage shall constitute "high tension."

The second question relates to how these circuits should be protected at the points at which they cross railroad lines, but there seems to be no necessity for taking any more precautions at these points than at crossings with telephone and telegraph lines or at highway crossings. The probability of wires breaking and doing damage to the railroad trains appears to be no greater than the possibility of their causing injury at the other points mentioned. That this contingency is very remote may be judged from the fact that practically no reports of accidents are published due to any of the many 15,000 to 33,000-volt lines of interurban railways in the Middle West, although these circuits frequently follow the interurban tracks through villages and towns.

The Internal Combustion Engine

The December meeting of the American Society of Mechanical Engineers, held in New York last week, was of especial interest to power users on account of the attention given to the internal-combustion engine. Three papers were presented on this subject, the authors being Mr. Reeve, Prof. Lucke and Mr. Bibbins. Of these, the paper by Mr. Reeve was the longest and proposes a solution of some of the present difficulties which is somewhat of a startling compromise. His general view is that the explosion engine involves some inherent difficulties so great as to make a radical departure from present practice necessary. Especially in the matter of regulation is the gas engine at fault, since either with "hit-or-miss" governing or with operation at variable charge and hence variable compression

the opportunity for regulation comes too far ahead of the power stroke. This failing is familiar, yet big gas engines are steadily coming into greater use. We do not think that engineers familiar with gas-engine practice will agree with Mr. Reeve that "With all fuels except blast furnace and producer gas a gas engine costs more for fuel than a steam engine." The statement is certainly incorrect with respect to the ordinary run of small steam engines if gas or gasoline can be had at prices now commonly current, and surely is open to question as a general proposition. We hold no brief for the gas engine, or any other type of engine, but must also strongly dissent from the proposition that "A gas engine may, and undoubtedly does, 'lie down on its job' at any moment." A long list could be made of gas engines that have shown reliability in service quite comparable with anything that could reasonably be required of a steam engine.

To our mind the most serious handicap of the gas engine has been the too frequent claim that it is "fool-proof" and the consequent carelessness with which it is very generally treated. Even the present commercial engines without any claim to perfection will give wonderfully reliable service if treated with reasonable intelligence. All this, however, is quite aside from the very interesting possibilities of improvement disclosed by Mr. Reeve. The first proposition touches operation at variable clearance, giving for all variations of charge nearly uniform compression and hence securing high efficiency at all loads. There are several possible methods of arranging for variable clearance, all rather troublesome yet not impracticable. Far more promising seems the plan of using outside compression. This requires a compressor cylinder delivering a predetermined charge of compressed air and gas. The compression is thus virtually uniform for all loads and the governor can act even into the beginning of the power stroke which supplies a great gain in regulation. Such an engine gives an impulse for each stroke, thus giving the advantage of a two-cylinder form to compensate for the addition of a compressing cylinder. By such construction the working value of compression and hence the efficiency could be considerably increased without danger of back firing, since the charge would not start compression at a rather high temperature as it does in the ordinary cylinder. Obviously such an engine can be readily arranged for reversal, which is still another advantage. Perhaps the objection advanced by Mr. Reeve, the limited rotative speed due to the time necessary for admission and ignition, may be the chief reason why external compression, already proposed in various forms, has not yet come into the use that seems its due. This objection, however, is certainly not serious for many of the uses to which such engines would be applied, and the type is one that deserves development.

By far the most interesting possibility considered by Mr. Reeve is the evolution of a totally different type of internal combustion engine with which he has already experimented with some degree of success. Briefly this substitutes for explosion, combustion under constant high pressure and in presence of water, the mixed superheated steam and products of combustion being then used expansively as in an ordinary steam engine. One may think of it almost as the last refinement of a flash boiler fired from the inside.

The plan involves substantially a compressor system feeding the mixed air and gas into a gas furnace supplied with water. The resulting mixture of superheated steam, nitrogen and CO_2 is led into the cylinder and used at high expansion, preferably with compounding. The working initial pressure would be perhaps 300 to 400 lbs. per sq. in., and the engines would have in themselves the ordinary properties of steam engines. A machine of this type requires rather formidable compression equipment with resulting mechanical losses, and obviously cannot start under load when cold without a good deal of trouble. It is obviously somewhat complex and heavy as a complete installation and would run, one would think, risk of heavy depreciation in the combined boiler and furnace. Mr. Reeve gives no definite figures for its efficiency. In the thermodynamic sense it is undoubtedly very high, yet there may be some question as to whether in fuel per brake-hp it would compare favorably with a first-class steam plant with high superheating. It would have no ordinary boiler to be sure, but would have other accessories about as considerable. It is, however, a mighty ingenious and interesting type of prime mover which we trust Mr. Reeve will work out into commercial development. It has not the simplicity of the explosion type of engine, yet it has some very evident compensating advantages which might put it into serious competition with ordinary steam plants, especially since it fits rather well with the growing practice of using turbines for the lower stages of expansion. At all events it is a departure that deserves to be encouraged.

The Gas Engine as It Is

In distinction from Mr. Reeve's paper dealing with the internal combustion engine as it may be, we have the two valuable papers by Professor Lucke and by Mr. Bibbins discussing things as they are. The former is an analysis of some of the peculiarities of internal combustion which cause practical difficulties as well as theoretical complications. Looking at the matter broadly it is a marvel that the present internal combustion engine performs as well as it does. It is required to work with a wide variety of mixtures, often with very imperfect elimination of the products of combustion and with ignition applied at various points of the stroke. In automobile engines particularly it has to perform at all sorts of speeds, often too high for good mechanical performance, frequently with rather imperfect ignition. Even under less strenuous circumstances the irregularities of supply due to governing are great enough to cause considerable and often inexplicable variations in the consecutive indicator cards. Two things in particular, the conditions leading to explosive waves which may result in serious strains, and to pre-ignition, which is only too familiar, are brought out by Professor Lucke with especial force. A smooth interior for the ignition chamber with a free entrance for a uniform gaseous mixture regularly supplied seems to give the best chance of averting both these troubles. Projecting parts in the cylinder that can readily become over heated and eddies in the gas supply seem to be the chief but not the only promoting causes. It is important to note that to produce pre-ignition in a pure and uniform mixture by compression alone requires compressions very much higher than are actually used in engines.

The facts thus presented lend additional force to the

comments Mr. Reeve has made on the advantages of exterior compression. If properly carried out this should furnish a regularly distributed supply of uniform mixture in any required amount and should lead to considerably improved regulation, especially necessary in the large and relatively slow-running engines to which the process best applies.

Mr. Bibbins' paper is an exhaustive report of a service test of just such a large engine as now built worked after the ordinary methods on producer gas. The machine was a 500-rated-hp double-acting horizontal Westinghouse engine running 150 r. p. m. and directly connected to a 300-kw generator, and the particular interest which attaches to the test is that it was made with the equipment in charge of its regular operating force working under the ordinary conditions of service. The producer gas averaged nearly 115 effective B. t. u., so that the engine was in no wise under selected favorable conditions. The results were most satisfactory. The average consumption of coal at the producer during the 51 hours covered by the run was 1.4 lbs. per kw-hour, which was equivalent to 0.97 lbs. per hp-hour. The coal employed was Clearfield bituminous run of mine, averaging 14,321 B. t. u. per lb. This economy in fuel is certainly much better than could be reached by any standard steam-driven set of similar output in regular operation and would be extremely good for a plant of any size with the most refined equipment and operated under strictly test conditions. Most steam plants of comparable output would show more than double this coal consumption.

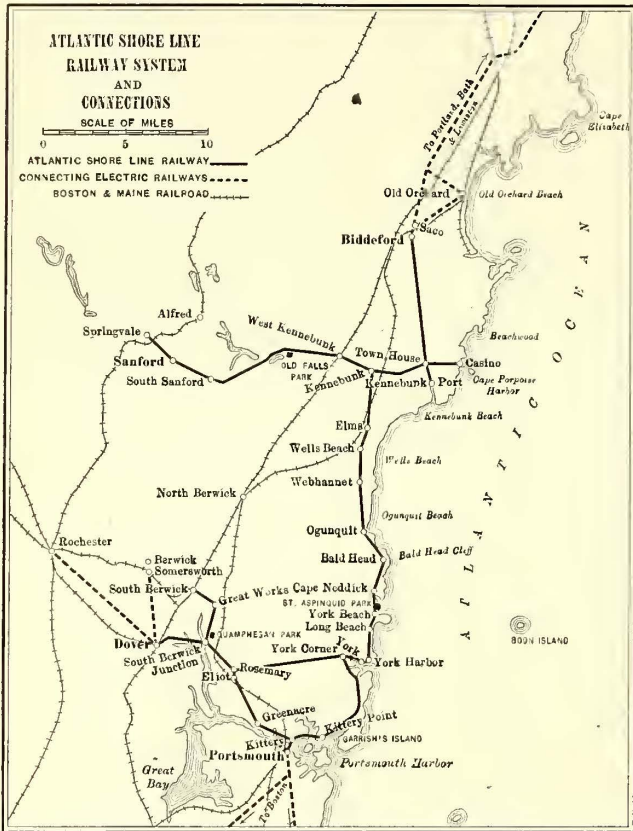
The cylinder oil consumption usually violently charged against the gas engine when all other arguments fail proved to be 0.6 gallon per operating day, or 1.44 gallons for a 24-hour day, an amount which surely does not imply a serious expense per hp-hour. The regulation proved to be from no load to full load 2.5 per cent above and below the mean. The operation of the engine at various loads showed a gas consumption varying from 190 cu. ft. per hp-hour at one-quarter load to 95 cu. ft. at full load, the thermal efficiency being 12.58 per cent in the first place, and 25.21 per cent in the second. These efficiencies are not at all extraordinarily high, although good, and the weakest point in the efficiency of the system seems to have been at the producer, of which the efficiency under the test load was 73.8 per cent. This would be considered high for boiler practice, however. There is probably much to learn regarding the most economical thermal value of gas and the best use of the fuel to produce it, for producer plants are not yet common enough in this country to furnish abundant data for the study of economies. Taken just as it is a plant such as the one here considered is a challenge that the steam engineer cannot safely overlook. The gas engine is far from perfect yet, but it is certainly even now capable of furnishing power at a wonderfully low cost. Its fuel consumption can be duplicated only by steam plants of great size and of the most elaborate and costly construction worked under almost ideal conditions with refinements as yet little known in this country. From Mr. Reeve's data one would be disposed to say that the present gas engine is now in about the relative state of the steam engine before Corliss and compounding. If the steam turbine and high superheating push the present gas engine into active improvement there will be something doing in economy records.

THE ATLANTIC SHORE LINE

The hope of a continuous trolley route along the Atlantic Coast from New York to Lewiston, Maine, has been recently fulfilled by the construction between York Beach and Kennebunk of the last coastwise link in the system of the Atlantic Shore Line Railway. The latter now extends

for home needs. The first section (3 miles) of the system was built between Springvale and Sanford in 1892 under the name of the Mousam River Railroad, primarily to carry incoming and outgoing mill freight to the Boston & Maine Railroad. In 1899, this line, which is shown in the accompanying map, was extended to Kennebunk, Kennebunkport and Cape Porpoise, thus making it possible to secure deep-water freight connections at the cape. The line to Biddeford connecting to famous Old Orchard Beach was completed in August, 1904. Two years ago, the present owners consolidated these lines with the Portsmouth, Kittery & York Railway. The system now covers, including the York Beach line, 100 miles of track, of which 50 miles are on right of way. The York Beach-Kennebunkport line has a right of way 66 ft. 8 ins. wide beginning between York Beach and Cape Neddick, returning to the public road for the 6-mile run between Ogunquit and Kennebunk. All of the franchises are perpetual.

For operating convenience, the system is divided into a Central, Western and Eastern division. The Western division, formerly the Portsmouth, Kittery & York Railway, connects Portsmouth, Dover and Salmon Falls, N. H., Eliot, South Berwick, Kittery, York and York Beach, Maine; the Central division, constituting the latest addition, connects York Beach, Ogunquit, Moody, Webhannet, Wells, The Elms and Kennebunk; the Western division includes the Sanford-Springvale-Cape Porpoise route, and is the one doing the heaviest freight business. The Central division, which is the principal scenic line, has brought several attractive communities into close touch with the world. The village of Ogunquit, for instance, is 6 miles from the nearest railroad station. A characteristic scene in Ogunquit, typical of other villages in this section, is shown in one of the accompanying illustrations.



MAP OF DISTRICT SERVED BY THE ATLANTIC SHORE LINE

ROAD AND TRACK CONSTRUCTION

On the Atlantic Shore Line there are eighteen intersections with steam railroads, only one of which is at grade.

from Portsmouth, N. H., connecting with the South and West via Boston, to Biddeford, Maine, where it meets lines running to Bath and Lewiston via Portland.

The stretch of Maine coast thus opened up for popular travel is widely noted for its long, splendid beaches, which alternate with rock-bound shores, peninsulas and islands, long famed for their majestic wildness. To the visitor, the district offers other attractions, too, for its quiet, old-fashioned villages still retain the stamp of the pioneer New Englander. In fact, from the start in Kittery, at the launching place of Paul Jones' "Ranger," to the end of the route in the flourishing mill town of Biddeford, the tourist will find many things of scenic and historic interest. It is hardly remarkable, therefore, to find that this is rapidly becoming a favorite trip for the New England trolley traveler.

Despite the fact that so much travel comes from non-residents, the Atlantic Shore Line Railway, properly called the "Sea View Route," originally consisted of several independent unconnected systems built by local capital purely

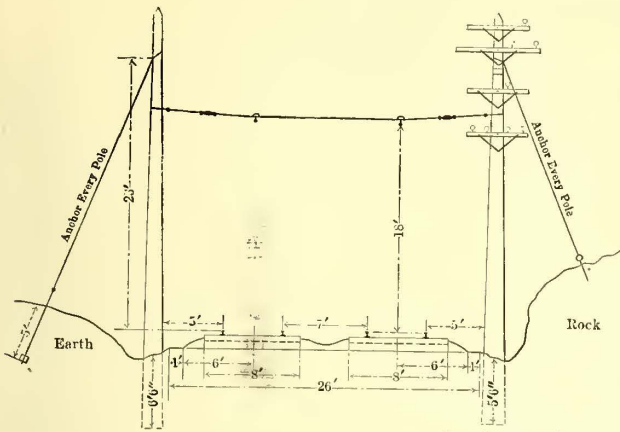


A LIVELY SCENE AT YORK BEACH DURING THE HEIGHT OF THE TOURIST SEASON

This is on a branch line at South Berwick and will soon be converted into an under-grade crossing. A typical example of the company's latest practice in this direction is shown in the accompanying view of an under-grade highway crossing at Wells, on the York Beach-Kennebunkport section. The steam railroad crosses on a girder bridge car-

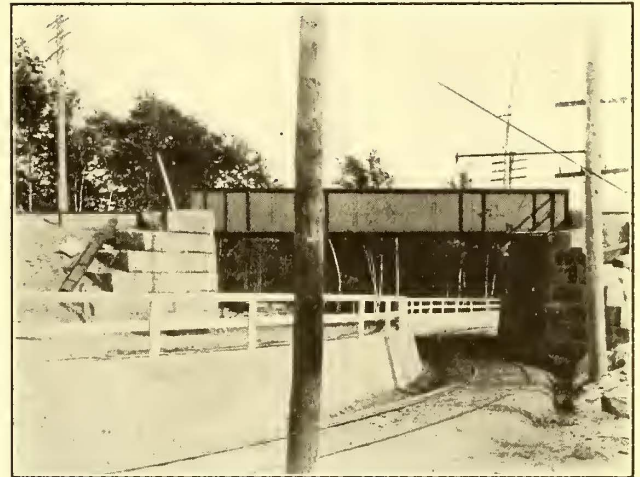
ried on granite abutments, while the trolley line is carried in a reverse curve along a depression in the highway. The part of the road reserved for other traffic is held by a retaining wall and is also fenced. *Most of the later under-grade highway crossings are built with concrete abutments.

line is ballasted with gravel from the company's pit at Wells, but rock has also been used where available. The rails are of 80-lb. T-section, laid in 33-ft. lengths on 6-in. x 6-in. ties 8 ft. long, spaced 2-ft. centers. The ties on tangents usually are of chestnut, but of oak on some of the

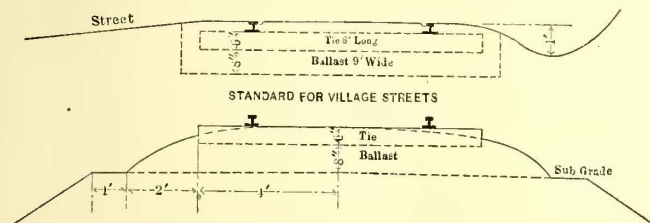


STANDARD TURNOUT CONSTRUCTION

There are about 3 miles of bridges and trestles on the entire system. The longest trestle, 600 ft., is over the channel of the Cape Neddick River on the new line. There are also several extensive rock fills on the new line. The



REVERSE CURVE UNDER THE BOSTON & MAINE RAILROAD, SHOWING RETAINING WALL FOR ROADWAY AND CHARACTER OF UNDER-CROSSING CONSTRUCTION



LATEST TRACK CONSTRUCTION STANDARDS OF THE ATLANTIC SHORE LINE RAILWAY COMPANY

longest of these, between York Beach and Ogunquit, is shown in one of the accompanying illustrations. The grades throughout do not exceed 4 per cent and, except in the towns, there are no curves of more than 50 ft. radius.

curves. The rails are jointed with simple angle plates and bonded with the American Steel & Wire Company's riveted copper bonds concealed under the fish-plates. No. 0000 flexible bonds are used for cross-bonding. The right of way is protected by wire fence and iron gates furnished by the American Steel & Wire Company. Stone for cattle guards has also been used in places where it could be conveniently obtained.

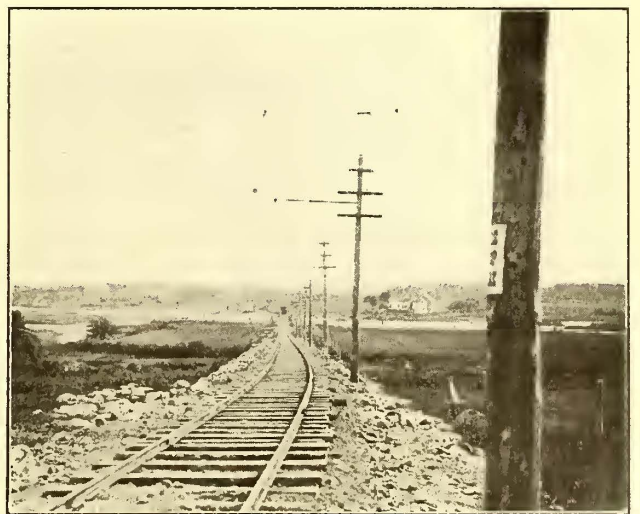
The roadbed construction on the other sections of the lines is somewhat lighter than that of the latest work, the rails varying in weight from 60 lbs. to 80 lbs. Lord soldered bonds are used on the Eastern division and different types of plain copper bonds on the other old sections.

OVERHEAD CONSTRUCTION AND TRANSMISSION LINES

The poles on the York Beach line are mostly of cedar with the rest chestnut, spaced 100 ft. on tangents. Those



A TYPICAL SCENE IN OGUNQUIT ON THE ATLANTIC SHORE LINE RAILWAY



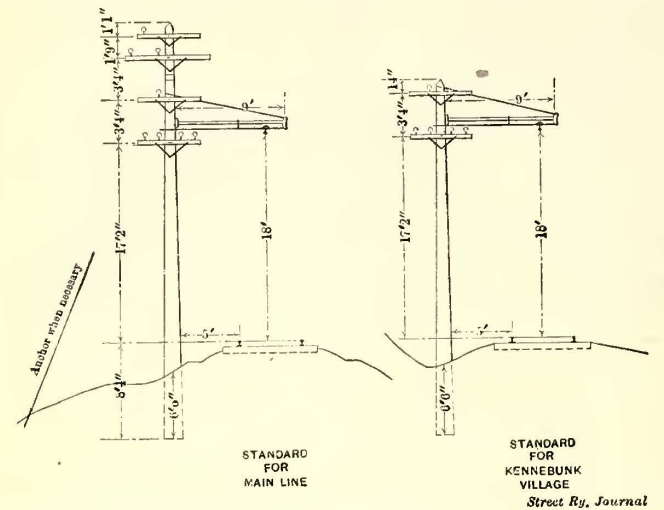
A HEAVY ROCK FILL NEAR CAPE NEDDICK, BETWEEN YORK BEACH AND OGUNQUIT

Two of the accompanying drawings show the character of the village and right-of-way roadbed construction adopted on the York Beach line, which represents the company's latest and best practice. The greater part of the

now carrying or intended to carry high-tension lines are 35 ft. long, but otherwise 3 ft. to 5 ft. shorter. Owing to the frequent heavy winds, it was considered advisable to anchor all the poles. Stombaugh anchors are used where

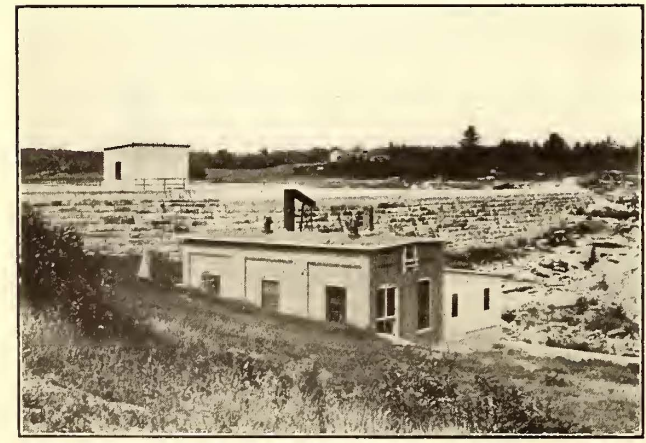
the soil is soft and anchor bolts in rock. The guy wires have wooden insulators to minimize current leakage.

