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Reliability of Car Service in New York

An indication of the efficiency of the surface car operation in the New York metropolitan district is afforded by the monthly comparative reports of car defects published by the Public Service Commission of the First District. The report for February, published elsewhere in this issue, shows that not one of the seven systems compared suffered through defects in car equipment more than 0.85 pull-in per 1000 car miles operated, while one of them had only 0.17 pull-in per 1000 car miles. A study of the figures brings out strongly the superior reliability of the overhead trolley over the conduit plow collector which the railways in Manhattan Borough are compelled to use. Thus 53.27 per cent of the car defects reported by one conduit railway were due to plows alone, whereas the corresponding maximum of overhead current collector troubles was only 3.03 per cent. If the conduit railways had been operated by the overhead system their records would have approached, if not bettered, those of their fellow companies. Other items show wide differences. Thus motor troubles vary in their percentage of cause of pull-ins from 13.42 per cent to 51.25 per cent and car body troubles from 2.78 per cent to 24.79 per cent. Of course, the widely different conditions of service have much to do with these variations. Taken all in all, the small ratios of pull-ins show what can be accomplished by a thoroughgoing maintenance policy even in densely populated cities and in congested streets where the conditions of street railway operation are very arduous.

Water-Power Conservation Conference

The statistics and facts presented at the recent conference in New York on the subject of water-powers disclosed a most startling condition. The agitation for the conservation of our natural resources has brought about a deadlock in the development of water-powers and consequently has resulted, up to the present time, in a much larger depletion of the fuel supply of the country than if the conservation issue had never been raised. It has seemed impossible to reconcile the conflicting interests of the States, which own the beds of the rivers, and of the national government, which has control over navigable streams and forest reservations. At least it has been impossible for a power company in most cases to secure sufficient security of location to warrant the investment required in a power development. Secretary Fisher, who spoke at the conference, did not believe there was any vital point of difference between the States and the nation, and stated that the latter was now seeking information and advice as to the best policy to pursue. The absence of public interest in the question is due to the fact that the slight additional cost for power generated from

fuel makes little general impression, but this indifference on the part of the public should not be a bar to the adoption of some scientific system of tenure which would encourage the development of powers now going to waste. The proper plan, it seems to us, should be a gradual sale of the government rights in the water-powers, by auction if necessary, as the need for the development of a power becomes apparent. We presume that the same arguments will be offered against perpetual ownership of water-powers as have been offered against perpetual franchises for street railways, namely, that no legislature is wise enough to foresee the conditions in force 50 years hence, and that one generation has no right to give or barter away the franchise rights of those which are to follow. But when the rates and services of public utility corporations are controlled and regulated as they are to-day in most States by commissions, there is practically no danger that public rights will suffer greatly under a system of perpetual franchises. The latter, however, does give at least an assurance to investors that the integrity of the capital in the enterprise will be preserved. The limited-term franchise is logical only when the holder of the tenure is able to move his plant at the end of his lease without much loss.

The Late Mayor Johnson

In the death of ex-Mayor Tom L. Johnson of Cleveland the country has lost one of the most interesting, we might say most picturesque, characters that ever were prominently engaged in street railroading. No one we believe, least of all those many individuals with whom he was engaged in hostilities during his stormy career, will deny that he was gifted with great courage and resources, that he possessed marked ability as an inventor and as an organizer, that he was a keen judge of human nature, and that he had the great faculty of being able to attach closely to himself his business associates and those whom he wished to make his friends. On the other hand, few even among his friends, we think, will be disposed to dispute the statement that his greatest financial successes as an owner of electric railway properties did not come to him as an operator but as a promoter of competitive lines in large cities and through the sale of these lines afterward at a large profit to longer established companies. It was indeed on the rock of operation that Mr. Johnson's theory of low fares when put in practice went to pieces. As a fighter and as a leader of the opposition he was unexcelled. If Tom L. Johnson had lived a few centuries earlier than he did, we can easily conceive that his loyalty to his friends, his personal bravery and magnetism and the many other qualities of leadership which he possessed would have raised him to an eminent position among his fellows in an age when might was right. But the disaster in Cleveland irretrievably ruined his political prestige and undoubtedly hastened his death. It is fortunate for the street railways of the country and for the people of Cleveland that the fundamental error of his well-known views on street railway operation was exposed as soon as it was. A policy which had proved successful as a club and as a campaign cry broke down when applied as an economic proposition. No company can long continue to do business at less than cost, and in that cost every element of expense must be included. It is in connection with the demonstration of this truth in Cleveland that Tom L. Johnson will longest be remembered.

SINGLE-PHASE FOR TRUNK-LINE RAILROADS

Before it had half a chance to show what it could do the New Haven single-phase installation was condemned by many engineers as a costly failure. It was indeed an expensive experiment carried out on a large scale, and at first it went through many tests by fire. But, phoenix-like, it has emerged with a record for reliability and efficiency which is cause for pardonable pride on the part of those who staked their money and reputations on its success. Two years ago W. S. Murray, electrical engineer of the New Haven, in a paper read before the American Institute of Electrical Engineers in New York, related freely and frankly the early troubles which developed with the power house, the overhead line and the locomotives. There was nothing in the operating record for eight months of 1908 included in his paper which indicated fundamental or ineradicable faults in any part of the system, although the number and duration of the delays due to electric operation were not small. Last week at the Toronto meeting of the Institute Mr. Murray in a second paper continued his log of electric operation through the year 1909, and a comparison with the previous year seems fully to warrant his belief that the single-phase system is applicable to all conditions of trunk-line electrification. An average of 15 minutes' delay per 100,000 train miles due to electric operation as compared with 21 minutes per 100,000 train miles for steam locomotives is sufficient evidence of the reliability of the electrical apparatus. As to comparative first cost and operating expenses, the author of the paper states that under trunk-line conditions similar to those considered by him the installation cost of the single-phase system would be not more than 85 per cent of that of its next best competitor and that the operating expenses of the two would show an even more favorable ratio.

