

# Street Railway Journal

Vol. XXIX.

NEW YORK, SATURDAY, APRIL 13, 1907.

No. 15

PUBLISHED EVERY SATURDAY BY THE

## McGraw Publishing Company

MAIN OFFICE:

NEW YORK, ENGINEERING BUILDING, 114 LIBERTY STREET.

BRANCH OFFICES:

Chicago: Monadnock Block.

Philadelphia: Real Estate Trust Building.

Cleveland: Schofield Building.

San Francisco: Atlas Building.

London: Hastings House, Norfolk Street, Strand.

Cable Address, "Stryjourn, New York"; "Stryjourn, London"—Lieber's Code used.

Copyright, 1907, McGraw Publishing Co.

### TERMS OF SUBSCRIPTION

In the United States, Hawaii, Puerto Rico, Philippines, Cuba, Canada, Mexico and the Canal Zone

Street Railway Journal (52 issues).....\$3.00 per annum  
 Single copies ..... 10 cents  
 Combination Rate, with Electric Railway Directory and Buyer's Manual (3 issues—Feb., Aug. and Nov.).....\$4.00 per annum  
 Both of the above, in connection with American Street Railway Investments (The "Red Book"—Published annually in May; regular price, \$5.00 per copy).....\$6.50 per annum

To All Countries Other Than Those Mentioned Above:

Street Railway Journal (52 issues), postage prepaid..... \$6.00  
 25 shillings. 25 marks. 31 francs.

Single copies ..... 20 cents

Remittances for foreign subscriptions may be made through our European office.

### NOTICE TO SUBSCRIBERS

REMITTANCES.—Remittances should be made by check, New York draft, or money order, in favor of the STREET RAILWAY JOURNAL.

CHANGE OF ADDRESS.—The old address should be given, as well as the new, and notice should be received a week in advance of the desired change.

BACK COPIES.—No copies of issues prior to September, 1904, are kept on sale, except in bound volumes.

DATE ON WRAPPER shows the month at the end of which the subscription expires. The sending of remittances for renewal prior to that date will be much appreciated by the publishers.

CLUB RATE.—On five or more subscriptions from one company or its employees, a club rate of \$2.50 each per annum is quoted.

### NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

*Of this issue of the Street Railway Journal 8,000 copies are printed. Total circulation for 1907 to date 122,650 copies, an average of 8,177 copies per week.*

### Rail Corrugations

The subject of rail corrugation, which has attracted considerable attention in this country, has created much more interest abroad, where the difficulty seems to be more pronounced than here. We have on several occasions referred to the large number of theories which have been advanced

to account for this phenomenon, and in this issue present an argument by a British tramway engineer who claims that the fault lies in the rolling stock and not in the rails. Briefly, he believes that the action can be attributed to the play of the axles in the truck frame, caused largely by the application of the power through the gear at one side of the axle. The effect of guard rails on curves is to intensify this action, as the flanges on the skewed axle striking the guard rail oscillate in the groove and give rise to intermittent skidding. If this theory is correct it would account to a considerable extent for the more general prevalence of the trouble abroad, where the rails have narrower grooves than in this country and where double-deck cars cause a tremendous weight per wheel on the track. We think, however, that Mr. Pantou's theories, though interesting, will not be generally accepted until further light is thrown upon the subject, and while the examples which he cites seem to bear out his claims, others which might be quoted would indicate an entirely different cause. While the problem is a baffling one it does not seem entirely incapable of solution. Our opinion is that it should be approached by the process of elimination, that is, by taking up each of the most plausible and most easily tested theories first, and by a careful examination and series of experiments determine whether the causes suggested were responsible for the trouble. By thus gradually eliminating some of the possible causes the chances of finding the real reason would be considerably greater.

### Overalls for Interurban Motormen

It would not be presumed at first thought that the question of whether or not motormen should wear overalls would be weighty enough to claim the attention of a meeting of interurban railway operators, yet at the recent Dayton meeting of the Central Electric Railway Association considerable time was spent in discussing it. After all, it is a question worthy of a great deal of consideration, as it is connected in a roundabout way with the operation of every interurban road. At the meeting referred to we are inclined to believe that those advocating overalls had the best of the argument. The strongest contention of the opposing side was the appearance of the men dressed in the garb of a day laborer. The argument supporting overalls was that the reluctance of the motormen to spoiling a twenty or twenty-five dollar uniform by getting down under the car often prevented them when on the road from making repairs which would enable the car to continue its trip to the end of the line instead of being stalled until pulled in. It cannot be denied that this is an important consideration. The percentage of cars that could be repaired by reasonably intelligent motormen could be found by examining the repair shop reports, and an investigation would no doubt

result in motormen being given every encouragement to make such repairs. The first step in this direction should no doubt be the substitution of overalls for the conventional motorman's uniform.

The opponents to overalls contend that a man in a dirty and greasy suit of overalls should not be placed up in the front of the car in plain sight of all the passengers and where probably, when the car was filled, passengers might be compelled to crowd up against him. This is, of course, true; but there is no necessity for the overalls to remain dirty very long, and it must be admitted that there is nothing repulsive about a clean suit of overalls.

### Dispatchers and Double-Track Roads

The question has been raised whether dispatchers are needed on double-track interurban roads, in view of the elimination of meeting points. It is urged on the one hand that if cars are properly flagged from the rear in case of delays, and if the line is equipped with telephone service throughout, so that any car house can be called without delay, there is very little occasion for the services of a dispatcher. On the other hand it is pointed out that a road should have a central operating point upon which everything focuses, regardless of the number of tracks. It is contended that emergencies are constantly coming up which can be handled only by a duly authorized dispatcher, and that although such an official has a much easier time of it on a double-track line, his presence is imperatively necessary to the best service.

The latter point of view seems, in most cases at least, the proper one, considering all the operating variations which come up each week on even a double-track interurban road. To the average passenger who rides over the line one day is usually very much like another as far as the road is concerned, but at headquarters very few days are alike in detail. Fluctuations in the volume of traffic, accidents, unexpected failures of equipment on the road, the blocking of the line by external causes like the breakdown of teams, falling of a derrick across the track, etc., all demand immediate action by centralized authority with power to order out extra cars, emergency wagons, call doctors, mobilize snow plow crews, linemen and trackmen, and in general meet the situation with the promptest decision and least possible obstruction to regular traffic. Divided responsibility tends to create delays, and the cost of maintaining a dispatcher on duty at all times is a small expense in proportion to the convenience of always having a firm hand upon the operating situation.

### Experimental Work in Shops

The proper maintenance of rolling stock is such an important and pressing problem on all electric railways handling a large traffic that the suggestion of encouraging experimental work in the shop looks chimerical at first flush. The shop exists primarily for the purpose of keeping cars in paying service, and any obstruction of regular repair work is rightly looked upon as intolerable. Yet it is a question if a certain amount of experimental work under the immediate personal oversight of the master mechanic or department heads may not bring exceedingly profitable

returns if it is conducted so as to be out of the way of the routine repair jobs.

There is so much still to be learned about the best mixtures of bearing metals, the most economical fuel for boilers, the best compositions of copper and brass to use in trolley wheels, the most desirable tool steels for general shop work, the cheapest ways of wiring up special rigs and putting together jigs, the determination of lamp candle-powers, efficiencies and life, the breakage of cement briquettes, the study of lubricants, boiler feed water and scale prevention compounds, etc., that a little space set aside in the shop for odd investigations is likely to be well worth its rental value. Out of these experiments and studies often come valuable gains in the life of equipment parts, for the analysis and testing of supplies is coming to be more and more important on progressive roads. If a quiet place with good light and steam connections, compressed air and power taps is reserved for these tasks, and if the company encourages originality on the part of its responsible employees, the results ought to be more readily secured than under the distractions and crowding of the main shops. There is a place for the so-called "laboratory method" even in the strenuous life of street railway repairs.

### Lamp Signals at Electric Track Switches

The advantages of the electric track switch in reducing delays to traffic and in decreasing the number of switchmen required on surface lines are now widely recognized. It is customary to notify motormen of the presence of an electric track switch by a small sign fastened above the trolley wire at the point where power is to be cut on or off to set the switch. These signs are readily seen in the daytime, but at night it is hard to locate them unless they are situated in a brightly lighted street. The same thing applies to section insulators located in dark places, although the motorman usually looks out for these more easily because the degree of accuracy required in shutting off power at a certain spot is not as exacting as in the case of the track switch.

In places where the traffic is heavy or where the schedule is figured closely with regard to the capacity of the motors and the number of stops, it might pay to install two or three lamps at the point above the trolley wire where the electric track switch sign is hung, placing the other three or two lamps of the series near the switch itself so that the movement of the switch tongue can be more quickly seen by the motorman. Without any illuminated signal it is largely a matter of guess work just when to shut off power, and there is considerable chance of setting the switch for the wrong route, with the possibility of the car's leaving the proper line and having to be reversed and backed down perhaps a hundred feet to get a fresh start. When a track switch is located on an ascending grade the time lost in drifting, the uncertainty as to the overhead connection and the extra cost of accelerating are worth considering. On a line with short headway interruptions in the regular movement of cars are far-reaching in their effect. If the cost of maintaining five lamps at a track switch looks too large, it ought not to be a difficult matter to install a single lamp over the sign which will light automatically when a car approaches, say within 300 ft., and go out when the car passes the switch.

## Turbine Power Station Operation

In spite of the fact that steam turbines aggregating several hundred thousand kilowatts in capacity are in operation in this country, very little in the way of actual operating statistics is available, yet the manufacturers probably have a larger aggregate capacity of turbines in course of design, construction and erection than the total in operation. That purchasers of steam motive power should have adopted the steam turbine to such a large extent is no doubt due to its advantageous features other than economy, as it has been shown and some of its warmest advocates have admitted that in consumption of steam it is not superior to the best steam engines. These other claimed advantages, most of which have been proven, comprise economy of space and foundations, lessening of expense for lubricants, absence of pulsations in speed, the possibility of installation on upper floors of buildings, the low cost of maintenance, large overload capacity, etc.

Generally the course of advance in the design of electric power stations has been by very short steps, each carefully tried and proven before advancing to the next. Conservatism has been the rule, and usually nothing but apparatus whose reliability and economy has been proven by experience has been adopted. The point was reached, however, where a further improvement in these directions from the reciprocating engine was very difficult, if not practically impossible, and where the next move had to be in an entirely different direction. A complete departure from the engine in type and principle, the steam turbine, appeared at this time, and has been adopted to an extent that even its advocates did not hope for a few years ago. Its design at once showed the possibilities in the directions mentioned, as well as a low cost of manufacture, including the electric generator, as compared with the reciprocating engine. Difficulties regarding details of manufacture were predicted, met and overcome, and now no complaint is heard on the score of reliability of operation. Enough experience has been had to prove that the amount of skilled attendance required is less than with the engine, and that the speed control may be perfect. All this aside from the matter of steam economy. Working under the same conditions as the modern reciprocating engine, the difference is not great. The turbine's advantage in the matter of economy lies in the fact that it can be designed to take advantage of the expansion of the steam as long as this force is capable of imparting an effective velocity in the steam itself, and its efficiency at this extreme limit can be made practically as great as where the pressure is high. The best engines, opening to exhaust at 7 or 8 lbs. absolute pressure, of course lose the expansive force of the steam below that point, but a great part of it is utilized by the steam turbine if a high vacuum is available. There is also a great saving with the turbine with the use of highly superheated steam, due to the reduction of the skin friction between the steam and the turbine blades. As the steam comes in contact with no oil or packing, a much higher degree of superheat can be used than is possible with the engine. Except by raising the degree of superheat and expanding the steam to a low absolute pressure—beyond the point where the steam engine is capable of working—we may not expect any great gain in

economy by the use of the turbine over that possible with the engine, except that the turbine is more economical on light loads, due to its small mechanical losses. It is consequently better adapted for widely varying loads than the reciprocating engine.

Theoretically, all these things are true, and they have been demonstrated as true, repeatedly, in shop and special tests. The majority of turbine installations, however, have been in stations where they are operating alongside of and under practically the same steam and exhaust conditions as reciprocating engines. Not many purely turbine stations are in operation, and very few data on costs of operation of such stations have been published.

It is, therefore, gratifying to receive definite figures on the actual performance and operation of a steam turbine plant of large capacity such as were printed in last week's JOURNAL in the article on the Neasden power station in London. The station contains four 3500-kw turbo-generator units, which during the tests described were operated with about 185 lbs. steam pressure and 150 degs. F. superheat, the average exhaust pressure being  $1\frac{1}{4}$  lbs. absolute. The "full-load" test, covering six hours run at an average load of 3850 kw, showed an actual steam consumption of 18.3 lbs. per kilowatt-hour, although the load varied from 1200 kw to 6000 kw. During a "half-load" run of two hours, the load averaged 2175 kw, varying from 800 kw to 3400 kw, the steam consumption being 22.2 lbs. per kilowatt-hour. With allowances made for the large variations in the load, and for other reasons not stated in the report, it was considered that the steam consumption was within the guaranteed 17 lbs. per kilowatt-hour at full load. When it is remembered that these figures are on the basis of a kilowatt-hour of electrical energy generated, and include the losses in the turbine and generator, and that they are results under actual operating conditions, they appear very favorable, indeed, in comparison with the performance of reciprocating engines under the same conditions of load.

The report also includes the principal operating statistics for several months. The total output being nearly doubled during the time covered, the coal consumption per kilowatt-hour varied from 4.4 lbs. to 4.0 lbs., the cost of coal remaining fairly constant near 0.5 cents per kilowatt-hour. The cost of labor, given as 0.2 cent per kilowatt-hour, seems high when compared with plants in this country using reciprocating engines, but as the data given on this point are meager, further comment cannot be made. The cost of supplies is given as 0.01 cent per kilowatt-hour, which is quite low, and doubtless due in great measure to the small amount of lubricant needed by the turbines, it being stated that the total consumption of lubricating oil for the entire station, turbo-generators, exciters, coal conveyor, pumps, etc., is under 100 gals. per month.

It is to be hoped that similar operating data and costs may soon be made public from some of our distinctly turbine plants. Such figures are not forthcoming as often as we might wish, even from the reciprocating engine plants, but their publication from turbine plants at this time should tend to increase the confidence with which the development proceeds. We hope before long to present even more complete figures from some American plants.

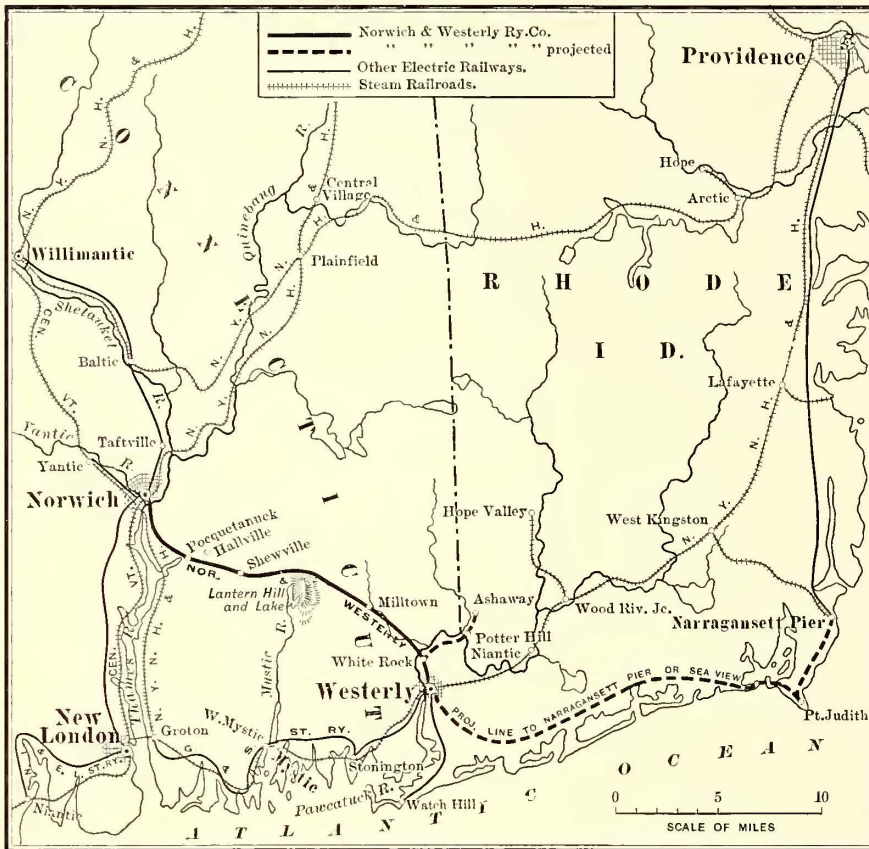
**THE NORWICH & WESTERLY RAILWAY**

With the opening last fall of the Norwich & Westerly Railway between Norwich, Conn., and Westerly, R. I., citi-

sides a large part of that going beyond each terminal city, as to Willimantic. The company has another source of income from its privilege to carry freight and express right through Westerly, this being included in its twenty-five-year franchise. The running rights in Norwich cover the use of the local company's tracks for about 1200 ft. Compensation for this is on a car basis.

**THE ROUTE**

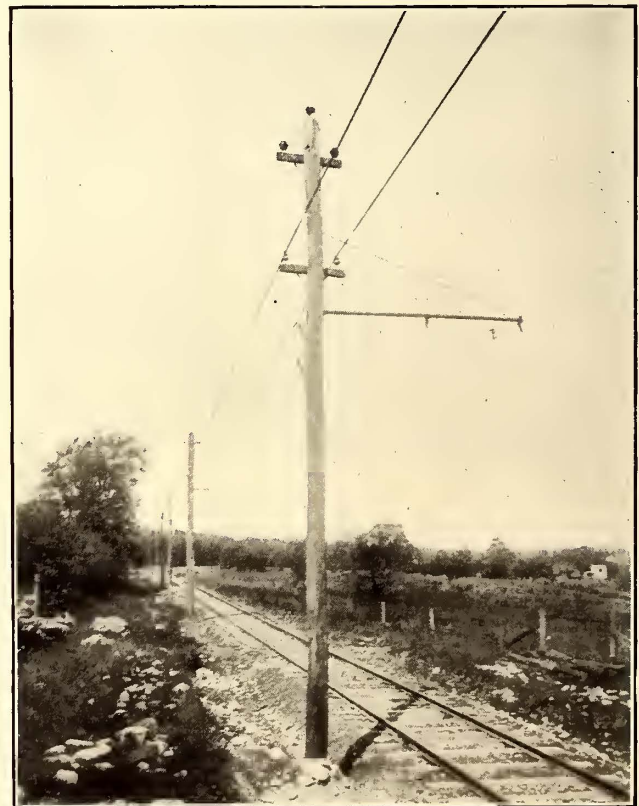
The line starts in the business district of Norwich within a few feet of the New York, New Haven & Hartford Company's station, with which, however, it has no rail connection. On leaving the town the railway enters on its own right of way, the public highway being used for only a small portion of the entire route between the main terminals. The first station is adjacent to the State Hospital for the Insane, 3.4 miles from Norwich, which harbors several thousand patients. About half a mile further there is a connection with the New York, New Haven & Hartford Railroad, at the village of Fox Point. The power station and car house are 0.4 mile from Poque-tanuck on a large tract owned by the company. Part of this area is wooded and has a small river which at present is used for water supply only, but later will help to form an attractive lake for boating, as the company intends to have an amusement resort at this place. North Stonington, the most important town along the line, is 10.4 miles from the power station. Some 3.7 miles beyond



MAP OF A PORTION OF EASTERN CONNECTICUT AND WESTERN RHODE ISLAND, SHOWING THE PRESENT AND PROPOSED ROUTES OF THE NORWICH & WESTERLY RAILWAY

zens of those States had the pleasure of riding for the first time on their pioneer high-speed interurban electric railway. To those familiar with the trend of interurban development in Ohio and Indiana it may be a surprise that one of the oldest and most thickly settled portions of the Union should have clung so long to city standards of construction. This, however, has been due to a variety of local causes, such as the larger proportion of riders living along the highway; the shorter distances between towns; the greater percentage of pleasure traffic for which speed and engineering considerations must often be subordinated to permit the full enjoyment of the scenery; and finally, the difficulty experienced in securing the franchises and right of way to compete effectively with the through service of the steam railroads.

An examination of the accompanying map, showing the steam railroads in this portion of Eastern Connecticut and Western Rhode Island, will reveal that before the construction of this electric railway the only rail connection between Norwich and Westerly was via New London on the steam railroad. Of course this is a round-about way, the steam railroad representing roughly two sides of a triangle of which the Norwich & Westerly forms the third. The length of this shorter route is 22 miles, which is traversed in 45 minutes by the limited cars and in 55 minutes by the locals. The trip via steam railroad requires one to one and one-half hours, depending on connections at New London. The fare on the latter is \$1.25, or \$0.27 more than on the electric line. Unquestionably the new railway will get most of the through traffic between the two cities, be-



TYPE OF OVERHEAD AND TRACK CONSTRUCTION ALONG THE RIGHT OF WAY

North Stonington is the sub-station. From the latter the distance from Westerly is only 2.1 miles. The total distance between the terminals is 21.6 miles, including 1200 ft. in Norwich and 800 ft. in Westerly.

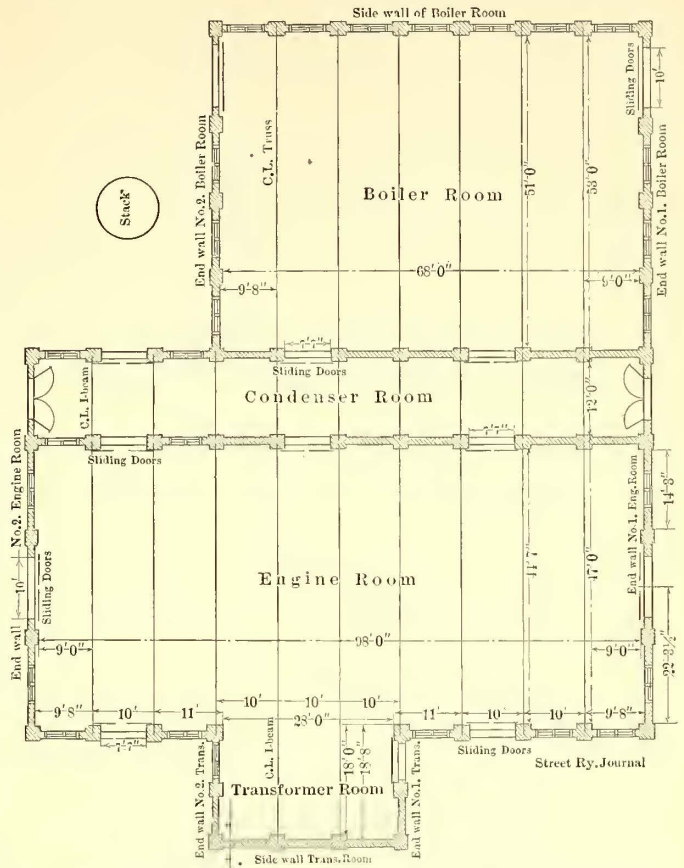
Although the Norwich & Westerly Railway is an inland line entirely, the rolling country through which it passes has induced quite a little pleasure riding. One of the most attractive places along the route is Lantern Hill, from which an excellent view of the surrounding hills and the nearby seacoast can be secured. During the coming spring the line will be extended for several miles from Westerly as far as the coast. This will greatly increase the traffic during the summer, as it will make available some fine bathing beaches.

ROADBED AND OVERHEAD CONSTRUCTION

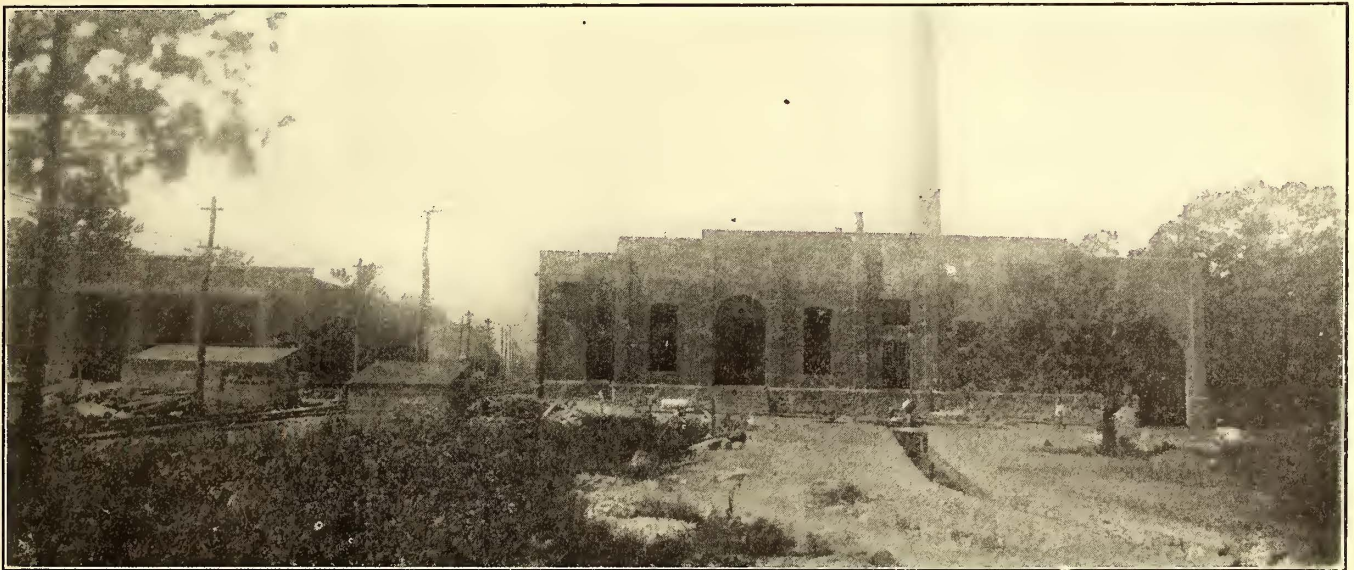
As the line was built primarily for high-speed operation, curves and grades are few in number. All curves have the outer rail elevated according to standard steam railroad practice for passenger train speeds. The maximum grade is 4.5 per cent. There are many cuts and fills on the line, some of the former being through rock. This disadvantage was balanced in one way, as it enabled the company to use a great deal of rock ballast. In fact, one of the accompanying views along the line shows clearly the rocky nature of this territory. Excellent gravel is also found in large quantities at different points along the line. Hence the abundance of good material also permitted the construction of unusually substantial fills.

In the open country the track consists of 70-lb. T-rails laid on wooden ties. The city sections are laid with 107-lb. girder rails to comply with the local regulations. The track is double bonded with two 0000 Chase-Shawmut soldered bonds. The overhead construction is principally of the side-pole type, carrying a 0000 trolley wire, a 500,000-

1860 hp and 1228 boiler hp, with an overload capacity of 50 per cent. The building is so designed that several additional units can be installed without disturbing any of the



PLAN OF POWER STATION OF THE NORWICH & WESTERLY RAILWAY COMPANY



CAR HOUSE AND POWER STATION OF THE NORWICH & WESTERLY RAILWAY

circ.-mil feeder and a 16,000-volt three-phase transmission line from the power house to the sub-station.

THE POWER STATION

The power house, as previously noted, is located on an extensive plot purchased by the company about 5 miles from Norwich. The accompanying illustration shows that it is a brick structure with one 7-ft.-diameter radial brick stack 175 ft. high. The plant is designed for a normal load of

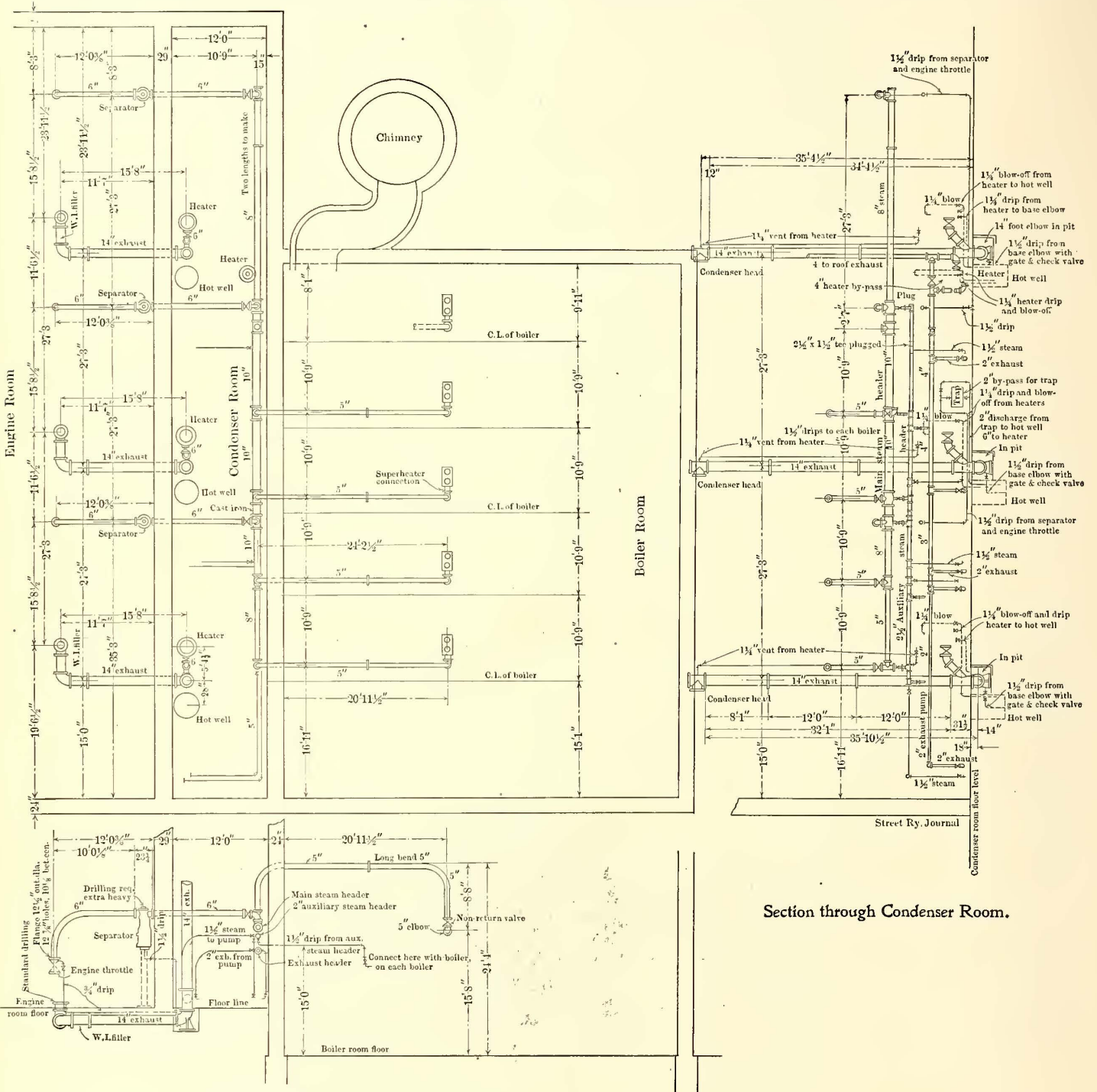
units now in use. The piping, feed pumps, valves and flue are also arranged to take care of the boiler and generating set to be added to the equipment in the near future. The piping and valves were laid out so flexibly that any or all of the boilers can operate with any or all of the engines. The engines can operate either condensing or non-condensing, and, likewise, the heater and economizer are so piped that they can be cut out of service without interrupting the service. The steam mains to the engines are provided with

Stratton separators. All steam piping is covered with Johns-Manville magnesia.

The boiler outfit consists of four 307-hp Franklin water-tube boilers for a working pressure of 160 lbs. Each boiler is furnished with a Foster superheater capable of raising the temperature of the steam 100 degs. Behind the boilers a 600-hp Green fuel economizer of 320 pipes has been in-

plan to a Goubert 300-hp primary feedwater heater. There is also a 250-hp feedwater heater of the same type to take care of the auxiliaries. The horizontal circulating condensing pumps and the two duplex outside-packed plunger boiler feed pumps were furnished by the Deane Steam Pump Company.

One of the illustrations shows the compartment where all



Section Boiler, Condenser and Engine Rooms.

Section through Condenser Room.

PIPING SYSTEM FOR STEAM, EXHAUST AND DRIPS IN THE POWER STATION OF THE NORWICH & WESTERLY RAILWAY

stalled with the flue so arranged that the furnace gases can be conducted through the economizer or direct to the stack. This economizer was also designed with reference to future enlargement.

Each engine exhausts into a separate barometric Spirojector condenser made by the George F. Blake manufacturing Company. Every exhaust line is laid on the induction

valves, pumps, heaters and condensers are installed. This room is located between the boiler and engine divisions, and it will be noted that the apparatus in it is arranged for very easy access, unlike any other power houses where it is so difficult to get at the auxiliaries when something goes wrong. The placing of the auxiliary machinery in a separate room also keeps it free from the dirt of the boiler room.

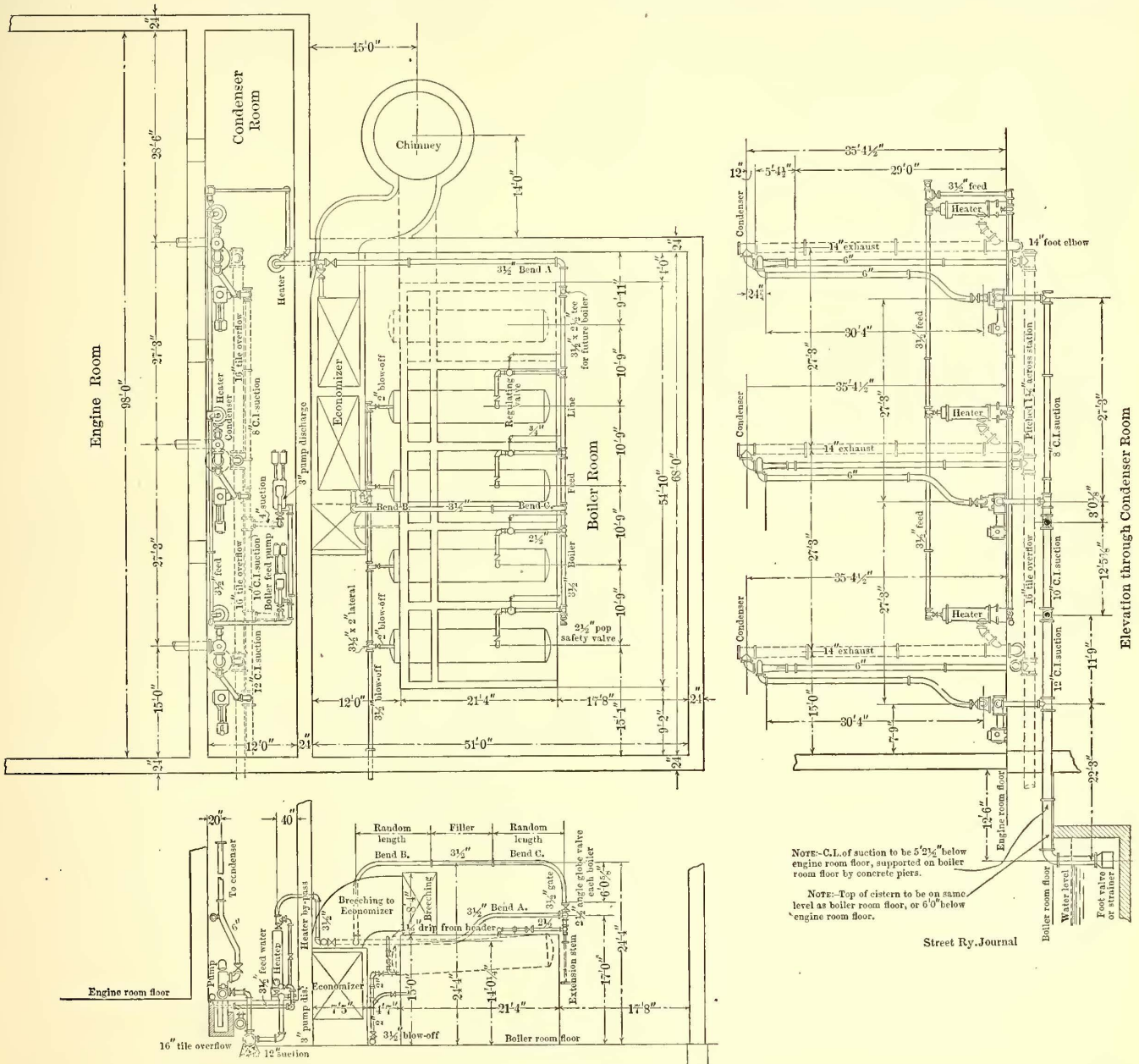
Coal is brought into the boiler room in charging cars running on a narrow-gage track led from an outside coal supply secured by dumping from cars which are run up a trestle outside the boiler house. The water for the boiler feed and circulating pumps is drawn from a specially constructed reservoir just outside the condenser room. This reservoir is fed by gravity from the neighboring stream, but which is tapped at about 500 ft. above the power house. This was done to insure as cool a temperature as possible and to prevent any possibility of the overflow from the hot wells discharging at a point in the stream where it could heat the circulating water.

The principal steam units consist of three cross-compound Hamilton-Corliss engines operating at 150 lbs. press-

generator connected to a Westinghouse standard engine. The other exciter set is of the same capacity but is driven by a three-phase, 25-cycle, 370-volt induction motor.