Two cross-arms are provided for two three-phase, 10,000-volt transmission circuits. Only one of these is now installed, however, and is carried on brown Lima insulators placed on one side, which is 7 ft. 2¼ ins. long. The upper cross-arm for the future high-tension circuit is 1 ft. 6 ins. higher and 5 ft. 3¾ ins. long. The feeder arm



POLE CONSTRUCTION WITH AND WITHOUT HIGH-TENSION TRANSMISSION LINES

is also 5 ft. 3¾ ins. long, and is placed 3 ft. 4 ins. under the lower high-tension arm. A double telephone circuit of No. 10 iron wires is carried on the lowest arm 3 ft. 4 ins. below the feeder. These telephone circuits are transposed every six poles to minimize interference from the a. c. lines. The feeders are No. 0000 copper tapped by No. 0 wire every 1500 ft. The No. 0000 trolley wire on this division is suspended from Ridlon trolley brackets to give a clearance of 18 ft. above the head of the rails. Specimens of the overhead construction on tangents and at



ESTES DAM AND POWER PLANT

turnouts are shown in the accompanying illustrations. Wood-insulated span wires carry the trolley wire at curves and turnouts.

The overhead construction on the older divisions differs in several particulars from the foregoing, such as the use of Brookfield glass insulators on the Western division and Locke white porcelain insulators on the Eastern division for the 10,000-volt current. The feeders throughout are of No. 0000 section, in multiple where necessary. The trolley wire on the Western section is No. 00 and No. 0 on the

Portsmouth, Kittery & York line, and No. 00 between Biddeford and Kennebunkport, in accordance with the different power requirements. All lines on the system of this company are protected at half-mile intervals by General Electric or Garton-Daniels arresters.

POWER EQUIPMENT

The power sources of the Atlantic Shore Line Railway are widely scattered and include two water-power plants, three steam plants, sub-stations and storage batteries. Within the last year the feeder lines for all divisions have been tied together at appropriate junctions with section insulators and switches. This work includes extending the 10,000-volt transmission system on the Western division now between Dover and York Corner to Ogunquit to meet the other a. c. transmission line from Old Falls. These changes will assist not only in better balancing of loads, but also cut down the losses resulting from long, low-tension, direct-current lines.

The principal steam plant is at Kittery Point, which served for years as the power supply for the Portsmouth, Kittery & York Railway, now constituting the Western division. This is a direct-current station and contains the following: Two Ball & Wood compound engines, belted to 225-kw and 110-kw G. E. generators respectively and one Erie City engine running a second 225-kw generator. The other steam plant operated directly by the company is of 300-kw capacity and located at Kennebunkport. It is used only as an auxiliary.

From a 1500-kw Curtis turbine steam plant at Dover, controlled by the railway interests alternating current at 3400 volts is transmitted to the South Berwick sub-station and at 10,000 volts to York Corner.

The company also operates two hydro-electric plants, using water from the Mousam and Alfred rivers. The lower of these plants was purchased some time ago from the Alfred Light & Power Company and is operated on a 60-ft. head. This station contains Smith turbines connected to



THE AUXILIARY STEAM PLANT AT KENNEBUNK, MAINE

three 500-kw Westinghouse a. c. generators, one of which is an a. c. d. c. generator.

The supply of power from this source has been recently increased by the construction of a new dam at Estes Pond, 850 ft. long and 40 ft. high. The new station is a brick building with a frame addition for the penstocks. The equipment consists of two 500-hp Victor turbines direct connected to two 300-kw, three-phase, 60-cycle, 2200-volt generators. Three water-cooled transformers are installed to step-up the generator potential to 10,000 volts for trans-

mission. The circuits from this station and from the other water-power plant are carried as a triple system to West Kennebunk. At this point one of the lines is carried to the sub-station at Town House, while the remaining two are carried across country to a portable sub-station kept near Elms and to the sub-station at Ogunquit. It will be noticed from the map that this arrangement saves considerable pole and wire material, besides avoiding the necessity of passing through Kennebunk with a high-tension line.

SUB-STATIONS AND STORAGE BATTERIES

The Western division has a sub-station at South Berwick which contains a 200-kw G. E. motor generator set and a 278-cell chloride accumulator battery. There is also a battery of 220 cells at York Beach, and a 300-kw Westinghouse rotary and transformer equipment is located at York Corner.

The Eastern division has a sub-station at Town House containing a 300-kw Westinghouse rotary. There is also a 240-cell line battery at Old Falls. This battery is kept in a separate wooden building directly alongside the turnout at this point at a short distance from the Old Falls power station. No regular attendant is found necessary at this section, but in accordance with the best practice in floating batteries installed at isolated points, a guide lamp is placed in front of the building to inform passing conductors whether the battery circuit

ends of the Central division. In addition, a sub-station equipped with a 300-kw, G. E. converter and transformers has been installed at Ogunquit, and a portable sub-station containing a 200-kw outfit of the same type was kept during the summer between Wells and Kennebunk to help out cars on the new division. This car outfit, when in service at



PARALLELING THE HIGHWAY ON AN EMBANKMENT IN WELLS, MAINE

any particular point, is jacked up to relieve the pressure on the car springs due to the movement of the rotary.

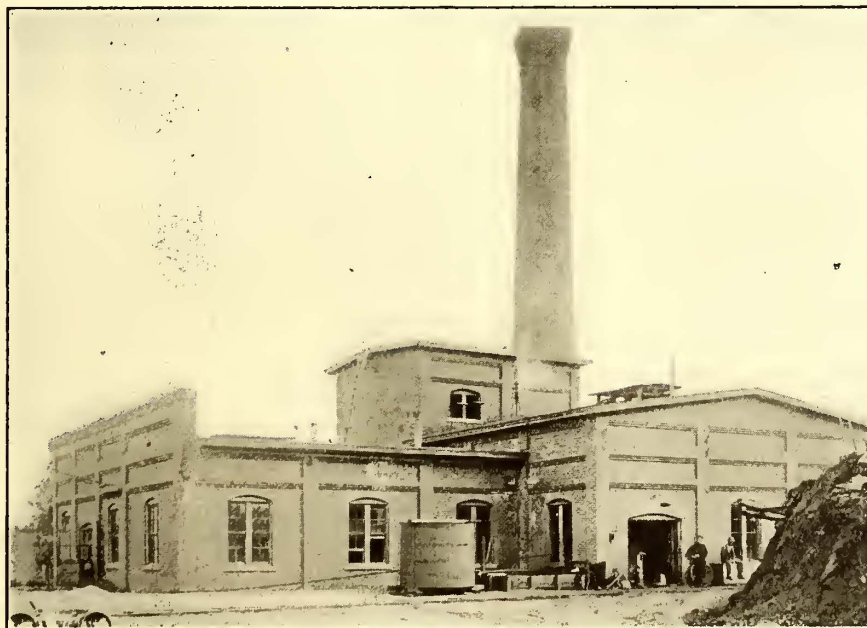
SIGNAL AND DESPATCHING SYSTEMS

The company is now using the United States Electric Signal Company's signals to cover the block beginning at the Kittery ferry opposite Portsmouth, a second block at York, and spacing sets for the protection of two curves along the Portsmouth, Kittery & York division.

The Eastern division has one set of signals at Kennebankport installed by the Eureka Automatic Signal Company, of Tamaqua, Pa. The same type is also installed at Kennebunk on the new line, equipped with lights for night use, beside the usual semaphore signals. In case of a circuit disturbance, the signals drop by gravity to "danger."

All despatching is done by telephone to the car houses, sub-stations and booths placed at the turnouts. The instruments are of both Stromberg-Carlson and Holtzer-Cabot type, but the installation was designed by the Holtzer-Cabot Electric Company. The usual type of booth is shown in one of the accompanying cuts.

Both the Central and Western divisions are governed by the despatcher at Kittery Point, while the Eastern division cars are despatched from Kennebunk. Both despatchers may keep in communication through a separate telephone system. Pegged boards are used by the despatchers to fol-



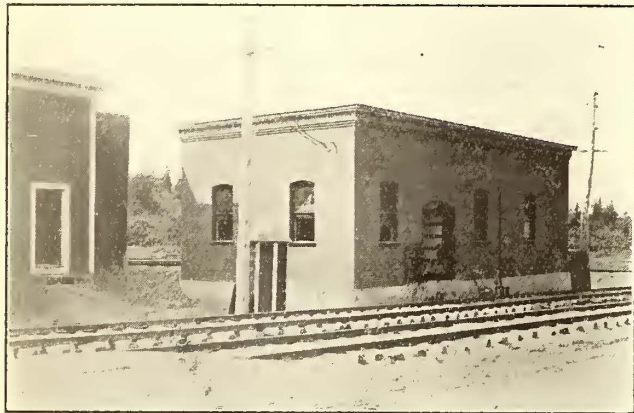
THE STEAM PLANT AT KITTERY POINT, MAINE

breaker is open or closed. The station at Sanford contains step-down transformers and a 250-kw, 500-volt rotary converter to supply Old Falls power to local manufacturers.

It will be noted from the foregoing that sub-stations and batteries are located at both the northern and southern

low the progress of cars in their charge. All stations and turnouts not previously named are definitely named for convenience in dispatching. The scheme is also of value to passengers, inasmuch as every turnout is furnished with a locality sign.

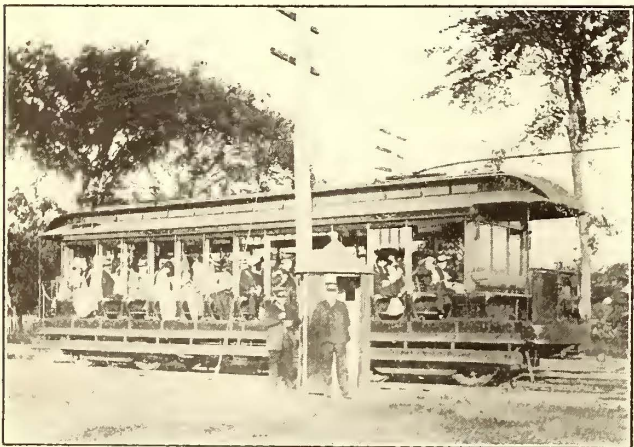
The dispatcher's orders are usually received by the car house or sub-station attendants, who write them out on Egry autographic registers, delivering one copy to the motorman and another to the conductor, while the third copy remains in the locked box. In cases when a car has been delayed for over five minutes, the motorman must call up



OGUNQUIT SUB-STATION WITH WOODEN CAR SHED AND TELEPHONE BOOTH ADJACENT

the dispatcher at the first turn-out, receive his order and repeat to the conductor. The latter then must repeat the message to the dispatcher before proceeding. It is also customary in busy times for the station men at York Beach and other important points to keep the dispatcher informed of the progress of the cars.

During periods of heavy traffic, the company runs cars two or more in a block, on the car-following system. The



CAR AT SIDING IN WELLS, WITH CREW AT TELEPHONE BOOTH

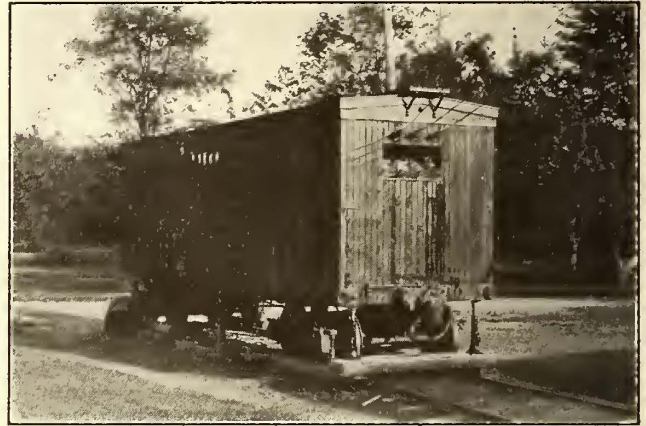
first car carries a sign worded "Car Following," instead of having the customary green sign. This serves as an indication to intending passengers that there is a car behind. Upon reaching a turn-out the crew of this car notify the opposing car to wait for No. 2. Should No. 2 bear a "Car Following" sign, it is necessary to wait for No. 3, and so on. Following cars are not subject to dispatcher's orders, being instructed simply to obey the orders given to the preceding car.

ROLLING STOCK AND BOATS

The latest cars purchased by the company are of the Brill semi-convertible type. Four are of the straight pas-

senger and two have baggage compartments. These are intended to meet the exacting requirements of the new York Beach-Kennebunk line, both with regard to the high speeds and comfort of passengers. Each car is equipped with four Westinghouse motors carried on Standard trucks. Two fifteen-bench open cars have been obtained from the same car builder. In all the company has fifty-six cars for its passenger service, five locomotives and eight snow plows.

Among the apparatus used with this rolling stock are the following: Christensen air brakes, General Electric air



PORTABLE SUB-STATION AT KENNEBUNK, MAINE

brakes, arc headlights and some type M control equipments; Wilson trolley catchers, Consolidated heaters, Ohmer registers and Sterling-Meaker printing registers.

This company also owns and operates two ferryboats between Portsmouth and Kittery.

CAR HOUSES

The consolidation of the lines now making up the Atlantic Shore Line Railway placed in the company's hands sev-



A NEAT SUB-STATION AND WAITING ROOM AT YORK CORNER, MAINE

eral small frame structures, which have been retained because of their convenience in eliminating unnecessary mileage. The regular repair work for the Eastern division is cared for at Town House. At that place the company has built the brick car house shown in one of the accompanying illustrations. This structure houses twenty cars.

At Sanford, which is also on the Eastern division, there is a frame structure for six cars. Repairs for the Western division are made at the Kittery Point frame car house, which holds twelve cars. There is also a twenty-car capacity brick structure at South Berwick junction. On the Central division there is storage for six cars at York

Beach to save cars from returning to Kittery Point, and also a new three-track building at Ogunquit for six cars. The Ogunquit installation has a concrete pit to allow light repair work.

PASSENGER TRAFFIC SOURCES

While the tourist traffic is unusually important on the Atlantic Shore Line Railway, the territory itself affords a good steady travel throughout the year, owing to the manufacturing and other industries of this district. Although



CAR QUARTERS AT TOWN HOUSE, KENNEBUNK, MAINE

the Boston & Maine Railroad operates lines to many points reached by the electric railway, the latter has secured more business. The York Beach travel from Portsmouth may be given as an example. In 1896, the Boston & Maine Railroad, without any competition and charging a fare of 65 cents on a 35-minute trip, received \$35,000, including the carriage of mails; the first year competition began, the electric line earned \$75,000 on a 25-cent fare and an hour-and-a-half trip, took away the mail and beat the steam railroad on local express handling. Despite this, the earnings of the steam line were not seriously affected, demonstrating again how the electric railway creates traffic.

Local pleasure riding is induced by giving free concerts at certain parks along the line, while the handsome Casino at Cape Porpoise attracts both the tourist and native. The Casino has a fine dancing pavilion as well as public and private restaurants. On Sundays sermons are delivered there, followed by a sacred concert. During the summer the lessee of the Casino publishes a 16-page weekly pamphlet called the "Atlantic Shore Line Railway Messenger." This paper contains illustrated descriptions of interesting points on the line news of the latest attractions, such as water carnivals and concerts, the latest time-tables, local advertisements, etc. It is distributed gratis at all the hotels, cottages, stores and other points in the territory of the company.

FARES AND SCHEDULES

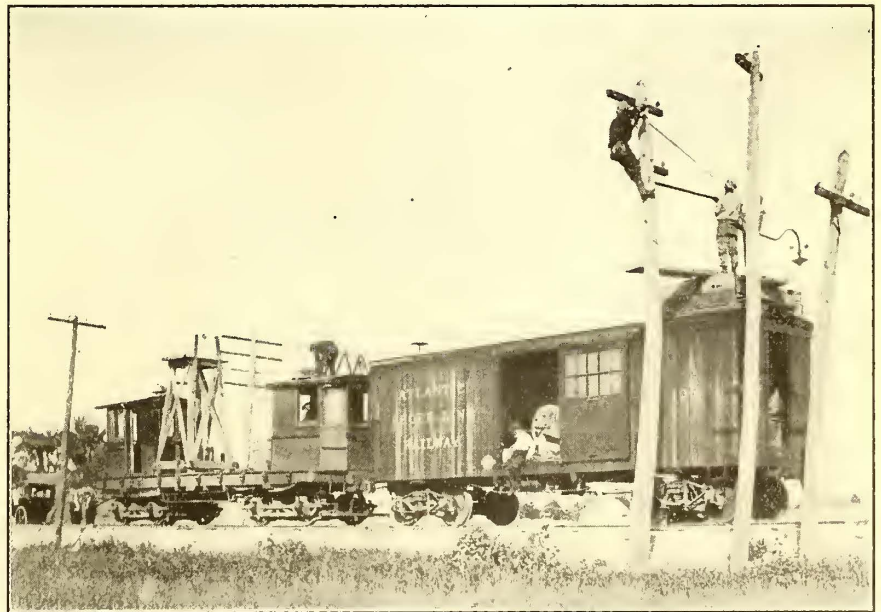
In general, the fares are based on about 2 cents a mile, except on the new line, where they are somewhat higher,

the 16-mile trip between York Beach and Kennebunkport costing 40 cents. Commutation books for workmen are sold at the rate of \$3.50 for 100 tickets, transportation good for fifteen days, and two books, good for one month, are sold to one individual. The rates on other sections work out as follows: Portsmouth to York Beach, 15½ miles, 25 cents; Dover to York Beach, 18 miles, 30 cents; Dover to South Berwick, 8 miles, 10 cents; Sanford to Cape Porpoise, 32 miles, 35 cents; Town House to Biddeford, 8½ miles, 10 cents. From this it is evident that the older portions of the system usually have the lowest fares. The fare zones are allowed to overlap to include churches, post offices or other points to encourage traffic. School tickets, good only on school days, are sold at reduced rates, and reduced rate tickets are also sold under certain restrictions to workmen. Waiting rooms are provided, either in special buildings as at Ogunquit, or in village stores, where tickets may be purchased.

During the summer months the coastwise lines are operated on a half-hour schedule and, if the traffic is heavy, two or three cars are run in a block on the "Car Following" system, already mentioned. Otherwise the cars are run every hour. In winter, of course, the schedules call for less cars, as there is then less outside travel.

MAIL AND EXPRESS

The company carries mail in a combination mail and



STRINGING A LIVE TROLLEY WIRE WITH THE AID OF ONE OF THE DOUBLE-CAR LOCOMOTIVES AND A STANDARD FREIGHT CAR

express car, receiving ¾ cent for each mile per lineal foot of car. Thus, a 12-ft. car returns 8 cents per mile traveled. Closed pouch mail is carried at 3 cents a mile. On the Eastern division mail is weighed for distances over 20 miles, as on steam railroads. On this the company is allowed about \$42 per mile a year. All packages which consigners desire shipped on the next car are carried as express at the local rates of the American Express Company.

FREIGHT HANDLING

The Atlantic Shore Line Railway may justly claim the honor of being the pioneer heavy electric freight line of New England. As mentioned in the opening paragraphs of this article, the present Eastern division was built in 1892 by the Goodall Bros., manufacturers of Sanford and Springvale, to haul freight for their mills to and from the Boston & Maine Railroad. The success of this project led to the Cape Porpoise extension to secure the economies of a deep-water connection. During the summer the coal used by the mills comes by way of Cape Porpoise, where the company has a barge-unloading equipment and coal pocket. In the winter coal cars are also hauled from the Boston & Maine Railroad. About 125 tons a day is the average amount shipped on this division. Lumber and products of the local woolen and other mills constitute most of the remaining freight business. The company is so well satisfied with the financial aspect of this business that it is arranging for an independent steamboat line from Boston, called the Eastern Maine Steamship Company, which could carry by way of Portsmouth and Cape Porpoise much of the freight now going via the Boston & Maine Railroad.

The company has found that its customers do not care to pay on a ton-mile basis for hauling freight cars. All car charges are therefore made up of a lump sum basis. The following is the present schedule of prices and the corresponding distances on the Eastern division:

income from this business on the Eastern division in 1906 was \$32,000 and \$35,152, ending June 30, 1907.

The three electric locomotives principally used in this work were built by the Laconia Car Company after the railway company's specifications. They are of the sloping cab type and are each equipped with four 50-hp G. E. motors, K 28 B controllers with contactors, G. E. air-brakes, Consolidated electric heaters and Lintern sanders. They weigh 45,000 lbs. The company has also three electric locomotives of the box-car type and has freight cars of standard size in addition to flat cars, etc.

GENERAL

The gross earnings and operating expenses of the Atlantic Shore Line Railway for the twelve months ending June 30, 1907, were as follows:

Gross earnings from operation.....	\$295,152.09	
Operating expenses	160,972.52	
Net earnings from operation.....		\$134,179.57
Accrued from sinking fund.....		3,125.00
Gross income		\$137,304.57
Deductions from income:		
Taxes	\$3,600.00	
Interest on funded debt.....	89,990.00	
Interest on notes.....	59.93	
Net income		93,649.93
Deductions from net income:		
Burglary at Town House.....		575.45
Surplus for year.....		\$43,079.19
Surplus from previous year.....		5,983.30
Total surplus June 30, 1907.....		\$49,062.49

The financing of the Atlantic Shore Line Railway Company is conducted by A. H. Bickmore & Company, New York bankers, who are planning further improvements and extensions to the system. All the officers of the railway except the vice-president, who represents the Bickmore interests, are local men. They are as follows: President, E. M. Goodall, of Sanford; vice-president, I. L. Meloon, of New York; treasurer, L. B. Goodall, of Sanford; secretary and general attorney, Fred J. Allen, of Sanford. The management of the system is in the hands of W. G. Meloon, who was for many years general manager of what is now the Western division. The operating headquarters are at Portsmouth, which, as previously noted, is directly opposite Kittery, the starting point of the system.

A by-law authorizing the Montreal Street Railway to carry freight over its line has been adopted. The company, which has signified its willingness to accept the conditions, will be allowed to carry freight at all times save between five and seven o'clock in the evening, and six and eight o'clock in the morning; freight is never to be carried to the detriment of the passenger traffic. The company is to pay a percentage to the city on the gross earnings received on freight cars entering or leaving the city as follows: Four per cent on earnings up to \$200,000, 6 per cent on earnings between \$200,000 and \$500,000, 8 per cent between \$500,000 and \$800,000, 10 per cent between \$800,000 and \$1,000,000, 12 per cent between \$1,000,000 and \$1,500,000, and 15 per cent thereafter. The franchise is for fifteen years.