With the exception of two or three comparatively short tunnel divisions the electrified steam railroads in the United States are still hauling freight trains on main tracks and doing yard switching with steam locomotives. The New Haven will be the first railroad to abandon steam locomotives entirely within its electric zone and haul and switch freight cars with specially designed electric locomotives. One of the early arguments in favor of electrification was that a uniform type of locomotive could be used for all classes of service and that a less number of locomotives, therefore, would be required. But the New Haven will have three widely different types of electric locomotives, just as it now has three types of steam locomotives, for passenger, freight and switching service. The passenger locomotives have a rated capacity of 1000 hp; the freight locomotives have a capacity of 1600 hp and a starting torque sufficient to handle a train of 2160 tons; while the switching locomotives have a capacity of only 600 hp. Tests of a steam switching locomotive in the Harlem River yards showed that the average power developed by a switching locomotive in regular service was only 313 hp while the throttle was open and that the hourly average was only 115 hp. No individual steam locomotive with such a low load-factor can compare in efficiency with a central power station delivering energy simultaneously to passenger and freight road engines and to all the switching engines working in a large yard.

The improvement of the power station load-factor which should follow the use of electric locomotives in freight and switching service is one of the most promising developments of the future. During the passenger service peaks operating re-

quirements make it necessary to exclude freight trains from the main-line tracks and the schedules of freight trains can be adjusted at other times so as to strike a fairly even balance of load. Switching in the yards produces a steady load with only occasional peaks of instantaneous duration.

One of the minor engineering details to which Mr. Murray called special attention was the value of adequate insulation, especially where the insulator is under mechanical strain. In the Hoosac Tunnel the trolley insulators have a dielectric strength of 300,000 volts, although the wires which they support carry only 11,000 volts. The cost of insulators is only a small fraction of the total cost of electrification and money spent for additional protection against breakdowns of the line is the best kind of insurance against interruptions to the service.

The simplicity and efficiency of the New Haven distribution system is one of the best arguments in favor of single phase, and Mr. Murray's paper discusses this point at some length. It will serve in the near future more than 300 miles of single track from the Cos Cob power station. No pressure higher than 11,000 volts is used and the maximum copper feeder cross-section is only 850,000 circ. mil. Under peak-load conditions the potential at the ends of the lines comprising the distribution network will drop to only 9151 volts, which is well within the limit for keeping all trains on schedule time. In this connection it is interesting to note that in the 62 miles of yard track electrification not a pound of copper is to be used with the exception of small-size bonds on one rail of each track. The extensive network of overhead steel catenary and contact wires and the low average power developed by the switching locomotives make possible this considerable saving in first cost without lowering the efficiency of the electrical distributing system.

POSSIBLE IMPROVEMENTS IN THE MILEAGE OF STEEL WHEELS

The wide adoption of the solid rolled-steel wheel for both city and interurban railways has developed certain special problems which, if solved, will add greatly to the value of this type of wheel. These problems may be divided into two classes, those which demand the attention of the wheel maker and those which demand the attention of the wheel user. The product as delivered will be considered first.

One of the first complaints made by the operators of the rolled-steel wheel was that it varied in hardness. Improved methods of rolling have now made hard spots or isolated irregularities negligible, but it is still true that the rate of wear does increase after the first turning. However, if an analysis were made of all the turnings on several hundred wheels operated under the same conditions, it would probably be found that the mileage between turnings began to increase again after passing the original center line of the rim. This result should be expected, because a piece of steel as thick as a wheel-rim would naturally be softer through the center where the rolling process has the least effect. The suggestion has been made that the life of steel wheels can be prolonged if they are heat-treated like gears and axles. It should be borne in mind, however, that the fundamental reasons for heat treatment of gears and axles are considerations not of mileage but of insurance against tooth-stripping and breakage respectively. Again, the

probable lower braking coefficient of a heat-treated wheel might introduce new difficulties in high-speed operation. The manufacturers have also been asked to consider the possibility of a one-wear steel wheel. This appears more attractive than the heat treatment, for, instead of complicating shop operations, it actually would simplify them by eliminating turnings. Furthermore, the one-wear wheel has the great merit of lower weight; as will be appreciated from the fact that a 34-in. rolled-steel wheel weighing 560 lb. suffers a reduction of about 210 lb. when the radial wear has reached 2 in. A one-wear wheel, if commercially practicable, would reduce the weight of the rotating element of a car by at least 100 lb. per wheel. The principal field for immediate improvement in wheel manufacture is in greater uniformity of dimensions and profiles so that the user of a given diameter of steel wheel can place a pair in service without any preliminary truing up on the lathe. This would eliminate much of the flange trouble caused by improperly mated wheels.