There are two 300-kw rotary converters giving 600 volts direct current at 500 r. p. m., equipped with starting motors and mechanical oscillators. There are also three 200-kw oil-insulated self-cooled transformers stepping up from 370 volts to 16,000 volts, used in connection with the transmission line to the sub-station.

The electrical apparatus is controlled from an eleven-panel switchboard. The panels are each 90 ins. high x 24 ins. wide x 2 ins. thick, built up in three sections of Vermont marble. All panels are mounted upon angle-iron framework supported on an angle-iron base. The instruments,



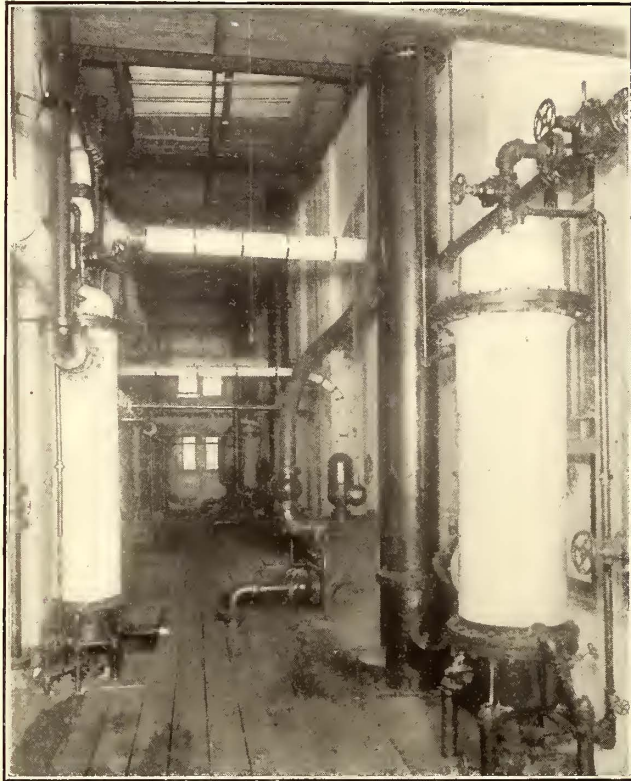
WATER-PIPING SYSTEM IN THE POWER STATION OF THE NORWICH & WESTERLY RAILWAY COMPANY

ure with 150 degs. superheat. Each of these engines is connected to three 400-kw three-phase revolving-field generators operating at 25 cycles, 370 volts, 107 r. p. m.

There are two exciter sets, each capable of exciting all three generators when operating at 50 per cent overload and 80 per cent power factor. One of these exciters consists of a 50-kw, compound-wound, 300-r.-p.-m., 125-volt

switches and metal parts are finished in dull black. Panel No. 1 controls the high-tension side of the step-up transformers; panel No. 2 controls the exciter sets, and has in addition to the usual instruments a four-pole double-throw switch whereby the station lights may be put on the exciter bus-bars or upon the lowering transformer from the generator bus-bars; panels 3, 4 and 5 each control one of the 400-

kw generators; panel No. 6 is a load panel and controls the high-tension side of the step-up transformers and besides the regular instruments contains a totalizing wattmeter; panels 7 and 8 control the a. c. end of the 300-kw rotaries; panels 9 and 10 are the d. c. rotary panels; panel No. 11 is a two-



CONDENSER AND PUMP ROOM

circuit d. c. feeder. Mounted on swinging brackets at the right and left of the eleven panel switchboards are a. c. high-tension voltmeters, a. c. low-tension voltmeters and synchroscopes.

Static protection is afforded by three low-equivalent lightning arresters with choke coils and the usual disconnecting switches. All of the electrical apparatus was furnished by the Westinghouse Electric & Manufacturing Company. The wiring in this station is of the slow-burning waterproof type required by the fire underwriters' latest specifications.

It will be noted from the foregoing description of the power house that the most careful arrangements have been made to provide for contingencies, both in the steam and electrical sections. The number of steam auxiliaries is also rather unusual for a railway station of this size.

An interesting feature in connection with this plant is the speed with which it was erected, owing to the railway company's desire to get a portion of the heavy fall travel in 1906. The contract covering the design and equipment of the steam portion of the plant was taken by the Washington Company, of New York, on Feb. 15, 1906, when ground had not been broken for the building. By May 15 all material was on the ground and on July 15 the first generating system was delivering power.

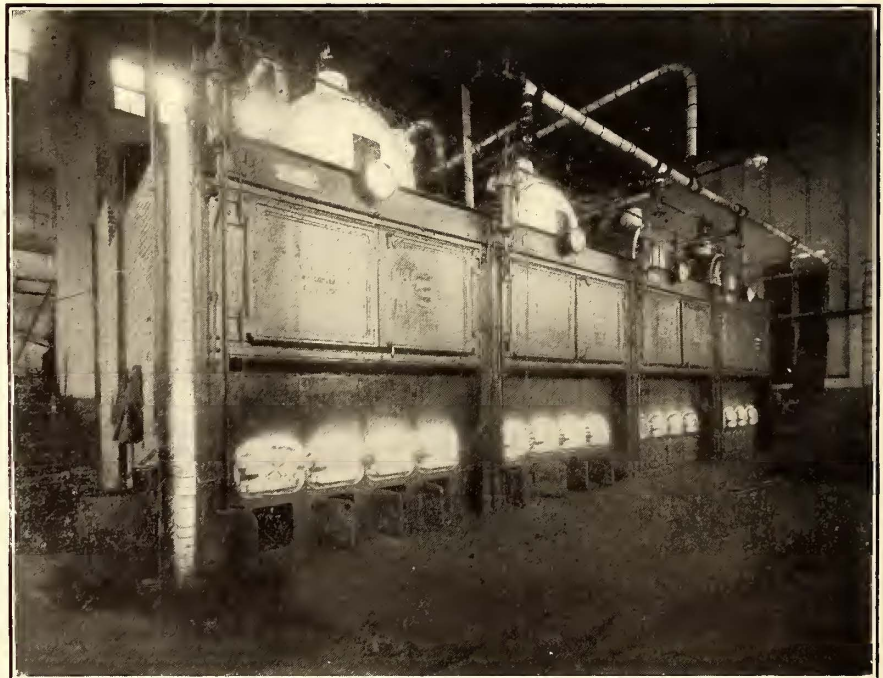
#### THE SUB-STATION

The sub-station is a small brick building located on the line 15 miles from the power plant or two miles from Westerly. It contains two 300-kw rotary converters equipped with starting motors and mechanical oscillators like those in the power house. There are also six 100-kw, oil-insulated, self-cooling lowering transformers to reduce the 16,000 volts transmitted to 370 volts for the rotaries. The primaries and secondaries of all transformers have caps to adjust the voltage to within 5 or 10 per cent.

The switchboard is of the same type as that used in the power station. It consists of two d. c. rotary panels, two a. c. panels, and one d. c. two-circuit feeder panel. All of these are duplicates of similar panels in the power house. There are also two high-tension panels for the control of the high-tension side of the step-down transformers. Aside from the usual apparatus on the panels there is an a. c. voltmeter mounted on a swinging bracket. Static protection is afforded by three low-equivalent lightning arresters with choke coils and disconnecting switches. The electrical apparatus manufactured in this sub-station is also of Westinghouse manufacture.

#### ROLLING STOCK

The high standard followed by the company in its track and power equipments was maintained in selecting the rolling stock. At present the equipment consists of four semi-convertible, four closed passenger cars and one motor freight car. Two of the closed cars are of the combination passenger and baggage type with folding seats for smokers in the baggage compartment, and the two others have a regular smoking compartment seating fourteen people. All of the closed cars have a toilet compartment. These cars are furnished by the Southern Car Company; they are about 47 ft.



BOILER ROOM IN THE POWER HOUSE OF THE NORWICH & WESTERLY RAILWAY

long and weigh, equipped, about 35 tons. They are furnished with end doors for convenience in train operation. The semi-convertible cars are fitted with Wheeler rattan seats and the closed cars with Heywood plush seats.

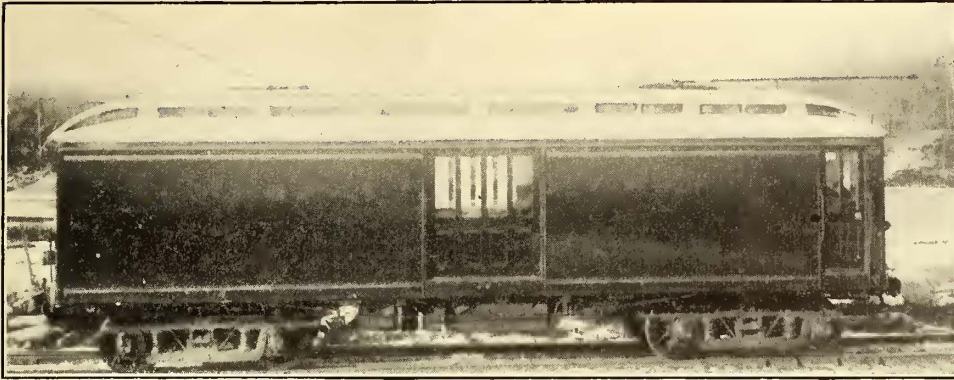
All of the cars are mounted on the Baldwin trucks of the 78-22 type. The wheel base is 78 ins.; diameter of axles, 5



in. at the motor bearings; journals,  $4\frac{1}{4}$  ins. x 8 ins. and 33-in.-diameter National steel-tired wheels. All of the features of the regular Baldwin type of truck are incorporated,

England, for some time. On certain trips of the day the cars are operated in trains and the rest of the day singly.

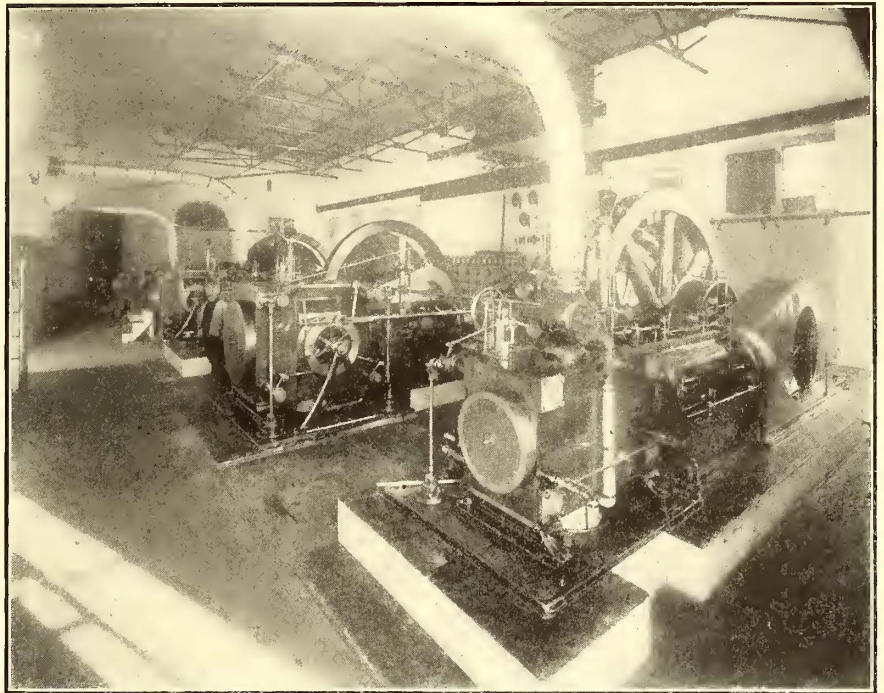
The braking equipment consists of the Westinghouse Traction Company's "A. M. T." automatic air brakes designed for use in trains of from one to five cars. They embody the graduated release of brake cylinder pressure and means to supplement with straight air release if desired, quick recharge of auxiliary reservoirs and quick service application of the brakes. Each equipment includes a D-2-E G motor-driven air compressor, capacity 24 29 cu. ft. free air per minute. Every car is also furnished with one Amer-



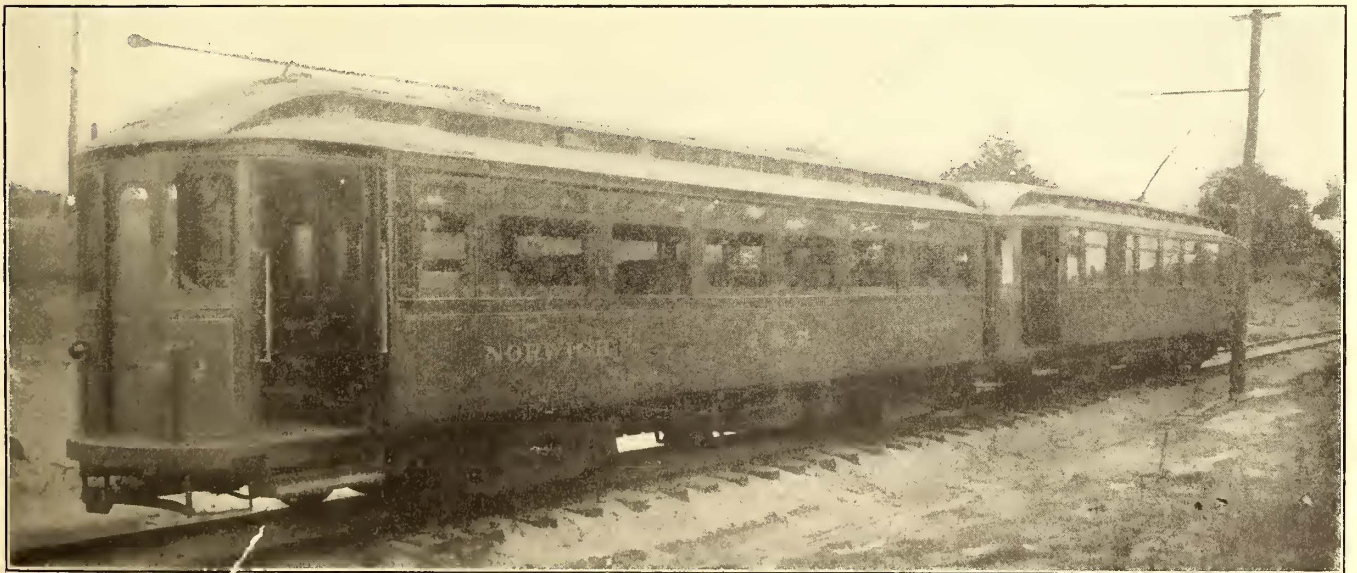
STANDARD EXPRESS CAR ON THE NORWICH & WESTERLY RAILWAY

among others the top member of the frame is of wrought iron forged solid in one piece; the transoms are of channel iron; the swing bolsters are adjustable for height and wear; there are double equalizer bars and trussed side frames. No member of these trucks is designed to withstand strains and stresses with less than a factor of safety of five. In spite of this high factor, the truck, owing to the careful distribution of weight, is comparatively light for the load carried, each truck complete weighing only 8000 lbs.

Both the freight and passenger cars are each equipped with four Westinghouse No. 112, 75-hp motors and unit switch control for train operation. The equipments are geared to maintain a schedule speed of 36.2 m. p. h. with stops every two miles approximately, thus giving a maximum speed of between 45 and 48 m. p. h. on level grades with 500 volts at the motor terminals. The equipments have been making these speeds, which is the fastest electric schedule in New



VIEW OF THE RECIPROCATING ENGINES AND DIRECT-CONNECTED GENERATORS IN THE POWER STATION OF THE NORWICH & WESTERLY RAILWAY COMPANY



A TRAIN ON THE NORWICH & WESTERLY RAILWAY, MADE UP OF TWO MOTOR CARS

ican automatic slack adjuster type-E-1 and standard train air signal equipment. In addition to this power braking the cars are furnished with vertical hand brakes made by John S. Baker, of Beverly, Mass. Among other details of the car furnishings are Knutson trolley retrievers and Van Dorn drawbars.

**CAR DISPATCHING AND GENERAL**

All cars are dispatched by telephone in accordance with regular steam railroad practice. The conductor on receiving orders fills out and signs the blank illustrated. The motorman receives and also signs a duplicate of the same order. These orders are turned in at the end of every run and examined daily by the traffic superintendent. This method has operated very successfully.

The Norwich & Westerly Railway was resurveyed, relocated, designed and equipped by the National Construction & Equipment Company, of New York, of which E. McKernan is president and E. W. Jackson is chief engineer and general manager.

**NORWICH AND WESTERLY RAILWAY CO.**

Telegraphic Train Order No. \_\_\_\_\_

Superintendent's Office, \_\_\_\_\_ 190

FOR SL. To C. & M. of \_\_\_\_\_ At \_\_\_\_\_ FROM SL.

CONDUCTOR AND MOTORMAN MUST EACH HAVE A COPY OF THIS ORDER.

Time received \_\_\_\_\_ M. \_\_\_\_\_ A. \_\_\_\_\_ P. \_\_\_\_\_

CONDUCTOR	MOTORMAN	TRAIN	GRADE	AT	RECEIVED BY

STANDARD DISPATCH ORDER  
BLANK

**PROPOSED SUBWAYS IN PITTSBURG**

E. K. Morse, of Pittsburg, recently presented a paper before the Engineers' Society of Western Pennsylvania on the subject of a proposed subway in Pittsburg. According to the speaker, the business district of Pittsburg now occupies a very congested area, only 210 acres in extent, between the Allegheny and Monongahela Rivers. This section is surrounded by water on all sides except to the east, where it is hemmed in by a ridge, which practically confines the business district to the space now occupied. To aggravate matters there is only one street in this district which is 80 ft. wide. Most of the others are 40 ft. and 50 ft. between building lines. All of the inbound cars must bring their passengers into and to this area.

Elevated railways are not considered suitable either in this district or elsewhere because of the narrowness of the streets, the grades which would have to be surmounted, and their interference with light, which in the smoky atmosphere of Pittsburg is a serious consideration. A subway is therefore recommended. Such a line could make a loop in the business district on Oliver Avenue, Liberty Avenue, Perry Street, Third Avenue and Grant Street. It would then extend east from the corner of Oliver Avenue and Grant Street in an almost straight line until reaching the corner of Penn Avenue and Franklin Avenue. For about a third of the distance it would extend under Center Avenue. It would then extend out Frankstown Avenue to Beachwood Boulevard. Mr. Morse recommends branches to be run south, one to Schenley Park and another to Brady Street; also a branch to extend from the down-town loop under the Allegheny River to Allegheny.

**PORTABLE TRANSFORMER STATION ON THE VALTELLINA RAILWAY**

Among the interesting features of the three-phase system used on the Valtellina Railway, Italy, is a portable transformer sub-station, which is used either to take the place of a stationary transformer station when the latter is undergoing repairs or to help out portions of the line carrying unusually heavy loads. The transformer, which is of 430-kilovolt-ampere capacity, is mounted in a freight car built entirely of iron. The car body is divided in two unequal portions, the larger of which contains all the high-tension apparatus, as follows: Transformer, electrically-driven ventilator, three-pole hand-operated cut-out switch, three-pole automatic 20,000-volt oil switch, three two-pole hand-operated 3000-volt oil switches, three automatic cut-outs, relays, lightning arresters and choke coils.

The smaller compartment contains three hand wheels for the oil switches of the secondary circuit, and a hand wheel for the primary switch, as well as the bell and lamp signal apparatus of the relays which immediately indicate the cut-out switch opened. In this case, three secondary switches had to be installed, as at one point on the system the transformer station supplies current to three lines. Insulators are on the roof for both the primary and secondary circuits.

This portable transformer station can be connected to operate without auxiliary resistances in parallel with a stationary transformer, in which case the current divides in the ratio of 43:30. This scheme has been a success even in cases where this parallel connection was made from a sub-station more than 3-km distant and not at the place where some fixed transformer was cut out of the circuit.

**DOG PERMIT AT LITTLE ROCK**

The people of Little Rock, Ark., probably because of a more affectionate disposition for animals than residents of other cities, for some time caused the Little Rock Railway & Electric Company considerable annoyance by bringing their dogs on the cars with them. On the Forest Park line, which extends several miles into the country, the practice was particularly troublesome. To check it the company adopted the policy of requiring the owners to

Form 322. 6 Bks. 11-1-06 Form 322. 6 Bks. 11-1-06

**LITTLE ROCK RAILWAY & ELECTRIC CO.** **LITTLE ROCK RAILWAY & ELECTRIC CO.**

**DOG PERMIT** Little Rock, Ark. \_\_\_\_\_ 190 **DOG PERMIT** Little Rock, Ark. \_\_\_\_\_ 190

I hereby agree that no liability will be incurred by the LITTLE ROCK RY. & ELECTRIC CO. for dog or dogs.

OWNER OF DOG \_\_\_\_\_

ADDRESS \_\_\_\_\_

Conductor \_\_\_\_\_ Line will allow bearer to carry \_\_\_\_\_ dog. Dog to be carried free and to be tied on front platform of car.

Good only until \_\_\_\_\_ 190 \_\_\_\_\_

In accepting this Permit the owner of dog releases the L. R. Ry. & E. Co. from all liability.

CONDUCTOR WILL TAKE THIS UP, CANCEL AND TURN INTO THE OFFICE WITH HIS REPORT.

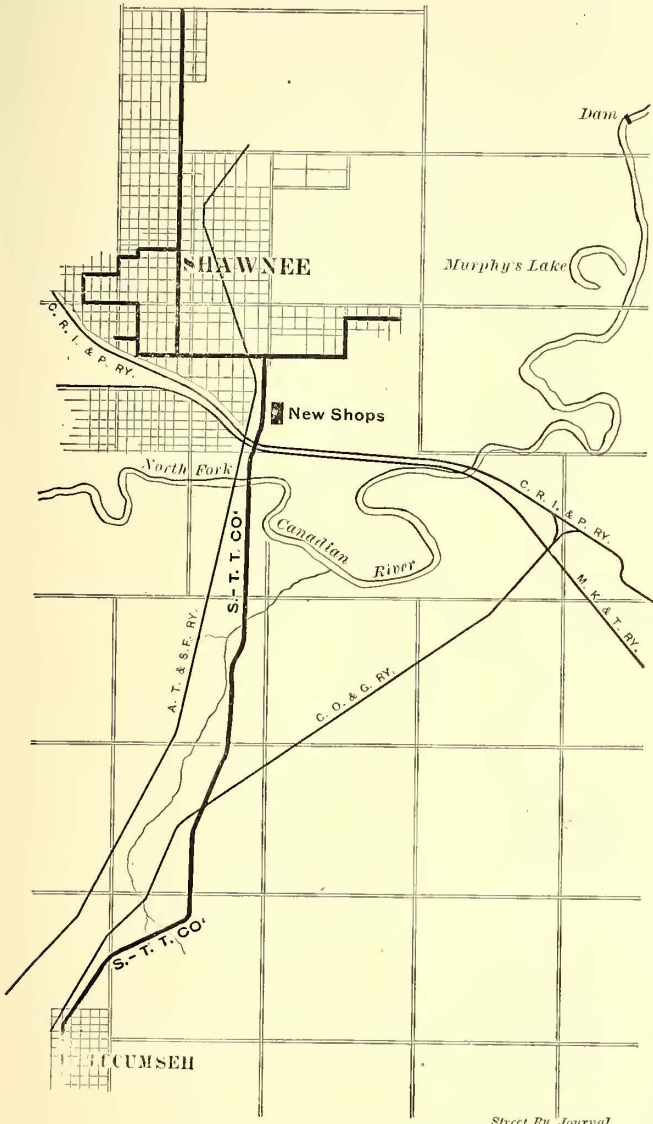
Supt. Transportation.

**CONTRACT FORM COVERING THE ISSUANCE OF DOG PERMITS BY THE LITTLE ROCK RAILWAY & ELECTRIC CO.**

obtain special permit for every dog carried on the cars. These permits are issued free, but the fact that the owner must call at the office of the railway personally and sign a release relieving the company from liability for injury to the animal does much to discourage the practice. In fact, only about one-fourth the number of dogs are brought on the cars as were carried before permits were required. Under the conditions of the permit the dog is tied to the front platform, out of danger to and out of the way of passengers.

**THE SHAWNEE-TECUMSEH TRACTION COMPANY**

The Shawnee-Tecumseh Traction Company is the one purely interurban railway in Oklahoma. Like everything else in this region, it is capable of great future development, and if the rate of increase of population that both the towns and the farming country of Oklahoma are now enjoying continues, it will no doubt be advisable within a few years to build so many extensions that the present trackage will be but a small portion of a large system. This railway extends south from Shawnee 5 miles to Tecumseh through one of the richest and most populous regions of the new



ROUTE AND CONNECTIONS OF THE SHAWNEE-TECUMSEH TRACTION COMPANY

State. It is located on the Santa Fe and the Choctaw, Oklahoma & Gulf Railroads. Tecumseh is the county seat of Pottawatomie County, in which Shawnee is located, and is very closely connected in business affairs with Shawnee.

Shawnee is situated on the North Canadian River and the adjacent river bottoms are the most fertile lands in this beautiful agricultural district. The city has had a phenomenal growth, as it was a mere hamlet in 1895, while by 1906 it had reached a population of 22,000. As Shawnee is located in almost the geographical center of the new State it will probably become the capital when the State's legal headquarters are removed from Guthrie in 1910. A site of 210 acres already has been offered for the State buildings.

Along the interurban line between Shawnee and Tecumseh are located several points of interest to the traveling public. About one mile from Shawnee are the new shops and round houses of the Santa Fe Railroad Company. About half way between the two cities is the Shawnee Indian Training School, or Indian Mission, a government institution, for educating Indian children and instructing them in agriculture and other industrial pursuits.

The interurban line is owned and operated by the Shawnee-Tecumseh Traction Company, in connection with a city

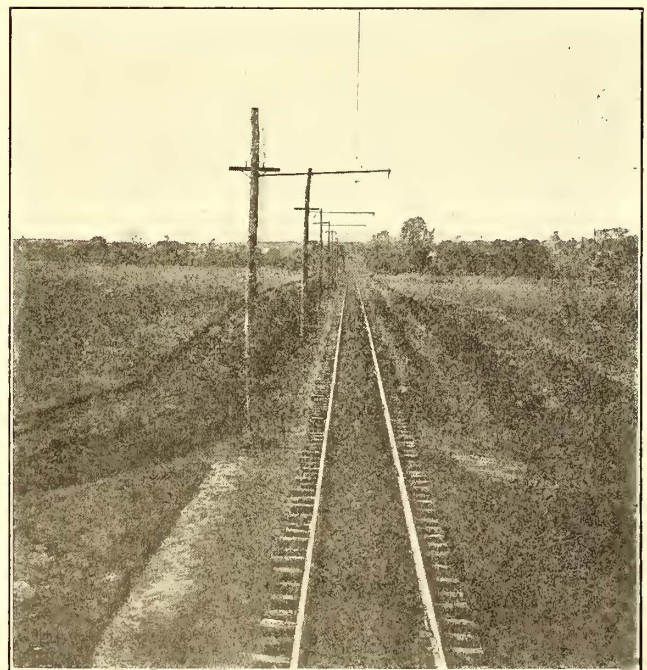


A REVERSE CURVE ON THE INTERURBAN LINE

system with a trackage of about 6½ miles in Shawnee. The company acquired the original system in Shawnee at a receiver's sale in 1906. Since that time the new interurban line has been constructed, the city system has been rebuilt and new equipment obtained. At the present time new car shops are being erected.

**THE CITY LINES**

The mileage of the city system is made up of one route in the eastern part of the city, a second in the western portion running due north, and a third due north from the central



BERME DITCHES, FOR CARRYING AWAY SURFACE WATER

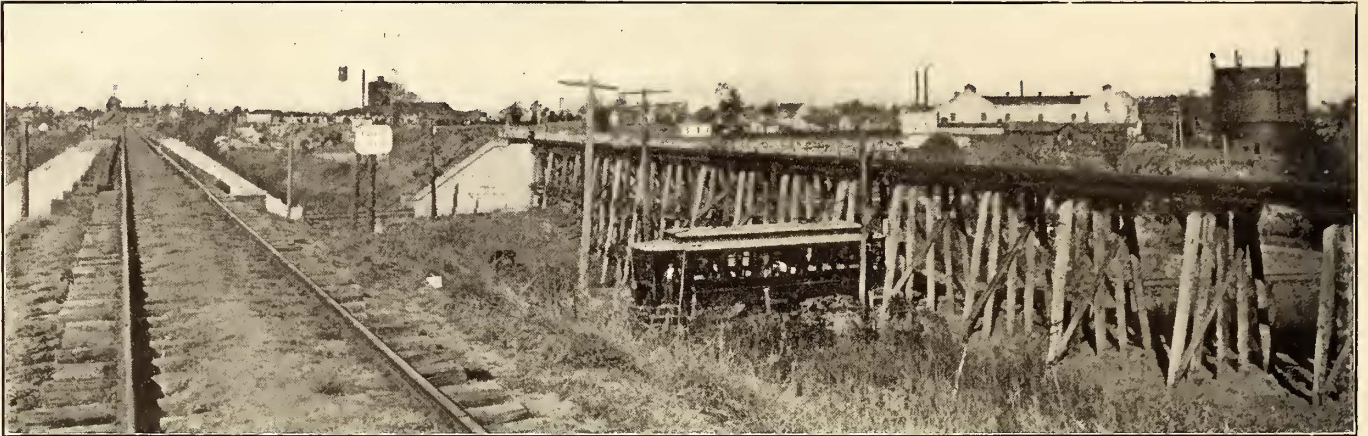
portion of the city upon which a 1½-mile extension has just been completed. One mile of track is laid with high T-rail, but with this exception the rails are all 70-lb. standard

section. The trolley is of No. 0 wire and is placed 17 ft. above the rails.

#### THE INTERURBAN LINE

The interurban line was opened for service Sept. 1, 1906, and is built on a private right of way 100 ft. to 130 ft. wide. Provision has been made for double-tracking by building the track 6 ft. off center. Where the road crosses the Canadian

and cross-bonds are installed at 1000-ft. intervals. Oak ties are placed sixteen to the rail, or about 2 ft. center to center. Ballast is largely of sand. It is proposed to ballast the whole interurban line with broken stone during the next year. A more permanent roadbed was obtained and drainage facilitated by making the cuts and fills very wide, as shown in the illustration. At the top the fills are 18 ft. and



ENTERING SHAWNEE FROM THE EAST, SHOWING THE UNDERGRADE CROSSING

River near Shawnee two trestles, aggregating 500 ft. in length, were erected, but other than these no large structures were required. Steam road crossings occur at four places. Two are at grade crossings on branch lines, while two near each other in Shawnee are under-grade crossings. At this point, fortunately, the steam roads were carried across a ravine on a trestle, so that no depression of the electric line was necessary. No heavy cuts were required in the con-

at the bottom the cuts are 20 ft. in width. One of the views shows some of the ditches dug behind the cuts to protect them from surface water. The company has now under consideration the building of an extension to connect the Shawnee lines with the Oklahoma City lines, a distance of 40 miles.

#### POWER SUPPLY

Power is rented on a meter basis from the Shawnee Light-



A STREET SCENE IN SHAWNEE, OKLAHOMA

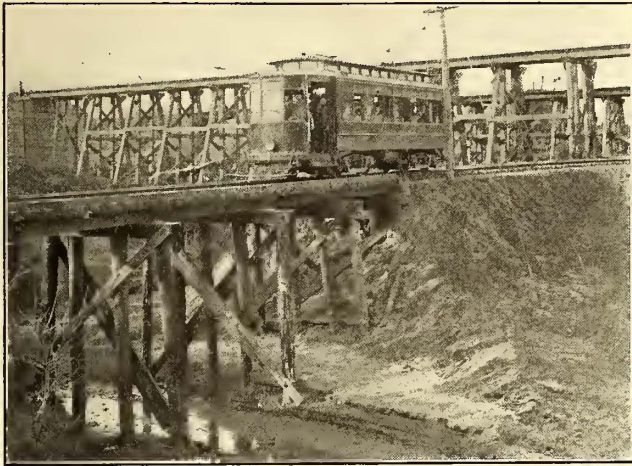
struction of the line, but there is one short 18-ft. fill and a sand fill 6 ft. high and 1 mile long just south of the Canadian River. With the exception of about 400 yds. of track in Tecumseh laid with high T 7-in. rails, the interurban line was constructed of 70-lb. standard section rails in 33-ft. lengths. Sidings with 300 ft. of straight track, and located at intervals of about 1 mile, are equipped with Elliott frogs and switch stand of steam railroad type. The joints are bonded with American Steel & Wire Company ribbon bonds

ing Company. The current is transmitted from a 500-kw, 2300-volt alternating-current Westinghouse turbo-generator in the power house in Shawnee, and is converted to direct current by a 300-kw General Electric motor-generator set. The power house also contains two 500-volt d. c. machines, one 150-kw and the other 200-kw, used when occasion requires.

#### OVERHEAD CONSTRUCTION

Bracket overhead construction is employed except on

sharp curves and in the towns. The poles are of chestnut, placed at 100-ft. intervals. On the interurban division the single No. 00 trolley wire is carried 19 ft. 6 ins. above the track. A No. 0000 copper feeder is carried within  $\frac{1}{2}$  mile of Tecumseh on a cross-arm just below the bracket. Lightning arresters which are grounded to copper-ground plates are placed on every tenth pole or 1000 ft. apart. A cross-

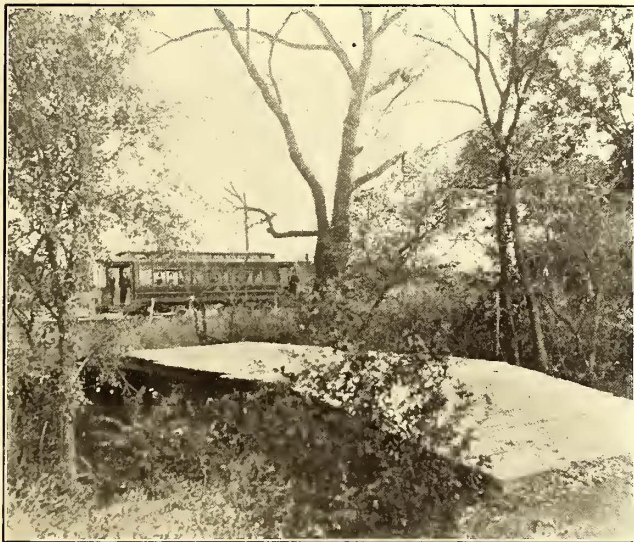


ANOTHER VIEW OF THE UNDERGRADE CROSSING

arm above the bracket carries the wires for the Eureka automatic electric signal system with which the railway is equipped. The signals are placed at each of the four sidings and at terminals to divide the road into five blocks. Cars are operated by them alone, the usual telephone dispatching system being dispensed with entirely.

#### CARS

The equipment consists of fifteen cars, eleven of which were built by the St. Louis Car Company and delivered



ALONG THE LINE NEAR THE PROPOSED PARK

in the summer of 1906. Of the new cars, four with single trucks and 20-ft. closed bodies are for regular city service in Shawnee. Four twelve-bench open cars, termed park cars, are used for special service this summer. Three cars for interurban service are 41 ft. long over vestibule posts and 8 ft. 5 ins. wide over all. The interior of the interurban cars is furnished in oak and is divided into two compartments. Cane seats for forty-four passengers are pro-

vided. The cars are heated by Johns-Manville electric heaters and are equipped with Parmenter fenders. They are mounted on the St. Louis No. 23-A-E trucks with 6-ft. wheel bases. Cast-iron wheels 33 ins. in diameter and with 3-in. tread and 1 5-16-in. flanges are employed. The cars are equipped with K-28-B controllers and four G. E.-80 motors.

#### NEW CAR HOUSES AND OFFICES

A new building, 50 ft. x 300 ft., to be utilized as a storage space for cars and for repair shops and storeroom, is nearing completion. The building is a concrete and brick structure with a steel truss roof. The floors are of concrete and the pits of brick laid in cement. In the rear portion of the building a space of 26 ft. is partitioned off from the car storage section in front for use as a storeroom and a machine shop. The shop will be provided with a lathe, drill press, grinder and air compressor outfit. Heavy wheel work such as boring and pressing on wheels will be done in the shops of the Rock Island Railroad as at present. Plans have been made for the erection of an office building measuring 34 ft. x 36 ft. near the new shops.

#### OPERATING FEATURES

The interurban line enters into competition with the Rock Island system and has caused that road to take off a local train between Shawnee and Tecumseh, although both roads charge the same one-way fare and the steam road makes a cheaper round-trip rate. The one-way fare on the electric line is 15 cents. This does not include a transfer to the city lines. In fact, the city lines are so routed that there is no necessity of giving transfers between them at all and the management is thereby relieved of a perplexing feature of railway operation. Two cars are operated regularly on the interurban line. These maintain a half-hour schedule with a lay-over of five minutes at each end of the line. The four city cars are operated under a fifteen-minute headway. The company is not bothered with the pass question. Employees and newspaper men only are given passes, the latter only to the value of the advertising account. The company makes special rates for chartered cars. A charge of \$5 is made for the first one and one-half hours and \$2.50 for each additional hour. A great deal of chartered car business results from theater parties of Tecumseh people attending the theaters in Shawnee. For such parties \$9 is charged for the round trip.

The company does not operate a park at the present time, but ground for one has been acquired and it will be built during the coming season. The park will be located on a waterway about 2 miles south of Shawnee. Willis E. Fertig is president of the operating company. O. H. Weddle, as general superintendent of the system, has complete charge of its operation. G. S. W. Brubaker, of Philadelphia, acted as engineer and superintendent of construction of the interurban line, and J. P. Algie and Jas. W. Beebe as assistant engineers.