ELECTRIC LOCOMOTIVE HAULING A TRAIN OF STANDARD FREIGHT CARS OVER A MILL SIDING

SCHEDULE OF PRICES FOR HAULING BOSTON & MAINE CARS OVER THE EASTERN DIVISION OF THE ATLANTIC SHORE LINE RAILWAY

B. & M. Sta.,	Springvale to	Springvale.....	Car	Miles
"	"	Sanford	\$2.00	.5
"	"	Siding No. 1.....	5.00	2.5
"	"	Moulton's	6.00	3.
"	"	Siding No. 3.....	7.00	4.
"	"	Siding No. 4.....	7.00	7.
"	"	Estes	8.00	9.
"	"	Whicher's	8.00	9.5
"	"	Old Falls	8.00	10.
"	"	Siding No. 10.....	10.00	11.5
"	"	W. Kennebunk.....	10.00	12.5
"	"	Kennebunk Sta.....	11.00	14.5
"	"	Brick Yard.....	12.00	17.5
"	"	Town House.....	13.00	19.
"	"	Cape Porpoise.....	14.00	20.
"	"	Kennebunkport	15.00	23.
"	"		15.00	21.5

Owing to the completion of the York Beach line, or missing link, the freight business will be greatly extended and some of the foregoing figures will be revised. The

MONTREAL SHOP NOTES

During the last year or two the Montreal Street Railway Company has introduced several additional labor-saving methods in its shops and also made some other changes to keep down the cost of maintaining equipment.

JIG FOR BORING BEARINGS

One of the latest kinks is a jig for boring motor bearings and turning the collars of the same. The face of the lathe is recessed to receive the hub, *A*, shown in the drawing, and the bolt, *B*, is slacked to receive the bearing. The jig is bolted to the face plate at *D*. The boring bar used to bore the bearing is put through the hollow spindle of the lathe, which acts as a steady rest and the shoulder of the bearing is then turned off without any further truing-up. At least eight bearings an hour can be bored and turned, as against one or two by the former method of truing every bearing separately in the chuck.

TROLLEY BASE

The company is now using a parallel-bearing trolley base made of cast steel and costing \$8.50 each for material and labor. It is only 4 ins. high over all and is adjusted for 14 lbs. tension with a 5 3/4-in. diameter trolley wheel. The base has a dust-proof cap on the top and is oiled simply by removing a small screw.

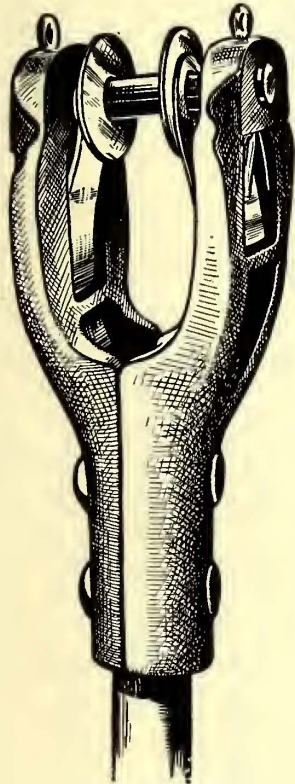
AIR BULLDOZER

A broken air cylinder has been used to form part of a pneumatic bulldozer for small work, the arrangement being as shown in the cut, where it will be seen that the shock of the bulldozer is taken up by a wood bumper. The compressor furnishing air at 120 lbs. is taken at random from a number waiting their return

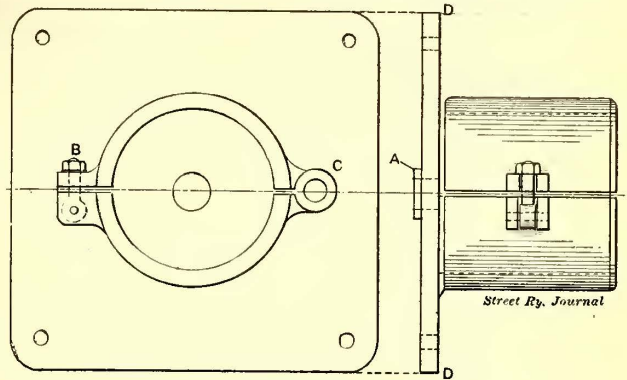
pany is now using a split fork of the type shown, so in most cases of breakage only half the fork requires replacement. The harp is made of steel and costs 30 cents with spindle, washers and other details complete.

WELDING TROLLEY TUBING

Instead of consigning broken or bent tubing to the scrap heap, the poles are saved and rewelded on slack days in the blacksmith shop. The cost per weld is usually from 15 to

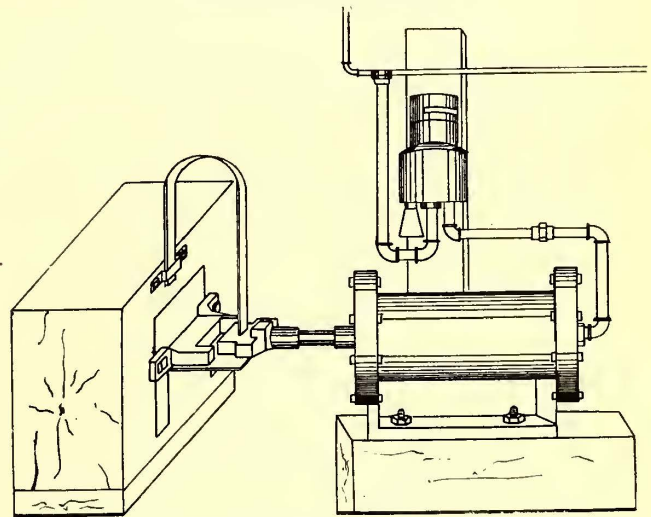


HOME-MADE DIVIDED TROLLEY FORK

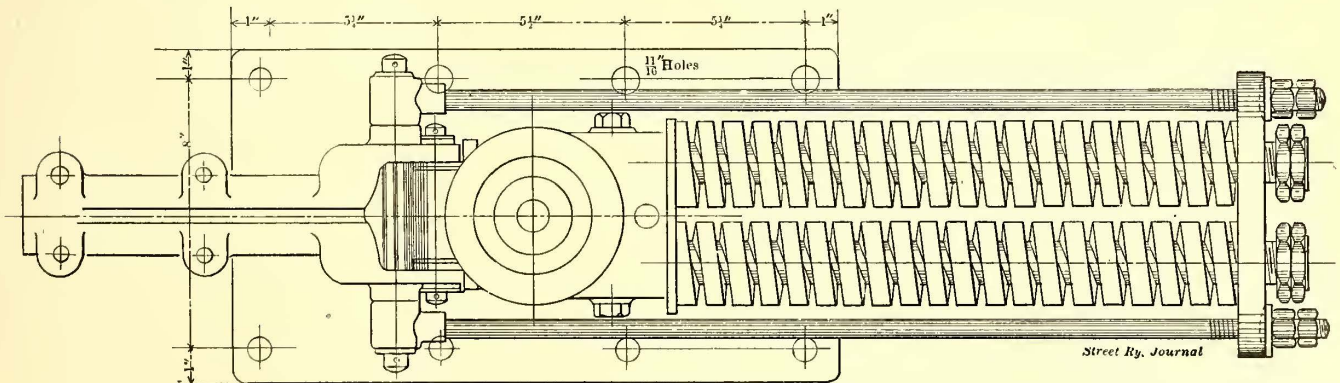


- A- Hub for recess on face plate
- B- Bolt
- C- Hinge
- D- Bolting to face plate

JIG FOR BORING BEARINGS



SMALL BULLDOZER OPERATED BY A SPARE COMPRESSOR



PARALLEL BEARING TROLLEY BASE USED IN MONTREAL

to the cars, and is seldom kept around for more than a day or two. The air bulldozer, therefore, simply makes use of apparatus that would otherwise be idle, and does not require any separate investment for a compressor.

DIVIDED TROLLEY FORK

To reduce the expense of trolley-harp breakages, the com-

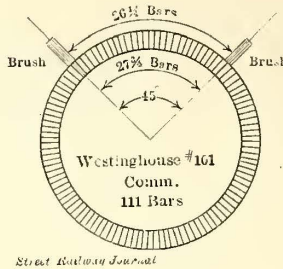
pany is now using a split fork of the type shown, so in most cases of breakage only half the fork requires replacement.

Mail service has been established on the Evansville & Eastern Electric Railway between Evansville, Newburg and Rockport. This is the first electric mail service in the district.

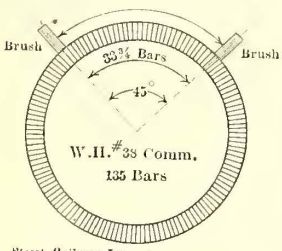
SHOP PRINTS OF THE PUBLIC SERVICE CORPORATION OF NEW JERSEY

For the use of the company's shop employees, Charles Remelius, master mechanic of the Public Service Corporation and the inventor of a number of shop labor-saving tools now in general use, has prepared a series of sixty instruction sheets, 6 ins. wide by about 3½ ins. high, of which he has had blue print copies made for distribution among the men. The Public Service Corporation, made up as it is of a number of constituent companies operating over all Northern and part of Southern New Jersey, naturally includes among its equipment a great variety of apparatus, and for this reason the instruction sheets covering

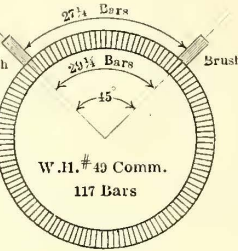
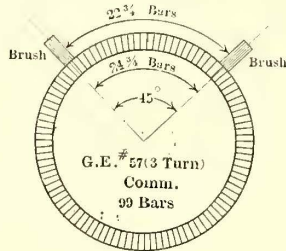
not without educational value, as the man who has a set of them for himself is almost sure in his leisure, when away from the shop, to study them out and see how well his memory serves him when tested by some actual case in the shop. Especial attention, it seems, should be directed to the charts of the set of motor brushes, which, by their clearness, make impossible improper adjustment of the brushes with its dire consequences, among them at times the flash-over. All the evils following inaccurate brush adjustment do not evidence themselves on the



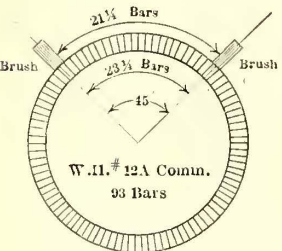
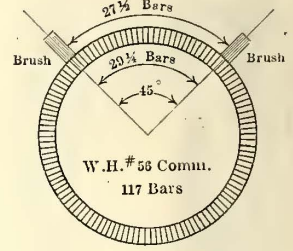
Street Railway Journal



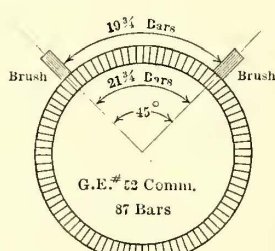
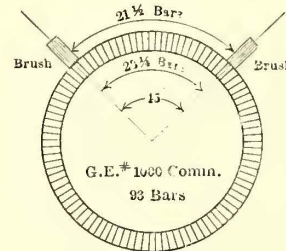
Street Railway Journal



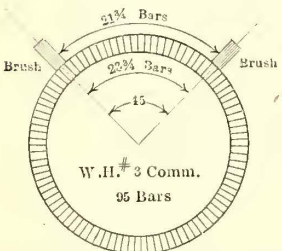
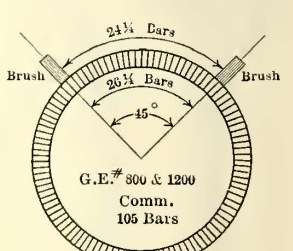
Street Railway Journal



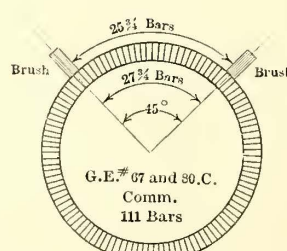
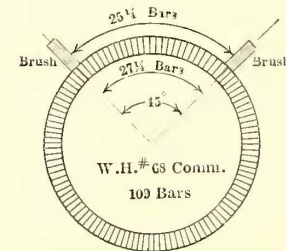
Street Railway Journal



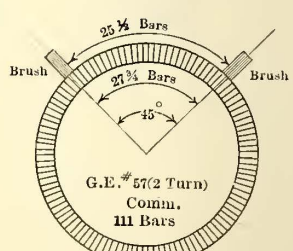
Street Railway Journal



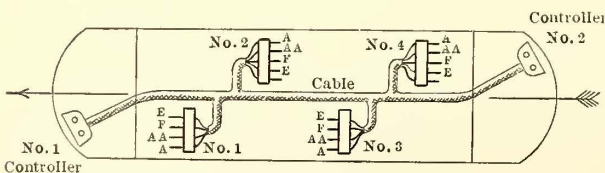
Street Railway Journal



Street Railway Journal



DIAGRAMS SHOWING PROPER SET OF BRUSHES FOR DIFFERENT TYPES OF MOTORS

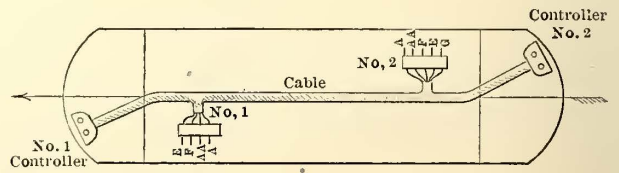


Facing Junction Box Single A Wire must be to the right—observing the order—A—AA—F—E—G.

Street Railway Journal

JUNCTION BOX CONNECTIONS OF A FOUR-MOTOR CAR

much standard apparatus will be of considerable interest to street railway managers in general. The value to the employees of a set of prints of this kind, covering the apparatus which they handle constantly, has proved very great. Not only do they prevent costly mistakes from being made, but they save a great deal of time. In addition, they are



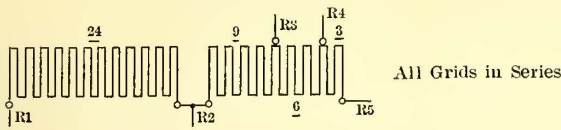
Facing Junction Box Single A Wire must be to the right—observing the order—A—AA—F—E—G.

Street Railway Journal

JUNCTION BOX CONNECTIONS ON A TWO-MOTOR CAR

surface, however, and for this reason are still more to be dreaded. A record, made not long ago by a man of wide experience in motor work, showed that out of a count of thirty only four were correct. Of the twenty-six improperly set, the error ranged from one to three bars, while in one case the error was five bars.

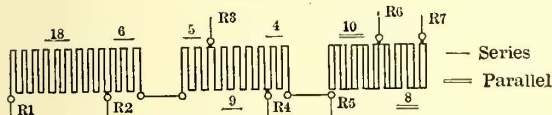
Gen. Elec. Car Resistance Connections for Four 800 or 52 Motors and K11 or K12 Controller



12 - A - 24 + (10 - A - 9 + 9 - A - 9) = 42 Grids Total
 R1 to R2, 24 Grids of 26512 = 2.71 Ohms
 R2 " R3, 9 " " 26510 = .33 "
 R3 " R4, 6 " " 26519 = .44 "
 R4 " R5, 3 " " " = .22 "

Street Railway Journal

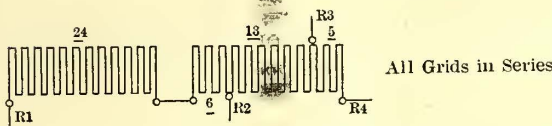
Gen. Elec. Car Resistance Connections for Four 67 or 80. C. Motors and K6 Controller



11 - A - 24 + 8 - A - 18 + 9 - B - 18 = 60 Grids
 R1 to R2, 18 Grids of 26511 = 1.66 Ohms.
 R2 " R3, 6 " of 11+5 of 08 = .84 "
 R3 " R4, 9 " " " = .53 "
 R4 " R5, 4 " " " = .24 "
 R5 " R6, 10 " " " = .18 "
 R6 " R7, 8 " " " = .15 "

Street Railway Journal

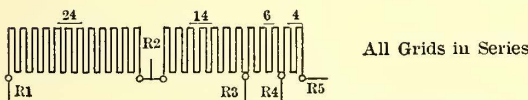
Gen. Elec. Car Resistance Connection for Two 800 or 52 Motors and K2 Controllers



14 - A - 24 + (14 - A6 + 12 - A - 13 + 11 - A - 5) = 48 Grids Total
 R1 to R2, 30 Grids of 26514 = 5.32 Ohms
 R2 " R3, 13 " " 26512 = 1.47 "
 R3 " R4, 5 " " 26511 = .45 "

Street Railway Journal

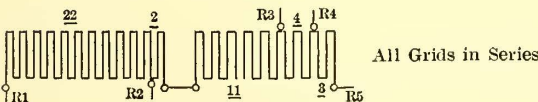
Gen. Elec. Car Resistance Connection for Two 58 or 1000 Motors and K11 Controllers



13 - A - 24 + 11 - A - 24 = 48 Grids Total
 R1 to R2, 24 Grids of 26513 = 3.40 Ohms.
 R2 " R3, 14 " " 26511 = 1.29 "
 R3 " R4, 6 " " " = .55 "
 R4 " R5, 4 " " " = .37 "

Street Railway Journal

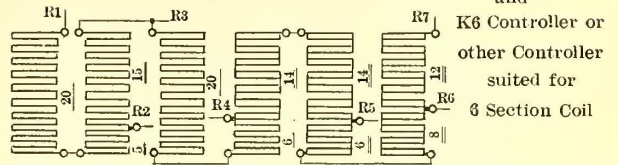
Gen. Elec. Car Resistance Connections for Two 57 (50 H.P.) Motors and K11 Controllers



11 - A - 24 + 9 - A - 18 = 42 Grids Total
 R1 to R2, 22 Grids of 26511 = 2.00 Ohms
 R2 " R3, 2 " " 11+11 of 09 = .98 "
 R3 " R4, 4 " " " 26509 = .30 "
 R4 " R5, 3 " " " 09 = .22 "

Street Railway Journal

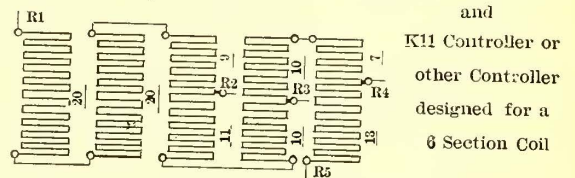
Westinghouse Car Resistance Connections for Four No. 68 or other 40 Horse power Motors



Total Grids—120
 R1 to R2, 25 Grids of 7468 = 1.50 Ohm
 R2 " R3, 15 " " 2444 = .60 "
 R3 " R4, 26 " " 9119 = .39 "
 R4 " R5, 28 " " 2444 = .28 "
 R5 " R6, 14 " " " = .14 "
 R6 " R7, 12 " " 2445 = .09 "

Street Railway Journal

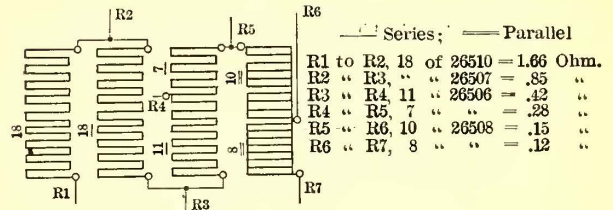
Westinghouse Car Resistance Connections for Two No. 68 or other 40 Horse-power Motors



Total Grids 100—all in Series—
 R1 to R2, 49 Grids of 7468 = 2.94 Ohms.
 R2 " R3, 21 " " 2444 = .84 "
 R3 " R4, 17 " " 2445 = .51 "
 R4 " R5, 13 " " 9120 = .26 "

Street Railway Journal

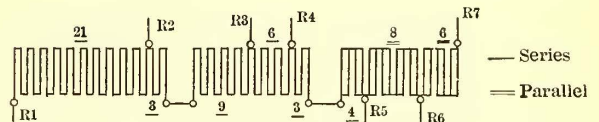
Gen. Elec. Car Resistance Connections for Four 57 (50 H.P.) Motors and K14 Controllers



10 - A - 18, 7 - A - 18, 6 - A - 18, 8 - B - 18 = Total 72 Grids
 R1 to R2, 18 of 26510 = 1.66 Ohm.
 R2 " R3, " " 26507 = .85 "
 R3 " R4, 11 " " 26506 = .42 "
 R4 " R5, 7 " " " = .28 "
 R5 " R6, 10 " " 26508 = .15 "
 R6 " R7, 8 " " " = .12 "

Street Railway Journal

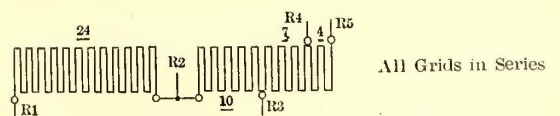
Gen. Elec. Car Resistance Connections for Four 58 or 1000 Motors and K6 Controllers



11 - A - 24 + 9 - A - 18 + 9 - B - 18 = 60 Grids Total
 R1 to R2, 21 Grids of 26511 = 1.93 Ohms.
 R2 " R3, 3 " of 11 + 9 of 09 = .94 "
 R3 " R4, 6 " " 26509 = .44 "
 R4 " R5, 3 " " 09 + 4 of 09 = .39 "
 R5 " R6, 8 " " 26509 = .15 "
 R6 " R7, 6 " " " = .11 "

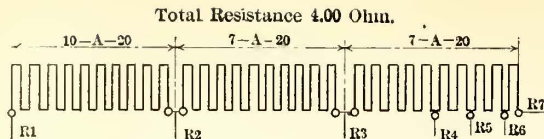
Street Railway Journal

Gen. Elec. Car Resistance Connections for Two 67 or 80. C. Motors and K11 Controller



13 - A - 24 + 12 - A - 10 + 10 - A - 11 = 45 Grids
 R1 to R2, 24 Grids of 26513 = 3.40 Ohms
 R2 " R3, 10 " " 26512 = 1.13 "
 R3 " R4, 7 " " 26510 = .65 "
 R4 " R5, 4 " " " = .37 "

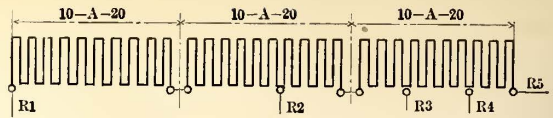
Street Railway Journal



Total Resistance 4.00 Ohm.