It is now proper to consider how the wheel user can get better results if the product delivered is up to the mark. The most important problem in getting the greatest mileage is to find the proper relation between service wear and the additional tread reduction required on the lathe in order to maintain the proper thickness of the flange. This point was discussed at length in H. S. Williams' paper on "Wheel Turning" which was published in the March 25 issue of this paper. Mr. Williams' contention is that "greater mileage can be obtained by a few turnings with deep cuts than from frequent turnings with light cuts." The more general opinion is that it is cheaper, as well as safer, to have many light cuts, provided the expense of wheel-handling is not too great. Thus the Third Avenue Railroad, New York, trues up its wheels every 20,000 miles, the cuts never exceeding $\frac{1}{4}$ in. This practice absolutely avoids flange trouble despite unfavorable track conditions.

The effect of track conditions on effective mileage was clearly brought out in some figures given by J. P. Barnes at the March 22 meeting of the New York Street Railway Association. Mr. Barnes explained that his 37-in. wheels gave less mileage than his 35-in. wheels because the former had to be operated over city tracks designed for chilled-iron wheels; consequently the limit for re-turning was set by the danger of derailment due to thin, sharp flanges and not by considerations of economy. In short, maximum life was out of the question with the best possible wheels if the track was not primarily intended for interurban trucks. There is no question, however, that better results can be obtained from steel wheels if more exact methods are used in the shops. The proper depth of cut should be accurately gaged in advance and not left to be guessed at by the machinist, for an extra $\frac{1}{16}$ -in. cut may mean a loss of anywhere from 6000 miles to 10,000 miles in available life. Since variations in diameter of mismatched wheels cause so much flange wear, the wheels on the same axle should not be permitted to vary more than $\frac{1}{32}$ in. in diameter. Other practices which tend to give better results are to space the wheels at absolutely equal distances from the center of the axle; to use anti-friction side and center plate bearings, especially on short wheelbase trucks with outside-hung motors; to apply equal braking pressure on all wheels and to employ brakeshoes which will not sharpen or distort the flange.

OFFICE BUILDING AND CARHOUSE OF THE DENVER CITY TRAMWAY COMPANY

BY JOHN EVANS, CHIEF AND ELECTRICAL ENGINEER DENVER CITY TRAMWAY COMPANY

The growth of the Denver City Tramway Company has been along radiating lines and a majority of the car lines of the system have their terminus at the "central loop" on Fifteenth Street, between Arapahoe Street and Lawrence Street. The car lines that do not terminate at the loop pass within a block or two of it, so that the central loop is the heart of the system. The "interurban loop," which is used by Denver's suburban cars, is located on Arapahoe Street between Fourteenth and Fifteenth Streets, so that the street railway center of Denver is at Fifteenth and Arapahoe Streets.

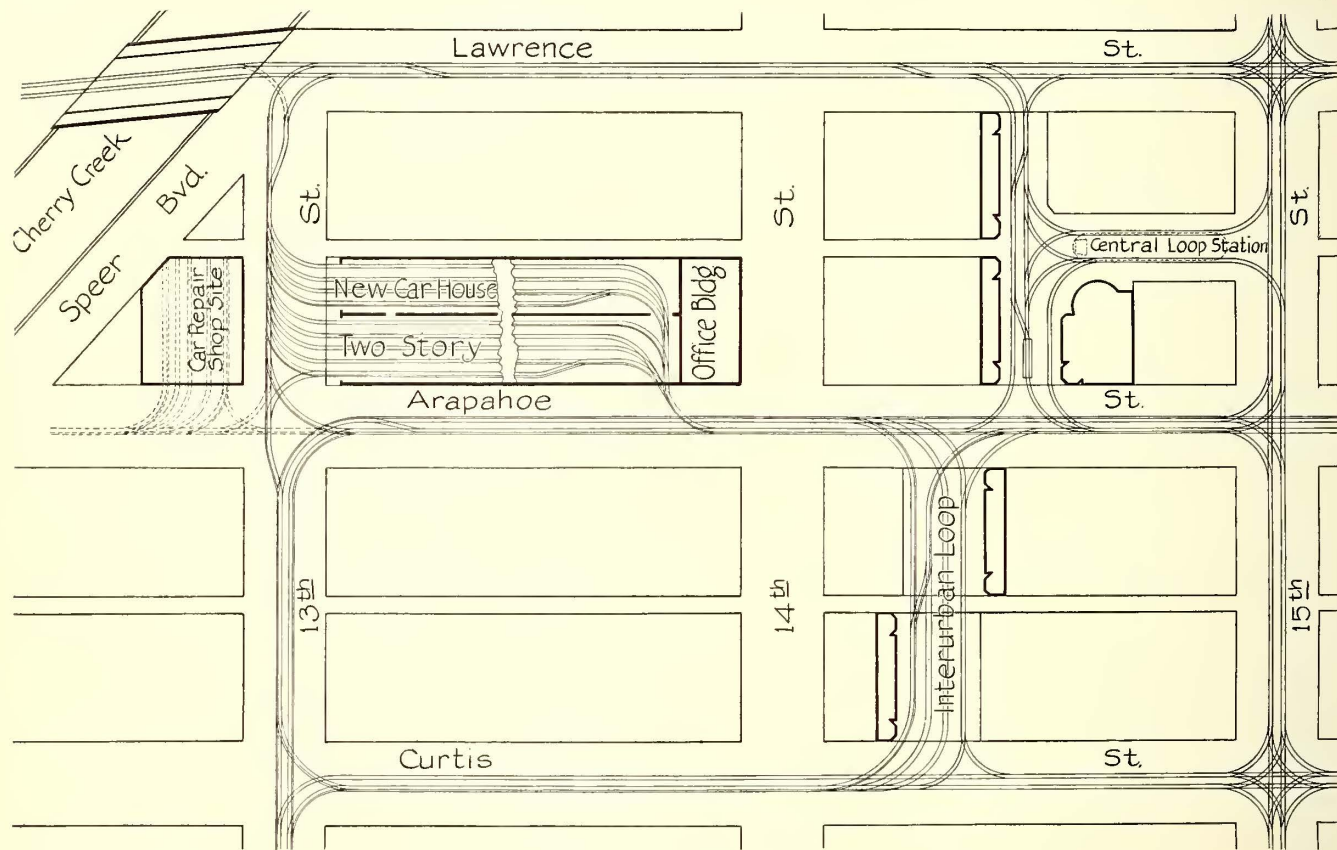
The Tramway company has never lagged behind the growth of Denver, but has been a potent factor in the building of an