The Steinway, or Belmont, tunnel under Forty-Second Street, New York, and the East River to Long Island City, is to be opened for traffic Aug. 1, according to present plans. The work in the north tube, it is expected, will be completed in less than thirty days. The excavation on the Manhattan end under the city's streets has been finished, so that it is now a question whether an injunction restraining the company on account of the alleged defects in its franchise will retard the work of getting the tunnel ready for traffic. Steel cars similar to those in the subway have been ordered.

## RAIL CORRUGATION\*

BY JOSEPH A. PANTON

The question of rail corrugation has, until recently, been surrounded with a great deal of mystery, and has presented one of the most puzzling problems with which the traction engineer has been called upon to deal. Even at the present time, great diversity of opinion still exists as to its real cause. It is because generalization has been attempted without careful and detailed investigation that so much of a misleading character has been published on the subject. In the present paper the author proposes to deal

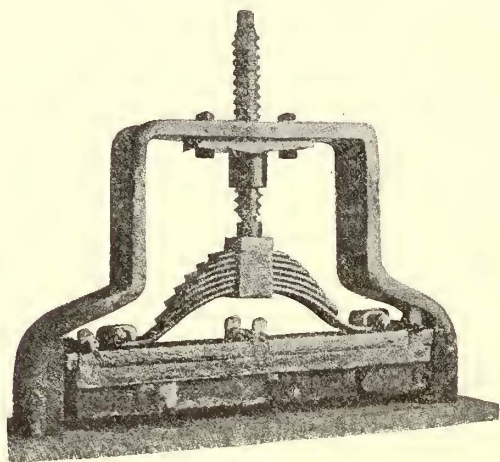


FIG. 1.—RAIL GRINDER

with the subject in a general way, confining himself as briefly as possible to the practical side of the corrugation problem, without entering to any extent into the question of materials and methods of manufacture. Details will be given of the method employed by the author in investigating the corrugation problem, and of the results which have led him to adopt his present theory, special attention being paid to some of the latest developments, which it is hoped will prove of interest. In dealing with a subject of such fundamental importance it becomes necessary to consider certain points which, though familiar to all, would, from their very nature and bearing on the subject, leave the treatment incomplete if omitted. Little actual work has been done in connection with the subject under consideration, therefore few practical details are available. Recent experiments carried out with rail grinders have turned out more or less unsuccessful.

**Rail Grinding.**—At present, as a partial remedy, we keep on grinding rails—and money—away, without making headway toward finding the actual cause of the trouble. Rail grinding can be accomplished by fixing to the car or locomotive a combined letter press and slipper block fitted with refill carborundum shoe (see Fig. 1). There are four carborundum blocks, 6 ins. x 3 ins., fitted in the shoe. This arrangement is by no means the best, as when a grinder of this length is riding on the crest of a wave, the outer ends have a tendency to dip into the hollows. To obviate this, one continuous block of carborundum would be preferable, in order to gain rigidity when negotiating waves of the same length. The author finds that a coarse grit of carborundum (No. 16) used on a wet day, with a medium file-cutting pressure, gives the best results. As regards wear of the

carborundum blocks and power required to drive them, Figs. 1 and 2 (Fig. 2 illustrates shavings obtained with the grinder) clearly indicate in a general way what can be done in the way of a temporary expedient. Rail grinding is, however, by no means a remedy, as the corrugations soon reappear, which indicates that we must look to the equipment directly or indirectly in contact with the rails, and not to the rails themselves, for the cause of the trouble.

**Rails.**—Seeing that the actual corrugations occur on the rail, it is but natural to suppose that their presence or absence depends on the quality of the rail. The author has given careful consideration to this view, and has come to the conclusion that no satisfactory evidence has yet been put forward in support of it. In fact, enough evidence has now accumulated to contradict any rail theory that might be promulgated. It therefore behoves us to look elsewhere for a solution of this problem. In this connection the author would give the following among other reasons why the rail theory fails to account for the presence of corrugation:

1. Because rails manufactured by every firm in the world have corrugated since the advent of electric traction.
2. That the rails did not corrugate in the days of horse and steam cars.
3. That the check or guard rails are corrugated to an equal degree, and parallel to that on the crown of the rail.
4. That rails did not corrugate so long as the armatures were built on the axle.
5. That it takes on the average three years to develop corrugations on a new system, and only three weeks on relaying with new rails thereafter.
6. That an ordinary railway rail taken from the straight road of an electrically operated railway (where no corruga-

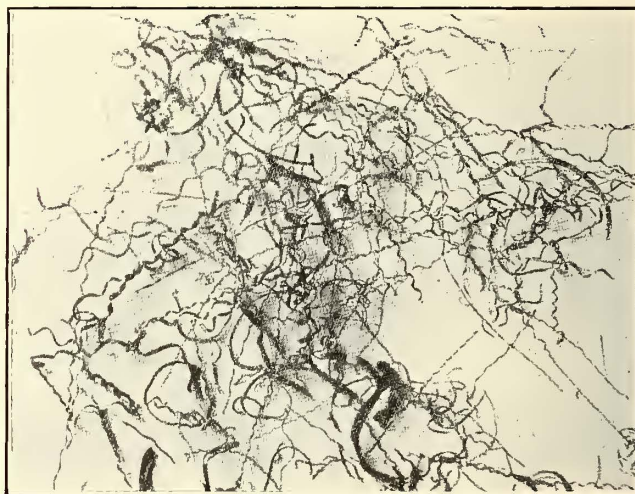


FIG. 2.—SHAVINGS FROM RAIL

tions occur) and relaid on a checked curve soon corrugates.

These are a few of the principal reasons why we cannot attach the blame to the rails or their manufacturers. Further, corrugated rails have been tested and found to contain all the chemical constituents and to possess the physical qualities required of them. It has been said, and continues to be repeated, that the trouble is due to the chattering of the rollers at the rolling mills, owing to play in the pinions and bearings of the rolls driven by antiquated steam engines. Let me here say that such statements are misleading and without foundation. For the sake of argument, assume that the chattering of the rollers does corrugate the rails. Why, then, is it that the rails on electrically operated railways only corrugate on checked curves, the remaining

\* Paper read at a meeting of the Institution of Electrical Engineers (London), March 21 1907.

seven-eighths of the track being perfect? And why does it take so long to corrugate tramway rails on a new system, and so short a time on renewals? And why are not corrugations found on our steam railroads, running at 60 miles per hour? These are facts which one cannot get away from, and which entirely dispose of the rolling theory. Further, in this country and abroad we find corrugations 24 ins. to 30 ins. in wave-length. If chattering is going on in the Middlesbrough rollers on so gigantic a scale, the noise of it should be audible for miles around.

**Defective Railway Rolling Stock.**—The author's attention was first drawn to defects in rolling stock as a means whereby corrugation might be caused about three years ago, by the action of a flanged brake block or shoe then being tried to keep down wheel flanges. The tendency of the flanged brake blocks was to cut into the outer edge of the wheel tire, as here shown (Fig. 3), and it appeared difficult to

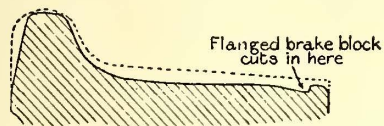


FIG. 3.—WHEEL CUT BY BRAKE-SHOE

account for this peculiar action. Later on it occurred to the author that the bogie truck frame and the wheels were not acting in unison, especially when rounding sharp curves. The truck frame, by means of the hangers, communicated to the brake block a twisting movement, that is to say, the truck frame and brake block had a tendency to get out of line with the wheels when on the curve, but were being prevented by the flange of the brake block; hence the thrust on the said brake block and its tendency to cut the wheel tread. On reverting to the brake block without a flange no cutting of the wheel-tread occurred. Having got thus far, by judicious watching it soon became apparent that this brake block had a decided tendency to run off the wheel tread on one side and cut into the flange on the other, as represented in Fig. 4. On further examination, it was soon found that the frames were out of square and the axles out of line or oblique to the line of motion, as already stated, this being due probably to the axle being geared at one end of the shaft only, the tendency being to form diamond-shaped truck frames. To prove this remarkable result of defective gearing, the author has only to draw attention to the case of the Liverpool Overhead Railway during the first nine or ten years of its existence, when the armatures were built on the axle, whereby a symmetrical drive was obtained. During this period there was no sign of any corrugations. On introducing single-ended geared axles into the same trucks, a series of difficulties cropped up when running over the same rails, necessitating the renewal of rails on checked curves—a serious additional expense. If, in the light of this result, we consider the fact that at least 75 per cent of our present-day electric railway and tramway equipments are unsuitably mounted on trucks of weak foreign design, the main feature of which is lack of durability, due to cheap methods of production, the outlook is anything but hopeful.

**Defective Tramway Rolling Stock.**—Many similar cases have occurred on tramway undertakings where the conversion from steam to electric traction over the same rails has brought about corrugation. The tendency of a gear is to get away from the pinion, and it can do so in time, due to the wear of the motor brasses, axle sleeve brasses, horn slides, etc. Being geared at one end and mounted in a weak

truck frame, the whole tendency is to push the frame out of square and the axles out of line, and, as an examination of the wheel tires clearly indicates, a grinding action takes place between the wheel flanges and guard rails. The wheels soon become groove-locked when speed is attained, and the wheel flanges striking the check rail intermittently cause the whole axle to jump or oscillate in the groove, giving rise to intermittent skidding and producing the peculiar flattening of the rail known as corrugation. Corrugations will also be found on the check rail, equal and parallel to those on the crown of the rail, which clearly demonstrates that the wheels oscillate in the groove. This soon brings

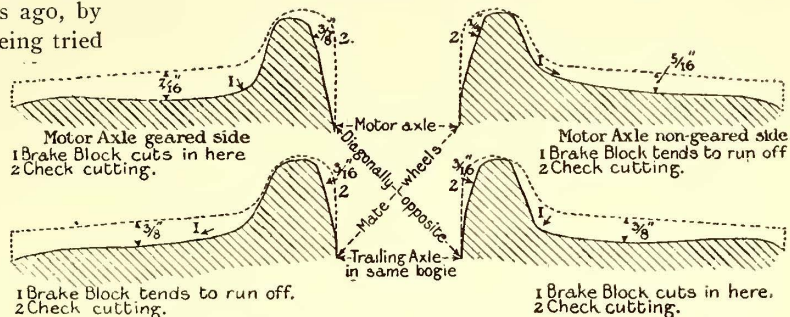


FIG. 4.—TIRES OF DOUBLE TRUCK EQUIPPED WITH ONE MOTOR

about unequal tires on the same axle, which causes a momentary slowing or lagging behind of one tire, and this still further increases the tendency to locking of wheel tires, as can readily be seen by the severe indentations on the check rail, each indentation tapering off to nothing as the tire is freed. Immediately the tire is freed it jumps forward the required distance to bring it into line, producing a sort of case-hardening effect on the head of the rail which remains high, and as it is at the same time revolving, in doing so it scoops or grinds intermittent hollows in the rails, the wave-lengths being determined by the speed and elasticity of the track. In the matter of wheels, we have clung to old practices longer than might have been expected, and longer than would have been the case had not first cost been a factor that had to be considered. We have retained the multitude of flange shapes and treads that existed in the horse-car days, having made few changes in their dimensions or contour, a matter which requires immediate attention; for as we have considerably increased the speed and

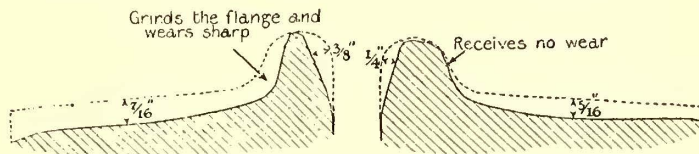


FIG. 5.—TYPICAL EXAMPLE OF TRAILING TIRES

weight of cars, the tread and wheel flanges ought to be suitably modified to adapt them to the new conditions. Again, the running of a 3/4-in. thick flange in a 1-in. wide groove requires further consideration, especially when rounding curves.

**Excessive Wheel and Flange Wear.**—It would be safe to assume that 75 per cent of our electric railways and tramways are troubled more or less with excessive and irregular flange and tread wear of their wheels. In the case of bogie trucks sharp flanges are produced on wheels in diagonally opposite corners of the truck, and square flanges on the mate wheels (see Fig. 4). This peculiarity has developed greatly since the advent of electric traction, and clearly indicates to the author's mind that the method of single-ended

gear-driven axles has the tendency to send the geared end of the axle forward, while the mate wheel has the reverse tendency; hence the sharp flange on the wheel nearest the gear, which, being the aggressor, is found to be of smaller circumference than the mate wheel, as shown in Fig. 4. The slightest difference in circumference of two wheels on the same axle will throw additional weight and wear on the smaller or slow wheel; the author has repeatedly measured differences in circumferences varying from  $\frac{3}{4}$  in. to 1 in. The slow wheel therefore grinds the flange and causes it to wear sharp (see Fig. 5), while the flange of the mate wheel is drawn away from contact with the rail and receives no wear. We therefore arrive at an unbalanced condition of the car-body, especially when rounding curves, which throws undue and constant pressure on the smaller wheels. In the case of street cars, where we have no elevation on curves, the inequalities of wheel circumferences are further aggravated. It will also be found that in short wheel base trucks secured to the car-body the two smaller wheels will be on the same side of the car, thus making an unbalanced condition of the car whether running on the straight or curved track, the wheels on one side being cut into at the back of the flanges, while on the other side the tires are frilled over the rim, which will tend further to increase corrugations where unequal rail level of the track exists. In serious cases this unbalanced condition has caused a cant or tilt of the car-body representing  $\frac{7}{8}$  in. in 9 ft. 6 ins. This accounts for the varying conditions of corrugations so often found on the straight track. The type of truck known as "Brill E 21" cannot get out of square so easily, but the axles still get skewed, though remaining parallel to each other. Taking into consideration the direction of motion, the accompanying diagram (Fig. 6) will illustrate why the two smaller wheels come to be on the same side of the car. Speaking generally, corrugations are most likely to be found in towns and cities where sharp loops and curves are negotiated regardless of speed with top-heavy, double-deck cars and trucks that were never designed for such circumstances, consisting of a few stampings and castings bolted together regardless of accurate fitting. Such frames are unable to retain their original squareness, however well reinforced with corner plates. This lack of squareness means axles out of parallel, motors out of alignment and bearings out of truth, resulting in climbing wheels, hot boxes, unnecessary consumption of power and rapid deterioration of rolling stock and rails. Some twelve months ago a set of Corporation tramway trucks were put through the engineering shops, thoroughly squared up, planed, fitted and finished. These trucks were then put on a particular route, and it is very gratifying to hear that the wheel flanges are greatly improved and the corrugations reduced to one-half their original size. The author has also taken in the side frames of a Brill E 21 truck 1 in., still finding the same bolt holes in the car-body; the result is a much steadier running car with better wheel flanges. One therefore arrives at the result that corrugations on electric railways and tramways are caused by weak bogie frames and trucks, unable to withstand the side strains of our top-heavy cars running at high speed on flat curves of short radii, the weakness being intensified by unsymmetrically driven axles being run through sharp loops and turnouts. Hence in towns where corrugations do not appear you will find a perfect track with trucks of sound mechanical design, preferably "former" built under refined engineering conditions. Recent trucks have been designed to permit the wheels and axles to move laterally upon curves, but how much lateral play can be expected

with a  $\frac{3}{4}$ -in. flange running in a 1-in. groove, admitting inequalities in track gage?

**Check Cutting.**—This is one more instance of skewed axles and unequal tires on the same axle, resulting in the wearing away of the back of the wheel flanges, as seen in Figs. 4 and 5, representing something like  $\frac{1}{4}$  in. to  $\frac{3}{8}$  in. More serious still, however, is the wearing away of the check rails, necessitating the renewal of checks every twelve to eighteen months. Not only so, but the filings given off have a tendency (as will be readily understood) to get into the motors and bearings, causing further complications. The author finds that check cutting is not due to want of lubrication between the car-body and bolster of the bogie, as at first seemed apparent, but rather to the oblique running of the wheels and axles, especially with tires of different diameter on the same axle. This leads to another important subject, viz.:

**Broken Axles.**—Taking the case of axles which are not deficient in material and construction, the author has observed that these fractures occur on the geared side of the axle, where the shaft enters the hub of the wheel. A fractured axle appears to be short in the grain, as if all the nature had gone out of the steel. Samples of this material have been tested, and the tensile strength and ductility have been found to be up to the standard. On examination, however, it will be noticed that the complete break is composed of a series of short fractures, evidently caused at different times and places, round the outer circumference of the shaft, which cannot be observed outwardly with the eye or lens. The author is strongly of opinion that these fractures are caused by the skewed axles coming up to the curve at the wrong angle, as shown in Fig. 7, this occurring when the axle is rigidly held in position by the motor on the geared side. With such a deviation it is quite obvious that the flange of the wheel (especially the wheel nearest the gear) strikes the check rail violently on entering the curve, the blow being determined by the horse-power of the motor, speed, weight of the train or car, and leverage from wheel flange to axle shaft.

This leverage is also responsible for broken spokes in solid cast wheel centers of motor axles. This skewing of axles is quite apparent on short radius curves, the check rail showing a decided cutting away of the ramped part of the check as the wheel enters the curve. It therefore appears that the only hope of saving axles at the present time is to keep the power switched off the motors as far as possible when rounding curves, so that the axles can move freely to suit the circumstances.

**Roaring Rails.**—Roaring rails (so called) are found principally on Indian steam railroads, and, reviewing the evidence from that direction, we can only surmise that the trouble originates in much the same way as corrugation, viz., from defects in the rolling stock, such as excessive play at the journals or longitudinal play between the journal box and pedestal, which would in time, by constant hammering, cause the sides of the truck frame to spread outwardly, at the same time distorting other parts of the frame connected therewith. Such faulty truck design allows the centrifugal forces to center at various points in the truck, thereby shifting the center of gravity horizontally and causing unequal strains on the wheel flanges and unequal tires on the same axle. Consider a truck of this description when rounding a curve. The centrifugal forces acting on the vehicle and truck frame, the kinetic energy is being dissipated in taking up the play between the journal box and pedestal; the wheels and axles remain unsuited to the curve, the avail-



able momentum not being sufficient to carry them to the high side of the curve. This is more apparent on electric railroads by reason of the extra weight of motors on the axles, and consequent friction between wheel and rail—a further reason toward the early development of corrugation as compared with steam and cable railroads. (The above action of vehicles when rounding curves has already been confirmed with reference to flanged brake blocks.) The outer wheels must therefore lag and skid round the curve like the oar of a rowboat. Wheels of different circumference are formed, the two smaller wheels being on the same side of the truck, especially when trains or cars are run on the same route and in the same direction without being turned round, or where there are more curves on one hand than the other. This, then, ought to convince one that it takes time to distort truck frames on a new system—speaking generally, three years at the outside, if they are going to give at all. Once distorted, there is no difficulty in corrugating newly laid checked rails, a matter which by this time has come under the notice of most tramway engineers. In a similar way, you will find the two smaller wheels on the same side of trailing bogies on electric railways. Fig. 5 illustrates a typical example of two like pairs of defective wheels obtained from a strained trailing bogie or truck out of square. Now, if a train is composed of more or less strained trucks of this type, drawn by a locomotive, one might expect roaring rails, because the axles are free to lag and lock across the track gage on any part of the road, according to the varying circumstances of the wheel tires. On the other hand, if the same train is driven by geared

motors, the power of the motor overcomes the tendency of the wheels to lag, which therefore run steadily though skewed and unchecked. It is only when such skewed axles meet check rails that the leading tires tend to groove-lock. Then it is that the two combined effects (i. e., the groove-locking and the wheel lag) are able to overcome the inertia of the motor, the opposing forces causing the axle to oscillate intermittently when checked. Hence corrugations can be produced at will, on checked curves or where check rails are used, be it on the straight or curved track. In the case of electric railways, any light depressions the trailing coach wheels might make on the rail are obliterated by the harshly acting and heavy motor coaches that follow. We therefore find no corrugations or roaring rails on the straight unchecked track of electrically operated railways. Roaring rails have most irregular ridges and hollows not confined to any one length, and quite distinct in appearance from corrugations, though caused by one and the same thing; add to this the climatic conditions and varying elasticity caused by the different qualities of ballast and packing, and we have a train supported by wheels of varying circumferences, unchecked in their career, lagging and hopping along a track consisting of inequalities in rail level. Hammered roaring rails are the inevitable result.

Elasticity and Vibration.—A great deal has been said about rail vibration. The author fails to see why an ordinary tramway rail, laid in solid cement, should vibrate, un-

less it is caused to do so by the hammering action of skewed wheels, locking and oscillating in the groove, which in turn sets up a vibration of the car and rail. Where deep corrugations have been found the vibrations set up in the rail by the car passing over it cause the sets or paving blocks to separate themselves entirely from the rail, the rail eventually becoming waterlogged. Similar cases will be found where cars when negotiating points and crossings have a tendency to gallop, due to the inequalities in the points and roadbed setting up a periodicity of blows that synchronize with the car springs. Whether this periodicity can be made to agree with the corrugations on the tongue of the points and rail remains to be determined. With regard to bridge-constructed railways, one can feel and hear the vibrations of the structure when the approaching train is half a mile off, yet there is not the slightest sign of corrugations on the straight track when no check rails are used. Take the average case of a tramway where the track is laid like an anvil, and the speed thereon is 10 miles to 12 miles per hour; you get corrugations of about 2-in. to 3-in. pitch. Compare this with elevated and bridge-constructed electric railways running at 30 miles to 36 miles per hour, entirely laid with ordinary railway rails on longitudinal sleepers supported every 2 ft. 6 ins.; you would expect to find corrugations in proportion,

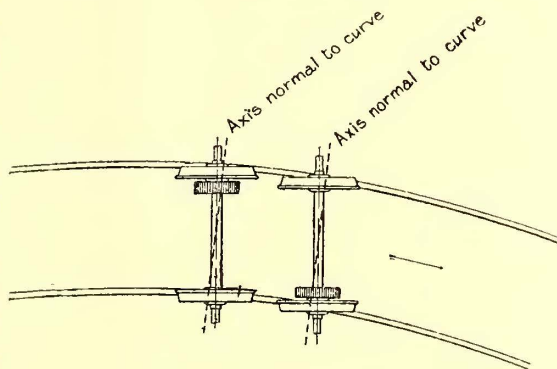


FIG. 6.—PARALLEL SKEWED AXLES

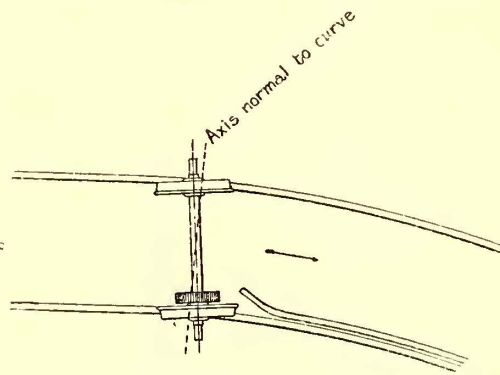


FIG. 7.—UNSYMMETRICALLY DRIVEN AXLE STRIKING GUARD-RAIL

say, of 6-in. to 9-in. pitch; as a matter of fact, the corrugations on the checked curves referred to exceed these lengths considerably, due entirely to the elasticity of the track both horizontally and vertically. Here it may be noted that the corrugations are shorter in wave-lengths at the joints than in the middle of the rail, depending on the rigidity of the joints and fish-plates in question. This proves that the wave-length of corrugation varies with the speed of the vehicle and track elasticity. Speaking generally, the composition of the metal and methods of manufacturing 7-in. girder rails in the early steam tramway days and to-day are not much different, unless it be for the better, yet rails manufactured by every firm in the world have given trouble through corrugations since the advent of electric traction, and rails that did duty for steam traction on being utilized for electric traction corrugated after a few years' service, thus showing that the change in the rolling stock is responsible for the corrugations.

Cable Cars.—We hear very little about corrugations with reference to cable traction, owing to the different method of applying the power to the axles. The speed not being high, the corrugations take considerably longer to form in the first instance, and are of smaller pitch compared with those found in connection with electric traction. There seems no reason for doubting that corrugations on cable roads are brought about by weak trucks on flat curves, as it is here that the greatest damage of all is done, forming the first factor in

making corrugations. The unequal wheels oscillating in the grooves form regular corrugations of definite wave-length, though the wheels are not so harsh in their movements as with geared axles, wherein the two forces are acting against each other. As the width of the check rail varies, so will the pitch of the corrugations. It also follows that as the longitudinal play of the axle increases, the corrugations will be formed at lower speeds. Hence the gradual extension of corrugations over the whole system, deeper at places according to the rail level and road camber.

Truck Design.—This matter of rail corrugation is now receiving the close attention of British manufacturers, the experience with early American designs and practice proving disastrous, as, in the hurry to secure cheap methods of pro-

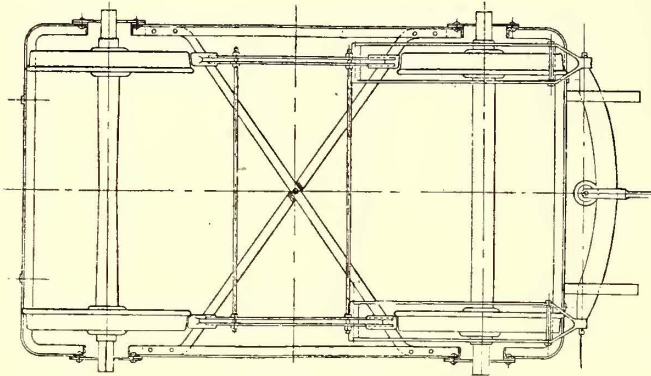


FIG. 8.—METHOD OF BRACING TRUCK

duction in order to compete with one another in foreign markets, the standard stamp of durability required in this country was not maintained. It follows, therefore, that a large percentage of the trucks under our street cars are not capable of meeting modern requirements, because of the inability of the frames to withstand side strains, so frequently found in city and suburban districts, where the flat curves (taken at a high speed) are usually frequent and of short radii. Such trucks may be cheap at the beginning, but constantly require repair, while at the same time they need more current to draw them, and are most expensive in the end, as many managers have learned to their sorrow. The present-day bogie truck frames of riveted and built-up construction, as used by most electric railway companies, carry the load in the center, and are themselves supported upon equalizing springs instead of on journal springs. This gives a short spring base for the frame, and in consequence, when the brakes are applied, the frame is pulled down at one end and pushed up at the other. The author has noticed frames tilting 3 ins. or 4 ins., bringing the life-guards down on the rail. This, of course, releases one pair of wheels of their share of the load, with liability at such times of derailment, especially with bogies fitted with one motor, where the total weights per axle vary. The tendency of this type of frame to tilt under brake action necessitates deeper flanges and wider treads than is practicable in electric services. The equalizing bar bears directly upon the axle box, and when the horn slides are worn the boxes take up a rigid position at an acute angle to the jaws of the frame, causing a binding of the boxes and producing the vibration so noticeable in trucks of this design. Hence the lurch and jerk so easily detected when entering a curve, which eventually wrenches and jars the car-body and passengers, quickly straining the trucks, with consequent loss of squareness and friction in the journals and motor bearings. It is therefore necessary to give up the riveted and built-up con-

struction of bogie frames, which are not capable of withstanding the excessive strains of single-ended gear-driven axles on modern high-speed electric railways. It is entirely due to the weakness in bracing the two sides together, especially under the axle box, that the present-day trucks are unable to withstand the severe side strain they are subject to. It will therefore be necessary to supplement the present trucks with suitable under frames well braced on either side of the wheels (see Fig. 8, with upper frame removed), in order to prevent the spreading and buckling of frames now going on, which in serious cases may amount to 1½ ins. Adjustable thrust-plates have been tried by some of our prominent railways with little success, the tendency being to further strain the already strained trucks. A motor truck for modern electric interurban services on railways and tramways has to withstand more severe shocks, strains and vibrations (due to higher acceleration and retardation), and carries a much heavier load in comparison than the frames of locomotives or early tramways ever experienced. We must therefore turn our attention to stronger and more substantially designed trucks, with solid forged side frames, equally as strong under the axle box as over it, securely braced together, and capable of withstanding side strains and shocks in every direction, by the use of journal springs to bring the load to the wheels without interfering with the easy action of the boxes in the jaws, and, if possible, by equalizing the weight on the frame before it is equalized on the wheels. In cases where there is only one motor per bogie it is advisable to have the brake gear toward the inside of the frame (see Fig. 9). By this arrangement, the leverage is proportional to the weight on the axles, the total difference in weight carried by the motor and trailing axle varying from 3000 lbs. to 2 tons. This arrangement still has the disadvantage of throwing excessive wear and strains on one side of the jaws or horn cheek-plates, eventually causing skewed and binding axle boxes, so noticeable on tramway systems that have been running for some considerable time with trucks not provided with renewable horn cheek-plates. In the author's opinion, the time is not far

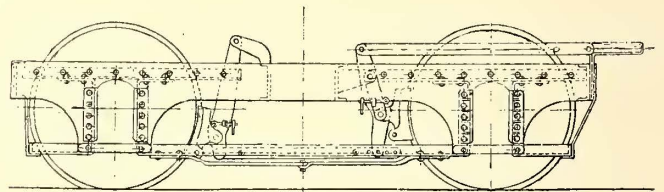


FIG. 9.—INSIDE HUNG BRAKE

distant when we shall have brake blocks on either side of the wheel, especially for street traction. The difficulty with horn slides would then be obviated, with a corresponding reduction in leverage and saving of labor on motormen. Regarding the possibilities of wheel skidding, a suitable tachometer or indicator fixed at each end of the car would give a visual warning to the motorman when the car wheels were skidding. Some careful observations have been made with reference to the effects of retardation on the rails. With heavy electric trains running at 40 miles to 60 miles per hour only barely visible wavy skin depressions appeared on the rails after a hard application of the brakes, the depressions being distorted and finally obliterated by the next train. Sudden braking operates unfavorably on the superstructure, in the sense that the rails are subjected to vibration, and consequently the substructure gets separated. This action has gone on for years at the same place without

creating any impression upon the head of the rail. There is therefore no ground for assuming that the application of brakes has any connection with corrugations or roaring rails.

To sum up briefly, corrugations are caused, directly or indirectly, by lateral play in weak trucks, the weakness being intensified by unsymmetrically driven axles. The whole question can, however, be finally settled and tested only by a full technical investigation carried out by the Board of Trade or a royal commission.

In conclusion, the author would point out that, however erroneous these observations may seem, and however crude the suggested remedies may appear, they are the direct result of practical experience gained since the year in which accelerated electric railway traction made a substantial start. The paper has been written as the direct result of several years' daily labor and thought, and is here submitted to your criticism as an earnest attempt to solve the vexed question of rail corrugations.

#### DISCUSSION

The discussion was opened by H. M. Sayers, who agreed with the author that corrugation was largely due to the rolling stock employed. All the causes mentioned by the author could be reduced to chattering actions—it might be said that vibrations of short period led to corrugation. Corrugations on one rail only were evidently due to torsional vibration, and generally appeared on the off-side or higher rail. The slight camber of a road often resulted in one side of the track being higher than the other, the latter taking extra weight and wear. He concluded that braking might sometimes cause corrugation, as at three of the Edinburgh cable tramway terminals, where brakes were applied, corrugations were well marked. He had noted on the Stratford route of the London County Council ten places where corrugation occurred, all but one being at a stop—this he believed due to alternate slipping and rolling of wheels under brake action. Wheel flanges were much too close a fit to rail grooves on tramways; it was impossible to compensate for curves by widening the gage, and the laying out of curves necessitated a careful study of the rolling stock. The ductile metal of the present-day rail was rolled up into hillocks, but if harder rails were employed this would not occur. He thought the hard rail was the cure for the trouble. Manganese assisted cold rolling, and even if its absence from the metal rendered the latter brittle, it was preferable in the end. The British Electric Traction Company's lines, constructed between 1898 and 1903, were laid with hard German rails and had not corrugated.

Prof. Carus-Wilson, in analyzing the causes of corrugation, said the latter usually appeared on curves of large radius, due to the skewing of the axles. The fact that an exchange of corrugated and non-corrugated rails in a track resulted in reversing the conditions of the rails, he thought, cleared the rail of blame. Tests showed that smooth rails were soft and roaring rails hard; the pitch of the corrugation dispensed with the suggestion of origin at the rolling mill gearing; from the irregular occurrence of corrugation, he suggested that it originated in the track laying, any irregularity in which might result in the car attacking a particular point on the track. Local conditions were the cause of roaring rails in India, and they were no doubt also partly responsible for corrugation over here. The author proved that distorted trucks were one cause of corrugation—but nothing further. He could not agree with the author that the distortion of the truck was due to side gearing, as both

gear wheels were rigidly held in the motor frame, which took the reaction. He held that the corrugations on the Liverpool Overhead Railway track were not due to the adoption of side-gearing in place of direct-driving motors, but were due to the 40 per cent greater speed of the newer stock with 100-hp motors, which gave 100 per cent greater flange action as the cause.

Worby Beaumont could not agree with any part of the explanation in the paper. He suggested that the origin of corrugation was the rolling action set up on a track by heavy loads on small wheels. The same action was used in manufacturing steel and other metals, and its recurrence under running conditions must have some effect. He was quite satisfied that rolling compression resulted in pushing the material of the rail gradually forward, and it was then compressed by the running wheel. The difference in pitch of corrugations was due to the quality of the steel.

Mr. Hawtayne agreed that quality of rail material had a good deal to do with the subject. He had used hard Belgian rails for six or seven years, and they had not corrugated.

#### INSTRUCTION IN COOKING BY ELECTRICITY

With the co-operation of the Union Electric Company, of Dubuque, the Woman's Club of that city has secured a series of fifteen lectures on household economics and cooking by electricity from Mrs. F. V. Sanborn, a well-known writer on domestic science. The first demonstration was given April 1 and was announced by handsomely engraved cards of invitation which were mailed to members of the club. The organization of this course was due largely to L. D. Mathes, the general manager of the Union Electric Company, who has been most assiduous in advancing the sale of current. Mr. Mathes is also president of the Dubuque Baseball League and incidentally the attendance at the ball games has increased materially the receipts of the street railway system.

#### MR. SHONTS ON NEW YORK TRANSPORTATION

Theodore P. Shonts, who recently succeeded August Belmont as president of the Interborough-Metropolitan Company, of New York, had an article in last week's "Harper's Weekly" on the New York rapid transit situation. He says that since coming to New York he has spent four or five hours each day riding on the subway, elevated and surface lines. He has therefore seen them at their best and at their worst, and admits there is reason for the dissatisfaction of the people with the present transit system. He then makes a strong plea for better facilities. Among the improvements especially necessary are additional tracks on the Second and Third Avenue elevated roads. These could be completed within eighteen months or two years.

The New York transportation companies themselves, however, will also test a number of improvements to better the transit situation. One of these is the introduction of side doors on the subway cars. The chief objection to this change at present is the fact that the station platforms in several instances are on curves, and the proper method of overcoming this difficulty is yet to be decided. Experiments will also be conducted with wider platforms and with pay-as-you-enter cars on the surface lines. A trial will also be made with a car which will refuse passengers after all the seats are occupied, although Mr. Shonts has his doubts as to the success of the attempt on the part of the company to enforce this rule.

## SOME BRUSHHOLDER EXPERIENCES

BY HENRY SCHLEGEL

In the STREET RAILWAY JOURNAL of Sept. 8, 1906, under the caption, "Importance of Effective Brushholder Inspection," the writer discussed the several possible sources of error in the adjustment of railway motor brushholders and indicated the requirements of a holder that maintains the brushes in correct relative and absolute position for successful operation. The present article undertakes to give an idea of what may be expected and realized where brushholders are neglected or are maintained by incompetent labor unguided by the necessary jigs and gages.

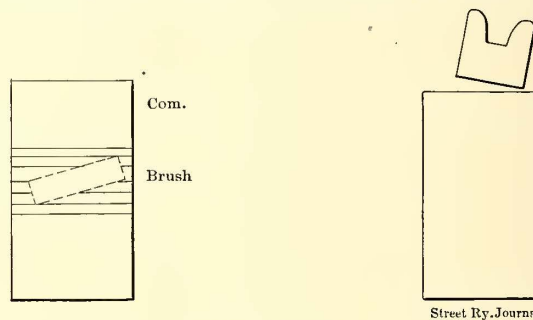
It can be stated that a number of supposedly similar factory holders subjected to gage tests showed slight differences, but in no case observed was the error sufficient to justify condemning the holder. New factory holders will maintain the correct set for months, because they are made of well-seasoned, paraffined wood and the machines for making them are correctly set for turning out a great number. This cannot be generally said of home-made holders.

With brushes set properly, the brush tension can be made light, thereby conducing to the long life of the commutators as well as high car mileage for the brushes. On a road equipped entirely with factory output, troubles usually begin with flashovers on the road or rough handling in the shop precipitate the necessity for renewing or repairing affected parts. Independent holders of the Westinghouse type require, per se, no gage nor jig further than a square to see that the holder is not bent or otherwise distorted and a plug to try the brush-way for smoothness, trueness and size. The angular frame grooved seat against which the holder is drawn by the holder stud is supposed to insure radiality of the holder, assuming that the holder is true, and repair men are strongly impressed with the desirable feature of adjustment. Unfortunately this impression as generally received must be qualified, because drawing the holder down to its seat in the customary careless manner by no means insures proper adjustment and radiality of the brushes: this is on account of the roundness and obtuseness of the engaging angles on the holder and babbitted holder seat. Assuming the holder seat and insulating washer to be correct and free from burrs, bumps, swells and foreign matter that would throw the holder out of line, if while tightening the stud the holder be lightly shaken from side to side, it will draw down into its true seat and inspection of a new brush against which the commutator has been rotated will indicate the line of bearing contact to be down the center of the brush. On holders of the independent type a line down the bearing surface of a new brush or perfectly square wear of the old brushes is an indication of correct position of the brushes on the commutator. On holders of the yoke type this is not so because brushes are often square with each other, have the correct spacing and make full contact with the commutator, but both are too far over in one direction or the other, thereby causing the brushes to spark for one direction of motion of the car but not for the other. If the line of contact is in the center of bearing of the brushes, the adjustment may be accepted as correct.