R1 to R2, 20 Grids of 26510	— 2.00	Ohms.
R2 " R3, " " " 26507	— 1.00	"
R3 " R4, 10 " " " "	— .50	"
R4 " R5, 4 " " " "	— .20	"
R5 " R6, " " " " "	— .20	"
R6 " R7, 2 " " " "	— .10	"

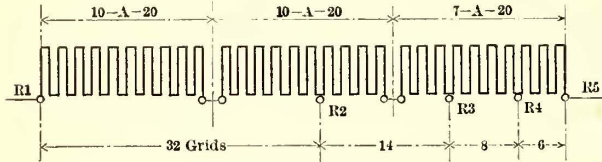
STANDARD RESISTANCE CONNECTIONS FOR FOUR (NOS. 800, 1000—52, 58, 67, 68 AND 80 C.) MOTORS



Total Resistance—6—Ohms.

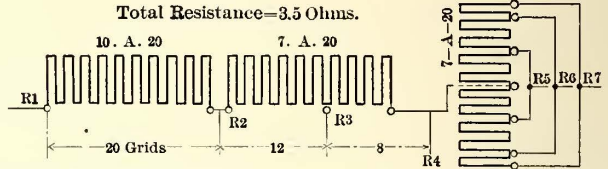
R1 to R2, 32 Grids of 26510	— 3.20	Ohms.
R2 " R3, 14 " " " "	— 1.40	"
R3 " R4, 8 " " " "	— .80	"
R4 " R5, 6 " " " "	— .60	"

STANDARD RESISTANCE CONNECTIONS FOR TWO (NOS. 800, 1000—52, 58, 67, 68 AND 80 C.) MOTORS



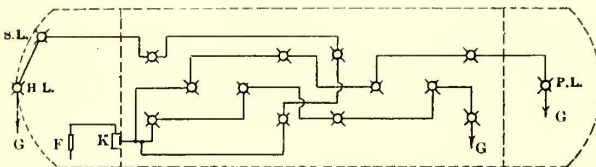
Street Railway Journal

STANDARD RESISTANCE CONNECTIONS FOR TWO G. E. 57, OR WESTINGHOUSE NO. 56 MOTORS



Street Railway Journal

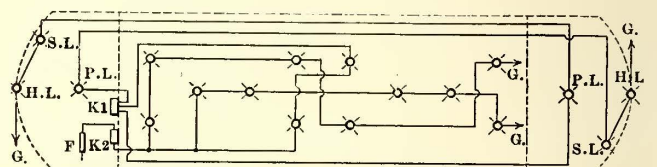
STANDARD RESISTANCE CONNECTIONS FOR FOUR G. E. 57, OR WESTINGHOUSE NO. 56 MOTORS



H.L.—Head Light
S.L.—Sign Light
P.L.—Platform Light
K—Light Switch
F—Fuse unless in Switch

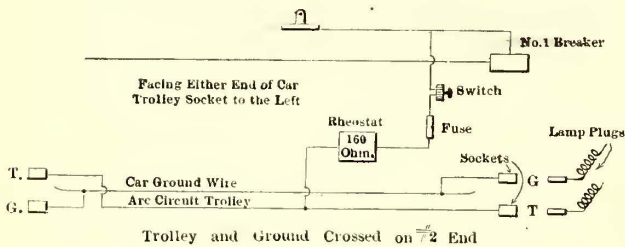
Street Railway Journal

LIGHT CONNECTIONS FOR SINGLE END CAR



H.L.—Head Light
P.L.—Platform Light
S.L.—Sign Light
K1—3 Way Switch
K2—Main Switch
F—Fuse unless in Switch

INCANDESCENT LAMP CIRCUITS OF A DOUBLE END CAR

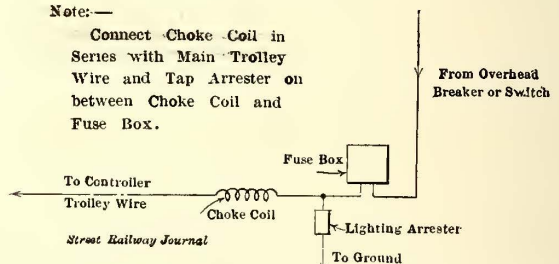


Street Railway Journal

ARC LIGHT CONNECTIONS FOR DOUBLE END CAR

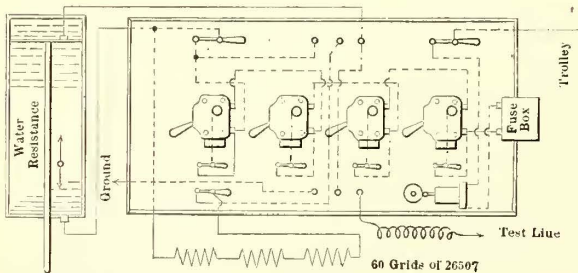
Note:—

Connect Choke Coil in Series with Main Trolley Wire and Tap Arrester on between Choke Coil and Fuse Box.



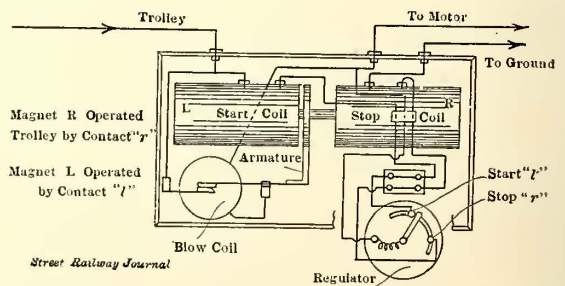
Street Railway Journal

CONNECTIONS OF CHOKE COIL AND LIGHTNING ARRESTER



Street Railway Journal

CONNECTIONS FOR CIRCUIT BREAKER TEST



Street Railway Journal

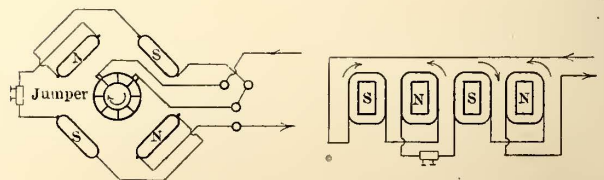
CONNECTIONS OF CHRISTENSEN AIR GOVERNOR

Notes—For apparently the same Connections, Westinghouse and G. E. * Armatures run in opposite directions,—

In all Cases the Terminal of the near Brush-holder issues from the Motor through the Bushing nearest to it.—* Except 57 and 1000.

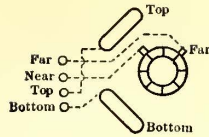


ARMATURE TERMINALS FOR APPARENTLY SIMILAR CONNECTIONS, BUT OPPOSITE ROTATION



WESTINGHOUSE NO. 68 FIELD CONNECTIONS OUTSIDE JUMPER

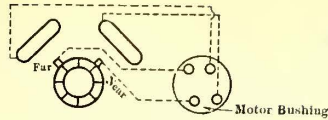
Note:-
Face Commutator End when looking at Armature Connections. Face Bushings when considering them.



Far Armature out of Top Hole
Near " " " 2nd "
Top Field " " 3rd "
Bottom " " " Bottom "

Street Railway Journal

ORDER OF BRINGING OUT MOTOR TERMINALS OF G. E. 57, 67, 52, 58, 80 C., 1000 AND 800 MOTORS ON THE LEFT-HAND SIDE WHEN ARMATURE TERMINAL BUSHINGS ARE VERTICAL



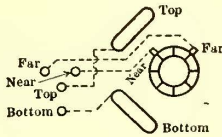
Facing Commutator, Motor Terminals come out on Right Hand Side of Motor

Far or Left Hand Armature out of Left Top Hole
Near " Right " " " " Bottom "
Far " Left " Field " " Right Top "
Near " Right " " " " " Bottom "

Street Railway Journal

ORDER OF BRINGING OUT MOTOR TERMINALS ON WESTINGHOUSE NO. 68 MOTOR, NEWARK TYPE

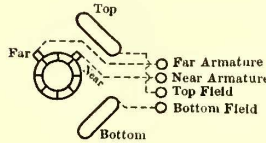
Note:-
Face Commutator End when looking at Armature Connections. Face Bushings when considering them.



Far Armature out of Left Hand Hole
Near " " " Right " "
Top Field " " 3rd "
Bottom " " " Bottom "

Street Railway Journal

ORDER OF BRINGING OUT MOTOR TERMINALS OF G. E. 57, 67, 80 C., 52, 58, 800 AND 1000 ON THE LEFT-HAND SIDE WHEN ARMATURE TERMINAL BUSHINGS ARE HORIZONTAL

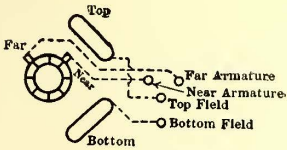


Note:-
Face Commutator End when looking at Armature Connections. Face Bushings when considering them.

Far Armature out of the Top Hole
Near " " " " 2nd "
Top Field " " " 3rd "
Bottom " " " " Bottom "

Street Railway Journal

ORDER OF BRINGING OUT MOTOR TERMINALS OF G. E. 57, 67, 80 C., 52, 58, 1000 AND 800 MOTORS ON THE RIGHT-HAND SIDE WHEN ARMATURE TERMINAL BUSHINGS ARE VERTICAL

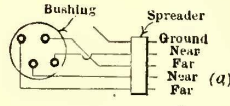


Note:-
Face Commutator End when looking at Armature Connections. Face Bushings when considering them.

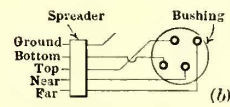
Far Armature out of Top Right Hand Hole
Near " " " " Left " "
Top Field " " 3rd "
Bottom " " " " Bottom "

Street Railway Journal

ORDER OF BRINGING OUT MOTOR TERMINALS OF G. E. 57, 67, 80 C., 52, 58, 1000 AND 800 MOTORS ON THE RIGHT-HAND SIDE WHEN ARMATURE TERMINAL BUSHINGS ARE HORIZONTAL

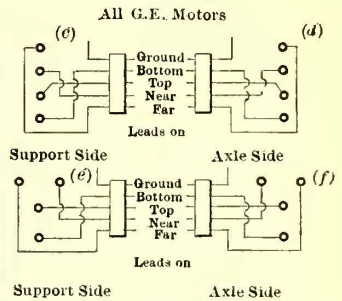


Westinghouse #68

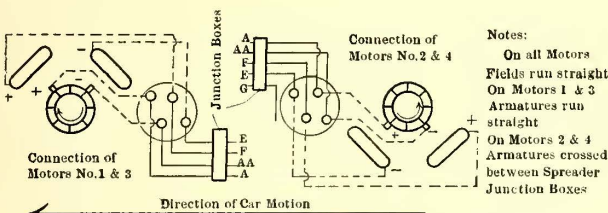


Westinghouse #56

Street Railway Journal



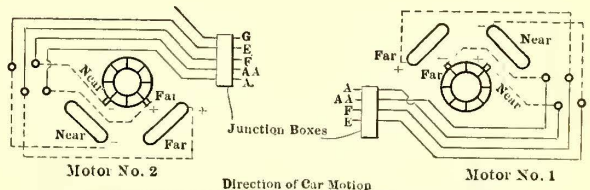
ORDER OF BRINGING OUT MOTOR LEADS THROUGH SPREADER



Notes:
On all Motors Fields run straight
On Motors 1 & 3 Armatures run straight
On Motors 2 & 4 Armatures crossed between Spreader and Junction Boxes

Street Railway Journal

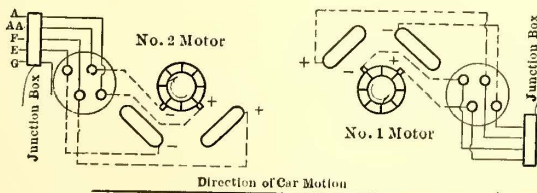
CONNECTIONS FOR FOUR WESTINGHOUSE NO. 68 MOTORS, HUNG OUTSIDE OF AXLES ON DOUBLE TRUCK CARS



No. 1 Armatures Crossed between Motor or Spreader and Junction Box. All other Motor Wires Run Straight

Street Railway Journal

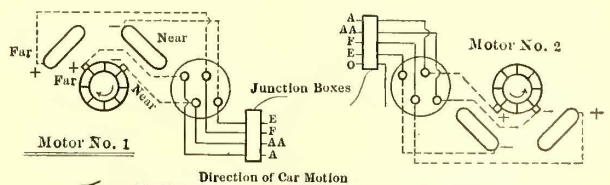
CONNECTIONS OF WESTINGHOUSE NO. 68 MOTOR MOUNTED ON DOUBLE TRUCKS; JUNCTION BOX ON AXLE SIDE



No.1 Connects same as No.2 on a 4 Motor Car
No.2 " " " No.1 " " " "
No.2 Armatures and Fields straight - No.1 Armatures Crossed

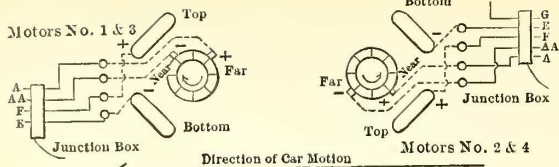
Street Railway Journal

CONNECTIONS FOR TWO WESTINGHOUSE NO. 68 MOTORS ON A SINGLE TRUCK



No.2 Armatures Crossed between Motor or Spreader and Junction Box. All other Motor Wires Run Straight

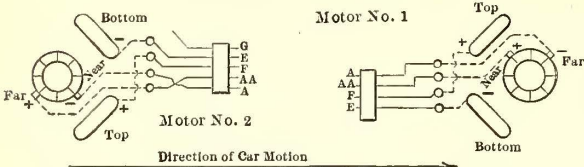
CONNECTIONS OF TWO WESTINGHOUSE NO. 68 MOTORS HUNG ON TWO DOUBLE TRUCKS; MOTOR TERMINALS OUT ON AXLE SIDE



Terminals out on Suspension Side
Armature Wires Motors #2 and 4 Crossed
All other Motor Wires Run Straight

Street Railway Journal

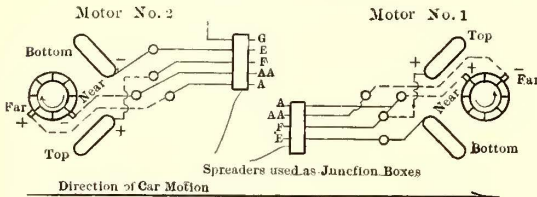
FOUR G. E. 57 OR 1000 MOTORS



No. 1 Armatures Crossed between Motor or Spreader and Junction Box. All other Motor Wires Run Straight.

Street Railway Journal

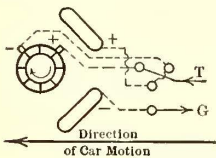
TWO G. E. MOTORS (EXCEPT NOS. 57 AND 1000), MOUNTED ON DOUBLE TRUCKS; MOTOR TERMINALS OUT ON SUSPENSION SIDE



Facing Commutator End, Motor Terminals come out on Left or Suspension Side of Motors.
Facing Spreader, Single A to the right.

Street Railway Journal

TWO G. E. MOTORS (EXCEPT NOS. 57 AND 1000), ON SINGLE TRUCK



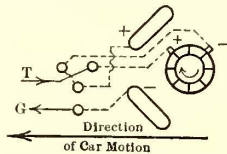
Notes:-
If Wiring is right, the Single As and Fs from Controller are +.
In considering Connections, Face the Commutator End.

When Near Brushholder and Top Field are Plus, Armature Rotates Clockwise, and the Car moves to the left.

Street Railway Journal

DIRECTION OF ROTATION OF G. E. 800, 52, 58, 67 AND 80 C. MOTORS WITH GIVEN POLARITIES

Notes:-
If Wiring is right, the Single As and Fs from Controller are +.
In considering Connections, Face the Commutator End.

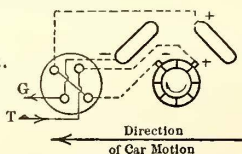


When Near Brushholder and Top Field are Plus, Armature Rotates Clockwise, and the Car moves to the left.

Street Railway Journal

DIRECTION OF ROTATION OF G. E. 52, 58, 800, 67 AND 80 C. MOTORS, WITH GIVEN POLARITIES, WHEN TERMINALS COME OUT ON THE LEFT AND CORRESPONDING DIRECTION OF CAR MOTION

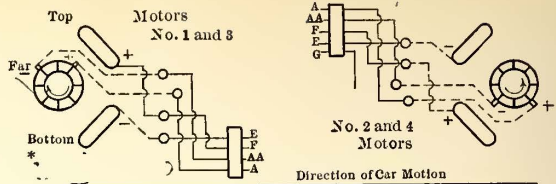
Notes:-
If Wiring is right, the Single As and Fs from Controller No. 1 are Plus.
In considering Connections, Face Commutator End.



When Far Brushholder and Far Field are Plus, Armature Rotates Clockwise, as indicated, and the Car moves to the left.

Street Railway Journal

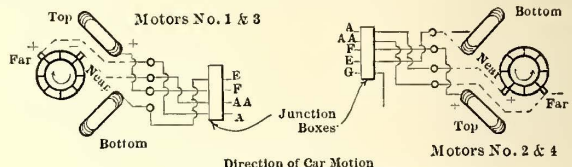
DIRECTION OF ROTATION OF WESTINGHOUSE NO. 56 MOTORS WITH GIVEN POLARITIES



Notes: Armature Wires on Motors No. 1 and 3 crossed between Junction Box and Spreader
All other Motor Wires Straight

Street Railway Journal

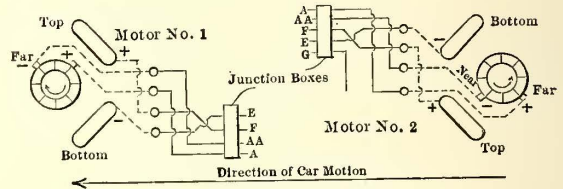
FOUR G. E. MOTORS (EXCEPT NOS. 57 AND 1000), HUNG OUTSIDE OF AXLES ON TWO DOUBLE TRUCKS; TERMINALS ON AXLE SIDE



Terminals out on Axle Side
Armature Wires Motors #2 and #4 Crossed
All other Motor Wires Straight

Street Railway Journal

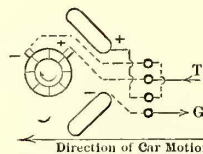
FOUR G. E. 1000 OR 57 MOTORS



No. 1 Armatures Crossed between Motor or Spreader and Junction Box. All other Motor Wires Run Straight.

Street Railway Journal

TWO G. E. MOTORS (EXCEPT NOS. 57 AND 1000), ON DOUBLE TRUCK; MOTOR TERMINALS OUT ON AXLE SIDE



Notes:-
If Wiring is right, Single As and Fs from the Controller are +.

In considering Connections, Face the Commutator End.

When Near Brushholder and Top Field are Plus, the Armature Rotates Clockwise, as indicated, and the Car moves to the left.

Street Railway Journal

DIRECTION OF ROTATION OF G. E. 800, 52, 58, 67 AND 80 C. MOTORS, WITH GIVEN POLARITIES

Notes:-
If Wiring is right, the Single As and Fs from Controller are +.

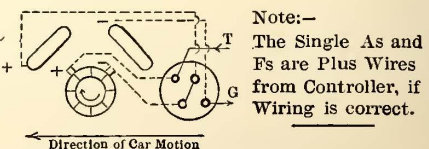
In considering Connections, Face Commutator End.

When Near Brushholder and Top Field are Plus, Armature Rotates Clockwise, as indicated, and the Car moves to the left.

Street Railway Journal

DIRECTION OF ROTATION OF G. E. MOTORS (EXCEPT NOS. 57 AND 1000), WITH GIVEN POLARITIES, WHEN TERMINALS COME OUT ON THE LEFT AND CORRESPONDING DIRECTION OF CAR MOTION

Note:-
In considering Connections, Face the Commutator End.



Note:-
The Single As and Fs are Plus Wires from Controller, if Wiring is correct.

When Far Brushholder and Far Field are Plus, the Armature Rotates Clockwise, as indicated, and the Car moves to the left.