trainmen. This is conveniently located in the carhouse and will be equipped with the most desirable features. The Tramway company is fortunate in having a class of trainmen whose desire is to remain with the company. This is probably accounted for by the fair treatment that they receive and the numerous advantages which are placed at their disposal.

The following is a statement of the general character and chief points of interest of the office building and carhouse. The accompanying engravings show the present condition of the building and its location with relation to the central loop and vicinity.

OFFICE BUILDING

This office building will allow the Tramway company to concentrate in a central administration building its now somewhat scattered departments, bringing them much nearer the center of the system. This building is 60 ft. x 125 ft. in ground dimensions and consists of a basement and eight floors. The Tramway company will at present occupy five floors and the



General Plan Showing the Location of the New Office Building and Carhouse in Denver; Also the Location of Important Track Loops

extensive city. With the increased growth of the city and the street railway system the Tramway company felt the advisability of collecting so far as possible under one roof the various departments of the organization. The economy to be effected by the construction of a carhouse in the heart of the city was also apparent, and the company decided upon the erection of a two-story carhouse and an eight-story office building. An ideal site for the purpose was secured on Arapahoe Street between Thirteenth and Fourteenth Streets, one block distant from the interurban and city loops.

The architects for the building are W. E. and A. A. Fisher; the consulting engineers are Crocker & Ketchum; the general contractor is the Whitney-Steen Company; the building was planned and erected under the supervision of the engineering department of the Tramway company. Construction was begun in March, 1910, and the building will be ready for occupancy in May of this year. Fireproof construction has been used and every safeguard against fire has been installed.

Considerable attention has been given to a club room for

remaining three floors will be rented until such time as the increased growth of the organization requires their use by the company.

CONSTRUCTION MATERIALS

The building has reinforced concrete framework. Square steel rods were used as reinforcing and gravel for the concrete. The exterior is finished with "Blackstone" brick of a rich red color, laid with wide joints of black mortar and ornamental white terra cotta. The floors are of structural terra cotta and reinforced concrete combined. The interior partitions are of hollow tile. The public halls will be furnished with Tennessee marble flooring of a light pink shade, and a veined white Arizona marble wainscot to a height of 4 ft., with a base of green Vermont marble. The office rooms will be floored with wood. Wherever there is a fire risk metal window frames are used with wire glass panes.

ARRANGEMENT OF OFFICES

On the lower floor are the offices of the superintendent of transportation and the treasurer; also a room for distributing

lost articles turned in by trainmen; also a large bulletin room used by the trainmen and containing lockers for their use. The second floor will be occupied by the physicians, the Tramway Mutual Aid Society and the legal and claim departments. The third, fourth and fifth floors will be rented as stated above. The auditing department will occupy the sixth floor and the engineering department the seventh floor. The eighth floor will be occupied by the president, directors, vice-president and general manager and the purchasing department.

There are two public elevators, each 5 ft. x 8 ft., and one private elevator. Each floor has two vaults for documents and records. There will be an additional vault in the bulletin room on the first floor, to be used for receiving the daily receipts of the conductors. The conductors will deposit their receipts in this vault by means of a burglar-proof chute leading to a truck in the vault. This truck will be taken daily to the treasurer's office on the same floor, where it will be emptied and replaced in the vault. A large number of the offices are provided with wall safes.

The offices of the treasurer, general manager and auditor will be connected by a pneumatic tube system to expedite the delivery of vouchers and other papers. There will be a public mail chute in the hall on each floor, and a private mail chute connecting some of the departments. The floors occupied by the auditing and the engineering departments each have a private telephone system for communication between the offices on the same floor. The elevator machinery is located in a pent house on the roof. The roof is made waterproof by laying a composition roofing on a concrete slab.

HEATING

A vacuum direct steam heating system will be used throughout the office building. Three 150-hp boilers are installed in the basement. This plant will also heat the carhouse and other buildings of the company at the central loop. The boilers are equipped with chain grates, coal hoppers and ash conveyors.

LIGHTING AND POWER

The office building, carhouse and central loop buildings will receive light and power from the plant in the basement of the

a. c., 60-cycle distributing system for lighting and for power to run a ventilating fan for the carhouse, and power for the pneumatic tube system. The elevators, house pumps, sump pumps and roller doors will be operated by 600-volt d. c., which is the Tramway company's trolley voltage.