If no special precaution is taken to have the apexes of the holder, insulator and babbitted seat coincide, on drawing home the brushholder stud these parts will bind slightly on the diagonal and thereby throw the brushes as much as  $1\frac{1}{2}$  bars out of the way, with sparking as a result. If the babbitted seat is not true or the insulation washer is not of uniform thickness, the brush adjustment will be in error. The

only way to get the seats absolutely true is to use a babbitting jig preferably obtained from the factory; after securing a correct jig it should not be thrown around and allowed to lay where it will be run into by a truck or barrow or where a motor will be let down onto it from a hoist—a jig that is wrong is worse than no jig at all because it is misleading. Where a holder is so distorted as to throw the brushes across the commutator (Fig. 1) out of parallel with the commutator bars or one end of the holder is further from the commutator than the other (Fig. 2) the brushes are caused to wear more on one end than on the other and may confine the current to an area unable to carry it without sparking—the first impulse of the average repair man is to straighten the holder.

Before changing a holder in any way, proper steps should be taken to ascertain if the faulty setting of the brushes is or is not due to irregularity in the holder itself. Under no circumstances should a holder be altered until it is proven to be wrong. A simple way to localize the fault is to substitute a factory holder that is known to be right and that is reserved just for checking the condition of suspected holders. If the standard holder sets right, then the fault is with the suspected holder that is replaced; but if the stan-



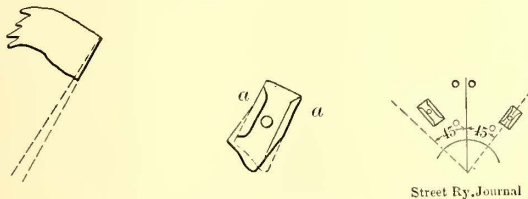
FIGS. 1 AND 2.

dard gives the same evidence of error, the irregularity must be elsewhere—either in the babbitted brushing or insulating washer. In either case correction there means that distortion of the holder by bending to straighten (?) it has been wisely avoided. In testing the adjustment of any holder, care must be taken to see that the stud bolt is drawn sufficiently tight to draw all parts firmly to their seats, otherwise an apparent error in adjustment will be due to the operator and not to the holder. At times a holder will be found actually to need straightening—probably foolishly bent on a former occasion when the fault was really elsewhere. Bending a holder without firmly securing all parts except that to be bent annihilates the original dimensions and angles of the holder and distorts the brush-way so that it must be filed to pass the brushes freely.

Another popular way of abusing the Westinghouse type of independent holder is to use a hammer and chisel for forcing the holder up or down on the insulating head when it is desired to move the holder in or out of accordance with commutator wear. This treatment burrs or swells the brass holder into the insulator, thereby so much increasing the interference between them that in future adjustments the holder must be removed from the motor—a feat that cannot always be accomplished without opening the motor frame. Such holders will go unadjusted out in the operating house, where the importance of brush adjustment is not generally acknowledged and where the general topography of the lower part of many cars may be such that it is impossible to adjust holders unless that can be done easily. For purposes of adjustment where the holder strongly resists being moved in or out on the insulating head a pair of tongs

similar to those used by a blacksmith to hold 4-in. to 5-in. stock can be used to advantage. The handles must be about 5-ft. long and the jaws shaped to suit the space conditions around the holder. To use this tool (Fig. 3) one jaw of the tongs is rested on the insulator and the other on the brass part of the holder, pressure being then exerted by resting one handle against the shoulder and pulling on the other; it takes a very obstreperous holder to withstand this pressure.

On all yoke types of holder the most prolific source of error is in the yoke itself, for if the yoke is wrong in the first place it will stay wrong and become worse, because where the proper precautions are not taken to prevent the yoke from shrinking as a result of the heat to which it is exposed, it will shrink and put the brushes in error. The guide mountings are also qualified to give much trouble. In some shops the guides on which the holders slide are bought finished and then mounted on the yoke; in other shops the rough castings are bought, then mounted on the yoke and afterward milled in position. Either method can be carried to successful results if proper care is taken, but it is very hard to maintain necessary care where the demand for holders is insufficient to warrant permanent setting up of the machines engaged in their making. It is difficult to keep the output from gradually drifting into error, assuming that all conditions are correct in the first place. As stated before, unless a great deal of care is taken to get thoroughly seasoned wood and to so treat it that it will not afterward absorb water, the resulting holders will warp and almost imperceptible warpage in the holder itself will introduce appreciable error in the set of the brushes several inches away (Fig. 4). The same, in effect, is true of the holders and the guides on which they slide. If the guides are not adjusted to a true right angle with the apex at the center of the armature, then will the brush-count increase or decrease with commutator wear, according as the apex is above or below the armature center. An error in the angle that the holders make with each other due to irregularity in the position of the guides is multiplied at the points where the brushes bear on the commutator. Where the finished guides are mounted on the yoke, there is liable to be error in the mounting; where the rough guides are mounted on the yoke and then machined, there can easily be error in the



FIGS 4, 5 AND 6

milling, either as a result of the machine being set up wrong or of the yoke being flimsily supported so that the cut runs off at the end, thereby producing a holder with curved guides (Fig. 5). If the guides are finished too narrow for the guideways on the holder, there results play which will introduce error in the set; if the guides are finished too wide for the guideways in the holder, either it will be impossible to install the holder on the guide or it will be installed against an interference that not only will give the brushes the wrong set but will so distort the guideways that they will have no precision in future. If the yoke goes out to a depot where everything that is done is done in a hurry and with no room nor light for working, the probabilities are that the holder will earn its right to the scrap pile.

Where the guide is too wide for the guideway, the ten-

dency to file again asserts itself; in a depot this may be the only practicable way to get a much-needed car on the road; but in the shop no filing should be done until proper gaging shows which part is in error. It must be borne in mind that not only must the guides make a right angle with each other, but their axes must intersect at the center of the armature; furthermore the axes must make equal angles with a

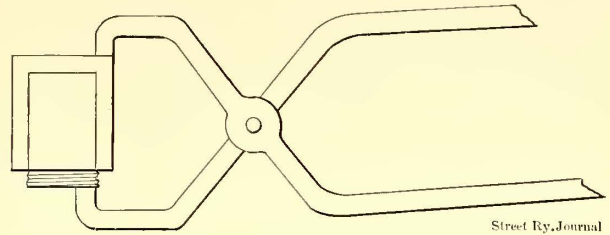


FIG. 3

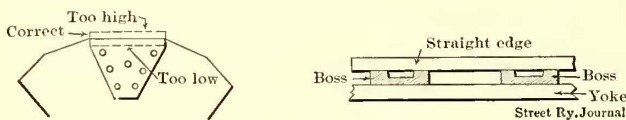
line drawn to intersect the armature center and the center of the line of support of the holder (Fig. 6), otherwise the brushes will spark in one direction of movement of the car but not in the other.

Assuming that the guides test to a true angle and that they are located symmetrically with regard to the center line but that on fitting them with holders, putting them in a motor and counting the set the brushes prove to be too far apart, the only thing to do is to reject the holder for correction. If, however, the error is such as to bring the brushes too close together, their distance apart can be increased to almost any reasonable degree (and without introduction of other errors) by inserting between the holder supporting bracket and the machined seat that it engages on the upper shell a fiber liner that is effective in moving the holder bodily downward. Before tightening the holder yoke, the holders must be loosened, because lowering the yoke moves them closer to the commutator, and if the yoke is tightened with the holders bearing on the commutator, the results will be misleading. The practicability of so correcting a faulty brush set is convenient in depot practice, but is not to be used in shop work. A yoke issuing from the shop should be per se correct in every respect. Such a feature suggests the possibility of error coming in as a result of the brushholder supporting bracket being planed off too much or too little (Fig. 7), the effect being to move bodily the yoke and holders nearer to the center of the armature or further from it, thereby introducing variations in the brush set. Unless great care is taken to mill the seat of the supporting bracket correctly the result will be to introduce error in a yoke that is otherwise all right. To illustrate the importance of this feature, it may be stated as a fact that a yoke and holders that give the correct brush adjustment when the armature bearings are new will bring the brushes too close when the bearings are worn, because such wear lowers the commutator bodily, thereby causing the brushholder axes to intersect at a point above the center of the armature. The effect of bearing wear is most noticeable on motors the armature bearings of which are babbitted above the center to increase the life of the bearings. The change of brush adjustment may amount to as much as three-quarters of a bar. Brushes that are three-quarters of a bar too close together will give more trouble than those three-quarters of a bar too far apart; in fact, in one case within the writer's knowledge the behavior of a lot of GE-1000 motors, that were being abused, was much improved by setting the brushes more than a half bar too far apart.

In counting off the set of brushes it is important that the brushes rest parallel to the commutator bars, otherwise an

error in count is liable to obtain. The usual cause of error in parallelism is that the machined bosses (*a, a*, Fig. 5) against which the brushholder guideways bear are not in the same plane. On old yokes this may be due to the yoke having warped into a curved shape: the only treatment for such a yoke is to discard it. On new yokes the guides may be milled unevenly or they may set on the yoke unevenly; in any of these cases the effect is to have the brushes set crossways on the commutator bars, with the result that the brush, instead of short-circuiting two or three bars, will short-circuit from three to five bars and produce sparking in both directions. The test for evenness of the bosses on which the guideways rest is to lay a straight edge across them; the straight edge should touch every boss (Fig. 8). In milling the bosses in position, care must be taken that the yoke sets level so that the same amount may be cut from the bosses on both sides of the holder. In trying a complete yoke in a motor to count off the brush set, clean the frame seat against which the supporting bracket bears, because dirt or the remains of a liner formerly used there will cause error in the set.

Tests of a large number of carbon brushes show that the variations in their thickness are considerable, especially in the case of brushes due to different makers. When a shop man or depot man finds that a brush will not go into a brush-way freely, he immediately proceeds to sandpaper the brush to the required thickness; in doing this the copper plating intended to improve the contact between the brush



FIGS. 7 AND 8

and brushway is removed, leaving a tendency for heating to take place at this area. Aside from the question as to whether this detrimental effect attains a degree to be considered serious there is no question as to whether or not it would be well to have brush-ways and brushes of uniform thickness, and to this end gages should be used; if a brush is wrong, change it or use one the thickness of which is known to be right. If the brushway is too narrow, inspection will generally reveal some local imperfection that can be easily corrected. If the brushway is too wide the holder should be discarded, because where there is too much play between the brush and way the bearing surface of the brush wears to two surfaces at angles to each other—one surface for each direction of rotation, and not only changing the brush set but reducing the bearing contact to a degree that may cause the brush to heat. Brushes also may be thicker on one end than on the other, so that the brush may show some clearance when first installed, but as it gets shorter from wear and the thick end enters the holder there ensues a binding action certain to result eventually in a flash-over. Excessive clearance between the brush and brushway is especially liable to cause trouble where no attention is given to adjusting the distance or clearance between the holder and commutator. This distance should be the least that will allow the holder to clear everything. On many neglected armatures in which wear in the thrust collars permits excessive end play, it is not practicable to run the brushes as near as they should because when the armature pulls over to the commutator end the holder will strike the commutator ear. Such a condition is generally indicated by a brush hanging over the end of the commutator or resting too far from it, and should be tested by forcing the armature as far

as possible in both directions to determine the end play; in any case an armature with excessive end play should not be passed. A satisfactory clearance between the holder and commutator is  $\frac{1}{8}$  in. Satisfactory end play is 1-32 in. when the armature is hot and the motor cold. It is not uncommon to see the holders in a motor just from the factory almost  $\frac{1}{2}$  in. from the commutator. Another important feature much neglected is brush tension, that is, the tension of the springs that press the brushes down on the commutator. We are not in a position to recommend just what the brush tension per square inch of bearing surface should be, but feel safe in saying that on a good rail and with brush adjustment in all respects correct it need not exceed 5 lbs. per square inch. On rough rail abetted by absence of regard for brush inspection, the brush tension must be strong, otherwise brushes will jounce at joints and cause flashovers. When one knows that motors of the same capacity shipped to the same service by different companies vary as much as 50 per cent in the tension, it is hardly doubtful but that difference of opinion to be respected exists in regard to what the tension should be. All tension in excess of what is needed is expended in causing useless wear of commutator and brushes; brush tension, then, is evidently a condition worth considering. While the absolute tension per square inch under given conditions may be an open question, there is no excuse for having the tension of one brush on a motor 2 lbs. and that on the other 6 lbs. per square inch. There might be some difference in the tension to be recommended on holders of different types, because some are more effective than others; but this difference is not nearly as great, so far as the writer has been able to observe, as the differences that exist on the different brushes of the same motors where this feature has been neglected for years. As an instance, take the cases of springs of the kind used on the old No. 3 and the newer No. 68 Westinghouse motors; these give satisfaction and have done so for a long time or they would have been discarded. Where the spring is properly assembled and installed there is but slight variation in pressure between the two positions occupied by the finger when the brush is new and when it has been allowed to wear a safe amount; but if the contact finger be so made or so fastened to the spring that when winding up the spring to get the proper tension the hump in the finger is caused to bear against the side of the brush instead of the top the force component tending to press the brush to the commutator is small and a much greater total tension must be used. In getting this greater tension the tip is liable to be drawn over so far as to leave no finger room on the end for raising the finger. On brushholders of the General Electric type, using the spiral spring, once the proper tension (hence the proper size and composition of wire) has been selected, steps should be taken to maintain this selection, otherwise springs of various kinds, sizes and characteristics will creep into repair practice and cause uniform changes in brush tension.

Finally, a word about the number of brushes to be used in each holder. There are good motors with two brushes per holder and there are seemingly just as good motors with one brush per holder. The writer may be prejudiced in favor of two brushes because he once saw a lot of hill-climbing motors cured of bucking by substituting two brushes for one; but aside from prepossession in their favor, common sense seems to be on the side of using two brushes per holder. Two brushes certainly better tend to equalize general faults of adjustment and to secure a fairly good brush contact under conditions not to be obtained with a sin-

gle brush. When a single brush is stuck in one place it usually might just as well be stuck all over. With a single brush the effect of uneven brush tension on its two sides increases with age; with double brushes it remains the same. The fact that the manufacturing companies have practically adopted the double brush would leave little doubt as to which is considered the best; yet the operating companies in possession of motors provided with single brushes do not seem to be in any particular hurry to change. From the depot man's point of view consider a single wide brush with two contact fingers that do not stay raised; the brush man has to hold up both of them in order to withdraw or insert a brush. With the tension twice what it should be, the motor hot and the brush man in a position representing a compromise between rope walking and piano moving, evidence indicates that the pleasure is not all his and that those brushes will not be renewed any oftener than they need be; generally he will use his gas tongs to hold the fingers up and in doing so he runs the chances of getting a burn or shock. We consider it an advantage to have brush-holder fingers that have no neutral position because it is impracticable to leave them up. Where the brush is split it is easy to hold up the fingers one at a time. Where a single brush is wide and has two fingers that have no neutral position, renewals will be made as often as they should be.

Theoretically, on a four-pole machine the correct spacing of the brushes is one-quarter of the circumference of the commutator. Calling a bar and its mica body a unit, a circumferential count from the center of one brush to the center of the next should include one-quarter of the total number of units. On railway motors it would be impracticable to count from center to center, so the count is made from the inside edge of one brush to the inside edge of the next one; this is seen to be one-quarter of the total number of units less the number of units covered by two half brushes. Assuming the brush holder to be strictly correct, as the commutator wears, the count between brush centers remains the same, but the count between inside edges becomes slightly less because the bars get thinner and two half brushes cover more units to be subtracted. This difference is insufficient to make any practical difference except when data are being collected for making a gage or jig.

---

## ATLANTIC CITY SELECTED FOR THE CONVENTION

Secretary Swenson, of the American Street and Interurban Railway Association, issued a circular letter on April 9, announcing the selection of Atlantic City, N. J., as the meeting place for the 1907 convention. The letter is addressed to the members of the American Street and Interurban Railway Association and its affiliated bodies, and reads as follows:

### PRELIMINARY ANNOUNCEMENT OF THE 1907 CONVENTION, APRIL 9, 1907.

#### PLACE OF MEETING

The annual convention of your association will be held at Atlantic City, N. J., on Monday, Tuesday, Wednesday, Thursday and Friday, Oct. 14, 15, 16, 17 and 18, 1907. The days upon which the different associations will hold their meetings have not yet been definitely decided, but this matter will be given attention in the near future.

At the meeting of the executive committee of the American association, held in New York, on Jan. 28 last, convention matters were given considerable attention, and it was decided that the 1907 convention be held in the East, and preferably on the

Atlantic seaboard. Special committees of the American Association and of the Manufacturers' Association were appointed to consider this matter and to decide upon the date and location. After a careful investigation, the choice was narrowed down to Norfolk (Jamestown Exposition), and Atlantic City. Both of these places were visited by the committees, and each has its peculiar advantages from the standpoint of taking care of this year's convention. On the whole, however, Atlantic City seemed to the joint committee to be the more desirable location, and it was therefore definitely decided upon as the 1907 convention city.

#### HOTELS

Practically the only criticism made in connection with the Columbus convention was the inadequacy of the hotel facilities. If any criticism of Atlantic City were made in this particular, it would be that there are too many large first-class and thoroughly modern hotels. Atlantic City can provide without difficulty at least 3000 rooms in the large beach front hotels, with from 1200 to 1500 private baths. In addition, there is an almost unlimited number of rooms in the best grade of side-street hotels, many of which are provided with private baths. The rates which have been obtained from thirty-five of the largest hotels, of which thirteen are on the ocean front, are the same as the rates guaranteed for the conventions of the Master Mechanics' and Master Car Builders' associations, which will be held in June of this year. The rates for one person on the American plan vary from \$2 to \$4 per day without bath and from \$3 to \$6 with bath. For two persons occupying the same room on the American plan, the rates are from \$4 to \$8 per day without bath, and from \$6 to \$10 (in some instances slightly higher) with bath.

#### EXHIBIT OF THE MANUFACTURERS' ASSOCIATION

The exhibit of the Manufacturers' Association has become a very important feature of the National Street Railway conventions. The 1907 exhibit will be located on the Steel Pier, which is within a few minutes' walk from the various beach hotels. It is expected that the Manufacturers' Association will have a larger and more attractive exhibit than that at the Columbus convention last year.

#### CONVENTION HALLS

A large convention hall, with a seating capacity of 800 people, will be provided on the Steel Pier for the opening of the American Association convention, and smaller meeting rooms will be available for the various sectional meetings of the American, Accountants', Engineering and Claim Agents' associations.

#### FURTHER INFORMATION

Additional information relating to the hotel and railroad facilities, convention halls and manufacturers' exhibits will be made from time to time in later convention bulletins. One of these bulletins will contain a diagram showing the location of each of the important hotels with reference to the Board Walk and the Steel Pier, together with complete information concerning hotel facilities, both on the American and European plans.

The secretary has also announced that the annual reports of the American, Accountants', Engineering and Claim Agents' associations are now in the process of binding, and will be distributed in the near future. One paper-covered volume of each of these reports will be supplied to each member company. In addition to the paper-covered volumes, the four reports will be bound in cloth in two volumes. The first volume will contain the American and Engineering Association reports, and the second, the Accountants' and Claim Agents' Association reports. The first will have a total of 720 pages, and the second of 601 pages.

---

The Conestoga Traction Company, of Lancaster, Pa., inaugurated a daily freight service on suburban lines April 2, putting six new large freight cars in use on the various lines. A new freight station has been established in Lancaster. Hereafter the company's passenger cars will carry no freight.

## REPORT FROM NEW JERSEY'S PUBLIC UTILITY COMMISSION

The commission authorized by the New Jersey Legislature and appointed by Gov. Stokes in October, 1906, to investigate and report upon the feasibility of a law providing for a division of the profits of public utility corporations with the municipalities where they carry on their business, presented its report March 25. The desirability of having such an investigation was considered by the Governor in his message to this Legislature, where he referred to such a division of profits, and said:

Under such an arrangement, public corporations would not be regarded as private monopolies; they would be exempt from political blackmail; they would be free from the suspicion of corrupt legislation. The gain in public morals would be greater than the gain in public revenues. The practical details of the latter suggestion could be worked out only after careful study and investigation.

The committee appointed in accordance with this suggestion consisted of James H. McGraw, president of the McGraw Publishing Company, chairman; A. E. Beach and A. N. Barber. Frequent sessions have been held during the last six months, or since the appointment, and a careful study has been made of the laws of other States on this subject. The report follows:

### REPORT

The plan proposed by the resolution suggests that the municipality and the corporation become or be made parties to an agreement by which, after the corporation has received from the operation of the utility under its control a reasonable compensation for the use of its capital in furnishing the service rendered to the public, any additional sum earned shall be shared with the municipality from which the franchise has been obtained.

It will be generally agreed that such an intimate financial relation between the municipality and the corporation, partaking of the nature of a copartnership, would, if based upon conditions mutually satisfactory and faithfully performed, establish the desirable status suggested by the Governor in his message. As, however, many binding contracts between municipalities and public utility corporations have already been made, and such contracts have not provided for a division of profits, it is evident that this general relation cannot be universally established by present agreement. If obtained it must be secured by legislation through which the State, in the exercise of its sovereign power, exacts the payment as a tax of a share of the dividends of the corporation. It would seem, therefore, that the plan submitted for investigation is intrinsically one of taxation, and its merit must depend upon the equity and uniformity of its application and upon the revenue it would produce.

### PRACTICE IN MASSACHUSETTS AND RHODE ISLAND

With the object of securing guidance from experience and example, your commission has made inquiry as to the practice of other States, in order to ascertain to what extent, if any, the proposed plan has been adopted and the practical effect of its operation. So far as your commission has been able to determine, but two States have enacted legislation providing for a division of profits beyond a fixed sum, namely, Massachusetts and Rhode Island, and their enactments apply to street railway companies only.

In Massachusetts, street railway companies are required to pay, in addition to other taxes, a tax equal to any dividend paid in excess of 8 per cent, provided dividends averaging 6 per cent have been paid since beginning operations. This law was enacted in 1898, but up to the present time no dividends in excess of 8 per cent have been paid. The law has not, therefore, been productive of revenue, nor does it seem to be regarded as of practical benefit to the public revenues.

In Rhode Island the law provides for a division of dividends by street railway companies in excess of 8 per cent, without the allowance of a preliminary payment averaging 6 per cent, as in Massachusetts. This payment is exacted in addition to a tax

of 1 per cent upon gross earnings. The provisions of the law apply to companies organized under the laws of Rhode Island and to lessees of roads, the lessors being exempt. It is, moreover, applicable only to companies accepting its provisions, and such companies if operating under limited franchises have the limitation removed.

The law went into effect in 1898 and from that year until 1903 no tax was paid except the 1 per cent upon gross earnings. In the year 1903 the Rhode Island Company, having leased the Union Company, the Pawtucket Company and the Rhode Island Suburban Railway Company, paid a tax of 1 per cent on gross earnings, and one-half of 1 per cent on dividends in excess of 8 per cent. In 1904 the same amount was paid. In 1905  $\frac{3}{4}$  per cent was paid, and in 1906 this was increased to 1 per cent.

The total amount collected was less than would have been obtained under a gross earnings tax equal to that levied last year upon street railway companies in New Jersey, and it would seem that the payment of the excess dividend tax might be evaded by a slight increase of capitalization by an operating company.

### THE PROBLEM OF CAPITALIZATION

The consideration of a plan providing for a division of dividends, in excess of a reasonable amount, declared by public utility corporations, is closely related necessarily to the problem of their capitalization. It is generally believed that these corporations are often capitalized beyond the amount at which their properties could be physically replaced to-day, and this belief is unquestionably correct.

This excess capital has been regarded by some persons as entirely unworthy of consideration, and it is contended that the State would be justified in destroying its value arbitrarily by refusing to allow the payment of dividends upon an amount greater than would be required to reproduce merely the tangible property of the corporations. It seems to your commission, however, that the existence of a capitalization beyond an amount which would be required to replace the property is due to a combination of several causes, which should not be overlooked. The first of these is the new condition brought about by the adoption of electricity for the propulsion of street cars and for lighting, which, during the past fifteen years, has completely changed the physical characteristics of those industries. The whole equipment of the horse railways has been literally wiped out of existence. Power houses have been built, wires strung along the streets and highways, heavier rails have been laid and cars designed specially for electrical operation purchased. These expensive changes came so quickly, it is agreed they could not possibly have been provided for out of current earnings, and the capital of the companies has been necessarily increased to meet them.

The first electrical machinery, while crude, was very costly, and as the economic feasibility of electric railways had not been demonstrated, there existed grave skepticism among investors as to the value of the new securities thus created. To meet this condition bonds and stock were issued in larger volume and with less conservatism than would now be considered proper and advisable.

### EFFECT OF MERGERS

Another contributing cause to increased capitalization has been the merger of different utilities in a common ownership, or under common control. When street railways were operated by animal power and confined entirely to cities, there was no obvious advantage in having all the railways of a municipality under the management of a single company. When, however, the motive power comes from a single source, and the powerhouse and the poles and wires are a necessary and expensive incident of operation, it is apparent that a strong incentive exists to prevent unnecessary duplication of equipment. If to this be added the fact that the same kind of energy that propels the street car, also generates the light used by the municipality in its streets, and the power utilized by the people in their factories and stores, the tendency is natural, indeed inevitable, to merge railway and lighting companies under a common control. Such mergers have been effected everywhere throughout the civilized world. While this process would tend to increase capitalization above the tangible property value of the corporations, it is undoubtedly true that stock has sometimes been issued in excess of an amount which would have been reasonable and conservative, to take advantage adequately of the changed conditions.



## EFFECT ON SMALL INVESTORS

As a result there exists a large capitalization upon which no dividends are now paid, and the enactment of legislation providing for the division of dividends beyond a certain rate would not affect the companies which have issued these securities. Moreover, since all these non-earning securities have been widely distributed in good faith by those who believe in the stability of our laws, it does not seem to your commission that the State would be justified in arbitrarily destroying their value in the hope of obtaining a share of the dividends declared upon the residue. Such a course would not injure those responsible for the issue, who have long since parted with their holdings, and it is doubtful if the public would obtain any considerable advantage from an attempted confiscation of capital value. The smaller holders would sacrifice their investments, and their securities would gradually pass into the hands of those financially stronger, who would find it easier than ever to control the corporation, and might discover obscure channels for the diversion of profits to their own advantage, without being productive of any gain to the people at large. The rate of dividend is, however, so intimately related to the capitalization that, with varying amounts of capital representing tangible property and earning capacity of equal value, it would seem that the enactment of a law allowing only a fixed dividend rate and requiring an equal division of all profits in excess would be unjust to companies which have been comparatively conservative in their capitalization and as a consequence are able to pay dividends, as well as to companies earning better returns from skilful management and good service.

The State should carefully consider whether under its policy against over-capitalization, with a stringent law recently enacted to prevent it in the future, there would not be danger of punishing those who have been free from offense in the past. No legislation should penalize the effort after improvement, whether manifested by an individual or by a corporation.

## HOLDING COMPANIES

There would be further complication with respect to the dividends of companies leased and operated by a holding company. Many of these companies have, as a condition of their leases, agreements on the part of the lessee to pay dividends upon their stock. With respect to two companies, the guaranteed dividend is in excess of 8 per cent. These companies seem to have been able to keep their capital account at a very low figure compared with the others. Aside from the exceptions noted, the guaranteed dividends of the leased companies run from 4 to 8 per cent. It is evident that if a law similar to that of Rhode Island or Massachusetts were enacted in New Jersey, requiring a division of dividends beyond 8 per cent, the leased companies, with two exceptions, would not be affected, and no return would come from the dividends declared on their capital stock. If the legal rate were made low enough to include all of these companies, the dividend would have to be placed at 3 per cent, which, as a rule of general application, could scarcely be considered reasonable. If, however, the lessors were made exempt and the tax collected from the excess dividends of the lessee, there would be no return whatever from the largest holding company in the State, the Public Service Corporation, as no dividends are paid upon its stock.

## THE VOORHEES TAX LAW

The State could, instead of attempting to obtain a large proportion of a high dividend rate, impose a small tax upon low rates. This plan is open to the objection which applies to the other plan of profit-sharing, that it would tend to penalize the corporation with a fair and conservative capitalization. Such a method has already been tried in New Jersey, with respect to gas and electric light companies and was discarded.

Before the enactment of the Voorhees tax law, these companies were required to pay a tax of 5 per cent on dividends over 4 per cent. This was in addition to a tax of one-half of 1 per cent on gross earnings. In 1900, the last year of the application of this method, the total revenue from the above assessments was \$37,459. Of this amount \$9,114 only came from the dividend tax. Had the Voorhees act requiring a payment of 2 per cent upon gross earnings been in effect in 1900, the companies would have paid \$113,375, or more than three times as much as the total amount collected from the tax of ½ per cent on gross earnings and the dividend tax combined, or more than twelve times the amount collected from the dividend tax alone.

In 1905 the 2 per cent tax upon gross earnings of gas and electric light companies resulted in a payment of \$205,013.

## EFFECT ON LIMITED FRANCHISES

Any proposition to limit the dividends of public utility corporations must necessarily be considered with respect to the effect of the policy upon companies to be incorporated hereafter, as well as those already in existence. Most of the companies now in operation have franchises which have been granted in perpetuity. As all franchises granted hereafter must be for a limited term of years, and as the demand for public utilities will come from the more sparsely settled communities rather than from the large cities where the privileges of any value have already been disposed of, it would seem that any fiscal limitation now placed upon dividends would, unless the permitted rate is very high, prevent effectually the investment of capital in desirable new enterprises.

## SCOPE OF THE PROBLEM

It will be seen from this brief discussion by your commission of some aspects of the problem, that it has simply outlined the innumerable methods and conditions that are involved in the essentially modern principle of intrusting to private corporations the supply of many of the necessities of existence. Few questions have more engaged the attention of legislatures and the thoughts of political economists in the last century than those connected with the fiscal regulation of this machinery of civilization, for the supply of comforts and necessities of recent creation; and even a superficial study of the laws, ordinances, inquiries, suggestions, schemes and treatises on the subject is an exhaustive task. In the foregoing discussion your commission has applied itself strictly to a categorical treatment of the recommendation dealing with a single point, but even this effort was found to involve a research into the whole body of fiscal laws as related to corporations and the communities they serve.

While this work has been conducted in the hope that some plan of profit-sharing could be devised which might be presented to the legislature as giving reasonable assurance of public benefit, the commission is of the opinion that the enactment of legislation along the line suggested would be inexpedient. Aside from the fact that no revenue has been obtained in Massachusetts from such a law; that in Rhode Island the payments have been small, and by a single company, which is otherwise taxed much less than are similar companies in New Jersey, fundamental objections to the proposed plan seem to be as follows:

1. Owing to different degrees of capitalization representing property values and affecting dividend rates, the law would be unequal as a rule of taxation.
2. It would not be productive of revenue, except in isolated cases, unless the rate of dividend allowed the corporation be placed below that at which money is ordinarily invested without risk.
3. It would place at a disadvantage independent companies as compared with those leased and operated by holding companies.
4. It would, except in populous centers and in its application to very valuable grants, prevent a sufficient return to attract the investment of capital in limited franchises and tend to give monopolies to corporations now holding franchises granted in perpetuity.

## TAX ON GROSS EARNINGS

Your commission is strongly inclined to believe that the method of taxing the gross earnings, as employed in this State, should be maintained and continued with as much freedom as possible from complication. This method is entirely free from the effect of different degrees of capitalization, and quite independent of the dividend-paying capacity of the corporations.

The question of the taxation of public utility corporations, however, is but one phase of their many-sided relations to the public. It should be recognized that, after all, the public is the sole customer of public utility corporations, and that the revenue to meet expenses of operation and necessary renewal or equipment, as well as taxes, must come from the charge made to the public for service.

## THE PUBLIC NECESSITIES

The function of public utility corporations in the opinion of your commission, is not so much that of an agent of the municipality employed for the purpose of increasing its revenue, as it

is a servant of the public to which certain functions have been relegated, and thus existing for the purpose of supplying needed service as efficiently and cheaply as possible.

It is the conviction of your commission that the great body of the public is primarily and vitally interested in the quality of the service given, and that this service should be adequate, quite irrespective of the dividends paid by the corporations or of the fiscal receipts of the municipalities.

An abundant supply of cheap, pure water, adequate trolley service, with cars running frequently in congested districts and extended to join urban and rural communities; gas and electric light supplied at fair prices, of proper quantity and quality to meet the public needs—these are matters of daily concern to the people.

While these features of the public utility problem suggest themselves as worthy of serious consideration, the necessity of reporting to the present legislature has prevented the commission going beyond the duty directly imposed upon it. It is believed, however, that the important question of improving and developing the service given by the public utility corporations might properly be made a subject of study and investigation to the benefit of the people.

Respectfully submitted,  
 JAMES H. MCGRAW, Chairman,  
 A. B. LEACH,  
 A. N. BARBER.

**GASOLINE TOWER WAGON**

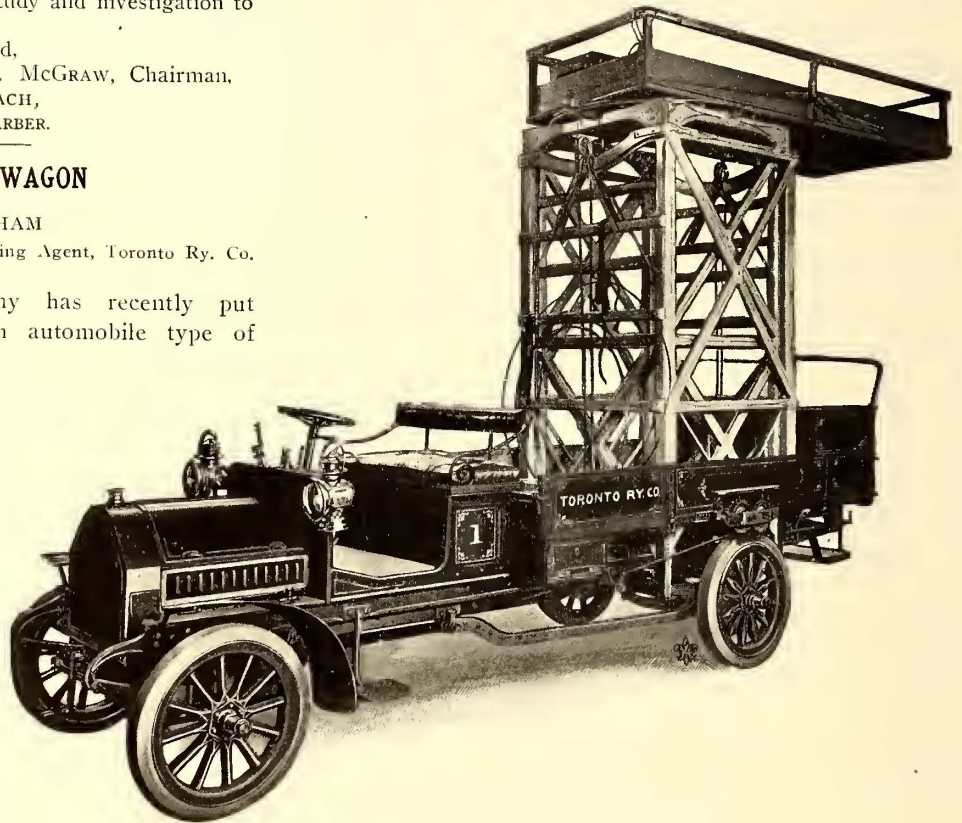
BY A. M. GRANTHAM

Superintendent of Construction and Purchasing Agent, Toronto Ry. Co.

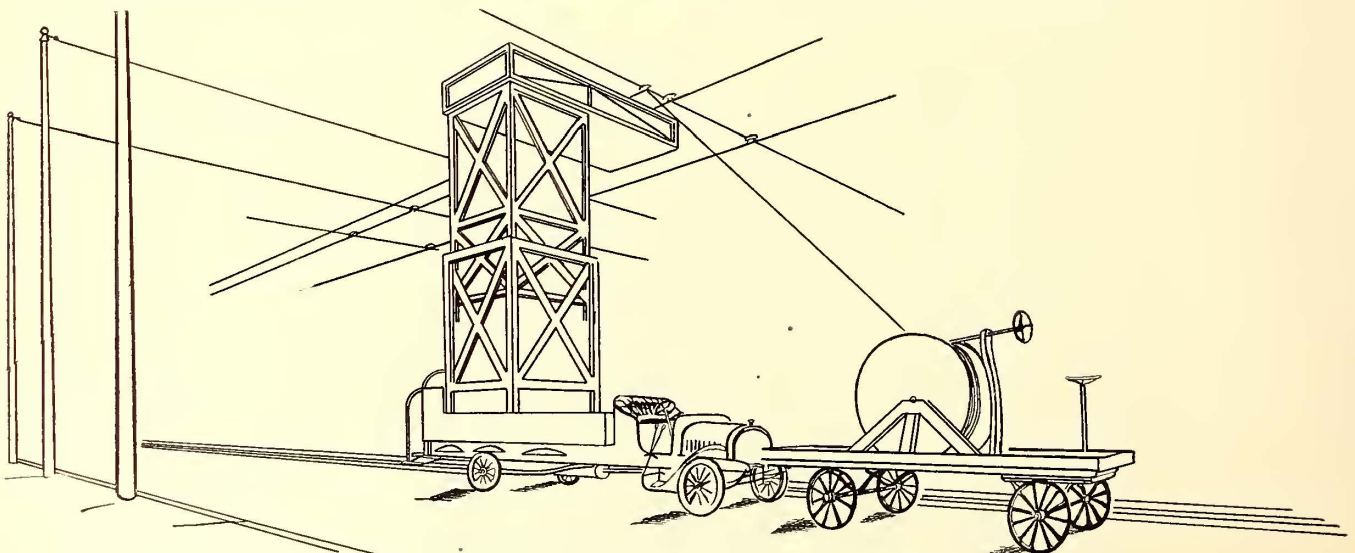
The Toronto Railway Company has recently put into commission a gasoline-driven automobile type of tower wagon for overhead construction and repair work. The special advantages of a motor truck of this description are speed, steadiness in starting up, ease of motion, dispatch in retrograde movement, ability to keep to a straight line in forward or reverse direction, as well as the desirability of being independent of horse flesh, and the ability to keep a wagon in commission continuously.