Street Railway Journal

DIRECTION OF ROTATION OF WESTINGHOUSE NO. 68 MOTOR WITH GIVEN POLARITIES

In addition to the instruction prints, Mr. Remelius has also had printed a set of wiring diagrams for the K 6 controller, K 11 controller, K 11 (B 23) controller, K 2 controller. A feature of these prints is a key giving the lengths of wire needed. In this way a man can, by telling

LENGTH OF WIRES FOR K₂ CONTROLLER

Trolley	.....44"	of No. 2 flexible wire
R ₁	.....43"	of No. 4 solid wire
R ₂	.....39"	" " "
R ₃	.....36"	" " "
A ₁	.....23"	" " "
AA ₁	.....27"	" " "
A ₂	.....28"	" " "
AA ₂	.....31"	" " "
F ₁	.....29"	" " "
F ₂	.....35"	" " "
E ₁	.....14"	" " "
L ₁	.....22"	" " "
L ₂	.....14"	" " "

SWITCH CONTACTS

15	.....39"	of No. 4 solid wire
19	.....36"	" " "

BLADES

R ₄ or 19	.....20"	of No. 4 solid wire
15	.....22"	" " "

LENGTH OF WIRES FOR K₁₁ (B₂₃) CONTROLLER

Trolley	.....2 18"	pieces No. 2 flexible wire
R ₁	.....28"	of No. 4 solid wire
R ₂	.....30"	" " "
R ₃	.....28"	" " "
R ₄	.....30"	" " "
R ₅	.....16"	of No. 4 solid and 42"
A ₁	.....40"	of No. 2 flexible wire
AA ₁	.....40"	of No. 4 solid wire
A ₂	.....39"	" " "
AA ₂	.....39"	" " "
E ₁	.....15"	" " "
E ₂	.....10"	" " "
8	.....16"	" " "
11	.....30"	" " "
12	.....36"	" " "
17	.....40"	" " "
20	.....35"	" " "
25	.....10"	" " "
Ground	.....2 20"	pieces of No. 2 flexible wire

LENGTH OF WIRES FOR K₆ CONTROLLER

Trolley	.....42"	of No. 2 flexible wire
R ₁	.....34"	of No. 4 solid wire
R ₂	.....33"	" " "
R ₃	.....31"	" " "
R ₄	.....30"	" " "
R ₅	.....28"	" " "
R ₆	.....28"	" " "
A ₁	.....18"	" " "
AA ₁	.....21"	" " "
A ₂	.....27"	" " "
AA ₂	.....29"	" " "
A ₃	.....22"	" " "
AA ₃	.....23"	" " "
A ₄	.....30"	" " "
AA ₄	.....31"	" " "
F ₁	.....28"	" " "
F ₂	.....33"	" " "
F ₃	.....34"	" " "
F ₄	.....34"	" " "

SWITCH CONTACTS

19	.....9"	of No. 2 flexible wire
15	.....21"	" " "

BLADES

R ₇ or 19	.....17"	of No. 2 flexible wire
15	.....15"	" " "
E ₁	.....18"	" " "
Ground	.....14"	" " "

LENGTH OF WIRES FOR K₁₁ CONTROLLER

Trolley	.....40"	of No. 2 flexible wire
R ₁	.....41"	of No. 4 solid wire
R ₂	.....37"	" " "
R ₃	.....34"	" " "
R ₄	.....31"	" " "
A ₁	.....21"	" " "
AA ₁	.....25"	" " "
A ₂	.....26"	" " "
AA ₂	.....29"	" " "
F ₁	.....27"	" " "
F ₂	.....33"	" " "
E ₁	.....12"	" " "

SWITCH CONTACTS

19	.....34"	of No. 4 solid wire
15	.....37"	" " "

BLADES

R ₅ or 19	.....18"	of No. 4 solid wire
15	.....20"	" " "

the job he is on, get just the material he needs, and by checking his time card against the material accurate tab can be kept on the material. The prints are all numbered and a key is published, making reference to them easy. The subjects covered include among others resistance con-

nections for Westinghouse and G. E. motors; junction-box connections for four-motor cars and two-motor cars; order of bringing out terminals on Westinghouse and G. E. motors; direction of rotation of Westinghouse and G. E. motors; order of bringing motor leads through spreader; connections for two and four-motor equipments, both Westinghouse and G. E.; construction and connection of standard resistances for four motors; connection of choke coil and lightning arrester; the set of brushes on both G. E. and Westinghouse motors; incandescent lamp circuits for both double and single-end cars; arc lamp connections for single-end car, and connections for the Christensen air governor.

T-RAILS FOR PAVED STREETS

In a recent communication to this periodical, H. L. Weber, Engineer Maintenance of Way of the Fort Wayne & Wabash Valley Traction Company, discusses the question of T-rails for paved streets. From his experience as a city engineer he can see no objection to the use of T-rails provided the proper paving is used in connection with them.

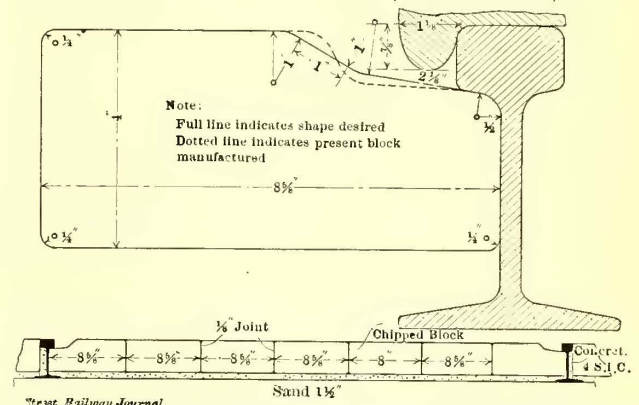


FIG. 1.—PLAN OF NOSE BRICK FOR STREET RAILWAY TRUCKS

While city engineer of Richmond, Ind., he designed, in 1894, the nose brick shown as Fig. 4, on page 884 of the STREET RAILWAY JOURNAL of Oct. 26, 1907, reproduced herewith by the solid-line drawing in Fig. 1. This shape was manufactured by the Canton Brick Company for the city of Richmond to repair some tracks on Main Street that

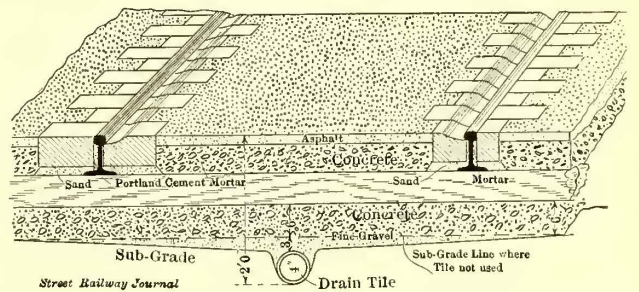


FIG. 2.—CROSS-SECTION OF T-RAIL TRACK ON N. E. STREET, RICHMOND, IND.

had been of poor construction, and to pave along the rails on N. E. Street, between Eighth and Tenth Streets, that had been contracted for. The track work on the N. E. Street improvement was constructed as shown in Fig. 2, and is practically as good to-day as in 1894. The solid-line drawing in Fig. 1 represents the form as originally designed, the dotted line the form as manufactured to-day. Mr. Weber is convinced that the original form—the solid-line drawing—is the best to use, as it affords an easy egress

for the wheels of vehicles in turning out of the way of cars, for as the angle increases the brick eases the wheel out of the rut, there being almost a gradual incline from the bottom of the ball of the rail to its highest point.

to his company include a 6-in., 72-lb. T-rail section as the standard for paved streets, as the bending moment of this size is about equal to the 85-lb. A. S. C. E. rail section and the rail has a depth sufficient for most kinds of paving.

What the street railway engineer must do in the near future is to use his old rail for cross ties, or steel cross ties and sheet concrete for the foundation. This form will give him the minimum depth of foundation he can use, with the maximum bearing surface. He believes it is better policy to adopt a rail with a good but not unnecessarily heavy foundation, than an unreasonably heavy rail with a poor foundation.

Should it be necessary to go to a 90-lb. per yard section he would favor the "Hunt" section. Where concrete beams are adopted they should have a base of at least 28 ins., for after the experience of his company he would not think of building any beam with less than 30-in. base and then on tracks over which only light city cars are operated. The first essential to any track is proper drainage and next bearing surface on a good foundation. The rails take the wear direct and transmit the weight to the foundation through the ties. All that is essential in a rail is to have one of sufficient strength that it will not bend under its load, and that will remain perfectly rigid, with ties placed from 36-in. to 49-in. centers. In sand, gravel or crushed

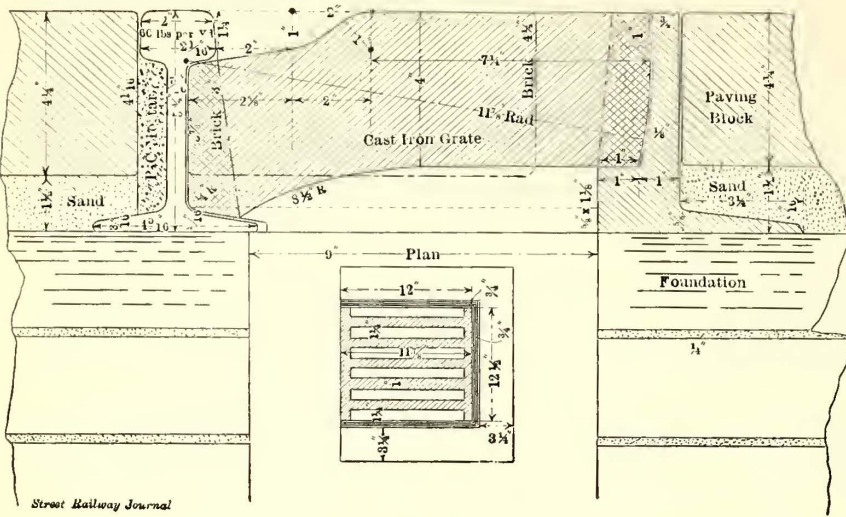
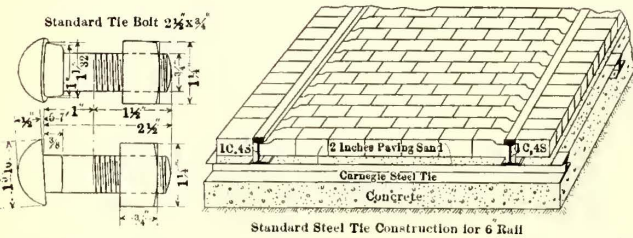
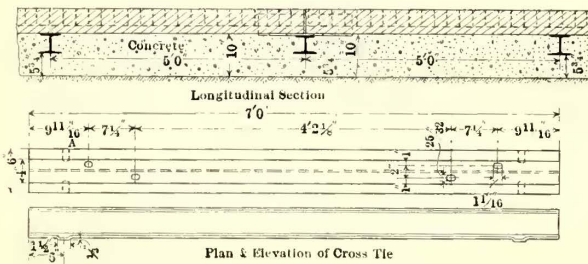


FIG. 3

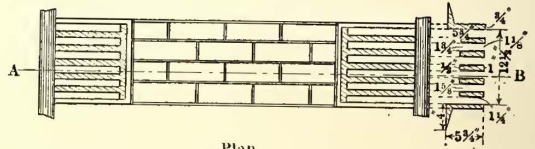
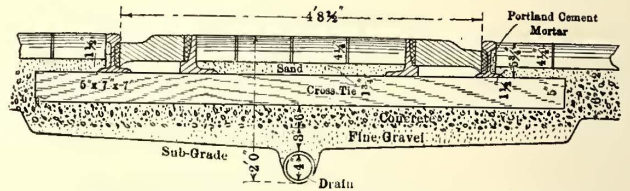


Standard Steel Tie Construction for 6 Rail

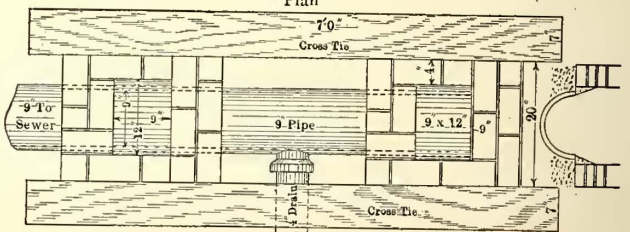


Plan & Elevation of Cross Tie

FIG. 4



Plan



Section A-B

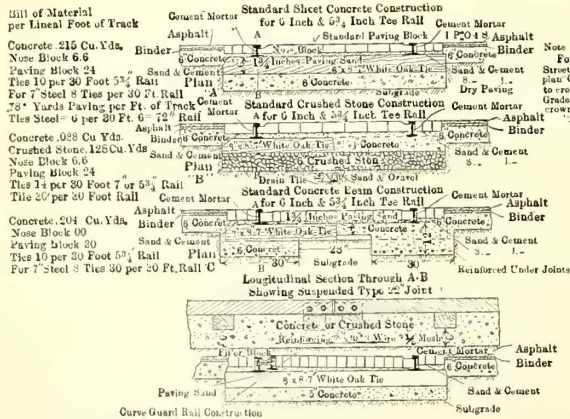


FIG. 5

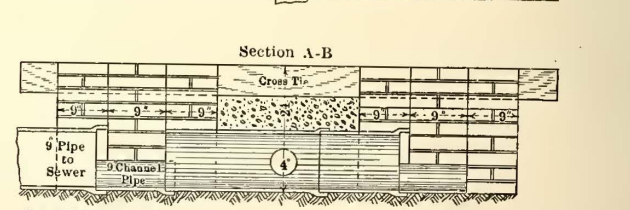


FIG. 6.—CROSS-SECTION OF TRACK AND DRAIN

There is no abrupt hump to catch the inside of vehicle tires as in the dotted-line drawing. The rail used was a 6-in., 60-lb. T-rail, 6 in. x 8 in. x 7 ft. ties placed 30-in. centers, as fully shown in the accompanying drawing. The track drain used is shown in Fig. 3.

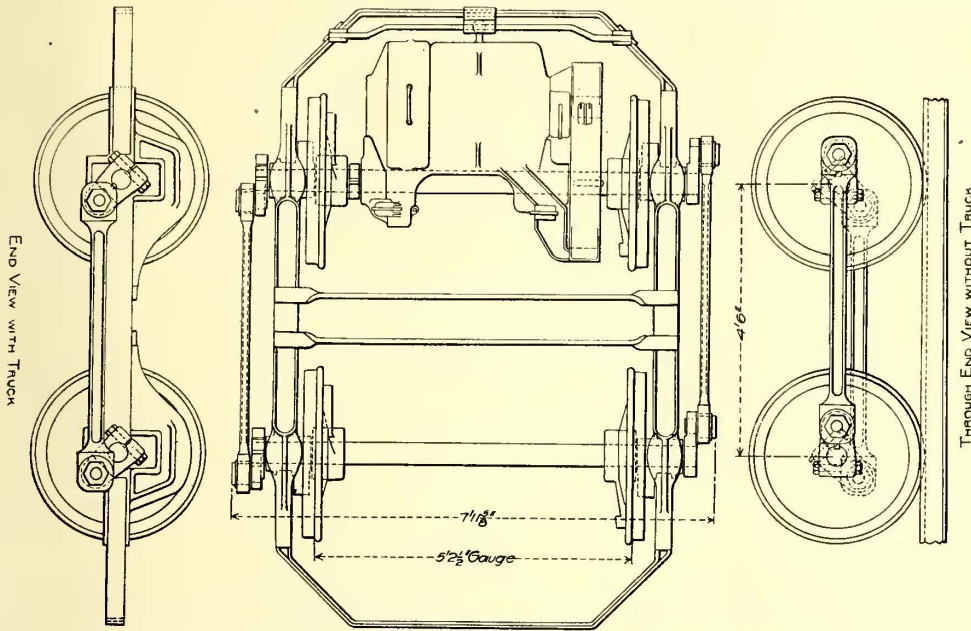
The standard sections that Mr. Weber has recommended

stone he would use ties from 24-in. to 27-in. centers. In concrete we will soon have to go to steel at from 4 ft. to 5 ft. with a good concrete base. The accompanying drawings, Figs. 4, 5 and 6, which are the Fort Wayne & Wabash Valley Traction Company's standard form of construction, embody his ideas for this class of work.

CAR WITH SIDE RODS IN PITTSBURG

Some interesting tests have recently been conducted in Pittsburg by John Murphy, general superintendent of the Pittsburg Railways Company, on the lines of that road, to determine the relative economy of a four-motor car, a

way by weights attached between the spokes. Connecting rods were used on both sides of each truck. This car was put in operation on June 20, 1907, and run for twenty-seven days in comparison with another car of exactly the same type and on the same route, equipped with four Westinghouse 93-A motors, but having no connecting rods.



PLAN AND SIDE ELEVATION OF TRUCK WITH CONNECTING ROD

Owing to the substitution of the rods for the motors there was a slight difference in weight, the four-motor car weighing 48,700 lbs. and the car with connecting rods 42,700 lbs. The result of this test, which showed a saving of 29.9 per cent in kw-hours for the car without connecting rods, is shown in Table I.

At the end of this test it was decided to make a comparison between the new car and a two-motor car of the ordinary type. Two motors were then removed from the four-motor car and the result of six days' operation is shown in Table II.

After these tests the car with connecting rods was put

in regular service on what is known as "the express route." This route is quite hilly and for about 6000 feet there is a

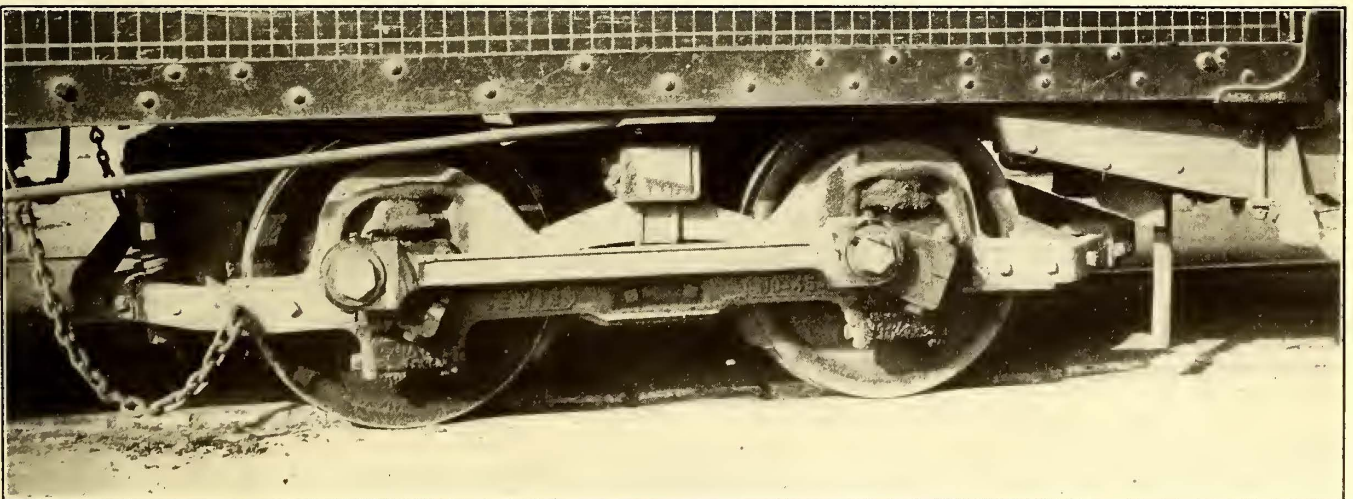
two-motor car of the usual type and a two-motor car in which side rods are used to connect the pairs of wheels under each truck. Some results which are quite striking in their character have been secured.

A standard double-truck car of the Pittsburg Railways Company measuring 40 ft. over all, and equipped with four 93-A Westinghouse motors, was selected for the trials. One motor was removed from each of the trucks of this car and the axles of each truck were connected with driving rods, as shown in the engravings. These driving rods

TABLE I

Period	Total K.W.H. used	Total miles run	Total Pass'g'rs carried	Per Car Mile		Per cent saving	
				K.W.H. used	Pass'g'rs carried		
27 days June 20 to July 16	Connecting Rod, 2 93-A motors. Ordinary Car, 4 93-A motors..	7,291	2,129	29,231	3.42	13.7	29.9
		10,287	2,186	32,560	4.88	14.8	...

5 per cent grade. The distance covered by the cars on this route averages 180 miles per day and the passengers car-



SIDE VIEW OF TRUCK WITH CONNECTING RODS

were attached by extending the axle through the box and attaching thereon a crank made of a steel forging and measuring 6 ins. between the center of the axle and the center of the crank pin. The latter was 3 ins. in diameter. The connecting rod between these two cranks was also of forged steel, 4 ft. 6 ins. center to center of pins, 3 ins. high and 1 1/2 ins. thick. The wheels were balanced in the usual

ried per car from July 19 to July 28 averaged 1745 daily. The trucks and wattmeters of the two cars were exchanged on July 17 and 18, and during the next ten days readings were taken to determine the relative efficiency of the two cars, as shown in Table III.

The car with connecting rods is still running on the express service and up to Dec. 4 had required no repairs

except truing of the wheels. The other cars operating on this route have quadruple equipments of 93-A motors.

A temperature test at the end of the 18-hour daily run has at no time been above 60 degs., which shows that the

TABLE II

Period		Total K.W.H. used	Total miles run	Total Pass'g'rs carried	Per Car Mile		Per cent saving
					K.W.H. used	Pass'g'rs carried	
6 days July 11 to July 16	Connecting Rod, 2 93-A motors. to Ordinary Car, 2 93-A motors..	1,695	528	7,183	3.21	13.60	15.5
		2,140	563	8,010	3.80	14.2	....

TABLE III

Period		Total K.W.H. used	Total miles run	Total Pass'g'rs carried	Per Car Mile		Per cent saving
					K.W.H. used	Pass'g'rs carried	
10 days July 19 to July 28	Connecting Rod, 2 93-A motors. to Ordinary Car, 2 93-A motors..	2,804	954	13,773	2.94	14.43	18.3
		3,092	862	11,823	3.59	13.71	....

motors were not overloaded even with this extreme service. Since this car was put in service on June 20 and up to Nov. 1, it had traveled 21,842 miles and carried 213,200 passengers, plus four days which the car was in the shop for truing of wheels and changing car bodies.

NO DOUBLE TROLLEY IN RICHMOND.

The City Council of Richmond Va., has defeated, by a vote of 21 to 7, an ordinance to require the Virginia Passenger & Power Company to install the double overhead trolley system as a means of preventing electrolysis. This action by the Council was taken as a result of the recommendations embodied in a majority report of a joint committee of the water and electricity boards, which has been considering the evidence submitted. The majority report recommends the appointment of a joint committee from the two branches of the Council to confer with the company as to the installation of appliances at certain points to indicate the condition of the return circuits so that they may be seen by the city; to agree upon methods for the prevention of the trouble in the future and to adjust the claim for past damage.

This action of the Council settles a question that from time to time since the summer of 1899 has involved the company. In that year A. M. Schoen, acting for the city, made a study of the electrolysis problem as it presented itself in Richmond, and, as a result of his report, a suit was begun by the city for damages. This suit, however, was not pushed.

When Mr. Gould took over the Richmond property, in 1903, the city began to force the matter of installing the double trolley. The company, to protect itself, engaged Lewis B. Stillwell, of New York, to investigate the return circuit and put the system in good shape in respect to the return. The investigation by Mr. Stillwell covered almost a year, and, as a result, about \$100,000 was spent in bonding special work to the full carrying capacity of the rails and bonding the rails to 3-ft. per joint in the congested district and 6-ft. per joint in outlying districts. In addition, ground potential wires were installed by which records of the drop in potential might be kept up to a fixed standard. Since then a series of monthly tests has been instituted in addition to the drop tests. Further, A. B. Herrick was engaged to test the system with his car, and reported the return circuit of Richmond to be better than any he had studied.