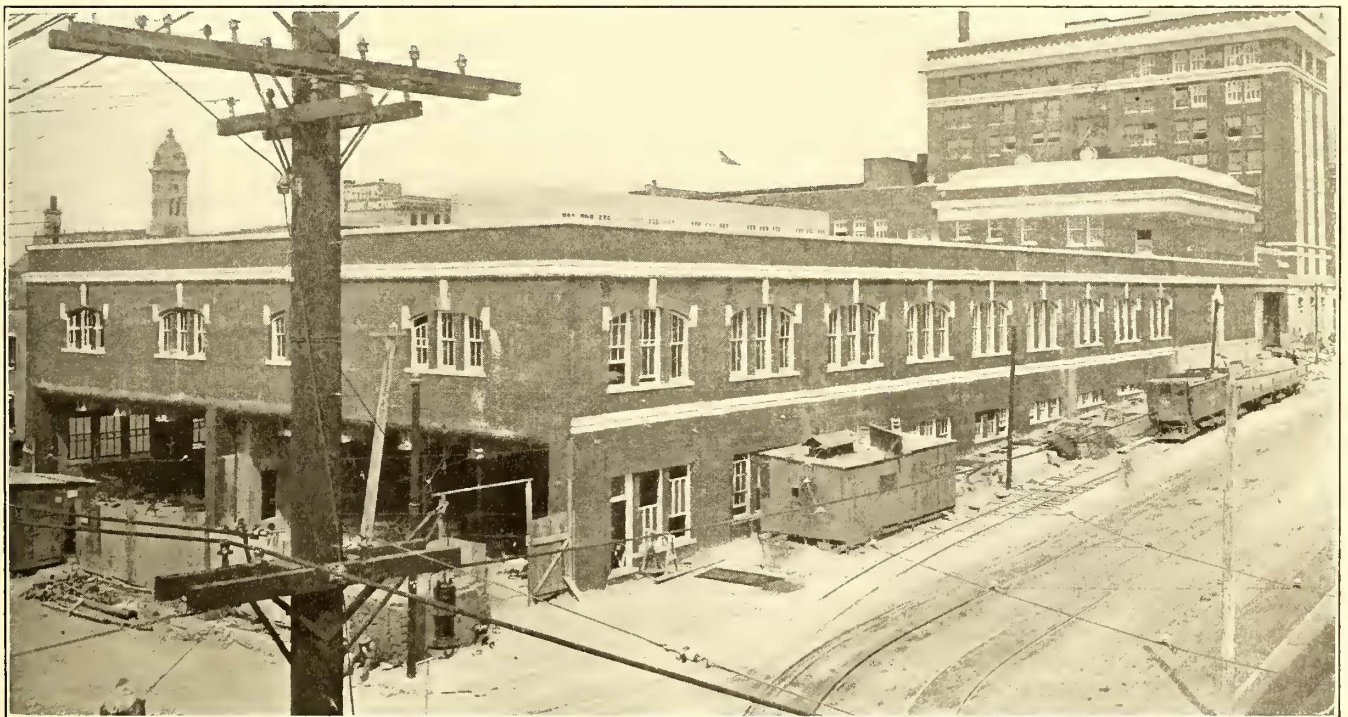
CARHOUSE

The location of the carhouse is most advantageous on ac-



Office Building and Carhouse of the Denver City Tramway Company

count of its proximity to the central loop. This will enable a car to start on its run almost immediately after leaving the carhouse and return to it with the least possible dead mileage



Carhouse Adjoining the Office Building of the Denver City Tramway Company

office building. This consists of two motor-generator sets, one of 40 kva and the other of 75 kva. The motors are driven by 600-volt d. c., supplied by the company's main power plant. This feed connection will be in duplicate to insure continuous operation. The generators will supply a three-wire, 110-220 volt

when taken off duty. A decrease in dead mileage results in a saving of trainmen's time, of wear on rolling stock and of power consumption.

A demand for extra cars on any line can be met much more readily from a centrally located carhouse than from any

of the outlying buildings. Extra crews can be readily obtained if needed.

The carhouse is 125 ft. x 326 ft. in plan. The street surface of Thirteenth Street is 14 ft. lower than Fourteenth Street. This difference in elevation is utilized by making a two-story carhouse and still avoiding the necessity of a car elevator. The tracks enter the lower floor from Thirteenth Street and run down a 0.75 per cent grade, and the tracks enter the upper floor from Arapahoe Street, near the office building, and run up a 0.75 per cent grade toward Thirteenth Street. This arrangement permits a height of 15 ft. 6 in. from top of rail to trolley for the lower floor. The trolley height is 16 ft. 6 in. on the upper floor. This trolley height is sufficient, although the height on street work is 18 ft.

TRACKS

The gage of the Tramway tracks is 3 ft. 6 in., but some of Denver's interurban lines are standard 4-ft. 8½-in. gage. One-third of the tracks in the carhouse will be built with three rails, so as to accommodate cars of either gage, and the tracks are so located that they can all be third-railed should this prove advisable.

There are nine tracks on each floor. Those on the lower floor enter the building from the end and run straight for its entire length. The full length of each track, about 320 ft., is available for car storage. One track runs into the store-room in the basement of the office building to facilitate delivery of supplies. On the upper floor the cars enter the building from the side and the storage capacity is somewhat reduced by the necessary curves and switches.

CAR CAPACITY

The standard Tramway motor car is 43 ft. 6 in. long. The carhouse will accommodate 63 cars of this type on the lower floor and 48 cars on the upper floor, a total capacity of 111 cars. In order to provide for a possible increase in the size of future equipment the tracks have been so located as to accommodate cars 51 ft. long and 9 ft. 1 in. wide. The upper floor is designed for cars weighing 27½ tons and the lower floor is designed for cars weighing 50 tons. The upper floor is for car storage only, but each track on the lower floor is provided with a pit 291 ft. long, so that the cars may easily be inspected. It is not, however, intended to use this building as a general repair shop, but only for inspection and emergency repair work. The Tramway company proposes to build a repair shop on Thirteenth Street, across the street from the carhouse. This shop, together with the carhouse, will enable a large amount of minor repair work to be done near the loop without sending the cars out to the general repair shops. This will reduce to a minimum the length of time that the cars are out of service and also decrease dead mileage.