In point of economy, a comparison between a horse-driven vehicle and a gasoline motor would be somewhat as follows:

HORSE-DRIVEN VEHICLE		GASOLINE WAGON	
Original cost of three horses (team and one spare), say .....	\$750		
Original cost of one wagon and tower .....	500		
<b>Total first cost.....</b>	<b>\$1,250</b>	<b>Total first cost.....</b>	<b>\$3,600</b>
Annual depreciation on horses, say.....	\$100	Annual repairs to outfit, including tires, etc. ....	\$300
Annual depreciation and repairs to wagon .....	200	Depreciation, allowing for new outfit in seven years....	500
Annual keep of horses	500	Gasoline and oil consumption .....	150
Harness, etc. ....	50		
	\$850		\$950
Capitalized at 5 per cent..	\$17,000	Capitalized at 5 per cent..	\$19,000
	\$18,250		\$22,600



TORONTO GASOLINE TOWER WAGON



GASOLINE TOWER EQUIPMENT IN SERVICE WITH REEL WAGON

As two gasoline wagons should easily do the work of three horse wagons, there is probably an actual saving financially to be shown in favor of the power outfit, not to mention the convenience in operating and handling and space saved in stabling horses.

For use in stringing trolley wire the Toronto Railway Company has devised a reel truck with steering handle that may be either pushed ahead or behind by the motor. The wire from the reel leads up over the tower, where it is fastened to the span. While there may be some difficulties to be overcome in the operation of this truck, it should work out ultimately a most expeditious and economical manner of doing work. The body and tower of the motor were built by the Toronto Railway Company to designs which were considered best adapted to the conditions. A sketch plan of the arrangement is shown herewith, and also a photograph of the motor.

The details of the motor chassis imported by the Dominion Automobile Company, of Canada, from Switzerland, are as follows:

TYPE II 20-HP TRUCK

Motor (foreign rating.—Two separately cast cylinders, 120 x 150 mm., 16 hp. when running at 900 revolutions, valves interchangeable and mechanically operated. Patented device for operating admission and exhaust. Minimum revolutions 200, maximum 1400 revolutions per minute. All working machinery protected from dust. The crank shaft made from the very best chrome nickel steel.

Carburettor.—Mechanically operated and hot-water jacketed.

Transmission.—Selective type; four speeds ahead and one reverse; direct drive on high speed. All gears made of very best chroma-nickel steel.

Brakes.—Three, working independently. One hand-lever brake, working directly on the hubs of the hind wheels. The second, a ratchet brake, working by pedal on differential. There is a third brake which works very regularly on the motor by means of closing the inlet valves.

Drive.—Bevel gear with spur gears and interior teeth on brake drums.

Radiator.—Honeycomb, Mercedes type.

Axles.—Both front and rear forged from solid steel.

Ignition (double).—By high-tension magneto and commutator.

Pump.—Gear driven.

Wheels.—Artillery type with solid rubber tires.

Chassis.—Channel steel.

Wheel Base.—3 1/3 meters.

Steering.—By irreversible worm and sector.

Tank.—20 gals. Capacity. Red copper, riveted and brazed.

Weight.—3200 lbs.

Load.—2 1/2 tons.

Speed.—3, 6, 10 and 18 m. p. h.

NEW YORK CITY STATISTICS

The Railroad Commissioners of New York State have issued a summary of the cash fares, transfers and car-mileage of the surface, elevated and subway lines in the five boroughs of New York City for the year ending Dec 31, 1905 and 1906. These statistics are given below:

	Cash Fares		Transfers		Car Mileage	
	1905	1906	1905	1906	1905	1906
Manhattan .....	745,896,116	811,477,337	166,125,312	191,350,671	149,334,212	154,217,602
Brooklyn .....	372,584,004	409,596,164	85,225,129	134,694,923	67,943,149	73,504,028
Bronx .....	25,002,165	34,813,555	15,356,061	15,371,827	6,403,478	8,182,551
Queens .....	19,493,173	23,444,906	3,695,954	4,627,586	4,244,982	4,979,005
Richmond .....	8,176,240	9,763,012	792,968	1,287,274	2,323,634	2,631,218
	1,171,151,698	1,289,094,974	271,195,424	347,332,281	230,249,455	243,514,404
Increase .....		117,943,276		76,136,857		13,264,949

RESULTS IN MARSEILLES

When the city of Marseilles contracted with the Compagnie Générale Française de Tramways for the construction of a complete electrical transit system, the terms of the concession attracted considerable attention, as they provided for: First, 2-cent fares (10 centimes); second, an annual minimum payment to the city of \$19,300 plus 1 per cent of the annual receipts when such receipts should exceed \$1,930,000, this percentage to increase with each million of additional receipts until the total receipts would amount to \$2,316,000, at which time the city's share should remain stationary at 3 per cent; third, reversion to the state of all rights and full proprietorship as to tracks, wires, and other material occupying the public thoroughfares, at the expiration of the concessionary period of fifty years.

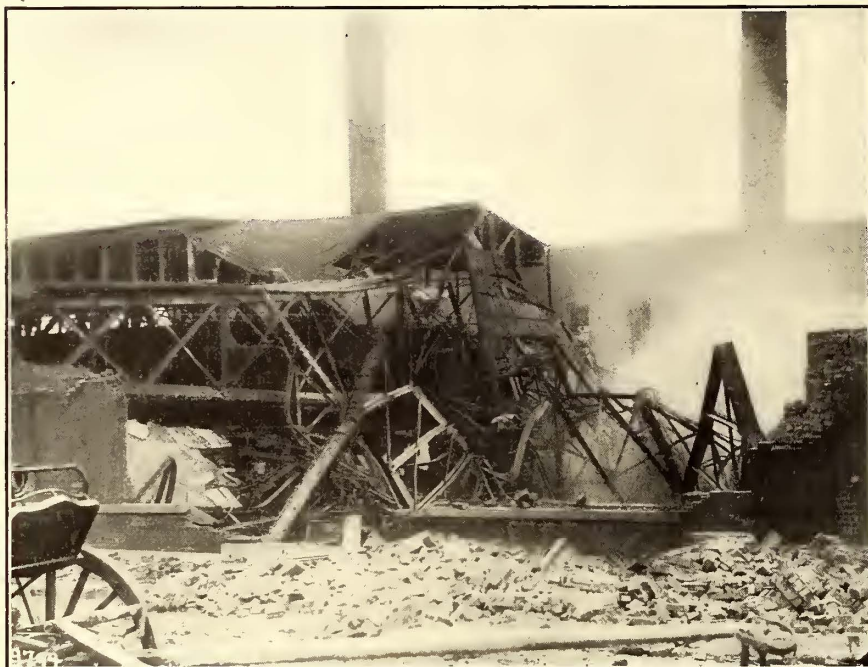
YEAR.	Length of Lines in Exploitation.	Number of Employees.	Mileage Traveled.	Number of Passengers.	Gross Receipts.
	Miles.				
1900.....	44.98	2,196	5,845,152	42,243,060	\$876,055
1901.....	50.39	2,125	6,730,243	48,581,585	1,019,539
1902.....	62.91	2,047	7,875,289	61,180,191	1,240,995
1903.....	64.70	1,763	8,387,623	64,605,692	1,317,869
1904.....	65.56	2,170	9,309,421	70,782,479	1,430,959
1905.....	73.00	2,400	10,664,306	77,176,908	1,550,183
1906.....	76.56	2,400	12,016,661	88,943,150	1,781,994

The company possesses similar concessions at Marseilles, Nancy, Havre, Orleans and Tunis, but the Marseilles system is by far the most important. The company, which was capitalized at \$4,825,000 in 1891, has now increased its capital to \$8,106,000, divided into 84,000 shares of \$96.50 each, and has also issued \$6,967,300 in 4 per cent bonds and \$205,641 in 3 per cent bonds. The 4 per cent bonds are now worth in the open market \$95.44 and the 3 per cent bonds \$81.44. The shares have paid interest regularly for the past seven years as follows: 1900, \$3.86; 1901, \$4.34; 1902, \$4.34; 1903, \$4.82; 1904, \$5.31; 1905, \$5.31, and 1906, \$5.31. There is now some talk of a \$5.79 dividend for 1907, but this is hardly likely. The shares are now quoted in the open market at \$123.52, which shows that the enterprise has been entirely satisfactory from the investors' point of view.

The results to the public have been these: The city enjoys the use of a street railway system which is probably as complete as any in Europe. The rolling stock is by no means as elegant as in many American cities, but the cars are substantially constructed and answer all practical purposes. The tracks reach out in every direction and converge into the heart of the business district. While no transfers are allowed, the fares are uniformly 2 cents, with the exception of one circular excursion route along the sea front, upon which 3 cents are collected. Very general use is made of the service and owing to the low fares cars are taken for distances so short that otherwise they would be covered on foot. Electricity replaced horse cars and omnibuses in 1900, but the new system was not completed until 1902. A table of statistics is published showing the length of the lines, number of employees, mileage traveled, number of passengers carried and the gross receipts since 1900, when the 2-cent service was partially inaugurated.

## INTERPOLE MOTORS FOR BOSTON

The Boston Elevated Railway Company, which has been a pioneer in so many departments of the transportation business, will be the first to employ on a large



A PICTURE TAKEN AT CLOSE RANGE, SHOWING THE DAMAGE DONE

scale interpole railway motors. The company has recently ordered from the General Electric Company 100 quadruple car equipments for its surface cars. Each car will be equipped with four GE 202 motors with type M control. Each motor is rated at 50 hp, and is designed to operate at 600 volts; is provided with interpole field windings, and is fitted with steel gear and pinion with a gearing ratio of 71:15. The armatures will be of the drum type with three turns per segment. The weight of each motor is 2700 lbs. These motors are purchased under three guarantees, namely, (1) that they shall commutate successfully in operation; (2) that they are to commutate successfully with a full-load current on a stand test at 750 volts; (3) that when running on the stand test at 750 volts they are to withstand interruption and reapplication of the full-load current without flashing over or serious arcing, the duration of the break to be 1 to 5 seconds.

The practical results in operation with these motors on the surface system in Boston will be watched with interest by electric railway engineers throughout the United States.

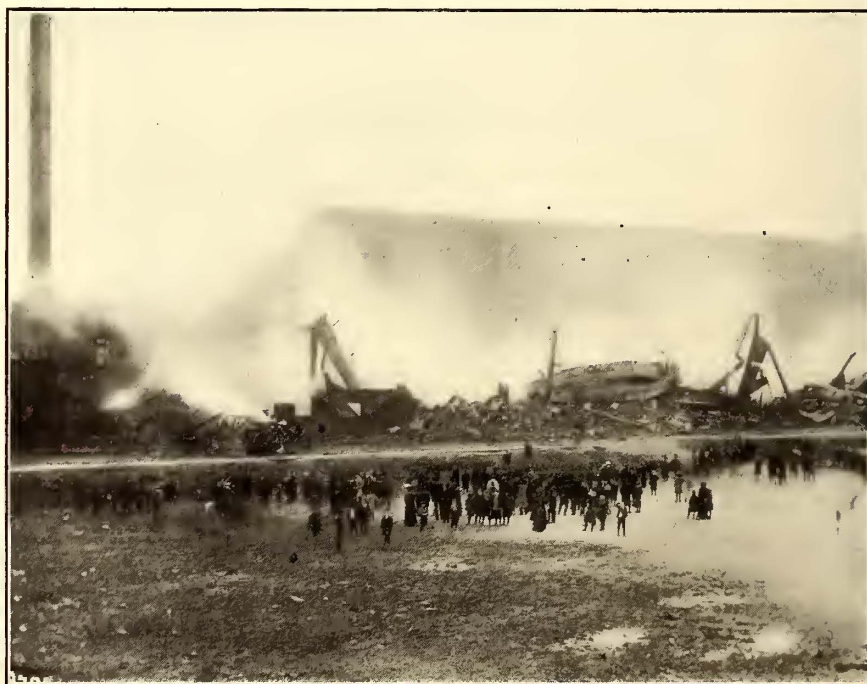
The new cars of the Ohio River Railway Company and the Youngstown & Ohio River Railway Company are being fitted with mail compartments.

## DISASTROUS CAR HOUSE FIRE IN NEW YORK

Fire, which broke out at 2 o'clock a. m., Monday, April 8, in the combined power and car houses of the New York Railway Company, at Seventh Avenue and 145th Street, completely destroyed the structure and its contents. The fire started in the end of the building used for the storage of cars at Lenox Avenue. In the Seventh Avenue end of the building was the power plant.

It was by far the most disastrous fire and heaviest loss the company has ever suffered. The north and west wings of the plant, which occupied the entire square block bounded by 145th and 146th Streets, Lenox and Seventh Avenues, with the exception of a strip 100 ft. deep on Seventh Avenue, are completely wrecked. General Manager Root, after a careful examination of the ruins, ordered the power plant shut down, and power was supplied from the company's other houses. Two large cracks were found in the north wall of the dynamo room, and it was feared that if the machinery was kept in motion it might cause the wall to collapse. The work of shoring the wall up with timbers was begun immediately after the flames were quenched.

Some of the records of the company were destroyed in the fire, but an inventory of the damage places the total loss to stock and building at \$1,500,000. So far



THE SITE OF THE FIRE IN NEW YORK AFTER THE WALLS FELL

as the company has been able to learn, a total of 317 cars was destroyed. Included among them were 156 box cars, 74 combination, 61 open, 14 sweepers and 5 plows. Seven miscellaneous freight and other cars also were burned.

The pictures show very clearly the havoc wrought by the flames, which spread with great rapidity. A particularly



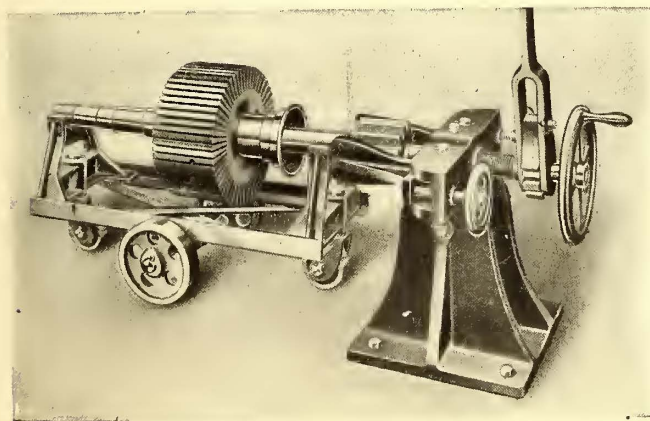
A VIEW OF THE DESTROYED NEW YORK CAR HOUSE BEFORE THE FIRE WAS OUT

distressing feature of the fire was the loss of a fire chief, who was buried in the ruins of a falling wall.

### AN EFFECTIVE PINION PULLER

The Columbia Machine Works & Malleable Iron Company, of Brooklyn, New York, has recently added to its long list of railway shop appliances a small but powerful pinion puller. This device was first shown at the Columbus convention of the American Street and Interurban Railway Association, where it created such a favorable impression that the manufacturer received quite a number of unsolicited orders before beginning to push the sale of this puller.

As shown in the accompanying cut, the mounted arma-



AUTOMATIC TRUCK AND PINION PULLER

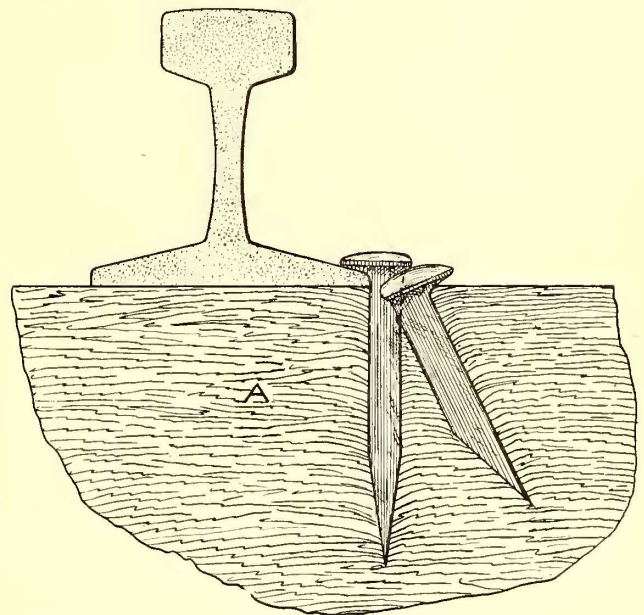
ture and pinion are brought to the machine on an armature buggy. The pinion is then arranged to come between a pair of grippers, each of which is controlled separately by a small hand wheel to permit adjustment for any size of pinion or wiping ring. Injury to the armature shaft center is prevented by the loose steel center of the screw shaft, which is adjusted by the large hand wheel. As soon as the pinion has been properly gripped a ratchet lever about 4 ft. 6 ins. long is applied on the main screw shaft by two men. The leverage thus secured approximates a pressure of 60 tons, which should be sufficient to remove any pinion within a minute.

In general, this tool is substantially built with due regard to the strains it must endure in service. The main screw is built of 2-in. steel with a 4-in. phosphor bronze nut as end bearing. The grippers and yoke are of crucible steel.

### THE SPIKE STRUT RAIL FASTENER

The Maryland Railway Supply Company, of Baltimore, has devised a new rail fastening called the spike strut, which consists of a spike with a recessed head and a bevel to permit it to take an angle when driven in the tie. Assuming that the rails have been laid to gage, this spike strut is placed in the tie about the width of a spike from the base of the rail, and is driven straight until the head is within an inch of the top, after which the bevel will cause the spike strut to take the proper angle. The regular track spike is then inserted through the recess in the strut and driven until the two heads come in contact. Upon this both heads are driven together until the track spike firmly overlaps the base of the rail. The spike strut should be placed on the outside of both rails and about three to the rail, on the inside.

It will be seen from the foregoing description that this strut is intended to fulfil the function of a tie-plate or rail brace. The maker asserts that it will keep the track to gage just as effectively for one-fourth the average cost of the plates or braces. The spike strut should hold the track absolutely to gage, because it shores up the head of the regular track spike. The tendency of the rail to move out-



SPIKE STRUT, SHOWING UP HEAD OF REGULAR RAIL SPIKE

ward under the wheel pressure causes the upper end of the rail spike, which overlaps the base of the rail, to tilt backward. This tendency naturally will work the spike loose in time and render it useless. In addition to this upward movement, the vertical pressure on the rail and tie simultaneously causes both to be depressed, but as the rail is more resilient than the tie, there results an upward pull on the spike head. The spike strut prevents the loosening of the spike as it holds up the spike head in the same manner as an inclined prop shores up the top of a post.

The application of a strut of this kind would seem particularly desirable on curves or at other points, such as rail joints, frogs and switches, where the track undergoes great strains.

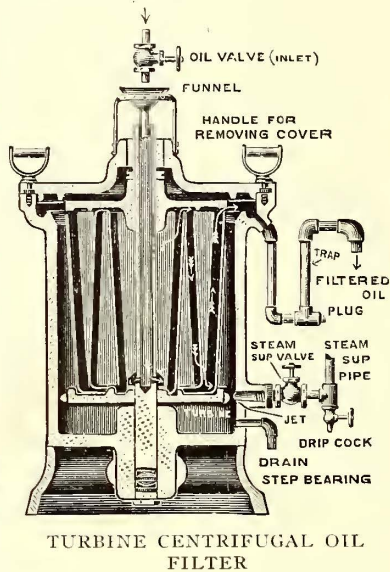
## A TURBINE CENTRIFUGAL OIL FILTER

The Oil & Waste Saving Machine Company, of Philadelphia, has brought out a novel centrifugal oil filter which is operated on the steam turbine principle and requires no care except to turn the steam on and off. The oil is run into the filter through the shaft of the turbine while in operation. It is then sprayed on to the filtering cloth and filter paper, which is revolved by the turbine. The centrifugal force carries the oil through the filtering materials over the cones to the outlet.

The oil continually passes through clean filtering material, because as soon as the filtering materials become dirty or dammed up at the point where the first material is exposed, or near the spray, it takes a new course through the clean filtering materials. This is a great

advantage over other filtering processes, as in them the filtering materials are all exposed at once to the dirt in the oil.

The filter can be taken apart in a few minutes and the filtering materials cleaned and reused continually excepting the paper through which the oil passes. This paper is so cheap it is hardly worth using again.

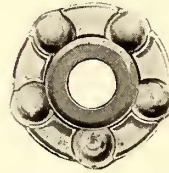


TURBINE CENTRIFUGAL OIL FILTER

Goldschmidt Thermit Company will be at No. 90 Wall Street, New York City.

## BALL BEARING SKATES WITH SPECIAL RETAINERS

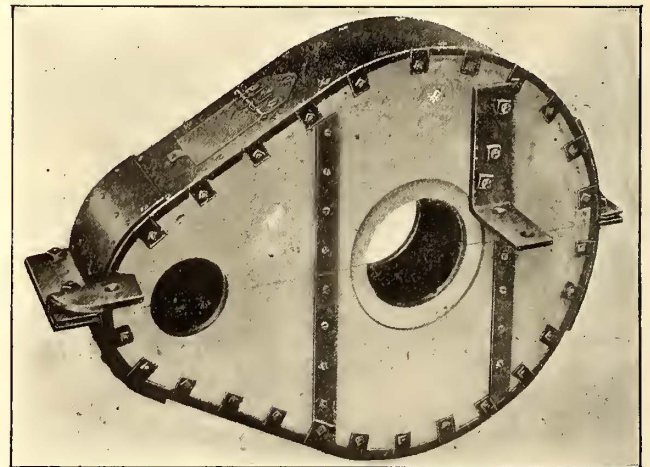
A line of roller skates intended primarily for rink use has been developed by Barney & Berry, of Springfield, Mass. In their design strength was the main consideration, and the frame is formed of two pieces of special cold-rolled sheet steel, so placed as to take the greatest strain edgewise. Top plates of special cold rolled steel in various forms are so attached to the plates as to give additional strength. A brace supports the end of the toe-plate and insures against weakness. The ball cups are of carbonized steel of special pattern, attached to the rolls, but readily removable. The balls, of  $\frac{1}{4}$  in., are set in a special retainer which increases their durability. In fact, the cones of carbonized steel to which the balls are connected by means of the retainers make a convenient self-contained outfit which outlives numerous rolls. There is no losing of balls with this arrangement; neither is there any need for frequent adjusting.



BALL-BEARING RETAINER

## COMBINATION STEEL AND WOOD GEAR CASE

As a manufacturer of a wide line of railway specialties, the Columbia Machine Works & Malleable Iron Company, of Brooklyn, N. Y., has kept in close touch with the experiences of many electric railways which have tried to lower their gear-case account by using either wood or combination cases. The result of this observation has led the company to design an exceptionally strong gear case. The body of the case is made of a light but strong, well-seasoned wood;



WOODEN GEAR CASE REINFORCED WITH IRON

## THERMIT WELDING FOR REPAIR WORK

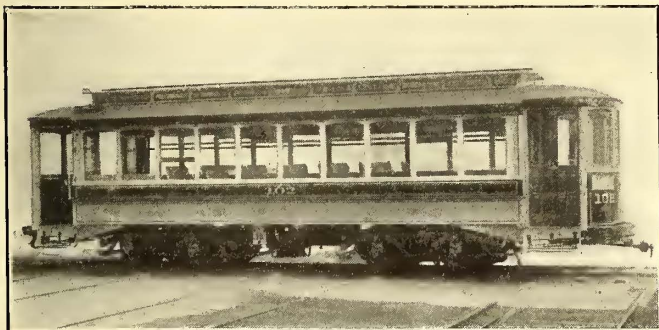
The Goldschmidt Thermit Company has recently issued a handsome pamphlet descriptive of its thermit welding process for repair work and other uses than rail welding. The first portion of the publication is devoted to the application of thermit to welding broken shafts, stern frames and propeller bearings of steamships. For this purpose the material has been extensively applied both abroad and in this country. Views are given of both before and after welding of broken parts of the steamships Frederick der Grosse, Sevilla, Apache and other ships to which the process has been applied. In all cases a very great saving of time over other methods was secured.

The concluding portion of the book relates to steam railroad repairs. Since the introduction of the process in this country it has been employed very extensively for welding broken locomotive frames and locomotive rods. Among the large railroad companies of the country which are using it for this purpose are the Atlantic Coast Line, Southern Pacific, New York, Ontario & Western, Central Railroad of New Jersey, Pere Marquette, Chesapeake & Ohio, Seaboard Air Line, Denver & Rio Grande, and Long Island Railroad. The book contains testimonials as to the value of thermit for repair work from superintendents of motive power or master mechanics of each of these companies, as well as views showing different stages of the work. The pamphlet also announces that after May 1 the New York office of the

the back, which conforms to the shape of the gear and pinion, is made from pressed sheet steel flanged over the edges, thus making the case dust, oil and water-tight. The connection between the flanging and the wood is supplemented by bolted side lugs in addition to the screws around the edge of the wood. The sides are stiffened by extra iron straps, while each end of the case carries an extra reinforcing plate as shown. The hangers are made of wrought iron and are attached to distribute the weight with the least strain to the case. Other features of this gear case are its horizontal division and the top door which permits easy access to, and lubrication of, the gears.

## SEMI-CONVERTIBLE CARS FOR ORANGE COUNTY TRACTION COMPANY

The Orange County Traction Company, at Newburg, N. Y., has received from the J. G. Brill Company some groove-less-post semi-convertible cars for operation on the inter-urban branch of the system connecting Newburg and Orange Lake Park, a distance of 6 miles. This park, while very well endowed by nature, has not heretofore been developed by the company to any great extent, but it is now the scene



EXTERIOR OF NEWBURG CAR

of considerable activity. Visitors there this summer will find a fine, commodious theater in connection with which some first-class engagements have been booked, and a number of other amusement features. The boating and bathing facilities, which have always been good, will be better than ever this year. During the winter the company made good use of the park by building a toboggan slide which carried "passengers" over a stretch of ice half a mile in length. The venture proved a great success, the sport being indulged in by thousands.

The car illustrated is one of the four double-truck cars which the traction company has just unloaded. The main exterior features are familiar to readers of the *STREET RAILWAY JOURNAL*. The window system permits of a seat 36 ins. in length and aisle space 22 ins. The rattan seats,



INTERIOR OF NEWBURG CAR

which are of Brill make, have corner grab handles and adjacent arm rests. The seats in the corners run longitudinally, each occupying the space of two windows. The lighting system calls for two rows of lights down the ceiling. The interiors are of cherry, ceilings of birch. In addition to these double-truck cars the company has received ten 20-ft. 8-in. cars mounted on single trucks of the 21-E

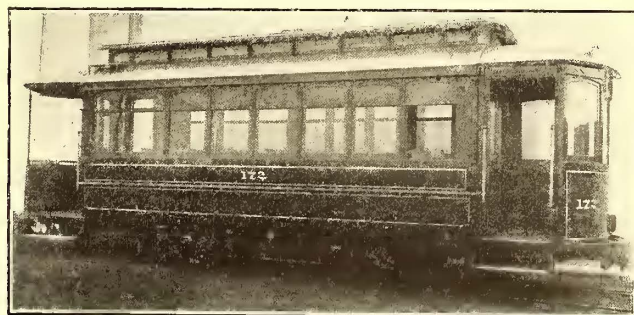
type. These are of precisely the same type as the larger cars, and the specifications called for the same finish and equipment. Thirty-eight cars in all are now operated. They include standard open and convertible cars in addition to the semi-convertibles. The chief dimensions of the double-truck cars follow: Length over end panels, 28 ft.; over crown pieces, 37 ft. 5 ins.; width over sills, including sheathing, 7 ft. 10½ ins.; size of side sills, 4 ins. x 7¾ ins.; end sills, 5¼ ins. x 6⅞ ins.; sill plates, 12 ins. x ¾ ins. The specialties of car builder common to both lots of cars are the sand boxes, angle-iron bumpers, gongs, signal bells, steps, etc.

## IMPROVED LAMP GUARD

W. N. Matthews & Bro., manufacturers of the hold-fast lamp guard illustrated on page 484 of the *STREET RAILWAY JOURNAL* for Sept. 29, 1906, have made an improvement in this guard by using No. 14 B. W. G. wire in the spiral to hold the lamp in place. This spiral holds the lamp flexibly and prevents it from being broken when it is hit against the wall or any other object. The manufacturers state that they are supplying these holders in large quantities to the Public Service Corporation, of Newark, N. J.; the International Railway Company, of Buffalo, N. Y.; the United Railways Company, of St. Louis, and several other important companies, who find this heavy-weight guard more serviceable than the standard weight formerly used.

## NEW CARS FOR WICHITA, KAN.

The Wichita Railroad & Light Company placed in operation a few weeks ago six new cars which were ordered from the American Car Company. The new cars, one of which is shown in the illustration, contain a new feature for Wichita in the way of "Detroit" platforms at the rear end; the front platforms are paneled around to the car body with windows at side of the drop sash type. The same window system is employed throughout the cars. The interiors are of cherry and contain Brill seats of rattan with push-over backs and corner grab handles; push buttons are placed at each post. The 21-E truck employed has a wheel base of 8 ft. Two



NEW DETROIT TYPE OF CAR FOR WICHITA

motors of 25-hp capacity each were installed on each car. A number of the car builders' specialties will be found on the cars, namely: sand boxes, gongs, signal bells, angle-iron bumpers, etc. The chief dimensions follow: Length over end panels, 20 ft. 8 ins.; over crown pieces, 31 ft. ½ in.; width over sills, including panels, 7 ft. 9½ ins.; over posts at belt, 8 ft. 2 ins. The framing consists of side sills 5 ins. x 3⅜ ins. with 3½-in. x ¾-in. x 6-in. angle iron; end sills, 3½ ins. x 8⅝ ins.; length of front platform, 4 ft. 8½ ins.; rear platform, 5 ft. 8 ins.

## LEGAL DEPARTMENT\*

## IMPUTED NEGLIGENCE

The Legal Department of this journal for April 2, 1904, contained an article on this topic, and the subject is now returned to because of a recent decision by the Supreme Judicial Court of Massachusetts in which the opinion minutely explains the duties and obligations of different parties concerned in a case where formerly the doctrine of imputed negligence was applicable. That doctrine was that when a person is riding in a vehicle driven by another and an accident occurs in whole or in part through the driver's fault, it is imputed to the passenger as contributory negligence, in like manner as if it had been his own act or omission. This was the principle of the old English case of *Thorogood vs. Bryan* (8 C. B., 115), and it may be said that it has now been almost universally repudiated by the courts of this country.

In *Schultz vs. Old Colony St. Ry.* (79 N. E. 873) the Massachusetts court radically and finally discarded *Thorogood vs. Bryan* as the law of that State, and formulated the status and responsibilities of all parties in the following language:

The rule fairly deducible from our own cases, and supported by the great weight of authority by courts of other jurisdictions, is that where an adult person, possessing all his faculties and personally in the exercise of that degree of care which common prudence requires under all the surrounding circumstances, is injured through the negligence of some third person and the concurring negligence of one with whom the plaintiff is riding as guest or companion, between whom and the plaintiff the relation of master and servant or principal and agent, or mutual responsibility in a common enterprise, does not in fact exist, the plaintiff being at the time in no position to exercise authority or control over the driver, then the negligence of the driver is not imputable to the injured person, but the latter is entitled to recover against the one but for whose wrong his injuries would not have been sustained. Disregarding the passenger's own due care, the test whether the negligence of the driver is to be imputed to the one riding depends upon the latter's control or right of control of the actions of the driver, so as to constitute in fact the relation of principal and agent or master and servant, or his voluntary, unconstrained, non-contractual surrender of all care for himself to the caution of the driver.

Applying this statement of the law to the present case, the result is that the plaintiff would not be entitled to recover if in the exercise of common prudence she ought to have given some warning to the driver of carelessness on his part which she observed or might have observed in exercising due care for her own safety, nor if she negligently abandoned the exercise of her own faculties and trusted entirely to the vigilance and care of the driver. She cannot hide behind the fact that another is driving the vehicle in which she is riding, and thus relieve herself of her own negligence. What degree of care she should have exercised in accepting the invitation to ride, or in observing and calling to the attention of the driver, perils unnoticed by him, depends upon the circumstances at the time of the injury. On the other hand, she would be permitted to recover if, in entering and continuing in the conveyance, she acted with reasonable caution, and had no ground to suspect incompetency and no cause to anticipate negligence on the part of the driver, and if the impending danger, although in part produced by the driver, was so sudden or of such a character as not to permit or require her to do any act for her own protection.

That a person being driven in his own vehicle by his own employee may be precluded from recovery against third persons by the imputation to him as contributory negligence of the servant's negligence was illustrated by a recent New York case (*Kerin vs. United Traction Co.*, 102 N. Y.

Supp., 423). It appeared that the plaintiff was injured while being driven by his servant by a car of the defendant coming from behind and striking the wagon. Although the Court charged the jury that the driver was the agent of the plaintiff and that if he (the driver) saw the approaching car his knowledge was imputable to the plaintiff, the Appellate Court held that error was committed in refusing further to charge that if the jury found that the driver saw the car approaching it was unimportant if the bell was not sounded. This ruling very decisively charges the master with any information or observation of the driver and with any neglect of the latter in not taking precautions thereby suggested.

The law is not settled as to the bearing of the negligence of the driver of a public hack or a vehicle hired from a livery stable, as between the passenger and the owner of the vehicle. There are cases holding that if the proprietor of a livery stable exercise due care in the selection of his drivers, he is exonerated from liability for any acts of negligence of which they may be guilty. It is believed that this is contrary to legitimate legal analogies, and the later cases seem to be tending toward the logical view that the servant of a livery stable keeper is on a par with the servant of anybody else; that the rule *respondet superior* applies and therefore a passenger may recover against the proprietor for injuries received through the driver's negligence. Such doctrine has recently been aided by holding the owner of an automobile responsible for negligence of his chauffeur through which the plaintiff, a guest of the hirers of the vehicle, with its operator, was injured. (*Routledge vs. Rambler Automobile Co.* [Texas], 95 S. W., 749.) No good reason can be assigned for the distinction between the chauffeur of an automobile and the driver of horses hired out, with a wagon, from the owner of a livery stable. Certainly the negligence of a chauffeur or driver of a hired vehicle, who was not especially designated or selected by a passenger, cannot be imputed to the passenger as contributory negligence in a suit by him against a street car company for its negligence which in part caused a collision. (*Cotton vs. Willmore, etc. Ry. Co.* [Minnesota], 109 N. W. 835.)

## CHARTERS, ORDINANCES, FRANCHISES, EJECTMENTS, ETC.

ARKANSAS.—Action—Misjoinder of Causes of Action—Eminent Domain—Compensation—Parties to be Compensated—Lessees—Torts—Joint Tort-Feasors—Rights of Tenant—Damages—Consequences Avoidable by Care of Person Injured.

1. Where a complaint alleged that plaintiff was in the possession of certain lands as tenant, and that defendant railroad company acquired a right of way over the lands without plaintiff's consent, and that another defendant, under a contract with the railroad for the construction of the road, entered upon the land and destroyed a portion of plaintiff's crop, there was no misjoinder of causes of action, as the action was not brought in part for damages for taking a right of way, but against defendants as joint tort-feasors for the destruction of the crops.

2. A railroad company, on receiving a deed for a right of way, has no right to enter upon the land until a tenant thereof has been compensated.

3. Where a railroad company, after obtaining a deed to a right of way, directed the one who had the contract for constructing the road to enter on the land without compensation having been made to a tenant thereof, it was liable to the tenant for damages to his crops, etc., as a joint tort-feasor.

4. Where a railroad company obtained a deed to a right of way from a landowner, and filed it for record, a tenant of the land who had not been compensated was entitled to damages, though he planted his crops on the right of way after the filing of the deed.

5. Where one having a contract for the construction of a road committed a trespass on entering on plaintiff's lands and letting down fences, whereby cattle entered and destroyed crops, plaintiff could recover only such damages as he could not have averted by reasonable exertions.—*Ft. Smith Suburban Ry. Co. et al. vs. Maledon*, 95 S. W. Rep., 472.)

\* Conducted by Wilbur Larremore, of the New York Bar, 32 Nassau Street, New York, to whom all correspondence concerning this department should be addressed.



CONNECTICUT. — Carriers — Defective Transfer Ticket — Right of Passenger—Expulsion of Passenger—Justification—Regulations—Reasonableness.