The total claims of the city, made from time to time, as trouble with pipes was reported, amounted to less than \$100 per year for six years, but, notwithstanding this fact, about

eighteen months ago, D. A. Maury, of Peoria, Ill., made a sensational report to the city, in which he said that \$160,000 damages had been done to the water mains. According to him some of the pipes were reported as almost completely eaten away. This startled the City Council, and immediately an ordinance was introduced to compel the installation of the double trolley. General Manager Huff, of the Virginia Passenger & Power Company; F. N. Waterman, of New York; Prof. Sever, of Columbia, and Mr. Herrick, all offered expert testimony for the company last fall. The city presented its side this spring. Mr. Schoen who had looked into the matter for the city, gave testimony unfavorable to the double trolley, and expressed the view that the present return system did not constitute a hazard to the city's pipes. Mr. Trafford, an electrical engineer of Richmond, testifying on behalf of the city, also declined to recommend the double trolley. Mr. Maury, of Peoria, and Mr. Foss, of Boston, both waterworks engineers, however, favored its installation. It is the testimony of these experts that the joint committee of water and electricity has been considering, and it is on the presentation of the case against the double trolley and the evidence as to the present excellent condition of the system, that the majority report in opposition to the double trolley was made and adopted by the City Council.

REPORT OF COMMITTEE ON CLASSIFICATION OF ACCOUNTS

The special committee on classification of electric railway accounts, appointed in conformity to the resolution passed at the conference held in Washington on Nov. 22, has rendered its report to Prof. Henry C. Adams, of the Interstate Commerce Commission. This committee consisted of the following members:

Geo. H. Harries, chairman, representing the American Street & Interurban Railway Association.

Wm. F. Ham, representing the American Street & Interurban Railway Accountants' Association.

C. Loomis Allen, representing the Street Railway Association of the State of New York.

Wm. J. Meyers, representing the New York Public Service Commission of the Second District.

Wm. O. Seymour, representing the National Association of Railway Commissioners.

C. F. Balch, representing the Interstate Commerce Commission.

Sessions of this committee were held in Washington from Nov. 29 to Dec. 3, and it went very fully into the subject. Prof. Adams has called a conference to consider the report of this special committee, the conference to be held at the rooms of the Interstate Commerce Commission in Washington on Dec. 17. It is expected that the subject will be very fully considered at that time, but that any action taken at that conference will be tentative in character and that before the Interstate Commerce Commission is asked to approve or disapprove the scheme submitted the accounting officers of the electric railway companies in the country, and others interested, will have an opportunity of making criticisms and suggestions.

The Traffic Commission of the municipality of Berlin has decided to build an underground railroad running northwest and southeast through the heart of the city, from Charlottenburg to Rixdorf. The cost of the new line is estimated at \$15,000,000. It is an addition to the subway to run north and south, plans for which are now under preparation. Berlin is also to have five new surface lines.

THE CLEVELAND SITUATION

As stated in the STREET RAILWAY JOURNAL for Dec. 7, President Andrews of the Cleveland Electric, on Tuesday of last week, forwarded to Mayor Johnson a communication in which he informed that official that the company had chosen Attorney F. H. Goff, of the firm of Kline, Tolles & Goff, with full power to act in the negotiations with the city, the board of directors having passed a resolution to that effect. This was an unexpected move on the part of the company, as at a meeting with the Mayor on Monday, President Andrews had asked under what terms the city would be willing to allow the company to rebuild and operate the lines on Central Avenue and Quincy Street, and the Mayor had given the usual answer to the effect that a proposition should be made.

Wednesday morning Mr. Goff formally addressed the City Council and councilmen-elect. He said he entered upon his duties under some degree of embarrassment because he was only slightly acquainted with the members of Council and the Mayor. Further he said that the settlement would be somewhat in the nature of a trial with the Mayor as judge, and the councilmen as jurors, and that in making his preliminary statement, he came unprepared to a large degree, as he had not had sufficient time to go over the matter.

Mr. Goff first stated that he owned 200 shares and his wife 130 shares of Cleveland Electric stock, but he said he would submit this fact to the Mayor, and if he felt that it would bias him in his negotiations, he would dispose of the stock before he took up the work. Mr. Goff also stated that he is a volunteer in this work, so to speak, as he was undertaking it without pay and with full authority to act. In speaking to the councilmen, he said that the disputes that had taken place in the past might have caused some feeling and that for this reason the case might be considered as almost half tried at this time; but he asked them, for the good of the public and all concerned, to consider the negotiations as if they were a new subject altogether. Of the 1000 stockholders of the Cleveland Electric Railway, Mr. Goff said many were people who had put their savings into it with the expectation that they would in this way possess a competency in later years. In some cases aged couples, with no other assets, own stock in the company. Mr. Goff said he owes a duty to these minority stockholders, and until this is discharged, he will not feel that his work is done. The Mayor and the councilmen also owe a duty to them and he asked that they consider this responsibility.

In explaining his views upon the question in general, Mr. Goff said that he would insist upon the company opening all its books and records to the public and to any investigators or experts that may be chosen to go through them. As the Mayor and Council seem to have considered the holding company plan of settlement the only feasible one, Mr. Goff said he was willing to take up the negotiations along that line. Owing to a tendency toward municipal ownership of public service corporations, in some quarters, he expressed himself as willing to go into the matter and find out whether an amicable adjustment can be brought about in that way.

In regard to the values to be placed upon the properties of the Cleveland Electric, Mr. Goff said he believed that it would be to the interests of all to have President Horace Andrews of the Cleveland Electric Railway and President A. B. DuPont of the Municipal Traction Company take up that work. He said he could not aid in this valuation

and that personally he wanted Mr. Andrews to take part in fixing it. A leasing arrangement contemplates not only a valuation of the physical properties, but of the underlying stock and the unexpired franchises. As there is a dispute as to when the franchises of the West Side lines expire, Mr. Goff suggested that City Solicitor Baker and some other attorney take this matter up and determine, if possible, the date of the expirations. After paying Mr. Baker a compliment for the work he has done, Mr. Goff suggested that his own law partner, S. H. Tolles, be selected to act with Mr. Baker and if they can not agree to call in a third lawyer.

As the basis for the valuation of the various kinds of properties can not be fixed otherwise, he suggested that engineers be selected to make an investigation and report their findings for the consideration of the representatives of the city and himself. As the proposed holding company has only a small capital stock, Mr. Goff proposed that the security franchise for the Cleveland Electric Railway Company should be very carefully drawn in order to protect the property of the company from depreciation. He felt that a fund should be set aside for maintenance and some arrangement made for the extension of the lines and other improvements.

Mr. Goff said there should be a unification of the lines and that he would endeavor to facilitate progress in every way in the discussion of the lease, the security franchise and other subjects that must be settled. He said he had no opinion yet as to the terms or the price upon which a leasing arrangement should be made.

Speaking of President Andrews, Mr. Goff said he yielded to none in appreciation of what he has done all through the negotiations between the city and the company. At the outset of these considerations, Mr. Goff said he wanted it understood that he will fight for the stockholders of the company just as hard as for the interests of the city and that he will hold out for the last dollar in the valuation. While endeavoring to be fair to the extreme so far as the city is concerned, he said he will never give up in his contention for what he thinks is right for the company. As to the directors of the holding company, he said they must be broad-minded business men, such as would make a success of any undertaking if the possibility of success lay within the proposition. In closing, he suggested that an armistice might be declared until some form of settlement is reached.

Mayor Johnson said he was very much pleased with Mr. Goff's presentation of the case and of his willingness to cooperate with the city in reaching an agreement. The city will approach the negotiations with the same degree of fairness that has been manifested by Mr. Goff, he said. He said, however, that he did not want to be considered a judge in this matter and that both he and the members of the council are open to conviction on all matters pertaining to it.

As to ascertaining the physical valuation of the property, the Mayor thought that men should be selected for each class of property, such as real estate, track, power houses, etc., and that they should report their findings for consideration. Then an attempt to agree could be made upon any point where differences arise. The Mayor finally agreed to the suggestion that Messrs. Andrews and DuPont be named to report on the valuations, with the understanding that they select men to go over the different kinds of property and report to them, after which they will report to the Council their findings. In effect, the detail is taken

from the Council by this arrangement and left to the two presidents.

Messrs. Baker and Tolles were agreed upon as a committee to investigate the franchise question and report upon the dates of expiration. The company claims that some of the franchises in question do not expire for two years after the dates claimed by the city. The city is relying on the decision of Judge Tayler, of the United States District Court, on the Central Avenue and Quincy Street matter for the expirations on the other streets in question. These gentlemen are to submit their findings to the council committee of the whole and Mr. Goff, and if agreements are not reached on all points before they are submitted, the committee will try to reach an agreement on them. That failing, a third lawyer will be called in for an opinion. However, none of the decisions will be binding on either side.

At the meeting of the Council committee of the whole to discuss the street railway question Tuesday, Nov. 10, Mayor Johnson suggested the appointment of two new committees of two members each to determine the ratio of increase or decrease in the gross receipts of the Cleveland Electric, and to fix a set of rules of procedure in the valuation of unexpired franchises. Both, of course, relate largely to the value of the franchises. Mr. Goff agreed to this, but the personnel of the committees was left open for the time.

Mr. Goff explained that he had endeavored to secure information that would enable him to state a figure somewhere near what he would demand as a basis price for leasing the properties of the company, but that he had been unable to do so as yet. He felt, however, that it will be easy to arrive at the physical value of the properties. The determination of the value of the franchises will be more difficult. He suggested that experts be employed and paid by the city and the company in conjunction, to aid in arriving at a proper valuation of the properties. He said that he wanted to get at the matter in a way that will bring results, and he believed this would be a good plan. The company is willing to pay its portion of any such expenses.

Mr. Goff reviewed the negotiations between the city and the company, saying that two years ago a price of 85 had been proposed, and that last summer the price was placed at 60, with a reduction of \$2 for each month that the company delayed in accepting the proposal. This, he said, was a kind of penalty inflicted upon the company for not accepting the offer. He stands for the values as they are found by the investigation, and the board of directors of the company will accept what is shown to be fair and right. Mr. Goff called attention to the fact that during the past fourteen years the company had expended \$12,000,000 for extensions and betterments, and that the property therefore contains that much more value.

Mr. Goff's suggestion of unification of the lines was repeated. He said he believed in only one company, and that if an arrangement was arrived at, then some way could be found to merge the owning companies. Stock of the Cleveland Electric might be issued to cover the assets of the Forest City Railway Company, or some other plan taken to unite the companies. A blanket franchise, with six tickets for a quarter, could then be issued to protect the old company.

Mayor Johnson agreed with Mr. Goff in his idea of unification. He said a new company might be organized by the stockholders of the Cleveland Electric to which the

security franchise could be given, and that this would cover all the lines after the companies had been united under the new company. The city, he said, is not particular whether there are one or more companies; but the old company would be safer to have the merger made and the franchise cover all the lines thus taken in, as all the extensions and improvements would then go to it. A certain sum should be set aside each year to retire the bonds of the old company. All this may be worked out so there will be no conflict of interests.

The great difficulty, he said, would be in fixing the price as a basis for leasing. In this connection he referred to Mr. Goff's remarks about the expenditure of money in betterments, and said that much had also gone into legal controversies, purchasing consents and in taking up tracks. He stated that the offer of 85 was made two years ago because the city desired to purchase a settlement, and explained that the figure did not represent what he considered the real worth of the properties. The offer of 60, however, was what the property was thought to be worth at the time. The drop of \$2 a month, he said, represented the further depreciation in the value of the properties.

The committee on buildings made a report on the value of structures aside from power houses and battery houses. On a portion of them they agreed to a value of \$83,356. On the others, Mr. Vanderwerf reported \$820,720 and Mr. Lougee \$705,235.

CORRESPONDENCE

TURBINE ECONOMIES

PITTSBURG, PA., Dec. 2, 1907.

EDITORS STREET RAILWAY JOURNAL.

Permit me to verify the statements made in your issue of Oct. 5 in connection with an economy test on a large turbine of the Parsons type at the New York Edison Company. The accuracy of the results has been called into question by a contributor to one of your contemporaries. I therefore desire, first, to uphold the accuracy of your published report, and second, to correct a popular misconception regarding comparison of turbine economies under different operating conditions. The point at issue is whether the water rate of 14.9 lbs. per kw-hour, developed by the New York Edison turbine, represents higher economy than 12.5 lbs. per kw-hour which is said to have been developed by a large Curtis turbine at the Chicago Edison Company. Presumably the latter figures have been incorrectly quoted from a test recently reported on a 9000-kw turbine at the Chicago Edison Company which showed a maximum economy of 12.9 lbs. per kw-hour at 10,000 kw load.

Now, as far as I am able to ascertain, the basic facts are these: Taking both machines at their point of maximum economy, the Westinghouse-Parsons turbine developed a water rate of approximately 15.1 lbs. per kw-hour output at the switchboard for two consecutive hours with an average steam pressure of 175 lbs. gauge, 97 degs. superheat and 27.3 ins. vacuum. Correcting to contract conditions, 175 lbs. pressure, 100 degs. superheat and 28 ins vacuum, this is equivalent to 14.73 lbs. per kw-hour. The Curtis turbine, on the other hand, developed 12.9 lbs. per kw-hour with 176 lbs. pressure, 147 degs. superheat and 29.5 ins. vacuum. Correcting to the above contract conditions by percentages advocated by the builders of these machines, it develops that the equivalent water rate at the

same load, is 15.08 lbs. per kw-hour. These results might be reduced still further—to a basis of dry-saturated steam—and still be within the limits of your published statement regarding the economic record established by the New York Edison tests, but I believe the above figures will be sufficient for the point in view.

The inference drawn from the above, is that economy tests are not comparable from either a technical or a commercial standpoint, unless respective operating conditions are known, so that it is manifestly improper to question the accuracy of your published report upon such a superficial basis. And, in making comparisons such as these (which heretofore have seemed neither necessary nor opportune), I do so purely in the interest of a clear understanding of the situation, not for the purpose of drawing illusive conclusions, even though the latter may be quite tenable on careful analysis. In examining the performance of prime movers, we must not simply accept the rate of consumption of heat energy in the form of steam, gas, oil, etc., but make comparisons on a true, scientific basis, else the results will quickly lead to erroneous conclusions. The sooner these principles are clearly understood and appreciated at their true value, the sooner will the apparently great disparity between turbine tests, such as those above outlined, be dispelled.

And herein, by the way, lies the greatest fallacy in the ceaseless struggle for high economies. Every engineer is, of course, interested from a personal standpoint, in the attainment of the highest cyclical efficiency for all forms of prime movers; but high efficiency, *per se*, means little from a commercial standpoint unless the cost of attaining it is reckoned. This is particularly true of the extreme operating conditions assiduously cultivated in turbine operation. Unquestionably, the results are spectacular, but when we take into consideration the extra cost, maintenance, a complexity of the additional auxiliary equipment, and the losses incident thereto, our enthusiasm wanes, and we intuitively seek a lower plane where efficiency and cost form a more reasonable balance.

J. R. BIBBINS.

THE GENERATORS FOR THE LINCOLN WHARF STATION, BOSTON

The Allis-Chalmers Company is supplying the enlarged Lincoln Wharf station of the Boston Elevated Railway Company two 2700-kw direct-current railway-type generators driven by engines with cylinders 42 ins. x 90 ins. x 10 ins. stroke at a speed of 72 r. p. m.

With the additions at the Lincoln Wharf, Harvard and Charlestown power stations of the Boston Elevated Railway Company, now nearing completion, the total generating capacity for the system will reach approximately 50,000 kilowatts. The work of laying out and constructing these station improvements was placed in the hands of the Stone & Webster Engineering Corporation, of Boston, in accordance with the recommendations made by this firm for a system of generation and distribution of power which would provide for present and future demands. It was decided to add 5400 kilowatts capacity to the Lincoln Wharf station, 2700 kilowatts to the Charlestown and 2700 to the Harvard power station, as has been previously mentioned in the *STREET RAILWAY JOURNAL*. Direct-current, steam-engine driven generators were selected as the type of the new units in order to conform in general design to those already installed in the various stations.

PAY-AS-YOU-ENTER CARS FOR THE PUBLIC SERVICE CORPORATION

As the result of careful study of the pay-as-you-enter car, the Public Service Railway Company of New Jersey has placed an order with the Cincinnati Car Company, of Cincinnati, Ohio, for 150 cars of the pay-as-you-enter type for delivery commencing next January. Mr. Danforth, the general manager of the company, made this announcement after his return on Monday of this week from Chicago, where he went especially to study the operation of the car on the Chicago City Railway. Mr. Danforth confirms the statements previously made about the ability quickly to load and unload the new type of cars, and in speaking about them laid especial stress on the fact that much time is saved because the conductor is able to give a prompt signal for starting when all intending passengers are safely aboard, something that cannot be done at present in every case when the conductor is so frequently called to the center of the car to collect fares.

The new cars will not be as great an innovation in New Jersey as they were in Chicago, as the Public Service Corporation has for some time operated both single-end and double-end cars with the Detroit platform. It is the standard single-end car of this type that the company has modified for operation on the pay-as-you-enter plan. Certain minor details, however, remain still to be decided, and for this reason a plan of the car was not available for publication. The length of the present standard car body is 30 ft. 8 ins. with a front platform of 5 ft. and a rear platform of 8 ft. 6 ins., making the length of the car over all 44 ft. 2 ins. The width is 8 ft. 6 ins. These dimensions will not be changed in the new cars. Neither will the seating arrangement be altered, which provides for cross seats in the middle of the car and longitudinal seats at either end. Two railings will divide the rear platform instead of one as at present, and the passageways will be distinctly labeled "Entrance" and "Exit." The second of these railings will be 5½ ft. from the rear, giving a passageway of 3 ft. The other will be 3 ft. from the first or 2 ft. 6 ins. from the rear, thus giving room for a few smokers, while leaving ample room for passengers to board and leave the car.

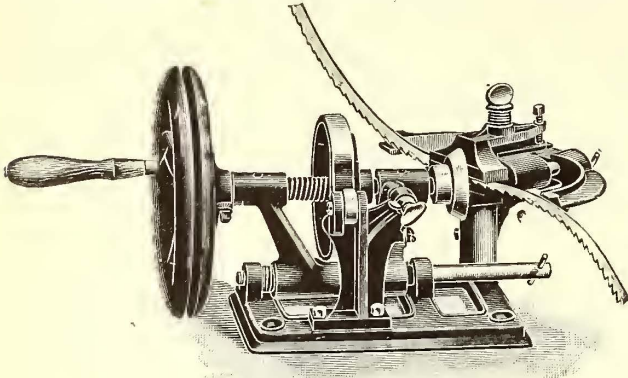
It is in the front platform that a decided change will be made. As now built, the single-end cars have a separate enclosure for the motorman. This will be done away with in the new cars, and a mutually operated door mechanism installed, controlled by the motorman. It is thus proposed to have passengers leave the car at the front. The front platform doors are to be of double folding type, so arranged that the grab handle will be in evidence only when the doors are open. Both front and back platforms will, of course, be enclosed. One of the considerations that governed in the decision as to form of front platform as made was the fact that the 44-ft. cars will just pass on curves with this form as previously adopted for all cars on the system.

As the cars are not to be put in service before March it has not been stated where they will be placed in service first. Before they do go into service, however, it is proposed to conduct a campaign to acquaint the public with their working, in which the daily newspapers will be largely used.

The Inglewood Park Cemetery Association has placed an order in the East for a funeral car, to cost \$12,000. This is to be used between Los Angeles and the cemetery on the electric line of the Los Angeles & Redondo Railway.

A SIMPLE BAND SAW SHARPENER

Practically every large modern wood working shop is equipped with a more or less expensive automatic band saw sharpener, but the smaller users of band saws, with one or two saws a week to sharpen, which would not warrant a large machine, are still using the hand file. It is for the



BAND SAW SHARPENER.

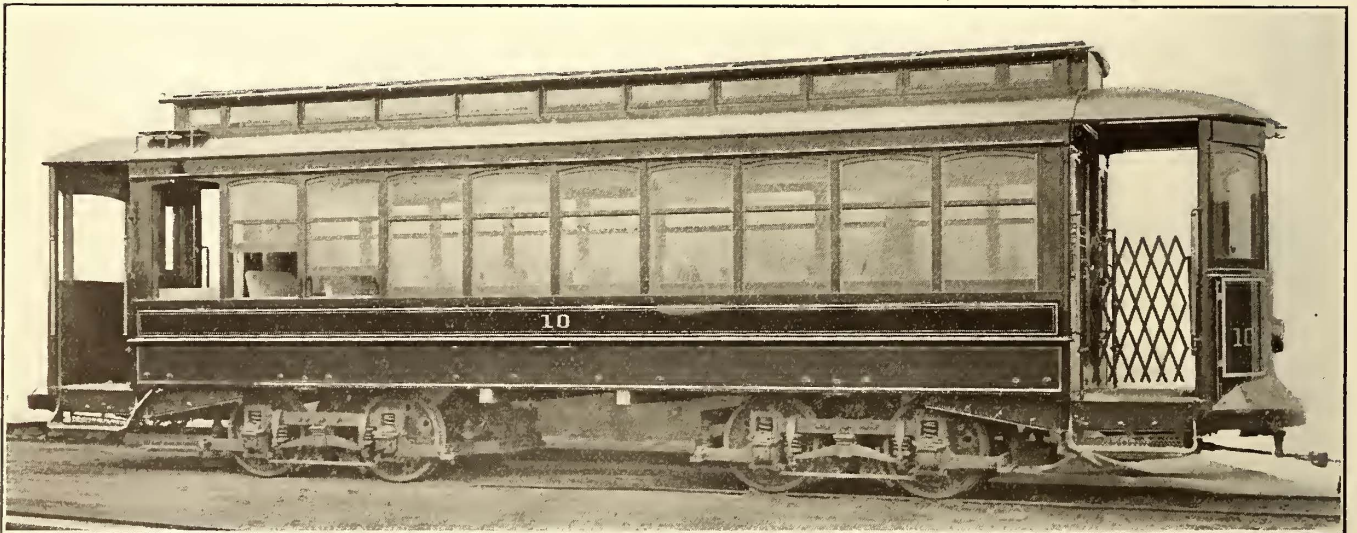
benefit of the latter that the Rotary File & Machine Company of Brooklyn, N. Y., is now making what it calls its Ideal sharpener for operation either by hand or power. This machine is adapted for filing small band saws, ranging in size up to and including saws with teeth $\frac{1}{2}$ in. from tooth point to tooth point and $1\frac{1}{2}$ ins. width of blade. The vise which carries the saw is clamped together by spring pressure sufficient to hold the saw firmly, yet allowing it to be slipped through as each tooth is filed. At each revolution of the file shaft, the file is automatically withdrawn from engagement with a tooth, dropped back, and just as the

RECEIVER FOR OHIO ROAD

Owen N. Wilcox was, on Dec. 10, appointed receiver of the Cleveland & Sharon Electric Railroad Company by Judge Strimple in the Common Pleas Court, on a petition filed by the company, through its president, Francis B. Morgan. An injunction suit was filed Dec. 9 by the Cleveland & Sharon Company to prevent the Eldenbel Construction Company, of New York, and C. F. Clendenin, trustee, from holding a stockholders' meeting, alleging the Eldenbel Company had arranged to get possession of the road. The traction company was organized under the laws of Ohio, with a capital stock of \$2,500,000, and has issued \$2,500,000 in bonds. Under an agreement, it is said that the Eldenbel Construction Company was to float the bonds for the road in London.