THIRD FLOOR

There is a partial third floor above the two carhouse floors. This floor contains an auditorium, gymnasium, shower baths, lockers, reading room, barber shop and bowling alleys. The auditorium is 58 ft. x 70 ft. and has a seating capacity of 500. This auditorium will be used for trainmen instruction classes, meetings and entertainments. The gymnasium is 27 ft. x 47 ft. The bowling alley contains four standard alleys and will be well equipped. The gymnasium, shower baths, reading room, lockers and bowling alleys are for the use of the trainmen. These rooms, being on the upper floor, have ample light and air.

CONSTRUCTION DETAILS

The carhouse is of reinforced concrete and steel construction. Reinforced concrete is used wherever practical, but in locations where long spans are desired steel girders have been used. The largest girders are over the Thirteenth Street entrance of the carhouse. One of these has a length of 68 ft and weighs 22 tons. The outside finish of the carhouse is of the same materials as the office building, so that the appearance of the two buildings is harmonious. Their combined length is 386 ft. Each floor of the carhouse is separated into two bays by a brick fire wall. This was done in order to lessen insurance rates. On the lower car floor there is a line of columns between each two tracks. In order to keep a maximum clear-

ance these columns were limited to a width of 12 in.; the largest column is 12 in. x 40 in. in section.

The pits on the lower car floor are 4 ft. 9 in. deep below the top of the rail and 2 ft. 9 in. wide at the narrowest point. Two of the nine pit tracks are three-railed, the others are for the 3-ft. 6-in. gage only, but can be three-railed later if necessary. The pit runways are entirely clear and free from cross braces and other obstructions. The rails are supported by reinforced concrete bents, spaced about 6 ft. apart. The pits are open at the sides between bents and the rails are unsupported except at the bents. This arrangement allows access from one pit to another by passing under the rails; the clear span of the rails is of great convenience in repair work.

The carhouse is completely equipped with automatic sprinklers on both track floors and on the third floor. On the car floors both overhead and aisle sprinklers are provided. These sprinklers are supplied by a 35,000-gal. tank located on the roof.

The carhouse entrances will be provided with steel rolling doors. These doors vary in width from 11 ft. 4 in. to 26 ft. There are 10 of these doors, including one in the fire wall on the upper floor. This fire-wall door is provided with a fusible link and arranged to close automatically in case of fire. The two largest doors are motor-operated, with automatic cut-out. The smaller doors are hand-operated.

The openings in the fire wall and between the carhouse and the office building are provided with sliding steel doors, held open by fusible links. Tanks for motor and journal oil will be provided. These will be connected with self-measuring pumps located at convenient points on both floors.

An indirect, high-pressure steam-heating system is used in the carhouse. Air is heated by passing over steam coils and then forced by a centrifugal blower, 13 ft. in diameter, into the ducts which lead to outlets located in the pits and at the floor level of both floors, and also to outlets on the third floor. The lowest floor level of the office building and carhouse is below the city's sewer level, so that all seepage and wash water will be collected in a carhouse sump and pumped to the sewer level.

The car floors will be lighted by clusters of metal-filament lamps designed to give an intensity of 1 candle-ft. at the floor level. Sockets will be located in the pits so that portable lights may be connected. Current will be supplied by the motor-generator set in the office building. Power for roller doors, ventilating fans and pumps is obtained either from the motor-generator set at 220 volts a.c. or from the power house at 600 volts d.c.

FENDER TESTS IN ST. LOUIS

The series of tests of fenders and wheel guards being conducted by the Board of Public Improvements of the City of St. Louis began on the afternoon of April 11. Owing to a cold drizzling rain and the uncertainty of the time at which the tests were to be begun the attendance was small. Those present at the first test included representatives from the St. Louis railways and connecting railways and the Illinois Safety Appliance Commission.

The car used in the test was one of the bridge cars belonging to the Illinois Traction Company. The dummies employed were made of canvas and stuffed with sand and sawdust. One is about 5 ft. 9 in. in height, weighs 200 lb., and is intended to represent a man. The other is about 4 ft. in height, weighs about 50 lb., and is designed to represent a child.

The program of the test as published on page 640 of last week's issue was followed on April 11 by a test of the fender of Benjamin L. Ingram, Mount Vernon, Ill. This fender is of the protruding type with an auxiliary wheel guard. Several tests were conducted with this fender, but no percentages of its performance were made public after the trial.

On April 12 the commission expected to test the Seeley automatic wheel guard, and thereafter either a fender or a wheel guard every two days, as in the official schedule. The rules for the test as published on page 460 of the issue of this paper for March 18 will govern.