1. A passenger who is aboard a street car without a proper transfer ticket due to the negligence of the conductor of the car from which he was transferred is entitled to sue for breach of contract for failure to furnish a proper ticket and recover the loss necessarily following therefrom, but he cannot refuse to pay his fare, and to forcibly resist being expelled from the car, and where he does so, and no more force is used than necessary to remove him from the car, he can only recover nominal damages.

2. Where a passenger is aboard a street car, the conductor in charge thereof may refuse to accept the passenger's explanation of the mistake of a conductor in charge of the car from which he was transferred in giving him an erroneous transfer ticket, and require him to pay his fare or leave the car, and after the demands made by the conductor it is the duty of the passenger to either pay the fare or peaceably leave the car.

3. A rule requiring the expulsion from a car of a passenger who refuses to either pay his fare or produce a proper transfer ticket showing his right to ride on the car is a reasonable one.—(Norton vs. Consolidated Ry. Co., 63 Atl. Rep., 1087.)

KENTUCKY. — Trial — Opening and Closing — Burden of Proof—Appeal—Waiver of Objections—Instructions—Carriers—Passengers on Street Car—Right to be Carried to Destination.

1. Under Civ. Code Prac. Sec. 526, declaring the burden of proof to be on the party who would be defeated if no evidence were given, plaintiff has the burden, and consequently the opening and closing; the petition alleging he was a passenger on defendant's street car, had paid his fare to the end of the line, and was, without fault on his part, wantonly assaulted and ejected by those in charge of the car, and the answer denying every allegation of the petition, except that it admitted his ejection, and pleading that the conductor, in striking him, acted only in self-defense; as, if plaintiff was not a passenger, he might be ejected, no more force than necessary being used.

2. One may not complain of the giving of an instruction where the same view is presented in an instruction given at its request.

3. While a street railway company is not obliged to run its cars so as to make a continuous passage, a passenger may not be put off before his destination on the line is reached, without a transfer being furnished, the company's franchise authorizing it to charge only one fare from one part of the city to another, merely because it is desired to send the car for a crowd, which is waiting to get into the center of the city.—Frankfort & Versailles Traction Co. vs. Marshall, 98 S. W. Rep., 1035.)

MICHIGAN.—Highways—Abatement—Estoppel—Parties Who May be Estopped.

1. Comp. Laws, Sec. 433, provides that the Circuit Court of Chancery shall have jurisdiction to determine all cases of encroachments on public highways. Sections 4121-4126 point out proceedings at law to be taken for the removal of any encroachment on a highway. Held that, where a street railroad company laid its tracks in a highway without obtaining authority from the township, as required by the statute, the township was entitled to maintain a bill in chancery to compel the removal of the tracks as a nuisance.

2. The fact that township officers made no objection to the laying of the tracks of a street railway in a highway, though no authority had been obtained as required by the statute, did not estop the township from maintaining proceedings to compel the removal of the tracks.—(Bangor Tp. et al. vs. Bay City Traction & Electric Co., 110 N. W. Rep., 490.)

MISSOURI.—False Imprisonment—Arrest of Passenger—Authority of Servant—Trial—Instructions—Assumptions as to Fact—Carriers—Injuries to Passenger—Action—Separate Causes of Action—Damages—Punitive Damages—Question for Jury—Assault—Civil Action—Damages—Pain and Mental Anguish—Ejection of Passenger—Duty of Carrier—Applicability to Evidence.

1. A street railway company is liable for the arrest of a passenger caused by its road officer, who was the superior officer of the conductor of the car on which the passenger was arrested, and had the right to take charge of the car at any point on the road.

2. In an action for ejection and arrest of a passenger, an in-

struction directing an award of damages if the alleged acts subjected the plaintiff to pain was not objectionable as assuming that plaintiff suffered pain.

3. Evidence that a road officer of a street railroad company threatened a passenger with the controller handle of the car, and that the passenger was forcibly removed from a seat near the front of the car to the back platform, was sufficient to justify an instruction as to the company's liability if its servants threatened and put the plaintiff in peril of his life, and of great bodily harm, and compelled him to leave the car.

4. The arrest of a passenger at the request of the road officer of a street railway company, following his assault and ejection from the car by the servants of the company, constituted a separate cause of action from the assault and ejection.

5. In an action for ejection of a passenger from a car, an instruction that the jury "should" find exemplary damages if they found the objection willful, was erroneous, the question of exemplary damages being wholly for the jury.

6. Where plaintiff's evidence tended to show that an assault on him was accompanied by circumstances of malice and oppression, and that his life or great bodily harm was threatened, it was proper to submit to the jury the element of pain and mental anguish in estimating his damages, though he suffered no physical injury.

7. Where a street car passenger paid his fare and received a transfer, and on boarding another car presented the transfer un-mutilated, entitling him to ride as a passenger to his destination, the carrier and its servants were bound to safely carry him to his destination if they could do so by the exercise of the high degree of care of careful railroad employees under the same or like circumstances.

8. In an action for ejection and arrest of a passenger, the modification of a requested instruction that the plaintiff must show by a preponderance of the evidence that the carrier had expressly authorized its agent or agents to cause the arrest, by adding the words "or impliedly" after the word "expressly" was not prejudicial to the carrier.

9. Where a passenger presents a transfer entitling him to passage, which is refused, and on his refusal to pay fare he is ejected from the car, he is not limited to a recovery of the amount of the fare demanded, but is entitled to have considered as an element of damages his shame and mortification from a public expulsion from the car.

10. In an action for ejection of a passenger on refusal to pay fare, an instruction that, if he refused to pay the fare demanded for the purpose of being put off, that he might make the expulsion the basis of a suit for damages, he could not recover anything more than actual compensatory damages for his loss of time, was properly refused where there was no evidence to support it aside from the suspicion of the carrier's road officer.—(Carmody vs. St. Louis Transit Co., 99 S. W. Rep., 495.)

NEW JERSEY.—Street Railways—Location of Road—Erection of Poles—Remedy of Landowner.

1. When a trolley company has laid down its railway in the streets of a city, and has obtained by petition from the governing body an ordinance granting such a right and fixing the route of the road and the places where the poles are to be located according to a map accompanying said petition, pursuant to the street railway act of April 21, 1906, it cannot afterwards lawfully place or erect its poles at places in the street different from those so designated.

2. If it locate one of its said poles in the street at a place upon land not thus fixed and designated, and without the authority of the owner of the fee thereof, it becomes a trespasser, and the owner may have relief by an action of ejectment to recover possession of the land thus occupied by the pole, such possession to be afterwards held subject to the public easement. (Moore et al vs. Camden & T. Ry. Co., 64 Atl. Rep., 116.)

NEW JERSEY — Eminent Domain—Remedies of Property Owners — Injunction — Jurisdiction—Legal Right of Complainant — Evidence — Sufficiency — Elevated Railroads — Grounds for Injunction.

1. Equity has no jurisdiction of a suit by an owner of property in a block through which an elevated railroad was about to be constructed, crossing and vacating a street on which complainant's property abutted, to enjoin its construction, unless complainant, by the undisputed facts of the case, and according to the established law of the State, established his legal private right in that part of the street which would be vacated by the construction of the road.

2. In a suit to enjoin the construction of an elevated railway, and the vacation of a certain street therefor, the fact that the legal right on which complainant founded his claim was wholly settled was not shown, where it did not appear that his predecessor in title purchased by reference to the street, the vacation of which was sought to be enjoined, at any time prior to its becoming a public street, though it was alleged that complainant's predecessor in title and the other owners on that street widened it, by vacating 10 ft. of their respective fronts, thus making the several properties more valuable, and increasing the price the complainant was obliged to pay for his property.

3. Nothing short of threatened destruction of property of great value, by acts of wanton lawlessness, inflicting injuries which, if not prevented, must result in irreparable damages, will justify the granting of an injunction staying an important public work, such as the construction of an elevated railroad and the vacation of a street therefor. (*Roberts vs. West Jersey & S. Ry. Co.*, 65 Atl. Rep., 460.)

#### NEW YORK — Carriers — Street Railroads — Regulation — Fares — Leased Lines — Continuous Passage.

Laws 1890, p. 1113, c. 565, art. 4, entitled "Street Surface Railroads," Sec. 101, provides that "no corporation constructing and operating a railroad under the provisions of this article or of chapter 252, page 309, of the Laws of 1884" (relating to street surface roads) shall charge any passenger more than 5 cents for one continuous ride from any point on its road, or on any road, line, or branch operated by it, or under its control, to any other point thereof, or any connecting branch thereof within the limits of any incorporated city, or more than one fare within the limits of any such city for passage over its main line and any branch or extension thereof, if the right to construct such branch or extension was acquired under the provisions of such chapter or this article. Section 104 requires the issuance of transfers to any point on any railroad operated by it. Held, that a road incorporated as a street surface railroad which leases and operates connecting elevated and steam surface railroads does so under article 3, Sec. 78, which applies to all railroads, and it may charge more than one fare for a continuous passage over its road and the elevated and steam surface roads, as it operates such roads under their respective charters, and its right in this respect is not changed by changing its motive power from steam to electricity.—*People vs. Brooklyn Heights Ry. Co.*, 79 N. E. Rep., 838.)

#### NEW YORK — Eminent Domain—Elevated Railroads—Remedies of Abutting Owners — Condemnation Proceedings — Easements.

1. The defendant erected in 1894, in good faith but without legislative authority or municipal consent, and has since maintained and operated without such authority or consent, a third elevated railway track in front of plaintiff's premises, involving a substantial depreciation in the value of her property. It was shown that defendant had spent over \$800,000 in acquiring the easements of abutting owners along the line of the third track, and that the third track constitutes a great public benefit. Held, that plaintiff had not the absolute right to compel defendant to remove the third track, and that the Appellate Division properly exercised its discretion, when it awarded plaintiff a money judgment and an injunction against the maintenance or using of the third track in front of her premises, unless within sixty days defendant should pay the sum awarded.

2. Where the defendant constructed a third track without legislative authority, it could not institute condemnation proceedings to acquire property rights, but it might be considered as a corporation acting in good faith, acquiring easements in aid of the construction of its track by entering into contracts with abutting owners. (*Knoth vs. Manhattan Ry. Co.*, 79 N. E. Rep., 1015.)

#### NEW YORK — Eminent Domain — Appropriating Land for Canal—Injunction—Right of Lessee Against Trespasser.

1. Laws 1903, p. 337, c. 147, Sec. 4, provides that the State engineer may enter on and take possession of and use lands the appropriation of which, for improvement of State canals, shall in his judgment be necessary; that he shall make a survey and map of such lands, and certify that they have been appropriated for such use; that the map, survey, and certificate shall be filed in his office, and duplicates in the office of the superintendent of public works; that such superintendent shall then serve on the owner of the land so appropriated notice of such filing; that from the time of the service of such notice the entry on and

appropriation by the State of such land for such improvement shall be deemed complete, and such notice shall be conclusive evidence of such entry and appropriation; and that the Court of Claims shall have jurisdiction to determine the amount of compensation for the land appropriated. Held, that the filing of the map, survey, and certificate, and the giving of such notice, are essential for an appropriation which will authorize the land to be entered on and used for the canal.

2. The lessee of the structures, rights, and franchises of a street railroad, being liable to the lessor for injury thereof, may, even if his interest be only personality, maintain injunction against an unauthorized entry on the land and injury of the structures. (*United Traction Co. vs. Ferguson Contracting Co. et al.*, 102 N. Y. Sup., 190.)

#### NEW YORK — Railroads—Right of Way—Use of Highways—Terms of Grant—Condition as to Bond—Waiver.

1. Heydecker's Gen. Laws, p. 3312, c. 39, Sec. 93, provides that the local authorities may make their consent to the building of a railroad depend on any conditions respecting security suitable to secure the construction "of the railroad within any time not exceeding the period prescribed in this article." Held, that the provision applies to towns and villages, and local authorities may impose a shorter term for the construction of a road upon a street than that provided by the general law, and may require a bond as a condition precedent, and on failure to comply with such condition may grant the right to build on the street to another road.

2. The resolution of highway commissioners extending the time for the construction on a railroad on a street is not a waiver of a provision in the original franchise requiring the giving of a bond. (*South Shore Traction Co. vs. Town of Brookhaven et al.*, 102 N. Y., Sup. 75.)

#### OHIO.—Street Railway—Franchise — Construction — Term — Title to Property After Expiration of Franchise—Constitutional Law—Due Process of Law.

1. Municipal grants of street railway franchises must be strictly construed.

2. Municipal ordinances extending the life of the franchise of the Euclid Avenue or main line of the Cleveland street railway system will not be construed as applicable to a road with a separate route and a different term of life, known as the Garden Street branch, on the theory that the latter road became a part of the main line because it was permitted to run in connection with such main line, and to use a portion of that line to reach a public square.

3. The words "main line" in municipal ordinances granting respectively the right to construct a small extension to the Garden Street branch of the Cleveland street railway system and the right to lay a second track on a portion of that branch, to terminate with the expiration of the grant for the main line, must be deemed to refer to the rest of the Garden Street branch, and not to the Euclid Avenue line.

4. A street railway franchise made to terminate with the grant to the main line is to be measured by the grant as it then exists, and not by any subsequent extension of the term which may be granted.

5. A grant of a street railway franchise by the Cleveland Common Council, to be valid "until the expiration of the grants for said company's tracks on said Quincy Street east of Lincoln Avenue, to wit: July 13, 1913,"—is not a grant extending to that date, where the Quincy Street grants were then in fact to terminate at an earlier date.

6. An extension of the time for the termination of the franchise of the Garden Street branch of the Cleveland street railway system to the date set for the termination of the Euclid Avenue or main line was not effected by a municipal ordinance consenting to a consolidation of several street railroads, including the Euclid Avenue and Garden Street lines, on condition that but one fare should be charged for a continuous ride.

7. The title to the rails, poles, and other appliances for operating the Garden Street branch of the Cleveland street railway system remaining in the various streets at the expiration of its franchise is in the railway company which has been operating the road.

8. The right to take possession of the property of a street railway company remaining in the streets at the expiration of its franchise cannot, consistently with due process of law, be conferred by municipal ordinance upon another street railway company. (*Cleveland Electric Railway Company, Appt., vs. City of Cleveland and Forest City Railway Company*, 197; *City*

of Cleveland and Forest City Railway Company, Appls., vs. Cleveland Electric Railway Company, 321; 27 Cup. Ct. Rep., 202.)

TEXAS—Carriers — Street Railroads — Conductors — Insulting Conduct — Pleading — Issues and Proof — Evidence — Appeal — Bill of Exceptions — Rulings on Evidence — Review — Exclusion of Evidence — Prejudice — Trial—Legal Decisions — Reading to Court — Presence of Jury—Knowledge of Custom — Misconduct of Counsel — Argument — Instructions — Negligence.

1. Where a street car conductor was guilty of insulting conduct toward a passenger while engaged in operating the car in the furtherance of the street car company's business, it was liable therefor.

2. Where, in an action against a street car company for insulting conduct by one of defendant's conductors toward plaintiff, the petition attempted to allege a number of circumstances, each forming part of a series of insults offered by the conductor to plaintiff, an allegation that the conductor failed and refused to stop the car at a certain point to allow plaintiff to alight in accordance with her request was proper, as part of the conductor's misconduct.

3. Where, in an action for insulting conduct offered by a street car conductor toward plaintiff, a passenger, the petition alleged that a certain conversation occurred between plaintiff and the conductor, evidence as to such conversation, which occurred between the conductor and another passenger, was inadmissible.

4. In an action for insulting conduct offered by a street car conductor toward plaintiff, a passenger, it was proper to permit proof of the presence of others on the car at the time.

5. In an action for alleged insulting conduct by a street car conductor toward plaintiff, evidence that the conductor was standing in the presence of negroes on the platform at the time it was claimed the insulting remarks were made by him was admissible though not pleaded.

6. Where the bill of exceptions failed to disclose the objections made to the evidence in question, the rulings could not be considered on appeal.

7. Where, in an action for insults offered to plaintiff by defendant's street car conductor, the conductor testified that he did not know that a certain sign "For Negroes," which was the cause of the altercation, had been moved by the passengers; that he was not angry when he returned the sign to its usual place, and that he told plaintiff and her companions that he had no intention to insult them, defendant was not prejudiced by the exclusion of a question as to what the conductor's intentions were toward plaintiff and her companions when he moved the sign in front of them.

8. In an action for injuries, it was improper for the court to permit plaintiff's counsel to read from decisions in similar cases in the presence of the jury, ostensibly for the purpose of arguing the law to the court but in fact for the benefit of the jury.

9. Where, in an action for alleged insults to passengers on a street car, growing out of plaintiff's change of a negro sign in the car, it appeared that defendant had no rule governing the placing of such signs in the cars, and certain conductors offered as witnesses stated that they did not know what the general custom was, such witnesses were incompetent to testify as to the customary location of the signs in the cars.

10. In an action against a street car company for insults offered by one of its conductors to certain lady passengers, it was improper for plaintiff's counsel to argue to the jury that the conductor was a Northern man and that the ladies were from the South.

11. In an action for damages, it was error for plaintiff's counsel to state to the jury that a member of the Court of Civil Appeals would approve a verdict in double the amount sued for because he was a Confederate soldier.

12. In an action for insults to a female passenger on a street car by the conductor of the car, an instruction that plaintiff and her companions willfully insulted the conductor, and such insults provoked the acts and language of the conductor, such fact might be considered in mitigation of damages, was promptly refused for failure to confine the matter to language or conduct of the conductor which arose from insults first given to him by the passengers which was in immediate response to such insults.

13. The gist of an action against a street car company for insults offered by a conductor to a female passenger is the wrongful act of the conductor independent of negligence.—(San Antonio Traction Co. vs. Lambkin, 99 S. W. Rep., 574.)

## LIABILITY FOR NEGLIGENCE.

ALABAMA.—Carriers—Existence of Relation of Carrier and Passenger—Pleading—Wanton Injury—Appeal—Review—Discretion—Competency of Young Witness—Trial—Motion to Exclude Evidence—Damages—Right to Punitive Damages—Instructions.

1. A complaint, aside from its express averment that plaintiff and her children were defendant's passengers, and that it was its duty to carry them on its car from G. to B., shows such relation by the allegations that defendant was a common carrier of passengers by means of an electric car running from G. to B.; that plaintiff, with her children with her, was at G., at the proper place used by defendant for receiving passengers on the car, for the purpose of boarding said car and being carried thereon as defendant's passengers from G. to B.; that the car stopped at said place for the purpose of receiving passengers, but that she did not board it by reason of the servant in charge of the car negligently failing to allow her a reasonable time or opportunity to do so.

2. The averment of the complaint that defendant's servant, in charge of its car, while acting in the line and scope of his authority as such servant, wantonly or intentionally prevented plaintiff from boarding said car as aforesaid, and thereby wantonly or intentionally caused plaintiff to suffer said injuries, it being theretofore alleged that said servant failed to allow plaintiff a reasonable time or opportunity to board said car, is sufficient as against a demurrer that it does not show that the injury was wantonly or unintentionally inflicted.

3. The discretion in holding competent a witness of tender years is not reviewable, unless it clearly appears that it was improperly exercised.

4. A motion to exclude relevant evidence introduced by plaintiff is too late; there having been no objection to the questions or answers, and not having been made till the close of defendant's evidence.

5. An instruction authorizing punitive damages if a thing was done "negligently, intentionally, or wantonly" is erroneous; such damages not being recoverable for simple negligence.—(Birmingham Ry., Light & Power Co. vs. Wise, 42 C. Rep., 821.)

ALABAMA. — Negligence — Actions — Pleadings — Characterization of Act—Willful or Wanton Injury—Appeal—Harmless Error—Erroneous Ruling on Demurrer—Trial—Instructions—Withdrawal of Evidence—Street Railroads—Collisions—Actions—Defenses—Care Required of Company—Instructions—Evidence to Sustain—Assumption of Fact—Injuries to Traveler—Contributory Negligence—Applicability to Pleadings.

1. A complaint, in an action against a street railway company for injuries in a collision with a car, which alleges that the company's servants, while running a car "recklessly and wantonly or intentionally," ran it against the wagon on which plaintiff was driving, is not demurrable on the grounds that it is uncertain whether simple or wanton negligence is charged and that it joins disjunctively in the same count simple negligence and wanton negligence.

2. Where, in an action against a street railway company for injuries in a collision with a car, the evidence without conflict showed that there was no defect in the car or its equipment, the error in sustaining a demurrer to the complaint, alleging negligence in failing to properly equip the car, was harmless.

3. An instruction, in an action against a street railway company for injuries in a collision with a car, that, if plaintiff was guilty of negligence that contributed approximately to the injury, he could not recover unless the company was guilty of subsequent negligence that proximately contributed to the injury, was erroneous, as premitting reference to willfulness or wantonness on the part of the company, charged in the complaint.

4. A plea, in an action against a street railway company for injuries in a collision with a car, which alleges that plaintiff was guilty of negligence contributing to the injury, in that he was riding in a covered wagon and attempted to cross the track in front of an approaching car without stopping, looking, and listening for the approach of the car, is not demurrable on the ground that it alleges that plaintiff did not stop, look, and listen, whereas, the law does not require him to listen, in addition to stopping and looking, unless the circumstances at the time and place make stopping and looking ineffective, which is not shown.

5. An instruction, in an action against a street railway com-

pany for injuries in a collision with a car, that it was the duty of the motorman to keep such control of his car so to be able to bring it to a safe stop before striking one in the act of crossing the track, was properly refused, because imposing on the motorman the duty of stopping his car, without regard to the suddenness with which a person came on the track.

6. Where, in an action against a street railway company for injuries in a collision with a car, there was no evidence that, after the wagon which plaintiff was driving was on the track, there was time to do anything which could have checked the speed of the car more than it was checked, an instruction that, if the motorman saw the danger in time to avoid the injury by reducing the rate of speed of the car, plaintiff was entitled to recover, was properly refused, because misleading.

7. An instruction that a party, admitting the written showing as to what an absent witness would testify, if present, does not admit thereby that the written showing is true, is properly refused, as leading the jury to believe that they were not to consider the written showing.

8. Where, in an action against a street railway company for injuries in a collision with a car, the evidence as to whether or not the car came in contact with plaintiff was in conflict, an instruction which assumed that the car injured plaintiff was properly refused.

9. An instruction, in an action against a street railway company for injuries in a collision with a car, that the company is seeking to escape liability for injuries alleged to have been negligently inflicted by setting up contributory negligence, is properly refused, as assuming that there was a liability on the company which it was attempting to escape.

10. Where, in an action against a street railway company for injuries in a collision with a car, it was, under the evidence, for the jury to determine whether the motorman saw that plaintiff was about to cross the track and whether the motorman's failure thereafter to stop the car was willful or wanton, it was error to charge that there was no evidence of any willful intent to injure plaintiff.

11. Where a traveler, injured in a collision with a street car, was guilty of contributory negligence, the company was liable only on proof showing either that it was guilty of willful or wanton conduct or of negligence after discovering the peril of the traveler.

12. An instruction, in an action against a street railway company for injuries in a collision, which does not follow the description of the willfulness complained of in the pleadings, is erroneous.—(Garth vs. North Alabama Traction Co., 42 S. Rep., 627.)

ARKANSAS.—Street Railroads—Actions for Injuries—Persons on Track—Question for Jury—Liability for Injuries—Trial — Argument of Counsel — Statements not Within Issues.

1. Where, in an action for injuries inflicted by a street car striking plaintiff, there was conflicting testimony as to whether or not plaintiff could have avoided the collision, the issue as to his negligence should have been submitted to the jury.

2. Where one received injuries by being struck by a street car through his own negligence, he cannot recover, unless the motorman in charge of the car discovers plaintiff's peril in time to prevent injury and negligently fails to do so.

3. In an action for injuries to plaintiff by collision with a street car, it was reversible error to overrule an objection to a statement by plaintiff's counsel in his closing argument that defendant was liable because it permitted an inexperienced motorman to operate the car, where there was testimony tending to show that another motorman was in charge of the car, that he was experienced, and that the two motormen reversed the car and applied the brake quicker than one could have done it; and the main issue submitted to the jury was whether proper effort had been made to stop the car after discovering plaintiff's peril.—(Ft. Smith Light & Traction Co. vs. Flint, 99 S. W. Rep., 79.)

CONNECTICUT. — Evidence — Production of Documents — Statutes—Trial—Instruction—Credibility of Witnesses—Invading Province of Jury.

1. Gen. St. 1902, Sec. 710, providing that a party to a civil action may compel the adverse party to testify as a witness in his behalf, subject to the rules governing other witnesses, places parties on the same footing as others in respect to their duty to become witnesses, makes them subject to the proceedings for

obtaining the benefit of evidence witnesses may have in their possession, and authorizes the court on a trial, on motion of a party, to order the adverse party or his counsel to produce to the court, for such use in the progress of the trial as it may authorize, any document claimed to be relevant which is then in court and in the possession of the person to whom the order is addressed.

2. In an action against a street railway company for injuries to a passenger, the conductor, on cross-examination, testified that he had made a report of the accident to the company. Thereupon plaintiff's counsel turned to defendant's counsel and asked, "Will you let me have it?" The answer was, "No, sir." The court then said, "I think you should supply it." Exception was then taken. The report was produced and by plaintiff offered the evidence without further objection. Held, that the order to produce the report was subject to the safeguards of defendant's rights, and on defendant complying therewith, without further objection, it waived any rights in that regard which it might have asserted.

3. The power of the court to compel the production of a document on a trial in possession of a party thereto is not regulated by Gen. St. 1902, Sec. 732, authorizing the filing of a motion praying for the production of papers within the possession of the adverse party, but the right arises from the inherent power of courts in connection with Sec. 710, authorizing a party to compel the adverse party to testify as a witness in his behalf.

4. The question presented to the court in an action against a street railway company for injuries to a passenger on plaintiff requesting the adverse party to produce the report of the accident made by the conductor to the company is not as to the admissibility of the report, but as to plaintiff's ability through the intervention of the court to obtain possession of the report for evidential use.

5. Where a boy nine years old, testifying with respect to an accident occurring a year before, stated that he had talked the matter over with his mother, that she had told him what happened at the time of the accident, and what he saw, an instruction directing the jury to give such weight to the testimony of the boy as in their judgment it was worth, and that they should recall his youth and liability to repeat what he had heard if he had been talked to, was not erroneous as invading the province of the jury.—(Banks vs. Connecticut Ry. & Lighting Co., 64 Atl. Rep., 14.)

DELAWARE.—Street Railways—Injuries to Pedestrians—Negligence—Contributory Negligence.

1. Where, in an action for the death of plaintiff's intestate in a collision with a street car, there was uncontradicted evidence by two of plaintiff's witnesses that the motorman, as soon as he discovered intestate in a dangerous position, applied the brake and did all that he could to stop the car and avoid injuring intestate, there was no sufficient evidence of negligence, though it also appeared that the car was not stopped within a distance certain expert witnesses testified it could have been stopped.

2. Where intestate deliberately stepped in front of defendant's street car when it was very close to him, running at a moderate speed, and after the gong had been sounded in due time, and the interval between his stepping on the track and the time he was struck was very brief, his negligence was part of a continuous transaction that terminated in his death, and precluded a recovery.—(Davis vs. People's Ry. Co., 64 Atl. Rep., 70.)

INDIANA. — Appeal — Verdict — Conclusiveness — Carriers—Passengers—Failure to Pay Fare—Effect.

1. The Supreme Court will not disturb a verdict merely on the weight of the evidence, and it is only when there is no evidence on a material point that the court can interfere on the ground of the insufficiency of the evidence.

2. A street railway company offered the free use of three of its cars to take members of a women's convention for a ride about the city. The offer was accepted, and during the progress of the ride a collision occurred between two of the cars, by which one of the women was injured. The cars were operated by regular employees of the company. Held, that the women were passengers, and the one injured was entitled to recover on showing that the collision was occasioned by the negligence of the employees in charge of the car; there being no contract relieving the company of risk of personal injury from the negligence of its employees.—(Indianapolis Traction & Terminal Co. vs. Klentschy, 79 N. E. Rep., 908.)

## FINANCIAL INTELLIGENCE

WALL STREET, April 10, 1907.

### The Money Market

Increasing ease characterized the local money market in all its branches during the past week. The heavy gains in cash, resulting almost entirely from the relief measures put into effect by the Secretary of the Treasury, have materially strengthened the position of the local banks, and the general situation at the close was clearer than at any previous time in months. The inactivity in the security market was also an important factor, as it lessened to a great extent the requirements for speculative purposes. The accumulation of funds here caused more or less pressure upon the market, and, despite the extraordinary demands upon the banks, such as the payment of \$24,000,000 on account of the Great Northern Railway new stock, lenders were compelled to make sharp reductions in rates for all classes of accommodation. Money on call was offered liberally at rates ranging from 4 to 1½ per cent, while for time loans asking rates fell 1 and 1½ per cent from the high level prevailing at the close of the month of March. Sixty-day money was obtainable in quantity at 4½ per cent, as against 6½ per cent asked a fortnight ago, while funds for five and six months were offered liberally at 5 and 5¼ per cent. The volume of business, however, was extremely light, even at the lower rate, borrowers generally being disposed to avail themselves of the low rates prevailing for demand money rather than to enter into contracts for fixed periods. One result of the easier conditions has been the growing demand for fresh capital on the part of corporations. During the last half of March some of the railroads found it impossible to negotiate short-time notes upon a satisfactory basis, but the developments of the past week or ten days have been such as to bring several of the railroads into the market. During the week the Erie was successful in disposing of \$5,500,000 one-year notes, and the Wabash has placed an issue of \$6,160,000 three-year notes, the proceeds of which will be used to retire a like amount of 5 per cent notes maturing on May 10 next. Several other loans of similar character have been negotiated, and rumors of further note issues are current. The Buffalo, Rochester & Pittsburg Railroad has placed an issue of \$35,000,000 fifty-year bonds, the proceeds to be used for various purposes. A feature of the week has been the pronounced strength in foreign exchange, rates for sterling rising to a point which eliminates all possibility of imports of gold from Europe. As a matter of fact, \$2,250,000 gold, which had been engaged in London for import, was re-sold in that market, the advance in exchange here making such transactions unprofitable. The foreign situation also improved considerably, money and discount rates ruling lower than for some time past. In well-informed quarters it is thought that, with New York bankers out of the market for gold, the governors of the Bank of England will adopt a more liberal policy in the matter of loans, and that possibly a reduction in the official discount rate will be made in the near future. At this time there is nothing in the situation or outlook calculated to disturb the present easy conditions. Reports from Washington of a change in the Treasury policy in the matter of relief measures have been officially denied, while the financing of the contemplated note or bond issues will be made in such a way as not to materially disturb existing conditions.

The bank statement was a remarkably favorable one, the cash holdings having been increased by \$10,533,900, while the increase in the legal reserve was \$4,223,950, thus resulting in an increase of \$6,309,950 in the surplus reserve. The latter now stands at \$19,441,225, comparing with a deficit of \$2,560,625 in the corresponding week of 1906, surplus of \$8,682,525 in 1905, \$22,916,400 in 1904, \$3,741,300 in 1903, \$4,571,750 in 1902, \$5,817,975 in 1901, and \$7,904,800 in 1900.

### The Stock Market

The stock market during the week experienced decided improvement in speculative sentiment, and confidence has been

restored to a considerable degree. This is indicated by the large improvement in prices from the low level recorded in the recent slump in values, and although there have been a few sharp recessions, these represented simply profit-taking selling on the part of interests who bought heavily when the market was very much lower. There has been a radical change in conditions having direct relation to prices and values, and chief of these is the decline in money rates and the easier condition of the money market. On the present basis of time money the dividend-paying stocks return a larger yield to the investor than could be obtained by placing the money in the loan market. This gives a good margin for further improvement in prices for securities and leaves the market on a decidedly sound basis. The heavy liquidation during the month of March brought investors into the market, and the buying for this account was of a volume to materially reduce the floating supply of all of the active shares, and, although the short interest has been very much reduced, it is understood that there is still a very considerable outstanding account for the fall, which alone will furnish a measure of support on any temporary drive that may be made. For the first time in months there is practical evidence of active interest on the part of the so-called public, which is reflected in the larger volume of business by commission houses. The improvement in the foreign situation has been an influential factor in the betterment here. The London settlement passed over in a satisfactory manner, and foreigners have been favorably impressed by the action of the New York bankers in refraining from withdrawing gold from the other side, and in the selling there the amount of the metal which had actually been obtained. Home developments have all been favorable. The settlement of the threatened labor troubles removed what might have been a serious menace to market stability. The increase in the Atchison dividend came at a time when its influence was most beneficial, and there is talk of like action on the part of other companies. The very favorable bank statement was largely the result of the relief measures by the Treasury Department, but these have done much to restore confidence and to remove timidity on the part of capital. Corporations now find it easier to sell short-time notes and also long-time bonds on a more satisfactory basis, and this will make it possible for them to carry out the contemplated improvements, which, a short time ago, was thought might have to be abandoned. The crop reports now coming to hand are of a highly favorable character, and these will become more of an influence during the next few weeks.

The traction stocks made decided improvement, in sympathy with the general market. Reports of probable competitive bidding for contracts for the proposed new subways were without any adverse influence, and more attention is being paid to expected large increases in earnings of these companies during the summer, which will result from the material addition to equipment made during the winter.

### Philadelphia

Greater interest was manifested in the local traction issues during the past week. There were indications of returning confidence in these shares, and, while the dealings were not large, they were accompanied by a higher level of prices. Philadelphia Rapid Transit was again the leader of the group in point of activity, and, notwithstanding the action of the directors in levying an assessment of \$5 per share, the stock held firm. The assessment is payable on May 6, and makes the stock \$35 paid in. Opening at 16½, the price rose 1¼, but later lost part of the improvement on profit-taking sales. Philadelphia Company rose sharply to 44¾, on light transactions, and the preferred advanced to 45½. Philadelphia Traction moved up from 92¾ to 95 on the purchase of odd amounts, and Consolidated Traction of New Jersey brought 71½ for several hundred shares. Union Traction advanced from 55½ to 58 and closed near the top. Other transactions included American Railways at 49½, United Companies of New Jersey at 245, Union Traction of Pittsburg, preferred, at 47, and Lehigh Valley Transportation, preferred, at 22 and 23.

**Chicago**

The result of the election on April 2, at which the traction ordinances were ratified by the voters, was reflected in a more active and decidedly stronger market for the traction issues during the past week. Practically all of the stocks of the various companies were dealt in at substantially higher prices. It is understood that the rehabilitation of the properties will be pushed from now on. It was rumored that the City Railway Company was negotiating the sale of a block of bonds, but this report was subsequently denied. At the close of last week City Railway stock was 150 bid, from which the price rose to 205, on the purchase of comparatively small amounts, a total gain for the week of 55 points. North Chicago rose from 25 bid to 43, at which price transactions were reported, while West moved up from 25 bid to 50, with sales at the high figure. Union Traction, after selling at 6 $\frac{1}{8}$ , eased off to 4 $\frac{7}{8}$ , and the preferred brought 18 $\frac{1}{2}$ . Other sales were: Chicago & Oak Park, preferred, at 15; Metropolitan Elevated, preferred, at 64 $\frac{1}{2}$  and 65, and South Side Elevated at 83.

**Other Traction Securities**

Interest in the Baltimore market again centered in the issues of the United Railway Company, all of which were animated and decidedly firm. The free stock was unusually active, at prices ranging from 117 $\frac{1}{8}$  to 135 $\frac{1}{8}$ . The 4 per cent bonds advanced from 87 to 88, while the incomes rose 2 $\frac{3}{4}$  to 56 $\frac{1}{2}$  on moderate purchases. The refunding 5s were quiet, at from 83 to 84. Charleston Railway & Electric 5s sold at 92. In the Boston market trading was quiet and prices displayed considerable irregularity. Boston Elevated sold at 153 $\frac{1}{2}$  and 154. Massachusetts declined from 19 to 18, and the preferred, after advancing from 60 to 61, lost all the improvement. Boston & Worcester sold at 23 $\frac{3}{4}$  and 23 $\frac{1}{2}$ , West End common at 91 and 90, and the preferred at 106.

The principal interest on the Cleveland Stock Exchange the past week, so far as tractions are concerned, was with the Cleveland Electric, as a result of the refusal to accept the city's offer to take the property over on a leasing arrangement. The stock declined two points on the afternoon of the day the refusal was made, but the asked price remained at 60 at the close. Forest City Railway stock did not show any perceptible change, and both stand about the same as they have in the past. There has been a demand for Aurora, Elgin & Chicago stock, but the change in quotations has been slight.