MORE SEMI-CONVERTIBLE CARS FOR LAKE CHARLES STREET RAILWAY

The accompanying illustration shows one of a number of semi-convertible cars recently delivered to the Lake Charles Street Railway Company by the American Car Company. The Lake Charles Company has had ample opportunity for testing this type of car and has been particularly impressed by its great carrying capacity. As many as 143 passengers have been accommodated on one of the single-truck convertible cars delivered by the American Car Company some fifteen months ago—a load that would be quite impossible with the drop-sash car with its restricted aisle space. The company has been introducing a number of improvements at Shell Beach to attract patrons of the line during the



SEMI-CONVERTIBLE CAR FOR LAKE CHARLES.

smooth portion of its circumference reaches the saw, it shoves the saw along for the next tooth. The amount of this movement is regulated according to the size of the saw tooth by a thumb screw. The file is controlled by cams to only cut a certain depth each time, and this feature always insures accurate and even teeth. The construction of the vise makes it possible for a thick weld, and, in fact, almost anything but a break to pass through the vise without stopping the machine or injuring a tooth. This machine, it is said, will save more than half the time of hand filing. If the saw through negligence is left in until it has passed the starting point, no harm is done. The wearing parts are made of high-grade steel.

winter months, and it is expected that the new double-truck cars will prove of great service in handling the increased traffic. The Lake Charles Street Railway Company also operates convertible cars—two on the Gooseport line, one on the Hodges Street line and two on the Shell Beach line. The semi-convertible cars just delivered at Lake Charles are 8 ft. longer in the bodies than their predecessors, namely, 28 ft., and are 37 ft. 5 ins. over the crown pieces. The trucks are the No. 27-GEI with 4 ft 6 in. wheel base. Other dimensions are as follows: Width over sills, including sheathing, 7 ft. 11 $\frac{1}{2}$ ins.; over posts at belt, 8 ft. 2 ins.; size of side sills, 4 $\frac{1}{2}$ ins. x 7 $\frac{3}{4}$ ins.; end sills, 5 $\frac{1}{4}$ ins. x 6 $\frac{7}{8}$ ins. The cars are finished in cherry.

FINANCIAL INTELLIGENCE

WALL STREET, DEC. 11, 1907.

The Money Market

Developments in the monetary situation have been rather unfavorable during the past week, and as a result rates for money in the local market have ruled considerably higher. Money on call early in the week was obtained in quantity at rates ranging from 5 to 10 per cent, but toward the close there was an advance to 25 per cent, the highest price recorded for demand funds for a month past. Time money was practically unobtainable, while merchants experienced considerable difficulty in securing requirements. The advance in the call loan rates was attributed solely to the heavy transfers of funds from this center to the interior. It was generally believed that the urgent requirements at the West and South had been practically satisfied, but during the week a renewed demand developed from those sources, which made it necessary for the local institutions to call in their loans and ship the money to their country correspondents. According to the statements made to the controller of the currency, as of Dec. 3, the demands from the out-of-town banks are not justified, as in most instances the statements showed cash holdings largely in excess of reserve requirements, while in some individual cases the percentage of cash amounted to more than 50 per cent of deposits. The demand for currency continues, and although the volume of business in this branch of the market has fallen off considerably, it is sufficient to keep the premium around 1 @ 1¼ per cent. The foreign exchange market has worked firmer, and consequently gold imports from Europe have been reduced to comparatively small amounts. At the close of the week the belief prevailed that no material improvement in the local situation was likely until after the turn of the year. Many time loans are now maturing and it is understood that these loans are not being renewed. Preparations must also be made in the near future for the Jan. 1 interest and dividend disbursements, which are usually heavy.

The bank statement published last Saturday was more favorable than expected. Loans decreased \$11,682,900 as a result of the liquidation in the stock market. Cash increased \$4,671,100, and as the reserve required was \$2,107,975 less than in the preceding week, the deficit was reduced by \$6,779,075. The total deficit now stands at \$46,210,350, as compared with a deficit of \$6,702,175 in the corresponding week a year ago, and a deficit of \$1,246,525 two years ago.

The Stock Market

The upward movement in the stock market which set in after the recent panic abated, and which has continued with very little interruption during the past few weeks, has come to a halt. The investment demand which has assumed such enormous proportions because of the unusually handsome yields that innumerable stocks afforded at the ruling prices has to a considerable extent subsided, and in consequence the tendency of values is downward. Efforts to inaugurate a bullish speculative campaign have failed, for the reason that the elements necessary to a successful movement of this character are lacking and that the recognized leaders of the market are averse to starting such a campaign at present, preferring to await the January interest and dividend disbursements before engaging in anything of the kind. As a matter of fact, conditions, while vastly better than they have been, are by no means propitious in the sense that an active bull movement is justified; on the contrary, all the underlying factors in the situation would seem to prompt the exercise of extreme caution. In the first place, there is still a very large deficit in the reserves of the New York Clearing House banks, while both time and call money are held at practically prohibitive rates. Furthermore, currency continues to command a premium, and matters in the mercantile world are anything but satisfactory. The principal argument against a sustained upward movement in security values at the present time, however, seems to be in the action of numerous corporations throughout the country in curtailing and deferring dividends. This policy is having a decided influ-

ence, as the average investor looks to the dividends which he is likely to receive, even before considering the security of his investment.

The only really bright spot in the situation is contained in the steadily increasing demand for railroad bonds, which for practically two years has been virtually nil. With dividends threatened, it is perfectly natural that investors should turn their attention to mortgages on which there is no danger of a default in interest, and the Wall Street community is now looking forward to a constant growth in the buying of first-class bonds as the chief means which will result in bringing money from its hiding places. London is in rather a pessimistic frame of mind regarding American securities and is disposed to sell on any favorable opportunity, while through the recent substantial advance a considerable portion of the short interest that had existed here was eliminated. It thus appears that there is little or no buying power behind the present market, hence the speculative temper has undergone quite a change from the optimism that has lately been in evidence. Then again the copper metal industry is in pretty bad shape, as indicated by the further reduction in output, as well as by the cutting and passing of dividends by many of the companies engaged in this branch of the business, to say nothing of the general belief that the reputed leader in this particular industry is about to follow a similar course. It may be that those having the destinies of our leading commercial enterprises in their hands may be endeavoring to paint the picture in its darkest colors, but whether this be true or not, there is no gainsaying the fact that the industrial situation at the moment is far from roseate, which explains the relative weakness of that class of securities, although railway shares have likewise suffered materially in the reactionary movement.

The local traction shares have stood up as well as any in the general decline, and there has been quiet absorption of most of them on the recessions. Brooklyn Rapid Transit has exhibited comparative strength, which is accepted as indicating that, as was stated in these columns some time since, the public investigation into its affairs would only result in giving to the company a clean bill of health.

Philadelphia

Trading in the local traction stocks has been considerably more active during the past week, and prices for all of the active issues have scored substantial gains in sympathy with the strength prevailing in the general securities market. The prominent feature was Philadelphia Rapid Transit, which advanced more than 2 points to 18½, on rather heavy purchases, but later there was a reaction of about a point on profit-taking sales. Union Traction also was conspicuously strong, the price making an extreme gain of 3 points to 50. American Railways advanced nearly a point to 44¾ and Philadelphia Traction scored a similar gain to 84. Philadelphia Company common rose from 34½ to 37, and the preferred moved up a point to 37. Frankford & Southwark Passenger was traded in for the first time in several weeks, a small amount of the stock selling at 385. The United Companies of New Jersey made an extreme gain of 5 points to 30, and closed at the highest. Consolidated Traction of New Jersey sold at 60.

Baltimore

There was a broader market for the traction issues at Baltimore during the past week, and prices in nearly every instance scored gains over those prevailing at the close a week ago. Investment buying of United Railway 4's advanced the price to 82¾, while the incomes rose from 45½ to 47. The new funding 5's, after changing hands at 70¾, advanced to 72¾, while the stock moved up a fraction to 10¾. Metropolitan Railway of Washington 5's sold at 105½, Washington City & Suburban 5's at 97½, Baltimore Traction 5's at 105, Norfolk Railway & Light 5's at 90, and Macon Railway & Light 5's at 97.

Other Traction Securities

The feature of the Boston market was the sharp fluctuations in Boston Elevated stock. Opening at 123, it advanced to 124 and then, on comparatively light transactions, the price

broke to 120. This was followed by a recovery of 2 points. Otherwise the trading in this market was extremely dull and devoid of any interesting feature. Boston & Worcester preferred sold at 55, Massachusetts Electric common at 9½, the preferred at 39, West End common at 81 @ 82 and the preferred at 98. Trading in the Chicago market was practically at a standstill. About the only noteworthy feature was Metropolitan Elevated preferred, which declined from 48 to 46. South Side Elevated sold at 64. The stocks of the various surface lines were neglected.

Cleveland Electric sold from 32 to 42 on the Cleveland Stock Exchange the past week, a number of sales being made around the latter figure. The negotiations, with Mr. Goff at the head, seem to have put some life into the business. Tuesday a few shares of Forest City stock changed hands at 100, but after that the asked price was raised to 101¼. Northern Ohio Traction & Light was quoted at 18¼ bid and 25 asked. Western Ohio preferred stock was listed on the exchange a few days ago.

Security Quotations

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

	Dec. 4.	Dec. 11.
American Railways	44	45
Boston Elevated	118½	124
Brooklyn Rapid Transit.....	38¾	38¾
Chicago City	a150	a150
Cleveland Electric	—	36
Consolidated Traction of New Jersey.....	—	59
Detroit United	32½	35
Interborough-Metropolitan	7½	7
Interborough-Metropolitan (preferred)	18¾	19
International Traction (common).....	—	40
International Traction (preferred) 4s.....	—	61½
Manhattan Railway	116	115
Massachusetts Elec. Cos. (common).....	9¼	9¼
Massachusetts Elec. Cos. (preferred).....	38	38
Metropolitan Elevated, Chicago (common).....	a20	21
Metropolitan Elevated, Chicago (preferred).....	46	46
Metropolitan Street	23	—
North American	47¾	43
North Jersey Street Railway.....	25	25
Philadelphia Company (common).....	34	36½
Philadelphia Rapid Transit.....	17½	16½
Philadelphia Traction	83	82
Public Service Corporation certificates.....	54	54
Public Service Corporation 5 per cent notes.....	89	85
South Side Elevated (Chicago).....	—	62
Third Avenue	18	25
Twin City, Minneapolis (common).....	79	81
Union Traction (Philadelphia).....	49	47

a Asked.

Metals

According to the "Iron Age" there were 226 furnaces in operation on Dec. 1, producing at the rate of 347,372 tons per week, a drop in two months of 164,000 tons. Since the first of the month seven furnaces have gone out, and the announcement in a number of cases that other plants will shut down. Transactions are on a limited scale. The Erie Railroad has placed an order for 25,000 tons of steel rails, and it is known that some other business for 1908 is pending. The old material markets are thoroughly demoralized and very low prices are being made.

The copper metal market continues dull. Lake is quoted at 13½ @ 10½, Electrolytic at 12¾ @ 10½ and Castings at 12½ @ 12¾.

ASKS RECEIVER FOR DELAWARE COMPANY

George H. Bates and Richard R. Kenney, counsel for Samuel F. Nirdlinger, of Philadelphia, have filed a bill in equity before Chancellor Nicholson, at Dover, Del., asking for a restraining order against the Delaware General Electric Railway Company, the Delaware Electric Traction Company, the Milford Construction Company, John B. Wharton, Thomas N. Rawlins, treasurer of the State of Delaware; Lewis Heisler Ball and

Martin B. Burris, each of whom were former State treasurers of Delaware; James Frank Allee, Caleb R. Layton, George W. Marshall, Luther S. Conwell, Sylvester John Abbott and Thomas C. Moore. The bill asks that respondents be enjoined from disposing of any of the effects, materials, etc., of the corporations named, and that a receiver be appointed for the companies. The chancellor granted the rule to show cause why a receiver should not be appointed for the Delaware General Electric Company, also a rule restraining Allee, Layton, et al., from disposing of any of the property of the company. A rule to show cause, returnable next Monday, Dec. 16, was also granted directing State Treasurer Rawlins to show cause why he should not be enjoined from using the fund otherwise than as simple custodian of it.

FIRE IN MILWAUKEE

The Farwell Avenue barns of the Milwaukee Electric Railway & Light Company were partially destroyed by fire Dec. 7, and the adjoining sub-station of the company also was damaged by the flames. The car barns are separated from the sub-station by a fire wall, which prevented the fire from spreading. There were some 200 cars in the barn at the time of the fire, about 45 being in the part which was attacked by the fire. Most of the cars were run into the street, but it was impossible to get out those at the rear before the flames had reached them. Among the cars destroyed were three salt cars, three snow sweepers, the private car of President Beggs and a number of passenger cars. Mr. Beggs is quoted as saying that nine cars in all were totally destroyed and that the loss aggregates about \$70,000.

ELEVATED TRAFFIC IN CHICAGO FOR NOVEMBER

Traffic of the elevated railroads of Chicago for the month of November showed a good increase over the corresponding month last year, with the exception of the figures of the Metropolitan elevated. These latter showed a decrease in the daily average of number of passengers carried of 953, or 0.63 per cent. The loss is attributed to the laying off of men in the large plants in the territory served by the company. Northwestern and South Side elevated each had large gains. The figures follow:

SOUTH SIDE ELEVATED.

	1907.	1906.	Increase.	P. Ct.
January	92,411	92,406	5	0.00
February	96,094	95,077	1,017	0.00
March	100,226	95,466	4,760	4.98
April	103,152	95,756	7,396	2.72
May	109,880	91,759	12,721	13.03
June	115,686	101,770	19,986	13.67
July	111,933	92,796	19,187	20.39
August	113,847	88,539	25,308	28.58
September	118,256	89,749	28,507	31.74
October	126,670	93,577	33,093	35.36
November	120,594	94,281	26,313	27.99

METROPOLITAN ELEVATED.

January	150,165	129,720	20,445	15.76
February	154,444	135,570	18,874	13.91
March	154,790	138,169	16,621	12.02
April	156,275	137,477	18,798	13.67
May	151,423	136,735	14,688	10.72
June	148,518	133,974	14,544	10.85
July	135,779	123,370	12,409	10.37
August	136,517	123,512	13,005	10.52
September	140,979	126,975	14,004	11.02
October	157,080	142,671	14,409	10.09
November	151,518	150,565	*953	*0.63

NORTHWESTERN ELEVATED.

January	88,632	81,204	7,428	9.15
February	88,435	83,572	4,863	5.81
March	89,344	85,154	4,190	4.92
April	99,134	84,244	5,800	6.99
May	94,204	81,748	12,456	15.24
June	99,051	80,165	18,886	23.56
July	91,542	73,308	18,234	24.87
August	93,174	73,170	19,998	27.32
September	97,447	77,508	19,939	25.72
October	108,806	88,344	20,462	23.16
November	106,847	93,238	13,609	14.59

*Decrease.

ANNUAL REPORT OF THE MASSACHUSETTS ELECTRIC COMPANIES

The Massachusetts Electric Companies has issued its eighth annual report, covering the year ended Sept. 30, 1907. The detail figures of operation show as follows:

	1907.	1906.
Gross earnings	\$7,758,511	\$7,518,240
Operating expenses	5,000,652	4,883,552
Net earnings	\$2,757,858	\$2,634,688
Fixed charges	1,702,622	1,594,502
Balance	\$1,055,235	\$1,040,185
Dividends	880,773	710,406
Surplus	\$174,462	\$329,779

The profit and loss statement of the parent company compares with previous years as follows:

	1907.	1906.
Dividends on stock owned.....	\$880,837	\$710,498
Miscellaneous interest on notes.....	82,003	66,651
Total income	\$962,840	\$777,149
Total expenses	16,629	18,395
Net income	\$946,211	\$758,754
Interest on notes.....	157,500	157,500
Surplus	\$788,711	\$601,254
Total surplus	1,566,884	778,173

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

The general balance sheet of Sept. 30, 1907, compares with the two previous years as follows:

ASSETS.

	1907.	1906.
Sundry stocks in treasury.....	\$33,360,839	\$32,860,420
Stock deposited to secure notes.....	4,375,000	4,375,000
Cash	60,847	183,180
Notes and accounts recorded.....	1,280,000	1,063,819
Due from operating companies.....	880,705	687,366
Cash to pay dividends.....	1,021	2,209
Total	\$39,958,413	\$39,171,994

LIABILITIES.

Preferred stock	\$20,557,400	\$20,557,400
Common stock	14,293,100	14,293,100
Coupon notes	3,500,000	3,500,000
Accounts payable	632	1,737
Accrued interest on notes.....	39,375	39,375
Dividends uncalled for.....	1,021	2,209
Discount reserve .....	.....	.....
Surplus	1,566,884	778,173
Total	\$39,958,413	\$39,171,994

President Abbott, of the company, says in part: "The net results have been nearly identical with those of last year. There has been a certain amount of variation in the items—gross earnings increased \$240,270, winter expenses were larger, cost of accidents was smaller—but the final result of all these variations is that net divisible income increased \$15,050; or, in other words, remained substantially the same as last year. The freight and express business has shown a gratifying increase on these parts of the Old Colony, where it has been put in operation, but it has not been possible even yet to secure all the necessary rights to carry freight over the whole of that system.

"With respect to the physical condition of the property, it has improved over that of last year. Liberal charges to operating expenses for maintenance have been supplemented by the expenditure of \$1,574,680 for construction, reconstruction, and the purchase of additional rolling stock and other property. Whether or not it will be judicious to spend, during the coming year, the balance required to complete the reconstruction of the property, will depend upon the general business situation, and the trustees do not intend to approve of any considerable new expenditures until that situation shall be clearer than it is at present.

"The above-mentioned expenditure of \$1,574,680 during the year just closed, has been divided as follows: Track construction \$158,080, track reconstruction \$393,048, cars and electrical equipment \$555,645, wire and bonding \$42,568, power stations \$294,111, land and buildings \$111,150, sundries \$20,073; total, \$1,574,680.

"It was of the utmost importance that the work outlined two years ago should be done as quickly as possible. Without it the system could not have been operated economically and successfully. And in view of the developments of the general financial situation during the past year, the trustees are of opinion that the wisdom of omitting the payment of dividends has been sufficiently demonstrated. The failure to pay dividends during the past year was not due to lack of earning power, or to disastrous losses from accidents. The earning power has proven excellent. The trustees expect that when the operating

companies shall have completed the reconstruction of their property, they will be in such physical condition as to require only ordinary annual expenditures for maintenance and reconstruction, and that they will then be able to finance their needs without drawing from the treasury of the Massachusetts Electric Companies the dividends they pay in."

TRANSIT MATTERS IN NEW YORK

The Public Service Commission has approved an order directed to the Interborough Rapid Transit Company regarding its Ninth Avenue elevated line. The order is to show cause why the service should not be increased by the addition of 58 cars to the 222 trains now run, southbound, from Thirty-Fourth Street between 6.30 and 9 a. m., and why 62 cars should not be added to the 252 trains at present running north between 4.30 and 7 p. m. The hearing was set for Dec. 17. Two orders, identical in form, calling for certain reports from corporations, were approved. One was directed to railroad companies and the other to gas and electric companies. The first was as follows:

That every railroad corporation, street railroad corporation, common carrier, and every stock corporation holding any shares of the capital stock of any railroad corporation, street railroad corporation, or common carrier, be and they are hereby severally required to file with the secretary of the Public Service Commission for the First District at its office, No. 154 Nassau Street, Borough of Manhattan, New York City, on or before the _____ day of _____, 1907, specific answers, verified by an oath of an officer of such corporation, to the following question, which is now addressed to each of them, to wit:

Give the name of every railroad corporation, street railroad corporation, or common carrier, organized or existing under the laws of the State of New York, of which, on July 1, 1907, you held any shares of the capital stock, the number of shares of such capital stock as held by you, and the par value of each such share.

That every railroad corporation, street railroad corporation, and common carrier, organized or existing under or by virtue of the laws of the State of New York, be, and they are hereby severally required to, file with the said secretary, at said office, on or before said date, specific answers, verified by an oath of an officer of each such corporation, to the following question, which is hereby now addressed to each of them, to wit: "Give the name of every stock corporation, railroad corporation, street railroad corporation, or common carrier, which, on July 1, 1907, held any shares of your capital stock, the number of such shares held by it, and the par value of each such share."

In 1908 the Public Service Commission of the first district will cost the taxpayers of New York City more than \$1,095,000. It will spend in addition \$150,000 of the State's money. A letter has been sent to the Board of Estimate by the commission, which contains a table of the commission's probable expenditures. This is the list:

Office and telephone rentals and lighting.....	\$50,000
Salaries	850,000
Furniture	2,500
Printing, stationery and supplies.....	25,000
Disbursements (of employees and counsel).....	15,000
Maps, plans, prints and photographic supplies.....	5,000
Engineering instruments and supplies.....	10,000
Compensation and expenses of special commissioners.....	10,000
Advertising	25,000
Real estate, search and appraisals.....	2,500
Contingencies and rapid transit studies.....	50,000
Special service and investigations.....	50,000
Total	\$1,095,000

Adding to this the \$150,000 which the commission receives from the state, the total is brought up to \$1,245,000.