NEW INSTALLATION OF AUTOMATIC BLOCK SIGNALS ON THE SAN FRANCISCO, OAKLAND & SAN JOSE CONSOLIDATED RAILWAY

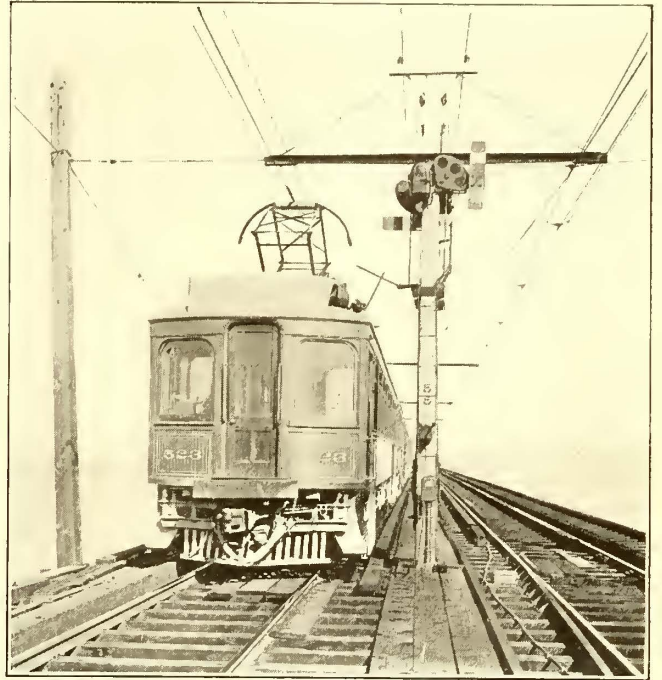
BY J. Q. BROWN, ASSISTANT GENERAL MANAGER AND ENGINEER KEY ROUTE

The San Francisco, Oakland & San José Consolidated Railway operates 30 miles of double-track line terminating at the end of a pier which extends 3 miles westward into San Francisco Bay from Oakland. The trains at this pier terminus connect with ferry steamers of this company which operate to and from San Francisco, 2.7 miles distant across the bay from the end of its electric railway pier. This road, popularly known as the "Key Route," has an equipment of 78 motor and trailer coaches, some of which are 70 ft. long. A modern and up-to-date train service is given, each train being made up of from four to eight cars operated with multiple-unit control and with a capacity of two GE-66 motors per car of each train. There are 575 trains operated daily to and from this pier terminal. The train service schedules are designed to provide very close connections with the ferry steamers which arrive at and depart from the terminal every 15 minutes during the rush hours and every 20 minutes during the remainder of the day. Each boat as it arrives is met by four or five trains which have come into the terminal from the pier approach under as close headway as is operable safely. The passengers from these trains transfer to the ferry steamers and those that have arrived by steamer in turn go directly to the waiting trains, which leave promptly for the 3-mile run over the pier to the shore and over a 1-mile double-track line to a junction where the routes divide.

On account of the exceedingly dense traffic on the pier and approaches to the junction points, and because of the comparatively high speeds and the foggy weather encountered at certain seasons of the year, the railway company recently undertook to protect its double-track line for a distance of 4 miles with an automatic block signal system, including automatic train stops. The signaling as installed provides for operating trains at full speed under 45-second headway, each train being protected by a full block overlap. Automatic train stops provide for service applications of the brakes whenever a train passes a signal set at stop.

In order to determine upon a suitable system to meet its rather severe operating conditions the railway company en-

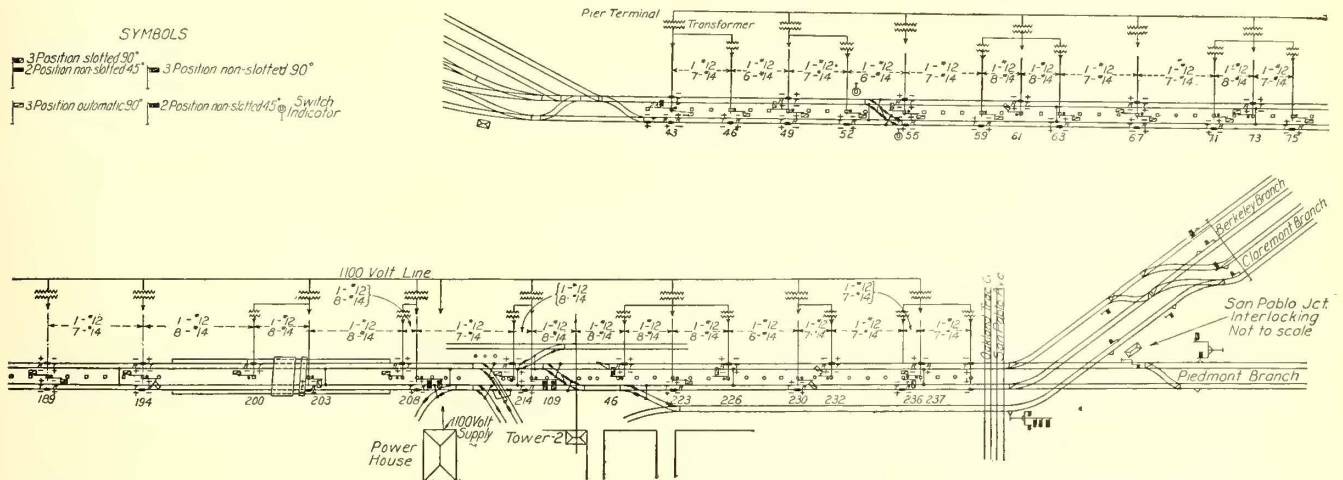
was given to other traffic conditions that might influence the location and scheme of control of the automatic block signals. A portion of the complete signal plan of the road showing the location of the signals with relation to interlockings, cross-overs and other physical features is reproduced herewith. The part of the complete diagram which has been omitted is to all practical purposes a duplication of parts here shown, the varia-



Key Route Signals—Automatic Stop Arm Engaging with Handle of Stop Valve on Car

ble features being the precise locations of the signals, which are placed according to speed, density of traffic and headway.