**Security Quotations**

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

	April 3	April 10
American Railways .....	49 $\frac{1}{2}$	49 $\frac{1}{2}$
Boston Elevated .....	143	143
Brooklyn Rapid Transit .....	62	61 $\frac{1}{2}$
Chicago City .....	160	a200
Chicago Union Traction (common).....	5 $\frac{1}{2}$	4 $\frac{1}{2}$
Chicago Union Traction (preferred).....	17 $\frac{1}{2}$	15 $\frac{3}{4}$
Cleveland Electric .....	—	58 $\frac{3}{8}$
Consolidated Traction of New Jersey.....	71	72
Detroit United .....	72 $\frac{3}{4}$	75 $\frac{1}{2}$
Interborough-Metropolitan .....	26 $\frac{3}{4}$	26 $\frac{1}{4}$
Interborough-Metropolitan (preferred) .....	62	60
International Traction (common).....	—	45
International Traction (preferred), 4s.....	—	72
Manhattan Railway .....	137 $\frac{1}{2}$	137
Massachusetts Elec. Cos. (common).....	18 $\frac{1}{4}$	18
Massachusetts Electric Cos. (preferred).....	61 $\frac{1}{2}$	60
Metropolitan Elevated, Chicago (common).....	23	25
Metropolitan Elevated, Chicago (preferred).....	64	65
Metropolitan Street .....	90	94
North American .....	78 $\frac{1}{4}$	75
North Jersey Street Railway .....	40	40
Philadelphia Company (common) .....	44 $\frac{1}{2}$	45
Philadelphia Rapid Transit .....	18	16 $\frac{3}{4}$
Philadelphia Traction .....	93	94
Public Service Corporation certificates.....	—	64
Public Service Corporation 5 per cent notes.....	—	93
South Side Elevated (Chicago) .....	82	80
Third Avenue .....	110	110
Twin City, Minneapolis (common) .....	97	96
Union Traction (Philadelphia) .....	57 $\frac{1}{2}$	57 $\frac{1}{2}$

**Metals**

The iron and steel trades continue active and firm. According to the "Iron Trade Review," there is increased confidence in the soundness of condition. The determined stand taken some time ago by large independent steel-making concerns that they would not buy pig iron for the last half of the year at more than \$20 per ton furnace has been abandoned. Sales aggregating 250,000 tons at \$21, furnace, have been made. There is still an active demand for iron in the English markets. The United States Steel Corporation has made sales of steel rails for delivery in 1908, at \$28 per ton, the current price.

Copper metal is firm at 25 $\frac{1}{2}$ c. for Lake, and 25 $\frac{1}{4}$ c. for electrolytic.

**SEATTLE MUNICIPAL ROAD SOLD**

The Seattle Electric Company has taken over the municipal street railroad owned by West Seattle. The negotiations for the sale of the road were finished some time ago, and Judge Albertson entered a judgment directing the sale. The road is a mile and a half long and was sold for \$30,000. The Seattle Electric Company is building an extension of its Youngstown branch to connect with the West Seattle line, which will be finished in about sixty days. The line will be continued from its connection with the West Seattle line around Alki Point. The company will also build along California Avenue from South Street to Ninth Street. The West Seattle road will practically be rebuilt by the company.

**THE HEARING ON THE BOSTON & EASTERN**

The Railroad Commissioners again considered, on Thursday, April 4, the petition of the Boston & Eastern Electric Railroad Company for a certificate that public convenience and necessity require the construction of the proposed road. The chief witness in favor of the road was William H. Treen, president of the Lynn Board of Trade. Mr. Treen said that Lynn was desirous of securing additional rapid transit facilities to Boston. The present mode of travel was slow and uncertain. He believed that the time had come when a road such as proposed would be of greater advantage to the city than either railroad. He contended that the present opposition to the road in Lynn was due largely to influence brought to bear by outsiders. S. B. Armstrong, W. A. Robinson and J. J. Coulhig, all of Lynn, were also witnesses, each appearing in favor of the petition, claiming that the city would benefit more than it would lose by permitting this railway to secure location within its limits. The Boston & Maine and the Boston & Northern Railroads are later to be heard in opposition, and it was announced that a large delegation of Lynn people would be present at the next hearing to object to the proposed route through the city.

**FINANCIAL STATEMENT OF THE UNITED RAILWAYS OF SAN FRANCISCO**

The following statement gives the combined earning of the United Railroads of San Francisco and the Philadelphia Company for the year ended Dec. 31:

Gross receipts .....	\$24,533,603	Inc.	\$304,541
Operating expenses and taxes....	12,746,041	Inc.	210,538
Net earnings .....	\$11,787,562	Inc.	\$94,003
Fixed charges .....	6,202,315	Inc.	318,215
Balance .....	\$5,585,247	Inc.	\$224,212
Sinking funds, dividend on Philadelphia Company and other stocks .....	647,235	Dec.	82,954

Surplus .....

Surplus .....	\$4,938,012	Dec.	\$141,258
---------------	-------------	------	-----------

The above statement includes the business done with the public by every company connected with the Philadelphia Company. They do not include inter-company business, except to the extent of a number of small transactions, which, however, if eliminated, would not affect the surplus as shown.

## THE SITUATION IN CLEVELAND

At a public meeting in the Council Chamber, Cleveland, Friday, April 5, a communication was read from the Cleveland Electric Railway Company, which not only absolutely refused to accept the plan offered by the city for a holding company, but stated that no negotiations would be entered into again with a holding company. As the company has contended that a railway system cannot be operated properly on a 3-cent fare, the communication asserted that it is the duty of members of the Council to give attention to the best offer that can be made—seven tickets for a quarter—rather than take up an untried plan and experiment with it at the expense of the public.

Mayor Johnson evidently had expected a different reply. When the reading was completed he arose and said that he thought he would be able to take care of the personal charges in the communication, and that the other matters would be left with the Council. He denied that he had not at all times done all that he had promised to do, and said that he had never known of any act of the City Council that could be construed as persecution. The company has a perfect right, he said, to withdraw the seven tickets for a quarter, which it had been giving the people for the past three or four months. He asserted that he did not think seven tickets for a quarter a good proposition, and that he would resist any action to give the company a franchise on that basis. The Mayor and a number of the Councilmen objected to the holding company being called irresponsible, on the ground that the granting of franchises to operate a complete system in the city would be worth millions of dollars if it had nothing else. The Cleveland Electric Railway Company, they said, would be amply protected by the security franchise that, in case of the failure of the holding company, would give it a right to operate for twenty years at the rate of seven tickets for a quarter.

President Andrews said that he had always understood before that the security franchise was to be based upon six tickets for a quarter and a 5-cent fare, and that this was the first time he had heard seven tickets mentioned. Mr. Andrews said, further, that the rate of interest, 3 per cent for the remainder of this year, 4 per cent for the second year, and 5 per cent for the third year, was not satisfactory. It should be 6 per cent from the start. He said that there were other things in the plan that were not satisfactory, although they had not been mentioned.

One of the surprises of the meeting was the statement of Mayor Johnson that he would recede from his original position and agree that a clause should be inserted in the leasing contract with the Cleveland Electric to the effect that the holding company should not charge more than 3 cents within the city, nor more than 5 cents on the lines outside. This was to be conditioned upon the fact that no unforeseen events, such as great conflagrations, earthquakes or anything of the kind occurred. In such cases the Council would have power to set aside this clause in the contract temporarily. The Mayor did not make this announcement until after the letter from the company had been read, and did it then, perhaps, for the effect it would have. The company in a measure put the responsibility of the failure of negotiations upon the Mayor, and he endeavored to put it back upon the company. But the fact that the company declared its willingness to submit to arbitration offset anything of the kind that could be done.

The committee asked until Monday, at 10 o'clock, to formulate an answer to the communication of the Cleveland Electric. This meeting was largely devoid of interest and few persons other than Councilmen attended. The officers of the Cleveland Electric Railway Company were absent, and there were few if any of the directors there. The report of the committee, read by City Solicitor Baker, stated that it is in answer to the charges made in the communication of the company read last Friday, regarding the motives of some of the city officers. The public is not interested, it said, in the motives of the officers, but in getting a street railway system at the lowest possible fare. It is denied that the Council attempted to force the holding plan upon the company, or had taken any action in that direction. Nothing is said, however, of what the Mayor has done in that line of action.

The concluding clause is to the effect that the Council stands ready to consult with the company and to award grants on unoccupied streets and those on which franchises have expired to the company making the best offer as to fare and conditions. Council is willing to submit the best offers of two companies to

the people and let them be the judges as to the company they desire to operate on the streets. This report was adopted by the City Council, and binds it to the referendum vote, if the companies so desire.

The fight against the Cleveland Electric was begun by the City Council, Monday evening, when ordinances were introduced with the purpose of compelling the company to exchange transfers with the Municipal Traction Company, especially on the cars that reach the Union Station. Other ordinances provide for grants to the Low Fare Railway Company on Woodland Avenue southeast, Kinsman Road southeast, Lorain Avenue, Madison Avenue southwest, and Detroit Avenue northwest. On all these streets the franchises of the Cleveland electric expire on Feb. 10, 1908. It seems to be the desire of the Council to get this agitation started at an early date, and Mayor Johnson said he felt that it is none too early, since a new company would have to have power houses and all equipment ready when the franchises expire. The Low Fare Railway Company was perhaps chosen to take these grants because of the fear that the financial interest of the Mayor in the Forest City Railway Company would operate against it. Ordinances were introduced providing grants for the same company for a so-called cross-town line beginning at Fifty-Fifth Street and Euclid Avenue and ending with West Fifty-Eighth Street and Detroit Avenue, crossing the Central Viaduct. In reality this is not a cross-town line, although it is called that in this case in order to come under the free territory rule. At the Council meeting it developed that W. B. Colver had succeeded Carlos E. Moore as president of the Low Fare Railway Company, the change having been made several months ago. A mass meeting will be held late in the week to talk over the subject of financing the Low Fare Railway Company. It is said that the Mayor's plans contemplate a regular campaign, with addresses in various parts of the city, urging people to invest their money in the company with the idea of owning their own roads.

## RECONSTRUCTION WORK IN ST. LOUIS

The United Railways Company, of St. Louis, Mo., has started its reconstruction work for this year. During the season at least 20 miles of new track will be laid in new roadbed. At present work of this kind is in progress on Plymouth and Etzel Avenues. The construction of the line on Olive Street, between Boyle and Taylor Avenues, has also been started. While the work is in progress the westbound McPherson and Delmar cars, which run straight out Olive Street to Taylor Avenue, will turn south on Boyle Avenue to Maryland Avenue, and will run out Maryland Avenue to Euclid Avenue, where they will take the regular route. There is no change in the operation of the eastbound McPherson and Delmar cars. General Manager McCulloch says that the plans for reconstruction will depend on the city's arrangements for street widening.

## RAPID TRANSIT MATTERS IN NEW YORK

Bids for the subway loop between the three East River bridges will be opened by the members of the board on Thursday. There will probably be six or eight bids. No question of operation enters into the bidding. Some of the firms which are bidding on the building of the loop are also expected to bid on the Lexington and Seventh and Eighth Avenue subways. At the meeting of the Rapid Transit Commission, Controller Metz will probably submit a plan, devised by one of his engineers, to obviate the congestion at Ninety-Sixth Street in the subway, instead of installing the three additional tracks suggested by the Interborough. The Finance Department plan contemplates the running of all local trains past the Ninety-Sixth Street station without a stop. Whatever switching is necessary for southbound Lenox Avenue locals would be done south of the station, and northbound Broadway expresses would also be switched before they reached the station.

What has been termed the Poulsen plan for relieving the Brooklyn Bridge crush has been revived, and it has been decided to try the plan in operation at the Coney Island terminal of the Brooklyn Rapid Transit elevated lines, where a set of tracks exactly resembling the track layout at the Manhattan terminal of the bridge will be put in place. The trial will be made at the expense of Mr. Poulsen, and will be supervised by Chief Engineer Lewis of the board.

## ANNUAL MEETING OF THE METROPOLITAN WEST SIDE COMPANY

The annual meeting of the Metropolitan West Side Elevated Railway Company was held on Thursday, April 4. The directors were re-elected and they in turn re-elected the officers. President Howard G. Hetzler, in submitting the report to the stockholders, announced that it covered the period between March 1 and Dec. 31, 1906, inclusive, the fiscal year having been changed to end Dec. 31, in place of Feb. 28, as formerly. The statement for ten months shows gross earnings of \$2,226,878, being \$185,574 more than those of the preceding year. Expenses increased \$117,928 and net earnings increased \$67,646. The surplus stands at \$816,910, an increase of \$56,638, equal to 3.83 earned on the preferred stock. For twelve months ended Feb. 28, 1907, the surplus, after all charges, is \$404,455, a gain of \$81,823, and are equal to 4.71 per cent on the outstanding preferred stock—\$8,707,900.

### INCOME ACCOUNT

For Year Ending Feb. 28

	1907	1906
Total passenger earnings.....	\$2,604,365	\$2,360,256
Advertising earnings.....	58,366	60,955
Rent earnings.....	15,909	14,419
Miscellaneous earnings.....	18,598	16,697
<b>Gross earnings.....</b>	<b>\$2,697,238</b>	<b>\$2,452,327</b>
<b>Expenses</b>		
Maintenance of way and structure.....	\$111,430	\$114,963
Maintenance of equipment.....	211,216	202,220
Conducting transportation.....	792,815	692,316
General expenses.....	78,422	76,692
Loop expenses.....	118,272	86,239
<b>Total operating expenses.....</b>	<b>\$1,312,155</b>	<b>\$1,172,430</b>
Net earnings from operation.....	1,385,082	1,279,896
Proportion of total operating expenses to gross earnings, loop expenses excluded.....	44.26	44.29
Proportion of total operating expenses to gross earnings.....	48.64	47.81
Proportion of total operating expenses and taxes to gross earnings.....	54.44	54.12
<b>Income</b>		
Net earnings from operation, as above.....	\$1,385,082	\$1,279,896
Interest and exchange.....	3,223	4,998
Rental of outside property.....	4,666	3,108
Other income.....	1,767	4,531
<b>Gross income.....</b>	<b>\$1,394,738</b>	<b>\$1,292,533</b>
Interest, first-mortgage bonds.....	399,189	392,150
Interest, extension mortgage bonds.....	120,000	120,000
Interest, collateral loan.....	34,275	43,635
Interest, equipment trust notes.....	5,206	.....
Rental, Illinois Trust and Savings Bank, trustee.....	4,797	4,797
Rental, Pennsylvania Company.....	11,900	11,900
Rental, Union Consolidated Elevated Railroad.....	20,353	20,351
Rental, Union Elevated Railroad (Loop).....	238,227	222,277
Taxes, car license and special assessments.....	156,337	154,791
<b>Total charges.....</b>	<b>\$990,283</b>	<b>\$969,901</b>
<b>Surplus.....</b>	<b>404,454</b>	<b>322,631</b>

### TRAFFIC STATISTICS

	Total	Daily Average
March, 1906.....	4,283,240	138,169
April, 1906.....	4,124,304	137,477
May, 1906.....	4,238,778	136,735
June, 1906.....	4,019,222	133,974
July, 1906.....	3,824,479	123,370
August, 1906.....	3,828,880	123,512
September, 1906.....	3,809,244	126,975
October, 1906.....	4,422,792	142,671
November, 1906.....	4,574,127	152,471
December, 1906.....	4,829,425	155,790
<b>Total.....</b>	<b>41,954,541</b>	<b>137,106</b>
Passengers carried March 1 to Dec. 31, 1905.....	28,369,482	
Daily average.....	125,390	
Increase per day, 1906 over 1905.....	11,716	
Passengers carried, calendar year 1906.....	49,771,812	
Daily average.....	136,361	
Passengers carried, calendar year 1905.....	46,358,843	

Daily average.....	124,271
Daily average increase, 1906 over 1905.....	12,090
Per cent of increase.....	9.72

### BALANCE SHEET AS OF DEC. 31

Assets	1906	1905
Cost of road, equipment and property.....	\$30,652,567	\$29,843,591
Construction advances.....	981,709	791,030
Capital stock in treasury, preferred.....	292,100	291,900
Capital stock in treasury, common.....	35,900	35,600
First-mortgage bonds in treasury.....	.....	194,000
Extension mortgage bonds in treasury.....	1,422,000	1,500,000
Cash on hand and in banks.....	220,449	281,512
Material and supplies.....	62,123	38,234
Accounts receivable.....	20,882	23,736
Prepaid insurance.....	16,190	21,330
Advances, Union Consolidated Elevated Railroad.....	43,559	43,559
Unadjusted accounts.....	43,201	22,520
<b>Total.....</b>	<b>\$33,790,680</b>	<b>\$33,087,012</b>
<b>Liabilities</b>		
Capital stock, preferred.....	\$9,000,000	\$9,000,000
Capital stock, common.....	7,500,000	7,500,000
First-mortgage bonds (4 per cent).....	10,000,000	10,000,000
Extension mortgage bonds (4 per cent).....	4,500,000	4,500,000
Collateral trust notes.....	600,000	800,000
Equipment trust notes.....	400,965	.....
Unpaid vouchers, pay-rolls and accounts.....	227,210	120,240
Interest coupons due and not presented.....	5,320	6,060
Interest due Jan. 1.....	61,560	60,000
Interest accrued, not due.....	175,320	172,383
Rentals accrued, not due.....	8,749	8,749
Taxes accrued, not due.....	101,872	95,365
Depreciation reserve.....	85,251	79,054
Balance surplus.....	1,124,433	745,162
<b>Total.....</b>	<b>\$33,790,680</b>	<b>\$33,087,012</b>

### PRESIDENT HETZLER'S STATEMENT

Owing to the greatly increased traffic of the past year, fifty new motor cars of our standard vestibule type were purchased and put into service during November and December, with the result that the operation has been satisfactory to both our patrons and the company. Twenty motor cars of the same type have been ordered for delivery during the months of October and November, 1907.

Rotary converters were installed and ready for use at the Robey Street and Forty-Sixth Avenue sub-stations during the month of October. Since that time power has been purchased from the Commonwealth Electric Company, making it possible to handle the heavy loads of the morning and evening rush hours in an efficient manner, and at the same time relieving the power house during the night hours and allowing necessary repairs to be made without interfering with the service.

Arc lights have been installed at the intersection of our structure with public streets, in accordance with the city requirements.

A sidetrack connection has been built between the tracks of the Aurora, Elgin & Chicago Railroad and the Chicago Terminal Transfer Railroad, a short distance west of Fifty-Second Avenue, enabling your company to effect quite a saving and convenience in the handling of material in carload lots.

A loop has been installed at Desplaines Avenue, and the handling of trains at that point greatly facilitated. Fifth Avenue trains on the Garfield Park branch are now running through to Desplaines Avenue during the morning and evening rush hours, and an all-night schedule is maintained on this part of the system.

On account of the elevation of the Burlington, Northwestern & Terminal Transfer Railways at Sixteenth Street on the Douglas Park branch, the tracks of your company have been raised approximately 14 ft. without interruption to the service.

The extension of the Douglas Park branch to the Western Electric Company at Forty-Sixth Avenue has been practically completed, and will be ready for operation about May 1, 1907. The elevated storage yard at Forty-Sixth Avenue, Garfield Park branch, has been abandoned, and a new yard of greater capacity has been built on the surface at Fifty-Second Avenue.

The increased earnings and satisfactory physical condition, together with a healthy growth in the volume of business, warranted your directors at their January meeting in placing your preferred capital stock on a 3 per cent dividend basis.

The equipment, structure, track and buildings have been maintained in good condition, and all requirements for safety have received careful attention.



## LEGISLATION TO DATE IN PENNSYLVANIA

With final adjournment but six weeks distant—May 16—the Pennsylvania Legislature will be required to dispose of no end of business to enact all the various reform measures pledged to the people by all the leading parties in last fall's campaign. One of these measures—the 2-cent railroad fare bill—has already been signed by the Governor; another, the Railroad Commission bill, passed the House last week, with a unanimous vote, as did also the bill giving electric railway companies the right to carry light freight, which now goes to the Senate. The bill granting the right of eminent domain under certain restrictions to electric railway companies, which was recommitted for the purpose of considering amendments proposed by members from rural constituencies, will be reported on favorably in a few days, and will undoubtedly pass the House. The five Reynolds bills, enforcing the provisions of the State Constitution in relation to railroads and other common carriers and their officials and directors, have been at last favorably reported from the judiciary general committee of the House and placed on the second reading calendar. Their passage is assured.

The bill allowing the city of Philadelphia to enter into a contract with the Rapid Transit Company for a division of street railway profits and the restoration of the company's franchises to the city at the end of fifty years has been passed by the Senate and sent to the Governor. The companion measure, requiring traction companies to secure franchise ordinances from local authorities before a charter is granted by the State, is on the postponed calendar.

A bill affecting the granting of future trolley franchises, by establishing the system of initiative and referendum in cities and boroughs of the State, went through the House without debate or amendment last week. This bill puts large powers into the hands of the people. Under its provisions no municipal ordinance can be passed, save emergency measures of limited extent, unless the people assent. After passage by Councils, franchise ordinances must lie over for thirty days, during which period 5 per cent of the voters can, by petition, compel the ordinances to be submitted to a vote of the people for approval or disapproval. Ten per cent of the voters can ask Councils to pass an ordinance of their own framing, and this must be enacted without change or the law-making authority must propose a competing measure, which, if passed, must then be submitted to the people for approval.

When a referendum vote is demanded, the question must come up at the next election, provided the petition is filed thirty days before election. Municipal executives will have no veto power over measures proposed by the people, or over any measure which has been approved by the people at the polls.

The Houser bill, conferring upon trolley companies the right to carry light freight and express matter, passed the House by a vote of 180 to 0, and without debate, a most remarkable occurrence. Local authorities are empowered to lay down reasonable regulations governing the condition under which street railways may carry on this business, and the question of reasonableness is one the Common Pleas Courts may pass upon.

When this bill came up for second reading, Democratic Floor Leader Creasy fought hard to get an amendment compelling the trolleys to carry freight, instead of giving them the mere right to do so if they wished. He declared the State Grange demanded this provision, and lost only after a sharp contest.

As it stands, the bill meets the views of the united trolley companies of the State, who favored it before committee through their counsel, former Attorney-General Hampton L. Carson. The measure was drawn up at the instance of Speaker McClain, who took the floor and avowed its parentage when Creasy, in the second-reading debate, said it was drawn to meet the views of the steam roads.

A determined effort will be made by the representatives from the third-class cities of the State to secure the passage of the Beidleman bill, providing for the taxation of real estate of public service corporations for local purposes. The passage of this bill would mean an additional annual revenue of about \$75,000 to the city of Harrisburg from the steam and electric railways, gas, telephone, electric light, heat and power companies, all of which corporations are fighting the bill.

Other measures affecting trolley companies now in various stages of progress in the Legislature are the following:

Authorizing street railway companies to issue bonds, payable at such times as may seem best to the directors.

Granting to railroad companies the right to connect their terminal by tunnel beneath Valley Forge Park.

Making it unlawful for a trolley company to charge more than 5 cents for a continuous trip within any city's limit.

Providing that electric railways may become common carriers of freight.

Providing that trolley companies, in lieu of all other State taxation, shall pay the State 5 per cent on the gross receipts.

Annuling and abrogating charters granted under any pre-existing laws or any law now in force or which may hereafter be enacted to any railroad company or corporation of any kind or charter which have not been constructed or are not now in the course of construction or authorizing the Governor to issue charters to other corporations covering the same lines or rights of way as that had by the charter of franchises annulled.

A bill to overcome the legal obstacles to the crossing of a steam railroad by a trolley at grade.

A bill to raise the State tax on corporation capital stock from 5 to 10 mills.

A bill to tax stock transfers at the rate of 2 cents per \$100 through a stamp system.

The Hall bill, forbidding the acquisition of trolley securities by railroad companies, and prescribing three years in jail or a \$500 fine for offending agent or employees, has passed the House.

The bill authorizing cities, boroughs or townships to contract with street railway companies to operate their lines is in the hands of the Governor.

## DETAILS OF THE CINCINNATI, NEWPORT & COVINGTON LEASE

The details of the lease of the property of the Cincinnati, Newport & Covington Light & Traction Company to the Columbia Gas & Electric Company have all been arranged with the exception of a few minor changes that may be made in the printed form. As at present arranged the lease dates from April 1, 1907, and the stockholders of the Cincinnati, Newport & Covington will receive their first dividend from the Columbia Gas & Electric Company in July, a little sooner than was at first expected, and more satisfactory than if the dividend period dated from the time of acceptance, which may be within thirty days. As a guaranty of good faith the Columbia Gas & Electric Company must put up \$1,250,000 in cash. Of this \$1,000,000 is to be spent in extensions and betterments to the property, while the remaining \$250,000 is to be deposited with a trust company, as trustee, as a guarantee for the faithful performance of the contract. Under this division of the original fund the Cincinnati, Newport & Covington property will receive the benefit of the \$1,000,000, while the \$250,000 is considered ample to secure the performance of the terms of the contract.

## McKINLEY LINES SECURE ST. LOUIS TERMINAL RIGHTS

The Mayor of St. Louis signed the bill which grants a franchise to the St. Louis Electric Terminal Railway Company, known as the McKinley system, to operate a line over certain streets of St. Louis for a period of fifty years, Saturday, April 6. The route of the line is from the river front at Salisbury Street to Ninth Street over private property, between Farrar and Salisbury Streets, south on Ninth Street to Branch Street, and thence to Twelfth Street and south on Twelfth to Lucas Avenue, where the terminus of the road will be. The McKinley system is to construct a bridge over the river from Salisbury Street to Venice, Ill., the cost of the bridge to be about \$2,500,000. It is reported in St. Louis that Vice-President Smith, of the company, will leave in a few days for New York to meet Congressman McKinley, president of the system, and other stockholders, for the purpose of deciding upon plans for the bridge and lines and terminal facilities in St. Louis, and that it is probable contracts for the construction will be let by the company in New York. The McKinley system promises under the franchises to carry express at freight rates and to reduce freight 40 per cent. The fare across the bridge from St. Louis to Granite City is to be 5 cents. The fare for foot passage over the bridge is to be 3 cents. In consideration of the franchise the company is to pay into the city treasury \$5,000 annually for the first five years, \$7,500 annually for the next ten years, and \$10,000 annually for the remainder of the life of the franchise.

**CHANGE IN OWNERSHIP OF SOUTHERN PROPERTIES**

E. W. Robertson and William Elliott, Jr., who are at the head of the Columbia Electric Street Railway, Light & Power Company, of Columbia, S. C., which operates the local street railways and the gas, electric light and power services, are now also in control of the Anderson Traction Company, which owns the electric railway system in Anderson. Mr. Robertson has been elected president and treasurer and Mr. Elliott vice-president and general manager of the Anderson Company. J. A. Brock, of Anderson, who organized the Anderson company and has been its president, voluntarily retires in order to devote more time to his cotton mill interests. He is president of the Anderson Cotton Mills and the Brogon Mills, of Anderson.

**AN ENGINEERS' CONTRACT BOOK**

The Goheen Manufacturing Company, of Canton, Ohio, manufacturer of oxidized carbon cement carbonizing coating, Galvanum and other protective coatings for metal work, issues an engineers' contract book which ought to prove very handy in preparing standard paint specifications for the complete presentation of steel railway bridges and other metal structural work where absolute freedom from rust and corrosion is essential. In addition to this, the book contains a series of large data sheets useful in making up and keeping track of contract work for sidewalks, paving, sewers, piping, conduits, power equipment, rolling stock, and other departments of electric railway work. This publication is 18 ins. x 23 ins. in size, and is known as "Zevy's Engineers Contract Book." Railway engineers can secure a complimentary copy on application to the Goheen Manufacturing Company.

**KALAMAZOO STRIKE ENDED**

The employees of the Michigan United Railways Company, of Kalamazoo, Mich., returned to work Wednesday, April 10, after being on strike since April 2. The settlement resulted in a decided victory for the company. There will be an open shop and the union is not recognized. The strike was originally declared because the company flatly refused to consider the demands of the men for recognition of the union and to arbitrate the entire agreement existing between the company and the men. It was proposed by the men that four arbitrators be named, the company to name two and the men two, and the four to name a fifth arbitrator, but the company declined to consider the proposition. The company already had offered to increase the wages of the men one cent an hour. The strike, while it was on, affected the lines in Kalamazoo and the interurban lines extending out of the city. The company had fortified itself against the walking out of its men, and was able to operate continuously almost the complete complement of cars.

**RECEIVER APPOINTED FOR INTERURBAN LINE**

On application of Frank M. Dell, as trustee, Judge McMaster has appointed W. M. Self, of Syracuse, Ind., tentative receiver for the Indianapolis, Huntington, Columbia City & Northwestern Traction Company. The promoters of the interurban road, it is said, failed to finance it. The complaint shows that \$1,500,000 in bonds were issued and that a large number of bonds were sold, but says that there are \$30,000 in claims against the company aside from the bonds, and that it has no funds. The concern built 5 miles of track near Syracuse and did considerably more grading.

**ANNUAL REPORT OF THE NEW ORLEANS RAILWAY & LIGHT COMPANY FOR 1906**

The annual report of the New Orleans Railway & Light Company for 1906, issued under date of April 8, shows that the gross earnings of all properties were \$5,773,190.13, an increase of \$679,480.34, or 13.3 per cent. With an increase of 13 per cent in passengers paying fare, the average fare paid on the railway was .045 cents per passenger. Statistics show that 9.8 per cent. of passengers paying fare took advantage of transfers. The total operating expenses were \$3,074,015.09, an increase of

\$402,554.74, or 15 per cent. This increase is due largely to an increase of 5 per cent to employees and to the increased volume of business, necessitating more cars and labor to conduct operations, and also to the increased cost of material used in making ordinary repairs. The net income for the year was \$798,274.27. The surplus for the year, after paying \$500,000 in dividends to the preferred stockholders, is \$298,274.27. President E. C. Foster, in presenting the report, said, in part:

"During the year we have expended for construction, betterments and improvements \$2,497,822.79, the larger portion of this amount having been expended on power stations, sub-stations, purchase of real estate for power purposes, transformers, motors, cars, equipment, etc.

"The extension of the Claiborne Avenue line to Poland Street was built and operated, and the extension of the Levee and Barracks line is being completed and will very soon be in operation.

"During the year 1906 we have expended for underground construction in the electric light and power department \$18,941.83, which consisted in installing additional new feeders in the direct current district, together with the extension of our underground mains and services to reach the more important customers.

"For electric light and power line construction, the sum of \$52,113.06 was expended the past year for new overhead feed lines and for the wire used in the extension of our street mains to reach new customers.

"In the gas department we expended during the past year \$78,842.04 for new mains and new services in this city, including Algiers, for the purpose of developing new territory and reinforcing existing mains.

"We erected in Algiers a complete gas plant, with a daily generating capacity of 125,000 cu. ft.

"The expenditures on the properties in the way of maintenance I believe to have been sufficient to maintain the property in its present serviceable condition, having expended for:

"Maintenance of track, roadway and paving, \$957.95 per mile for the year.

"Maintenance of electric line, \$261.10 per mile for the year.

"Maintenance of electric cars, \$207.36 per car for the year.

"Maintenance of electric equipment of cars, \$164.14 per car for the year."

The income account and operating statistics for the year ending Dec. 31, 1906, are herewith presented.

**INCOME ACCOUNT**

For the Year Ending Dec. 31, 1906

	1906	1905
Income		
Railroad department earnings.....	\$3,724,272	\$3,291,961
Electric and gas department earnings.....	1,875,400	1,705,897
Miscellaneous earnings .....	173,518	95,911
<b>Total earnings .....</b>	<b>\$5,773,190</b>	<b>\$5,093,770</b>
Expenses		
Railroad department, operating .....	\$2,225,580	\$1,901,084
Electric and gas department, operating.....	848,435	770,376
<b>Total operating expenses.....</b>	<b>\$3,074,015</b>	<b>\$2,671,460</b>
Net earnings from operation.....	\$2,699,175	\$2,422,249
Interest on funded debt, taxes and miscellaneous...	1,900,901	1,784,226
Net income .....	\$798,274	\$638,023
Dividends on preferred stock.....	*500,000	125,000
Surplus .....	\$298,274	\$513,023
Percentage of operating expenses to earnings.....	53.2	52.2

\* The dividend in 1905 was for three months, at the rate of \$1.25 per share of preferred stock, and the dividend in 1906 was for the year, at \$5 per share of preferred stock.

**STATISTICAL STATEMENT**

(Railroad Department)

Total miles of single track .....	52.36	
Total miles of double track .....	64.83	
Total miles special track (sidings).....	10.48	
Total miles all track, reduced to single.....	192.50	
Total miles of street and right of way occupied by tracks, not including 10.48 miles of sidings.....	117.19	
Gross passenger earnings per mile of single track.....	\$19,346.87	
	1906	1905
Revenue passengers carried.....	73,606,068	65,021,214
Transfers redeemed .....	7,220,152	6,641,193
Revenue mileage .....	17,718,107	16,753,874
Eighteen-hour cars .....	108,637	102,156

## THE RELATIONS OF THE UNITED RAILWAYS & ELECTRIC COMPANY AND THE MARYLAND ELECTRIC RAILWAY COMPANY

From time to time a great deal has been said about the situation in Baltimore, more especially as it related to the relations between the United Railways & Electric Company and the Maryland Electric Railway Company, in whose name much of the reconstruction work has been carried out. Even in financial circles the true relations of the companies seem at times not to be generally understood. Because of this seeming lack of knowledge, Hambleton & Company, of Baltimore, under date of April 6, thus lucidly defined the relations of the companies:

Under the mortgages of the United Railways Company it is provided that all properties owned or which may be acquired in the future are pledged for the security of such mortgages. Under this condition it was impossible for the United Railways Company to issue an additional mortgage bond for the purpose of securing funds for the necessary extensions, improvements and betterments, and for the purchase of additional equipment. Therefore, it was decided by those who are not only close to the management, but who are also largely interested in the securities of the United Railways Company, that it was not only desirable, but necessary, that an outside company should be formed to finance the United Railways Company and to furnish it with such funds as were necessary for the building of car barns, the purchase of additional equipment, and such extensions and improvements as seemed desirable. Hence it was that the Maryland Electric Railways Company was formed.

The Maryland Electric Railroad Company held a charter—and a very valuable one—which was amended by the last Legislature, giving it still broader privileges, and this charter was used for the formation of the Maryland Electric Railways Company. As a basis, the Baltimore & Annapolis Short Line Railway was taken over and the stockholders of that company were given for their stock, six shares of Maryland Electric Railways Company stock for one share of Baltimore & Annapolis Short Line Railway Company stock. The par of the Maryland Electric Railways stock being \$50 and that of the Baltimore & Annapolis Short Line Railway \$100 per share, the effect of this was that the Baltimore & Annapolis Short Line stockholders obtained six shares for one, or 300 per cent of the Maryland Electric Railways stock for 100 per cent of the Baltimore & Annapolis Short Line stock.

It has been stated that the parties who owned the charter of the Maryland Electric Railroad Company—for which it is said they paid \$30,000—put their stock in the Maryland Electric Railways Company upon the same terms as did the Baltimore & Annapolis Short Line stockholders. The result of this was the creation of a capital stock of about \$1,250,000 for the Maryland Electric Railways Company.

The Maryland Electric Railways Company provided for an issue of \$8,000,000 first mortgage 5 per cent bonds. Four million of these bonds were sold to an underwriting syndicate—\$2,000,000 having already been delivered, \$1,000,000 to be delivered July 1, 1907, and \$1,000,000 Jan. 1, 1908, to the underwriting syndicate. A contract was made between the United Railways & Electric Company and the Maryland Electric Railways Company that the former should lease from the latter certain properties—such as car barns, which are now in process of construction; additional power plant, which it is proposed to build; new equipment, which has already been contracted for, or such as may be contracted for in the future; extensions, such as the extension which is now being built from St. Paul Street through the new boulevard to Roland Park, and for other purposes.

The proceeds of the sale of the Maryland Electric Railways Company bonds have been and are to be deposited with the Mercantile Trust & Deposit Company, the trustee. These proceeds are to be invested as provided above, and when so invested the United Railways & Electric Company is to lease the properties on a guaranteed rental of 6 per cent of the cost of such properties and an obligation to provide a sinking fund to retire the Maryland Electric Railways bonds at maturity. The result of such an arrangement is that the United Railways Company is supplied with the funds which it needed—and which it was so essential it should have—upon the very easy terms of a rental of 6 per cent of the actual cost of the properties so acquired and the obligation to retire the principal of the Maryland Electric bonds at maturity, or sooner, at 110 and interest if desirable; the United thereafter to acquire the properties mortgaged. We cannot imagine any arrangement which would be more advantageous than this to the United Railways & Electric Company, and therefore to the holders of its securities.

The United Railways Company was entirely unable in itself to raise the money for betterments and improvements and to purchase new equipment, build car barns, etc., because, as stated above, it could not issue any new securities—even upon properties which should be acquired in the future—which would not be a lien subsequent to the present mortgages.

So far as the stock of the Maryland Electric Railways Company is concerned, it was hardly to be supposed that the owners thereof would present it as a gift to the United Railways & Electric Company. Why should they; and how was it possible for the United Railways Company to acquire the Maryland Electric Railways Company stock either as a gift or by purchase?

The taking over of the Baltimore & Annapolis Short Line Railway had positively nothing to do with the United Railways & Electric Company; but it is an additional security for the bonds of the Maryland Electric Railways Company.

## PITTSBURG COMMISSION FAVORS SUBWAYS

The report of the executive committee of the Rapid Transit Commission of Pittsburg Councils was submitted Saturday evening April 6, at a meeting of the Commission. The report favors the subway proposition, rejects the elevated line idea, suggests that the underground system be built by private enterprise, but with privilege for the city to take it over later; limits the franchise to 50 years; provides compensation to the city and regulations for building. The reports will be taken up for consideration at a meeting April 15. Speaking in a general way the Commission recommends the establishing of a system of underground railway, with a central terminal in the heart of the business district, and with straight lines radiating from it in several directions, like the spokes running out from the hub of a wheel. In planning for such a central terminal, the purpose is to provide such a one as will serve for the use of future suburban lines in all directions, and for a terminal for such suburban lines as may be built first. At the same time it is intended to construct such central terminal in such manner that direct lines can be operated through it (as from the East End to Allegheny or from the South Side to Lawrenceville) without transfer.