The Fidelity Trust Company, of Philadelphia, has filed a petition in the United States Circuit Court in New York, asking to be allowed to intervene in the receivership of the Metropolitan Street Railway. The Fidelity Trust also asks to be allowed to intervene in the action which the Morton Trust Company has begun to foreclose the Metropolitan Street Railway's re-funding mortgage, under which it is trustee. Ownership of 7,800 shares of Metropolitan Street Railway stock is made the basis of the application in both instances. The petition of the Fidelity Trust sets forth that the allegation of the insolvency made against the Metropolitan Railway is unfounded, and that the income of the corporation is sufficient to meet all its outstanding obligations, including fixed charges. Therefore, the petition urges there can be no legal default either under the mortgage, of which the Morton Trust is trustee, or under the lease to the New York City Railway. The attention of the court is also called to the proposition that the interests of the Metropolitan Street Railway cannot properly be committed to those who are in charge of the New York City Railway, because of a diversity of interest, the New York City Railway being desirous to rid itself of the obligations attaching to the Metropolitan lease, and the latter corporation being equally anxious to have the payment of the rental continue.

Arguments were made before the United States Supreme Court, Dec. 9, on motions asking for a writ of mandamus against the appointment of receivers for the New York City Street Railway Company. The case was then taken under advisement, but a decision is expected at an early date. Roger Foster addressed the court in favor of the prohibition against the naming of receivers. The street railroad interests were represented by J. Parker Kirlin and James Byrne. Frederic R. Coudert also filed a brief in intervention. This action was for the sole purpose of affording an opportunity of bringing the case before the Supreme Court later in another form if it becomes necessary. The motions for writs of mandamus were filed on Nov. 11. One was on behalf of Joseph Konrad, who claimed \$200 paid in fares where he thought transfers should have been issued. As administrator of the estate of Paul Flanovsky, who was killed by the cars of the defendant company, Konrad claimed damages aggregating \$8,538. Another motion was filed in connection with suits brought against the company by Daniel Gallagher and Francis Peisenberg, both of whom claimed damages. The receivers were appointed on applications by the Pennsylvania Steel Company and the Degnon Constructing Company. Judge Lacombe having declined to permit intervention in New York, Attorney Foster sought the writ of mandamus from the Supreme Court.

The Public Service Commission of the first district will hold a hearing Dec. 21, at which the New York City Railway Company will be given an opportunity to show why the order of the board directing that all its cars be overhauled should not be complied with. The order is based on a report made to the Commission by A. W. McLimont, who was engaged to make a study of the service and equipment of the lines of the company. The details of the report have not been made public. The suggestion is made that the cars should be overhauled ten at a time, and that every detail of their construction shall be subjected to scrutiny by expert engineers. It is provided that the cars be inspected by employees of the commission after the repair work is done and before the car is put into service.

ANOTHER MOVE IN INTERURBAN MATTERS IN MASSACHUSETTS

Another step in the interurban railway development now beginning in Massachusetts under the "electric railroad law," so-called, was taken last week, when the Railroad Commission granted to the Boston & Worcester Street Railway the long-desired right to build a branch connecting the town of Natick with its main line. The decision is virtually a statement of the State policy with regard to the construction of fast-service routes in districts already supplied with ordinary street railway service. The situation presented in Natick was one of a chain of local roads recently formed into a system by the Boston Suburban Railways Company, with the possibility of a straighter and quicker run into Boston for the Boston & Worcester Company by the construction of 2 miles of track northward to a junction with the Boston & Worcester. Previous petitions for a location have been negated by the Railroad Commission because they contemplated entrance into the center of Natick through streets regarded as too narrow; but the present location will keep to the wider thoroughfares, crossing the Boston & Albany Railroad on the Washington Street bridge. In its decision the board says: "The action of the Legislature in enacting the Electric Railroad Law and the subsequent action of this board in granting under it a certificate of exigency to the Boston & Providence Interurban Electric Railroad Company has established beyond question a State policy which approves the fast electric interurban railway. With it must necessarily come branch lines connecting through other local railways with cities and towns along the route. The fact that the Boston & Providence Interurban would bring the benefit of such connection with different communities along its route was one of the features which made that enterprise preferable to the undertaking of the New York & Boston Electric Railroad Company. The Boston & Worcester Street Railway was the forerunner of this class of railways. The people of Natick have desired a branch connection with it in order to secure quicker transit to and from Boston. The construction of that branch may to some extent affect the patronage of the existing line which now serves Natick and other communities, but it cannot be said that the result of building and operating the

new line will be such a loss to existing lines as to make the net outcome harmful to the public interest. In view of that fact, the board must certify that the location granted to the Boston & Worcester Street Railway Company under the order of the Selectmen of Natick, dated July 5, 1905, is consistent with the public interests." The decision is signed by two of the Commissioners, Chairman James F. Jackson and George W. Bishop.

The other interurban matter before the Massachusetts Commissioners was that of the proposed line westward from Waltham, which would enter Boston over the lines of the Newton system (Boston Suburban) of street railways. This project, known as the Boston, Waltham & Western Electric Railroad, was up for a hearing on its merits on Friday forenoon. The Commissioners took a view of the proposed route in automobiles a month ago, and the question is now whether to issue the certificate of public exigency which gives the promoters sanction in going ahead to secure definite locations from local authorities.

INAUGURAL DINNER AT THE ENGINEERS' CLUB

The inaugural banquet to commemorate the opening of the new club house of the Engineers' Club in New York, was held on the evening of Dec. 9, in the banquet hall at the club house, at 32 West Fortieth Street. Andrew Carnegie was the guest of honor and about 220 members were present, a number which taxed the seating capacity of the banquet hall. The speakers were Mr. Carnegie, John Fritz, Samuel L. Clemmons, John Foord, Wm. H. Fletcher and Thos. C. Martin, president of the club. The menu was bound in a cover of Scotch plaid and the participants were presented with souvenirs of the occasion of a particularly artistic and handsome design.

TWIN CITY RAPID TRANSIT MAKES IMPORTANT LEASE

The Twin City Rapid Transit Company has leased from the Minneapolis & St. Louis Railroad 1½ miles of its track from Manitou Junction to Tonka Bay, Lake Minnetonka, and has graded 1½ miles of right of way from the end of the present Excelsior line to Manitou Junction, and will lay the track early in the spring. The Twin City Company will electrify the Minneapolis & St. Louis line from Manitou Junction to Tonka Bay, and will then be able to take passengers direct to Tonka Bay Hotel, which is the finest hotel at Lake Minnetonka. This means that the Minneapolis & St. Louis Railroad practically gives up the tourist business to Lake Minnetonka and leaves the Twin City Company in possession of the heavy south shore trade.

SOUTHERN PACIFIC COMPANY

In connection with the electrical work already planned and being investigated by the Southern Pacific Company in California, the following news item from San Francisco is of interest: "It is reported that the Southern Pacific Company contemplates changing its motive power for the movement of its trains between San Francisco and Sacramento. The general manager of the General Electric Company, of New York, visited the Pacific Coast recently, at the instance of President E. H. Harriman, to investigate the feasibility of the change and to report on the difference in cost of operation. The expert reported that the road could be operated with electric power at a saving of 38 per cent over the expense of operation by steam. He also said that the main purpose of Harriman's recent visit to the Pacific Coast was to investigate the electric power proposition, and that as a result of the investigation the president of the railroad company was favorably impressed with the advantages to be gained by the contemplated change in motive power. In case this change is made, it is the intention to obtain electric power from the Western Power Company, which is planning to construct a power line to have its source in some of the available water sheds in Lake County. Although the present financial stringency will have some bearing on the proposed project, it may be assumed, with a reasonable degree of certainty, that eventually the trains on this division of the Southern Pacific Company will be operated by electricity instead of steam."

NEW PUBLICATIONS

Locomotives: Simple, Compound and Electric. By H. C. Reagan. John Wiley & Sons, New York and London, 1907. Fifth Edition. Price, \$3.50.

The increasing use of electricity on steam railroads brings in its train many new problems to be solved by the operating departments of the converted systems. Among these few are more important than the instruction of steam locomotive engineers and firemen in the principles upon which electric motive power depends in its application to heavy railroad service. There has thus come about a real need for the preparation of an exhaustive descriptive treatise including within its covers the best current practice in both the steam and electric locomotive fields. Mr. Reagan has endeavored to bring the whole matter up to date in the fifth edition of his work on locomotives, and so far as descriptive matter, clearly expressed and exhaustive in detail, is concerned, he has produced a volume of positive worth to the engine runner primarily, and to the motive power officer and shop worker secondarily.

The first twenty-one chapters of the book, covering 583 pages, are devoted exclusively to steam locomotives and their equipment, including both domestic and foreign designs. The boiler, cylinders, frames, rods, valve motion and setting, compounding, indicator cards, superheating, brakes, auxiliary apparatus, typical locomotives, troubles, remedies and fuels, are considered at length, with numerous illustrations and data. Special attention has been given to the compound locomotive and to the steam superheater in view of the recent progress in these directions. A chapter has been devoted to foreign built engines, some types no longer modern being described because they show the efforts put forth at their respective periods to improve the compound locomotive and form part of the evolution of the compound engine.

The rapid development of the electric locomotive and its use on trunk lines require the treatment of the construction and operation of the electric locomotive in great detail, together with the apparatus essential to the generating and transmitting of the current which operates the locomotive. The principles of the generating and translating apparatus and the method of application are fully explained, and the following electric systems described: The single-phase system, using single-phase motors; the polyphase system, using induction motors; the three-phase system of generation and transmission, using rotary generators, with direct-current motors on the locomotive; the three-wire direct-current system, and the simple direct-current system. Methods of control and brake systems are also described, and a brief chapter is devoted to gasoline-electric cars. Eight chapters are devoted to the electric locomotive, making a total for the book of 932 pages, including an index.

The explanatory matter in the electric locomotive chapters includes a very clear exposition of the principles of current generation, free from needless technicalities in phraseology, including the relations of the magnetic field and the windings, both in generators and motors. Counter electromotive force, reversing motors, electrical instruments, lightning arresters, rheostats, controllers, direct and alternating currents, are all treated in a manner that should offer little difficulty to the intelligent layman's understanding. The more important electrical generating apparatus of the power plant is handled with simple directness and an excellent description given of the relations of the transformer, rotary converter and distribution circuits in the alternating-current and direct-current system so frequently installed. Alternating-current systems and catenary trolleys also receive due attention, and the detailed descriptions of earlier and recent electric locomotives leave little to be desired. Considering the amount of attention given to apparatus outside the locomotive itself it is singular that the functions of the third rail and the suburban motor cars should apparently be overlooked, both in the context and index. The latter might well be amplified with profit to the reader, especially in reference to the individual electric locomotives described. As a manual for the student of locomotives and a reference book of recent designs, in both steam and electric fields, the volume is certain to be highly useful.

C. E. Robertson, read a paper before the Toledo Section of the American Institute of Electrical Engineers at the regular meeting, Friday evening, Nov. 6, on the rotary converter. He illustrated his remarks with blackboard sketches and drawings. Aside from explaining the various uses of the rotary, Mr. Robertson told of the latest methods of starting them.

DIVISION CHANGES ON THE P. S. C.

Announcement has been made by the Public Service Railway Company of changes in the street railway operating department. John McCarthy has been appointed supervisor in charge of the turnpike, Fourth, Mt. Prospect, Mulberry and Kearny lines and the Harrison and the Miller Street car houses in place of George Christensen and C. H. Coe, who are transferred. Mr. McCarthy has been at the Springfield Avenue station for the last year. Mr. Coe has been supervisor at the Miller Street station, and he has been made general instructor of the school for motormen and conductors. Mr. Christensen has been appointed supervisor in charge of the Bloomfield Valley Road, Crosstown and Eagle Rock lines and the Montclair and Orange and Passaic Valley car houses, vice A. M. Stewart, who resigned to engage in business. Mr. Joseph Welch has been appointed acting supervisor in charge of the South Orange, Plank Road and Chapel lines and the South Orange and the Sixteenth Avenue car houses, vice C. H. Thorne, transferred. Mr. Welch was station master at the Sixteenth Avenue barns and has been in the employ of the company for about ten years. C. H. Thorne has been appointed supervisor in charge of the Roseville, Orange and South Orange and Maplewood lines and the South Orange and Maplewood car houses, vice A. W. Pratt. Mr. Thorne has been at the South Orange station for three years. A. W. Pratt has been made supervisor in charge of the Springfield and Kinney lines and the Springfield car house, vice McCarthy. Mr. Pratt has been at the Roseville station.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED NOV. 26, 1907

871,777. Amusement Device; William J. Browne, Pittsburg, Pa. App. filed March 27, 1907. A pleasure railway in which the car is elevated by mechanism on the principle of the Archimedean screw and allowed to descend a spiral trackway by gravity.

871,826. Electric Train Lighting System; Walter Scribner, Columbus, Ohio. App. filed Jan. 12, 1907. System of lighting from a dynamo carried by the wheel axles and including storage batteries with automatic means for shifting the connections to accord with the speed and direction of the dynamo.

871,909. Combined Tie-Plate and Guard-Rail Clamp; William F. Bossert, Utica, N. Y. App. filed March 18, 1907. Means for holding a guard and main or stock rail spaced apart and rigidly held to the cross-piece of a railway without the utilization of springs or wedges for adjusting the parts to the proper distance between the rails.

871,913. Trolley Wheel Bearing; William M. Caswell, Warren, Pa. App. filed June 6, 1907. An oil cup in the bearing of the trolley wheel so disposed that the oil will not run out of the bearing when the trolley wheel leaves the wire and the pole flies upwardly to a vertical position.

871,960. Signaling System; Wilmer W. Salmon, Buffalo, N. Y. App. filed Aug. 29, 1905. Details of a signal system having sectionally energized track rails and polarized relays operated by the short-circuiting of local batteries by the wheel axles.

871,970. System of Motor Control; Emmett W. Stull, Norwood, Ohio. App. filed March 31, 1906. Means whereby injured or disabled motors may be cut out from the circuit without affecting the action of the controller upon the remaining motors. Has a unitary cut-out switch for cutting out either pair of motors.

872,002. Railroad Signaling Device; Burns S. Miller, Everett, Wash. App. filed May 4, 1907. Mechanical means whereby a semaphore is operated when a track-protecting bulkhead is broken by a landslide.

872,014. Bolster Swing-Damper; William G. Price, New Castle, Pa. App. filed Aug. 18, 1906. Means for damping or checking the endwise movement of swinging bolsters.

872,015. Bolster Swing-Damper; William G. Price, New Castle, Pa. App. filed Aug. 18, 1906. See above patent.

872,016. Truck Frame; William G. Price, New Castle, Pa. App. filed Aug. 18, 1906. The transoms are so constructed and located as to make the wheel base as short as possible and provide for the insertion of the bolster hangers between the transoms and the bolster.

872,017. Truck; William G. Price, New Castle, Pa. App. filed Jan. 17, 1907. Consists of the combination of side frames, a bolster, transoms secured to said side frames, a stiffener-plate on the outside of the side frame, and gusset plates connecting the transoms to the stiffener-plate.

872,094. Trolley Securing Device; John Szeker, Pittsburg, Pa. App. filed Aug. 23, 1907. A rectangular frame surrounds the trolley wheel and has upwardly extending swiveled hooks which close over the wire.

872,104. Sand Box for Cars; Abbott L. Bacon, Franklin, Mass. App. filed March 22, 1907. Consists of improved means for electrically heating the supply of sand contained within the sand box and in an improved outlet valve.

872,116. Fluid Pressure Brake Apparatus; Charles H. Ferguson, Jersey City, N. J. App. filed Feb. 12, 1907. Consists of a triple valve, a retainer valve connected with the exhaust therefrom and operated by fluid pressure supplied through an auxiliary train pipe, and a valve in said train pipe at either side of the retainer valve adapted to act to retain pressure in the retainer valve upon a sudden reduction of pressure in the train pipe.

872,142. Rail Bond; Asa H. Mosher, Westfield, N. J. App. filed Jan. 17, 1907. The bond is received in a conical plug with an eccentric hole and slotted on one side so as to be driven into binding or wedging relation on the bond.

897,197. Electric Switching Device; James A. Posey, Midlothian, Tex. App. filed March 3, 1906. A track switch including a movable trolley section displaced by the wheel and closing or opening the circuit to a solenoid which has contacts for energizing either of a pair of electromagnets to operate the switch point.

872,253. Amusement Apparatus; Henry E. Riehl, New York, N. Y. App. filed July 17, 1907. A pleasure railway having a rotatable car and means for imparting rotation thereto as it travels over its tracks.

PERSONAL MENTION

MR. N. A. THOMPSON, who has been solicitor in the passenger and freight department of the Columbus, Delaware & Marion Railway, headquarters, Columbus, has tendered his resignation, which took effect Dec. 1. Mr. Thompson was formerly soliciting passenger and freight agent for the Indiana, Columbus & Eastern Traction Company, and later was the company's freight agent at the Columbus interurban station.

MR. CHAS. A. CLARK, engineer of way of the International Railway Company, of Buffalo, N. Y., has been appointed by the Cleveland Electric Railway Company, of Cleveland, Ohio, to act as appraiser of tracks and pavements, in co-operation with Mr. Robert Hoffman, city engineer, of Cleveland, Ohio, who will look after the interests of the Municipal Traction Company and the City of Cleveland, in the settlement of the street railway situation in Cleveland.

MR. M. D. KILBRIDE has been appointed superintendent of the Rochester & Eastern Rapid Railway Company, of Canandaigua, N. Y., to succeed Mr. Wm. W. Griffin, who, as noted elsewhere in this column, has been appointed superintendent of the Rochester Railway Company. Mr. Kilbride started electric railroading under the late Mr. F. J. Stout, on the Lake Shore Electric Railway at Beach Park, as cashier of the Cleveland division, on Aug. 16, 1902; on Jan. 1, 1903, he went into the dispatcher's office and resigned on March 1, 1904. On March 10, of that year, Mr. Kilbride entered the employ of the Rochester & Eastern Rapid Railway Company, and was made chief train dispatcher Nov. 1, 1904, remaining in that capacity until Dec. 1, 1907, when he was appointed superintendent of the company.

MR. MARCELLUS HOPKINS, president of the South Side Elevated Railroad, of Chicago, died Dec. 7, of pneumonia. Mr. Hopkins was born in Kennebec County, Me. His parents were in moderate circumstances, and Mr. Hopkins, when only 17 years old, secured a position on the Chicago & Northwestern Railroad as brakeman. While he was working he went to school, and at the end of six months became a clerk in the Chicago station. Mr. Hopkins was then sent to the Wisconsin Division of the same road, and was made foreman of freight houses and docks. He held this position eight years, later becoming assistant superintendent of the Galena Division. When the South Side Elevated Railroad became the successor to the South Side Rapid Transit Company, Mr. Hopkins was made general mana-

ger. That position he held until the death of the president of the company, when he was elected to fill the vacancy.

MR. J. R. HARRIGAN has resigned as assistant general manager of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., to take effect Jan. 1, 1908. Mr. Harrigan formerly was general manager of the Chippewa Valley Electric Railroad, of Eau Claire, Wis., and before that for a year, in 1901, was general superintendent of the Dayton, Springfield & Urbana road, under Mr. A. E. Appleyard. In 1902 he became general manager of the Columbus, Buckeye Lake & Newark Traction Company and the Columbus, Newark & Zanesville, remaining in that capacity four years, until the road was purchased by the so-called Widener-Elkins syndicate. In 1906 he assumed the management of the Canton-Akron road, another Tucker-Anthony property, and was general manager of the company until it was absorbed by the Northern Ohio interests. He has been in Buffalo since Jan. 1, 1907. Mr. Harrigan is going to take a needed rest, and will probably visit his old home in Wisconsin. He has not, however, definitely decided what he will do after his vacation.

PROF. CHARLES P. MATTHEWS, professor of electrical engineering at Purdue University, died at Phoenix, Ariz., on Saturday, Nov. 23, 1907. Professor Matthews was of Vermont stock, his family going from that State to New York in 1852 where, at Fort Covington, he was born Sept. 18, 1867. At the time of his death he was, therefore, a little more than 40 years of age. He attended the St. Johnsbury Academy at St. Johnsbury, Vermont, graduating there in 1887. He then entered Cornell University, graduating from Sibley College with the degree of Mechanical Engineer in 1892. In 1901 he received the degree of Ph. D. from his Alma Mater. Immediately after graduation he became instructor in physics and applied electricity at Cornell, serving in that capacity four years, until 1896. At that time he was called to Purdue and was appointed associate professor of electrical engineering. In 1905 he succeeded Prof. Goldsborough as head of the School of Electrical Engineering, and from this time until his death he was continuously a member of the Purdue faculty. Prof. Matthews made valuable contributions to the science of electrical engineering, particularly in connection with the subject of photometric standards for arc lamps. This work was done in connection with the National Electric Light Association.

MR. WILLIAM W. GRIFFIN has been appointed general superintendent of the Rochester Railway Company and its connecting lines, to succeed the late Mr. E. J. Wilcoxon. Mr. Griffin has been identified with the Rochester & Eastern Rapid Railway from the time work was begun on the line, five and one-half years ago. To take up the superintending of the construction of the line from Rochester to Geneva for the Comstock-Haigh-Walker Company, Mr. Griffin came from the West, where he had superintended the building of several railways, and he has had practical charge of the Rochester & Eastern operations since the road was opened about four years ago. Mr. Griffin entered mining and electrical engineering about twenty years ago. He is about forty years of age, and is president of the Rochester Engineers' Society, a member of the Rochester Club, the Red Jacket Club of Canandaigua and the Canandaigua Business Men's Club, and is also an asso-



W. W. GRIFFIN.

ciate member of the American Institute of Electrical Engineers. Mr. Griffin's appointment has resulted in some changes in the personnel of the Rochester & Eastern Company. Mr. M. D. Kilbride, chief dispatcher and for some time past Mr. Griffin's chief assistant, will become superintendent of the Rochester & Eastern. The management of the affairs of the Ontario Light & Traction Company will pass out of the supervision of the Rochester & Eastern officials, and Mr. S. P. Cobb, of Rochester, who has been the constructing engineer for the Canandaigua Gas Light Company, will be made superintendent of the lighting companies.