## THE REHABILITATION OF THE CHICAGO SYSTEM TO GO FORWARD AT ONCE

The rehabilitation of the Chicago properties will go forward with all possible speed. On this all the interests involved are agreed. According to report the City Railway Company expects to authorize a bond issue, probably \$50,000,000. There is to be issued to the stockholders \$24,000,000 of bonds, bearing 5 per cent interest. The bonds will be given to the stockholders free and will capitalize the \$21,000,000 of assets which the city agreed to be the value of the City Railway Company's property. The other \$3,000,000 of bonds will cover the \$3,000,000 of money raised by the City Railway Company on its notes to purchase new equipment. The city of Chicago has agreed to pay 5 per cent on the value of the railway company's assets and this will provide the necessary 5 per cent to pay the interest on the bonds. It is estimated that \$18,000,000 more of the \$50,000,000 bonds authorized will be sold and the proceeds used to reconstruct and rehabilitate the property. The remainder of the bond issue is to be sold from time to time to meet new construction needs.

As regards the Union Traction Company, it is announced in the East that all arrangements for financing are complete. G. W. Wickersham and L. C. Krauthoff, of New York, trustees under the reorganization agreement, are expected in New York this week to arrange for distribution of the stock of the Chicago General Railways Company. It is proposed to exchange the outstanding bonds for preferred stock of the new company and to exchange the stock of underlying companies, except Consolidated Traction, for common stock of the Chicago General Railways Company at a ratio to be determined by the trustees. If the various interests cannot agree, the new stock will be deposited with the trustees until the court settles the dispute. Chicago General Railways has no bonds outstanding, but can issue bonds immediately for rehabilitation of the properties. The ordinances took effect when the canvassing board announced a majority of referendum votes by the people in their favor.

Thomas E. Mitten, president of the Chicago City Railway Company, who returned from New York on Sunday, said that he would call a meeting of the directors of the company, probably this week, for the purpose of accepting the traction ordinances, and that the work of reconstructing the tracks of his company would commence as soon as rails could be obtained.

"As soon as John P. Wilson, our attorney, returns from Washington, where he is engaged in the tax litigation case, which will probably be some time toward the last of this week, I shall call a meeting of the directors of the Chicago City Railway Company for the purpose of formally accepting the Chicago City Railway ordinances. In the meantime such preliminary work as is possible under the circumstances will be proceeded with."

"We do not want to go to work and lay tracks down town now and then have to tear them all up when we begin the construction of the subways," said Bion J. Arnold. "My report of 1902 on the subway system has met with approval, and I think we have only to wait for the necessary legislation to begin their construction."

Subways will first be built from Twelfth Street to Chicago Avenue, State Street being used on the South Side and Clark Street on the North. Another will run from Halsted Street to Michigan Avenue, probably in Madison Street. Subsequently they will be extended to the outlying districts, ultimately to run from Englewood to the city limits in the North Side.

As a result of the ratification of the ordinances there will go into effect the increase in wages promised to Chicago City Railway trainmen by President Mitten, of the company, the increase dating from April 1. The official bulletin announcing this increase is appended:

To All Trainmen, Chicago City Railway Company:

Immediately after the ratification of the settlement ordinances April 2, and without awaiting the termination of the present contract expiring July 31, 1907, the company stands ready to enter into a new contract with Division 260 at the following advanced rate, to become effective April 1, 1907:

#### PROPOSED CONTRACT RATE

First three months' service.....	23c. per hour
Following nine months' service.....	25c. per hour
Thereafter .....	27c. per hour

#### PRESENT CONTRACT RATE

First six months' service.....	19c. per hour
Following six months' service.....	24c. per hour
Thereafter .....	25c. per hour

For some months past the management has had this increase in contemplation in order to secure the co-operation of conductors and motormen necessary to enable it to supply the excellent service required by the settlement ordinances, and makes the announcement at this time in order to contradict statements now being circulated to the effect that a reduction in wages of conductors and motormen would follow the ratification of the settlement ordinances at the polls.

Chicago, March 28, 1907.

T. E. MITTEN, President.

### DECISION IN ROCHESTER PAVING CASE

In a decision recently handed down by the United States Supreme Court, it is held that the Rochester Railway Company is liable for the paving between its tracks and for 2 feet on either side in the cases up for review, Park Avenue and St. Paul Street. Affected by the same decision, it is unofficially reported, are a number of lines, which will make the aggregate of paving charges of the company about \$100,000. The case was tried before Justice Nash in December, 1903, and decided against the city. Nov. 15, 1904, the decision received the unanimous affirmation of the Appellate Division. It was then reversed by the Court of Appeals of the State, June 6, 1905, and judgment was ordered for the city. In this decision the Court of Appeals was divided. Justices Cullen, Haight, Vann and Werner stood for the reversal of the decision and judgment in favor of the city, and Justice Gray wrote the dissenting opinion, which was concurred in by Justices O'Brien and Bartlett. Motion for reargument was made before the Court of Appeals, Oct. 16, 1905, and was denied the next day, Oct. 17. The case was then taken to the Supreme Court of the United States and argued there Jan. 14 and 15, 1907.

### AMENDING THE PUBLIC SERVICE BILL

Senator Page and Assemblyman Merritt are preparing a number of minor amendments to the public utilities bill, which were practically agreed upon at the public hearings before the Senate judiciary committee and the railroads committee of the Assembly last week. Many of these amendments are of a purely technical nature. One is a provision to make the salary of the proposed Commissioners \$17,500 instead of \$10,000, as the bill at present provides. Another is a provision to divide the cost for the maintenance of the metropolitan commission between the city and the State. The bill now provides that the city of New York must bear alone all the expense of the proposed commission for the metropolitan district, while all fines and forfeitures incurred by local transit companies for violations of the proposed public service law would be payable into the State Treasury. A third is a provision modifying the clause prohibiting railroads from investing in the stock of other rail-

road companies operating in this State to the extent of more than 10 per cent of their capital stock. The amendment will permit unlimited investment in the stock of railroad companies whose lines may serve as feeders and extensions. The bill will be taken up for consideration in executive session by the two committees having it in hand Wednesday, April 10. Up to that time briefs and suggestions for amendments will be received.

### SUPPLY MEN'S COMMITTEE FOR CENTRAL ELECTRIC RAILWAY ASSOCIATION

President Nicholl has appointed the following supply men's committee: John F. Ohmer, Dayton Ohio, chairman; L. J. Drake, Indianapolis, treasurer; S. D. Hutchins, Columbus, Ohio; Wm. Bloss, Indianapolis, Ind.; R. W. Palmer, Cincinnati, Ohio.

### HEARING ON APPLICATION OF CANANDAIGUA & SOUTHERN

On March 27, the first hearing of the application for a certificate of public convenience and necessity, under Section 59 of the State Railroad Laws, was held before the State Railroad Commissioners. George H. Switzer, of Bath, the engineer who secured the right of way and surveyed the route of the proposed road, said that the main line of the road would be 33½ miles long, and would extend from Atlanta northward through North Cohocton, Naples, Bristol Springs, Bristol Center, Vincent, South Bloomfield and Centerfield, entering Canandaigua by way of Western Avenue. He gave the estimated cost of the road at \$720,000, and stated that 80 per cent of the necessary right of way has already been secured. The equipment will include six vestibule passenger cars, each of 475-hp motors, two express cars and six freight cars. The company intends using Niagara power, and arrangements have already been made with the Niagara, Lockport & Ontario Company to that end. The hearing was adjourned to a later date.

### THE REORGANIZATION OF THE ATLANTIC CITY & SUBURBAN COMPANY

The creditors' committee of the Atlantic City & Suburban Traction Company has issued a readjustment agreement, accompanied by a circular letter, which says, in substance:

"The company defaulted in the interest due Feb. 1, 1907, upon its \$750,000 of outstanding bonds. The company has a floating debt of about \$100,000; has issued \$27,000 of car equipment bonds, \$4,000 of which become due in June, 1907, and has entered into a contract, in pursuance of its franchise in Atlantic City, to pave Florida Avenue, at a cost of about \$15,000, which will have to be paid during the coming summer.

"On the part of the first mortgage bondholders, the plan contemplates simply deferring the payment of the interest maturing Feb. 1 and Aug. 1, 1907, without any impairment of the lien or relative position with respect to other creditors of the bonds, or of the coupons maturing upon those dates. The refunding mortgage bondholders are asked to agree that the interest for two years upon their bonds shall be deferred upon the same conditions, and also to buy (at par non-cumulative 6 per cent) preferred stock to an amount not exceeding \$30,000 (in amounts equal to 12 per cent of their respective holdings of the bonds), to provide for the paving of Florida Avenue, and other pressing obligations. The unsecured creditors are asked to accept preferred stock in full payment of their claims (as of March 1, 1907) amounting to \$50 and upwards. The taxes must be paid in cash, as well as odd amounts not equal to \$50, the value of a share of preferred stock; but if the plan is to succeed and the property saved from a receivership or foreclosure sale, every unsecured creditor for advances, supplies, machinery, etc., with the limitation just suggested, must accept preferred stock for the amount of his claim.

"The holders of more than a majority of the capital stock have agreed to assign their certificates to this committee, that the committee may control and manage the company. The present officers and directors will resign."

At a meeting of the shareholders, in Atlantic City recently, more than 14,000 shares, it is stated, were voted in favor of issuing the \$30,000 preferred stock called for by the plan.

## REPORT OF THE PORTLAND RAILWAY

The Portland Railway Company reports for the year ended Dec. 31, 1906, as follows:

Gross receipts .....	\$1,684,156
Operating expenses .....	974,699
Net earnings .....	\$709,457
All fixed charges, including taxes.....	436,832
Surplus .....	\$272,625
Dividends—Preferred stock, 5 per cent on \$2,500,000 .....	\$125,000
Dividends—Common stock, 2 per cent on \$4,000,000 .....	80,000
Surplus .....	\$67,625

The general balance sheet as of Jan. 31, 1907, follows:

Assets	
Cost of property .....	\$14,139,081
Supplies on hand .....	141,870
Prepaid and suspense accounts .....	48,517
Cash .....	\$36,800
Accounts receivable .....	195,386
Bills receivable .....	282,245
Total .....	\$14,843,898
Liabilities	
Capital stock:	
Preferred .....	\$2,500,000
Common .....	4,000,000
Portland Railway Company first and refunding mortgage 5 per cent bonds, due Nov. 1, 1930.....	6,227,000
Underlying bonds .....	1,603,000
Accounts and notes payable .....	226,106
Accrued liabilities .....	148,630
Deferred liabilities .....	20,503
Sinking fund for extraordinary renewals, depreciation, etc. ....	46,463
Profit and loss .....	72,197
Total .....	\$14,843,898

## NEW CAR BUILDING PLANT AT DANVILLE, ILL.

The Danville Car Company formally opened its new car works at Danville, Ill., on March 16, and is now ready to do business. The company will build street railway cars of every description, for both city and interurban service, as well as steam coaches, freight cars and trucks and locomotives for electric service. It will also make a specialty of repairing steel cars. The works cover 160,000 sq. ft., and were built and completed in a remarkably short period, the site having been converted from a corn field to a modern car building factory in ninety-five working days. The history of the plant can be told in a few words: When H. F. Vogel, formerly vice-president and general manager of the St. Louis Car Company, severed his connection and disposed of his holdings in that company, he organized the Danville Car Company, Inc., under the laws of the State of Illinois with a capital stock of \$250,000. A large tract of land was secured on the outskirts of the city of Danville, and ground broken on Nov. 17, 1906, and on March 15 the plant was practically completed.

The erecting shop is 320 ft. x 150 ft., the freight car shop is 320 ft. x 90 ft., the wood working department measures 180 ft. x 60 ft., the cabinet shop 120 ft. x 60 ft., the varnish and trimming shop 120 ft. x 60 ft., the power house 120 ft. x 60 ft., the blacksmith shop (all steel) is 120 ft. x 82 ft. In addition the works include dry kilns, 160 ft. x 18 ft.; truck and machine shops, 120 ft. x 120 ft., and office building, 120 ft. x 30 ft.

The construction work was done by the H. F. Vogel Contracting & Railway Supply Company, of St. Louis, Mo., and is a model of excellence and durability. Due care was taken in the location of the various shops to provide for ample extensions should occasion demand them.

The organization of the company is as follows: H. F. Vogel, president and manager, has associated with him as secretary and

treasurer E. H. Gorse, who was formerly secretary of the Missouri-Lincoln Trust Company, of St. Louis; W. L. Primm, formerly general manager of the Merchants' Association, as auditor and purchasing agent; E. J. Lawless, formerly with the American and John Stephenson Companies, as general sales agent; G. A. Moffat, formerly with the Philadelphia Traction and Metropolitan Street Railway Companies, of New York, as general superintendent; H. O. Lapp, formerly of the Chicago & Eastern Illinois Railroad shops at Danville, will be in charge of the freight car shop.

## TWO RAILWAYS PROJECTED FROM FRESNO TO THE OCEAN

Two electric railway projects are now on foot for connecting Fresno, Cal., with the Pacific Ocean. The latest projected road is the San Joaquin Valley Western, recently incorporated by influential men who are directly interested in the development of the country through which the road will pass. The men include Senator Thomas Flint, of San Juan Bautista; C. G. MacBride, of San Jose, of the firm of Miller & Lux; Philip McRae, capitalist, of Hanford; C. P. May, president of the Bank of Coalinga; James Shaw Robertson, capitalist; J. O. Hickman, cashier of the First National Bank, Hanford; D. G. Hart, capitalist, Fresno; J. A. McClurg, Jr., Fresno, and William M. Graham, manager of the California Oil Fields, Ltd., Santa Barbara.

The capital stock of the new road is \$6,000,000, of which \$250,000 has been subscribed. Charles A. Lee is general counsel, and John R. Rogers, chief engineer of the Ocean Shore, has been appointed head of the engineering staff.

The San Joaquin Valley Western is to start at a point in the city of Fresno and run by the most available route to the town of Mendota, thence westerly to the town of Tres Pinos in San Benito County, northerly to the city of Hollister, and continue to the town of Chittenden, Santa Cruz County; thence westerly to the city of Watsonville, a total distance of 140 miles. In addition two branches are contemplated, one 40 miles in length, to the city of Hanford, and a second, also 40 miles long, to Coalinga. The length of main line and branches is to be 220 miles.

The route in general is northwest from Fresno, and will be the most direct line to the sea coast. At Watsonville the new line will meet the Ocean Shore Railway, with which a traffic arrangement will be effected that will allow unbroken connection between Hanford, Fresno, Coalinga and San Francisco.

The incorporators of the San Joaquin Valley Western deny that their project has even the most distant connection with the Monterey, Fresno & Eastern Railway Company.

The new road has already been financed, and will be energetically rushed to completion just as soon as the survey is made. The projectors also assert that electricity will be the motive power of the new line.

The second proposed line is the Monterey, Fresno & Eastern Railroad Company, which has done considerable preliminary work. The company announces that on April 1 it would start a daily steamer service between Monterey Bay points and San Francisco. By that time the company expects to have under construction its wharves at Monterey and Port Watsonville. To connect the latter point with Watsonville the company will use the electric line recently purchased from the Watsonville Transportation Company for carrying freight and passengers. The railway company states that since filing articles of incorporation, Dec. 31, it has acquired franchises and terminal facilities for a standard gage line between Monterey and Fresno, and contracts have been let for a large part of the construction work. Timber has been secured for building 60 per cent of the line. Contracts for steel and other structural material have been placed, delivery to begin in June or July. Sufficient bonds have been sold to afford means for early construction. It is expected that by Sept. 1 cars will be running from the Monterey Bay terminus into Salinas and San Juan.

It is proposed to build the line from Monterey Bay through Salinas, San Juan, Hollister, Tres Pinos and Cleveland, and by way of the Los Aguilos Pass to Fresno. The company is in no way related to the Monterey & Fresno Railway Company, organized some years ago, or to any other line projected in that section. The directorate includes E. W. Wilson, S. C. Buckbee, L. F. Monteagle, W. H. Chickering and Alfred D. Bowen, all of San Francisco, and William Palmtag, of Hollister.

## BIDS RECEIVED FOR BRIDGE LOOP—IN NEW YORK TWO BIDDERS

The New York Rapid Transit Commission met at noon Thursday, April 11, to receive bids for the construction of the first section of the subway loop which is to connect the Williamsburg and Brooklyn bridges. The section for which bids were received is the longest and most important of the five sections. It will extend from Pearl Street to Canal Street and should be finished within twenty-one months. There were only two bids made for the construction work. The bidders were the Degnon Company and the Cranford Company. The Degnon Company offered to construct the section for \$2,952,000, and the pipe galleries for \$83,000. The Cranford Company made a bid of \$3,773,000 and \$50,000 for pipe galleries. The Degnon Company did some of the work on the present subway. Vice-President Starin took the bids for examination, to report on them at a full meeting of the board later in the day.

Sixty days after the awarding of the contract, work will begin. It has been estimated that the expense of constructing the entire system, including that portion of it lying in Brooklyn, will be about \$15,000,000. It has been planned to have the system ready for operation inside of two years. The expense of construction will be paid for by the city in order that it may have the power to issue operating leases to both Manhattan and Brooklyn companies.

## DEDICATORY EXERCISES OF THE ENGINEERING SOCIETIES BUILDING

The Engineering Societies Building at 29 West Thirty-Ninth Street, given by Andrew Carnegie to the three founder engineering societies, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, and the American Institute of Mining Engineers, will be dedicated April 16 to 19.

The dedicatory exercises proper will take place Tuesday afternoon in the main auditorium. Owing to the limited seating capacity of the hall, admission will be by ticket only. The exercises will be opened by music, and prayer by Rev. Edward Everett Hale, Chaplain United States Senate. Communications from the President of the United States, the president of the Republic of Mexico, and the Governor General of Canada will be read, followed by a historical address by Charles F. Scott. The keys of the building will be accepted by E. E. Olcott, president of the United Engineering Society. Mr. Carnegie will deliver a short address, after which there will be music and an oration by Dr. Arthur Twining Hadley, president of Yale University, on "The Professional Ideals of the Twentieth Century."

A reception will be held for members and ladies Tuesday evening, at which the guests will be received in the main auditorium by the president of the American Institute of Electrical Engineers, Dr. Samuel Sheldon, and Mrs. Sheldon; the president of the American Society of Mechanical Engineers, Dr. Frederick Remson Hutton, and Mrs. Hutton; the president of the American Institute of Mining Engineers, Dr. John Hays Hammond, and Mrs. Hammond; the president of the United Engineering Society, E. E. Olcott, and Mrs. Olcott; the chairman of the reception committee, John W. Lieb, Jr., and Mrs. Lieb. The officers and councils of the societies will receive the members and guests in the rooms of the respective societies.

The second dedicatory exercise will be held on Wednesday afternoon, April 17, at 3 o'clock, when the audience will be addressed by the presidents of the three founder societies. Greetings and felicitations for foreign and national scientific societies and institutions of learning will be read, and the John Fritz Medal will be presented to Alexander Graham Bell by Charles F. Scott, chairman of the John Fritz Medal Board of Award. Presentations of medals for distinguished services will then be made to Ralph W. Pope, secretary of the American Institute of Electrical Engineers; Frederick Remson Hutton, past-secretary of the American Society of Mechanical Engineers, and Rossiter W. Raymond, secretary of the American Institute of Mining Engineers, by A. R. Ledoux, past-president of the United Engineering Society.

In addition to these exercises there will be professional sessions of the three societies. They will commence with a meet-

ing at 8:15 on Monday, April 15, of the American Institute of Electrical Engineers. It will be held in the auditorium, and Sir William Preece, past-president of the Institution of Electrical Engineers, will act as chairman. A paper will be presented by Louis M. Potts, on the Rowland telegraphic system and its apparatus. The professional meeting of the American Institute of Mining Engineers will be held on Thursday afternoon at 2 o'clock, when H. T. Hildage will read a paper on "Mining Engineering Operations in New York City and Vicinity." This paper will describe the excavation and tunnel work now under construction by the transportation companies. The American Society of Mechanical Engineers will hold a session on Thursday evening at 8 o'clock, when William Crozier, Brigadier-General, Chief of Ordinance, U. S. A., will deliver an address on "The Ordinance Department as an Engineering Organization." Friday afternoon will also be devoted to the reading and discussion of professional papers by the American Institute of Mining Engineers.

The functions of the week will terminate with an informal smoker and vaudeville for the members of the founder societies, on Friday evening, at 8 o'clock in the concert hall of Madison Square Garden. For this a subscription fee of \$2 is asked from those who expect to attend.

## STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED MARCH 26, 1907

848,035. Trolley Wire Sleeve; Charles W. Ketteman, Dayton, Ohio. App. filed Oct. 29, 1906. An emergency connection for broken trolley wires consisting of a sleeve having gripping rollers with serrated edges which engage the ends of the wires.

848,111. Rail-Joint; Francisco F. Martins, Gloucester, Mass. App. filed June 21, 1906. Relates to means for securing a splice-joint.

848,155. Reinforced Concrete Cross-Tie; William A. Bryant, Wetumpka, Ala. App. filed Jan. 14, 1907. A railway tie including a plurality of detachable sections, spaced reinforcing-loops embedded in each section and having their closed ends extended in opposite directions and means for connecting the sections.

848,197. Railway Tie; Parshall D. Nicols, Edgeworth Borough, Pa. Consists of a rail section having one of its members spread laterally to form the base-plate and having portions of its opposite members spread laterally to form seats for the rails.

848,201. Car Seat; Charles K. Pickles, Philadelphia, Pa. App. filed March 17, 1905. Details of construction of a walk-over seat.

848,262. Fare Register; Wilfred I. Omer, David B. Whistler and John E. McAllister, Dayton, Ohio. App. filed Nov. 20, 1906. Details.

848,293. System for Operating Switch Points and Signals; Albert Descubes, Paris, France. App. filed Aug. 27, 1904. Provides an interlocking system for railroad switches and signals adapted to work the switches and signals by means of two levers, each of which corresponds to one of the ends by which a train can enter or leave a protected zone of the road.

848,382. Overhead Trolley; Allen P. Lord & Nathaniel Wilkins, Bradford, Pa. App. filed Oct. 29, 1906. Mounted on the trolley axle is a U-shaped spring the extremities of which extend above the trolley wheel, and are bent horizontally inward to prevent displacement of the wheel. The harp is hollow and wicks conduct the oil through the arms thereof to the bearings of the trolley wheel axle.

848,408. Roundabout or Carousel; James M. Taylor, Omaha, Neb. App. filed Sept. 26, 1906. Provides a passenger-carrying device in which two series of trucks are moved in opposite directions upon sinuous tracks or ways.

848,442. Traction Wheel and Rail; Matt C. Carr and Charley R. Bohannon, Easy Gap, Ky. The wheel has an auxiliary tread consisting of a toothed surface adapted to engage a rack attached to the rail. To be used on up grades.

848,507. Underground Electric Railway; Sylvester M. Sullivan, San Francisco, Cal. App. filed May 7, 1906. Relates to the installation of underground trolleys in the old cable conduit.

848,601. Electric Trolley Retainer; Edward T. Platt, Chicago, Ill. App. filed May 21, 1906. A pair of flaring blades pivoted in the trolley harp and upwardly spring pressed to guide the wheel on the wire and which are depressed in passing hangers, etc.

848,610. Overhead Trolley Frog; Burt Wilbur, Syracuse, N. Y. App. filed July 18, 1905. Comprehends a form of switch point in the frog which is spring pressed to guide the trolley wheel in one branch of the turn-out, so that the wheel always takes the path corresponding to that of the car.

### PERSONAL MENTION

MR. M. L. MASELLER has resigned as general freight agent of the Mexico Electric Tramways, Ltd., of Mexico City.

MR. E. P. WETMORE has been appointed general manager of the Augusta Railway & Electric Company, of Augusta, Ga.

MR. JOHN F. RUTHERFORD has been elected president of the Citizens' Light & Transit Company, of Pine Bluff, Ark., to succeed Capt. J. B. York, resigned.

MR. W. K. BALL has resigned as superintendent of shops of the Tacoma Railway & Power Company, of Tacoma, Wash., to enter as a partner the Horton Furniture Company, of Tacoma.

MR. FRANK M. TUCKER, for many years chief inspector of the Louisville Railway Company, has resigned, because of illness, and his former assistant, Mr. A. J. Connelley, has been appointed chief inspector.

MR. CHARLES GREEN, at one time president of the Fourth Street and the Arsenal Railway Companies, of St. Louis, now merged into the United Railways, and who was prominent in business circles in St. Louis, is dead.

MR. P. J. WOOD, formerly master mechanic of the Oneonta & Mohawk Valley Railroad Company, has accepted a position with the Southern Michigan Railway Company, of South Bend, Ind., as superintendent of motive power.

MR. A. H. JONES has resigned as general superintendent of the Greensboro Electric Company, of Greensboro, N. C., to become connected with the Southern Equipment Company. He is succeeded in the Greensboro company by Mr. J. K. Russell.

MR. SAMUEL CROSS, superintendent of repairs and tests of the Interborough Rapid Transit Company, of New York, has recently resigned his position to engage in business for himself. Mr. Cross has organized the Cross-Lachance Electric Company, of which he is president and general manager.

MR. R. V. PARTAIN, former superintendent of the local division of the Public Service Corporation in Perth Amboy, has been appointed assistant division superintendent in Elizabeth. Mr. Partain occupied a similar position in Jersey City three years ago, when he went to work on the main line of the Public Service Corporation, and then at Perth Amboy.

MR. JAMES W. ANDERSON, recently superintendent of the Blackstone Valley Street Railway, has been appointed superintendent of the Worcester & Southbridge Street Railway, with offices in Worcester. This road, with the Worcester Consolidated and the Blackstone Valley Company, is owned by the New England Investment & Securities Company.

MR. E. R. GILBERT, superintendent of the lines of the Consolidated Railway Company between Stamford and New Rochelle, has resigned from the company. Before becoming connected with the Consolidated, Mr. Gilbert was general manager of the Chicago Electric Traction Company, and later was with the Helena Railway Company. At one time he was general manager of the Miami & Erie Canal Transportation Company.

MR. SAMUEL P. HUNT has been appointed assistant to General Manager J. Brodie Smith, of the Manchester Light & Power Company, which operates in Manchester, N. H., and to Nashua, with the title of assistant general manager. Mr. Hunt was born in Manchester and graduated from Dartmouth College, after which he attended the Massachusetts Institute of Technology, graduating in 1896 as an E. E. Immediately after graduation he accepted a position with the American Telephone & Telegraph Company, and later became superintendent of the

Binghamton Light, Heat & Power Company. He has recently been employed as an electrical engineer by the Boston & Northern Street Railway Company, with headquarters at Boston.

MR. J. F. HEYWARD has resigned as manager of the Cincinnati Traction Company to become president and general manager of the Citizens' Traction Company, of Oil City and Franklin, Pa. Under the management of Mr. Heyward many improvements were made in the railways at Cincinnati, and President Schoepf expressed regret at his departure. However, he felt that the possibilities of a wider field of action were offered in the position to which he goes.

THE BOSTON ELEVATED RAILWAY COMPANY announces several important changes in its personnel. Mr. George R. Tripp, superintendent of division 6, Charlestown, is appointed superintendent of transportation. Mr. Julius E. Rugg, superintendent of transportation, becomes superintendent of employment and discharge. Mr. Karl S. Barnes, superintendent of employment and discharge, is named as acting superintendent of division 4, East Boston, in place of Mr. H. H. Esty, whose new position is not yet announced. Mr. Lemuel T. James, chief inspector of division 6, will be acting superintendent of the Charlestown division.

MR. HENRY WALTON GOODE, president of the Portland Railway, Light & Power Company, of Portland, Ore., died at Atlantic City, N. J., a few days ago, after a short illness. Mr. Goode was very prominent in business affairs in the West, and was director-general of the Lewis and Clark Fair in 1903, and president of the fair in 1904. Mr. Goode was born in Indianapolis, Ind., Sept. 26, 1862. After being educated in the public and high schools of Indianapolis, he studied electricity, and from 1885 to 1892 he was connected with the Westinghouse Electrical Manufacturing Company, of Pittsburg, and with the General Electric Company, of New York. Mr. Goode was married in 1889 to Miss Edith B. Fairlough, of Chicago. General Manager Fuller is temporarily in charge of the executive affairs of the corporation.

MR. DAVID WILLCOX, for many years identified with the Delaware & Hudson Railroad as counsel, and for the last four years as president, retired from that position Tuesday, April 9, and was succeeded by Mr. L. F. Loree, formerly president of the Baltimore & Ohio. At the same time the resignation was announced of Mr. A. I. Culver, as second vice-president of the company. Both Mr. Willcox and Mr. Culver have been prominent in electric railway work recently, because they were identified as officers with the electric railway companies under the control of the Delaware & Hudson, acting in this connection in the case of the United Traction Company, of Albany, as president and vice-president, respectively, of the company. Mr. Willcox had only recently been elected president of the Hudson Valley Railway, to succeed Mr. J. H. Caldwell, resigned.

MR. L. L. SMITH has resigned as master mechanic of the Schenectady Railway to accept similar position with the Chicago & Milwaukee Electric Railroad, with headquarters at Highwood, Ill. Mr. Smith has been connected with railways, steam and electric, for the last sixteen years. Upon graduation from Cornell University, in 1890 he entered shops of the Chicago, Burlington & Quincy Railway, at Aurora, Ill., serving for nine years in various capacities from apprentice to general foreman. In 1899 Mr. Smith entered the service of the Chicago Great Western Railway as division master mechanic, and subsequently had charge of the shops at Oelwein, Iowa, for the Chicago Great Western Railway, and at Elizabethport, N. J., for the Central Railroad of New Jersey. Mr. Smith became master mechanic of the Schenectady Railway in November, 1905, having been previously connected with the New Hampshire Electric Railways at Salem, N. H. In going to the Chicago & Milwaukee Electric Railroad, Mr. Smith succeeds Mr. Alex McIver, who has resigned to enter the employ of the Metropolitan Street Railway, of New York City.

MR. EDWIN E. JOHNSON has been appointed by the Georgia Railway & Electric Company, of Atlanta, Ga., to the newly-created position of manager of the publicity department, which the company has decided to establish to handle all matters of advertising connected with the company, all matters of general news interest, as special attractions gotten up by the company and things of similar nature. Mr. Johnson is one of the best-known newspaper men in Atlanta. He began his career on

"The Atlanta Journal" about six years ago. Later he was with "The Constitution," and was for a time city editor of "The Atlanta News." Subsequently Mr. Johnson was connected with the New York "American." When "The Georgian" was launched he returned to Atlanta as city editor, surrendering that position to go into the advertising field.

MR. MASON B. STARRING, formerly vice-president of the Chicago City Railway, has assumed the presidency of the Northwestern Elevated, of Chicago, succeeding Mr. Clarence Buckingham, who resigned to give his attention to other matters. Mr. Buckingham, however, remains in the management as vice-president and director, succeeding Mr. Walter B. Smith as vice-president. Mr. Samuel McRoberts succeeds Mr. Smith as a director and Mr. Starring takes the place on the board formerly held by Mr. C. Ledyard Blair, of New York. Mr. McRoberts represents the Armour and associated interests in the company. Mr. Starring is a native of Chicago, was educated in the public schools and has been in the railway business since early youth. In the beginning of his career he was employed in the operating departments of the Burlington and the Pennsylvania roads. In 1888 he went to the Chicago City Railway Company as a clerk, studied law under Mr. William J. Hynes and Mr. J. S. Grinnell, and advanced until he became vice-president and general solicitor of the company.

MR. F. L. FULLER, general manager of the New York & Queens County Railway Company, has been elected president of the company to succeed Mr. Arthur Turnbull, resigned. Mr. Fuller has been general manager of the company several years, and before taking charge of the property was general manager of the United Power & Transportation Company, which controlled a large number of electric railway and lighting properties in the neighborhood of Philadelphia and Wilmington, Del. Mr. Fuller's connection with street railways dates from January, 1888, when he entered the service of the St. Paul City Railway Company as foreman of the Selby Avenue cable line, just placed in operation. The following year electricity was installed in St. Paul, and Mr. Fuller acted as assistant superintendent. On the consolidation of the St. Paul and Minneapolis systems in 1893, Mr. Fuller became connected with the West Chicago Street Railway Company, of Chicago, as assistant superintendent. The Chicago company's system was then divided between cable and horse lines, and in 1894 the work was begun of equipping the horse lines with electricity, with Mr. Fuller as superintendent. In 1899 Mr. Fuller accepted the position with the United Power & Transportation Company. The New York & Queens County system, now allied in interest with the Interborough Company, operates throughout Queens County, and eventually will operate into New York by tunnel from Long Island City to Forty-Second Street, Manhattan.

MR. J. B. POTTER has been appointed manager of the New York & Stamford Railway Company and the Stamford lines of the Consolidated Railway Company, to succeed Mr. E. R. Gilbert, whose resignation is announced elsewhere in this issue. Mr. Potter comes to Stamford from Putnam, Conn., where he was connected with the local branch of what now is the Consolidated Company. Mr. Potter's first work in the railway field was with the Westinghouse Electric Manufacturing Company, with which he was connected from 1897 to 1898. From the latter date till 1900 he was with Sanderson & Porter, of New York, as constructing engineer, building an electric railway from Central Village, Conn., to Webster, Mass. In November, 1900, Mr. Potter was appointed manager and treasurer of the Webster & Dudley Street Railway Company, at Webster, Mass., and continued in this capacity for two years, when, in addition to the management of the Webster & Dudley property, he was made the manager of the Worcester & Webster Street Railway Company properties. These properties he managed until September, 1903, at which time the Webster & Dudley and the Worcester & Webster Companies were leased to the Worcester & Connecticut Eastern Railway Company, extending from Webster to Moosup, Conn., and Mr. Potter was made general superintendent of the Worcester & Connecticut Eastern Railway Company, afterwards known as the Consolidated Railway Company, Putnam lines. In August, 1905, in addition to the duties of general superintendent of the Putnam lines of the Consolidated Railway Company, Mr. Potter was made general superintendent of the Worcester & Southbridge Street Railway Company, which position he held up to the time of his appointment as manager of the New York & Stamford

Street Railway Company and the Stamford lines of the Consolidated Railway Company.

MR. F. H. DEWEY, who, as announced in the STREET RAILWAY JOURNAL of April 6, assumed the presidency of the Worcester Consolidated Street Railway Company, of Worcester, Mass., as successor to Mr. Chas. S. Mellen, has announced a number of changes in the personnel of the companies brought under his jurisdiction. Both the Blackstone Valley and the enlarged Southbridge system will be operated from the Worcester office of the Worcester Consolidated Street Railway Company by General Manager Edward G. Connette. Mr. J. B. Potter, superintendent of the Worcester & Southbridge and Worcester & Webster lines, has been transferred to the superintendency of the Stamford system, at Stamford, Conn., another New Haven line, and his place will be taken by Mr. J. W. Anderson, superintendent of the Blackstone Valley. Mr. Samuel Anderson, general manager of the New Haven's Eastern Connecticut and Massachusetts lines, has been transferred to Connecticut, and in the future will be connected with the Connecticut end only. Mr. J. B. Gorman, superintendent of division 2 of the Worcester Consolidated, will take charge of the Blackstone Valley in connection with his division 2 work. The Worcester Consolidated Grafton line and its Marlboro & Westboro line will be transferred from division 2 to division 1, under Superintendent Thos. A. Leach, in order to equalize the division. The change will add about 100 miles to the lines operated by the Worcester Consolidated management, and all of these roads will be operated from Worcester by General Manager Edward G. Connette. The Worcester Consolidated, the Blackstone Valley and the Worcester & Southbridge are all owned by the New England Investment & Securities Company, and the Worcester & Webster and the Webster & Dudley by the Consolidated Railway Company of Connecticut. All of the roads in the operative consolidation are controlled by the New York, New Haven & Hartford Railroad, through these two holding companies. Mr. James W. Anderson, who leaves the Blackstone Valley road to take charge of the much larger Southbridge system, went to the Blackstone Valley line in 1900, when the road was taken over by Mr. M. J. Whittall and Mr. Alfred Thomas.

GENERAL EUGENE GRIFFIN, first vice-president of the General Electric Company since its organization in 1892, died suddenly April 10; the cause reported was apoplexy. Gen.



GENERAL EUGENE GRIFFIN

Griffin from 1888 to 1891 was second vice-president and general manager of the railway department of the Thomson-Houston Electric Company, and in this capacity had a great deal to do with the commercial establishment of the modern electric railway. It was largely through his initiative that the Thomson-Houston Company secured the patents and services of Mr. Charles J. Van Depoele, and upon this as a basis the Thomson-Houston electric railway system was established. Soon after, the important contract for the equipment with the electric system

of a large portion of the West End Street Railways, of Boston, was taken by the Thomson-Houston Company.

Gen. Griffin was born in Ellsworth, Me., Oct. 13, 1855, and was graduated from West Point in 1875. He immediately entered the corps of engineers of the regular army and served on various surveys until 1883, when he was appointed professor of civil and military engineering and the art of war at West Point. In 1885 he was transferred to the staff of Maj. Gen. Hancock, for whom he acted as aide-de-camp. In 1885 and 1886 he also served as chief engineer of Division of the Atlantic and Department of the East, and from 1886 to 1888 was assistant engineer commander of the District of Columbia. On the outbreak of the Spanish War he organized the first regiment of United States volunteer engineers and commanded this organization in the Porto Rico campaign. At the close of the war he was given the title of brigadier-general. He was a member of many clubs and engineering organizations, and was a director in most of the foreign Thomson-Houston companies. He was at the time of his death one of the Governors of the Engineers' Club, of New York.