The signals installed are the General Railway Signal Company's model 2-A mechanisms controlled directly over the line without the intervention of line relays. The signals are operated by 55-volt a.c. motors, power for which is supplied from two motor-generator sets located in the nearby Yerba Buena power station. This plant generates current at 600 volts and



Key Route Signals—Diagram of Signal Locations

gaged the General Railway Signal Company, Rochester, N. Y., to study the situation and prepare plans for a suitable scheme of signaling. At the completion of the preliminary engineering work a contract was given to this company for the installation which is here described. As a part of the study of the operating conditions of the road, careful tests were made of the speed at various points and the braking distance and consideration

the motor-generator sets deliver 1100-volt, 25-cycle alternating current to the signal transmission line. The entire system, consisting of 75 signals with their controlling track circuits, etc., requires for its operation about 10 kw.

The signals user are three-position upper-quadrant semaphores spaced to permit a headway of 45 seconds at the speeds encountered on the various parts of the line. In this connect-

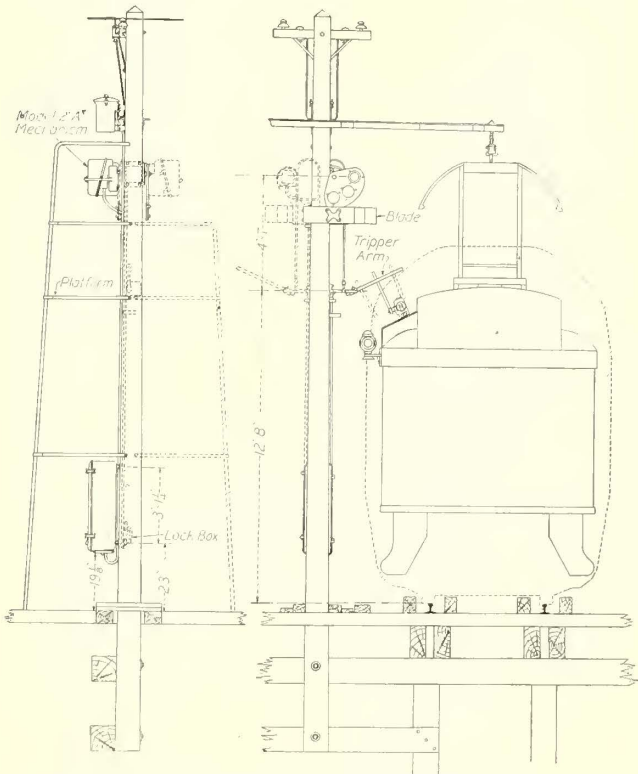
tion it might be stated that trains running from the pier terminus toward the mainland operate first at slow speeds which are gradually increased to about 35 m.p.h. In running from the mainland to the pier terminus the speeds over the 3-mile pier are maintained approximately at 35 m.p.h. These variations of speed require the arrangement of signals indicated

of maintenance and inspection. A photographic view and an elevation drawing of a signal pole showing the outline of a car and its clearance line, together with the position of the signal and the automatic train stop, are reproduced. The signal for the opposite track is indicated by dotted lines. Because of the salt spray which at times reaches the deck of the pier, lead-covered cables were used throughout the signal installation for making connections between transformers and relay boxes and between relay boxes and signal mechanisms. Lead-covered wire was used to make connections between the relay boxes and the rails. The track relays are the General Railway Signal Company's standard polyphase type, as used on a number of other large electric railway systems.

A feature of this installation which differs from the more common forms of signal systems for d.c. electric railways consists in the use of single-rail track circuits—that is, one rail of each track is given up for signaling purposes, the other line of rails being supplemented by a 1,000,000-circ. mil copper conductor to assist in carrying the return propulsion current. This plan of giving up one rail of each of the two tracks for the signal system was found to reduce considerably the cost of installation because the block sections are very short and the use of the large number of reactance bonds which otherwise would be required under such conditions would call for a greater initial expenditure than that required for purchasing and installing the supplementary return cables.

The two junction and terminal interlocking plants which have protected the movements of trains on this road now form a part of the completed signaling system. The signals at these interlockings through which the block system passes are now semi-automatic, electrically operated and under the full control of the towermen.

The scheme used for controlling interlocked signals is as follows: All slotted interlocked signals in accordance with the usual custom are normally at stop and assume a 45-deg. position when the proper levers are reversed, the track circuit ahead being unoccupied and the switches properly set. They also assume a 90-deg. position if the next signal ahead is at 45 deg. In addition to these conditions and on account of the use of automatic stops the next signal in the rear is normally at stop, the second signal in the rear being at caution. This arrangement of signals gives the towerman full control of any situation and prevents the unnecessary tripping of the automatic stop valves on a following train in case the signals

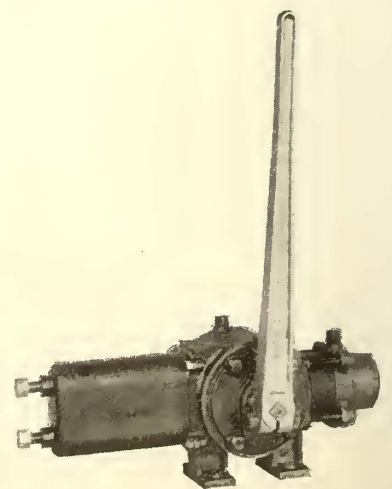


Key Route Signals—Details of Signal Pole and Automatic Stop Mechanism

on the plan, by reference to which it will be noted that the signals are spaced much closer in some locations than in others, this being necessary to maintain the 45-second headway under varying speed conditions. The automatic stop feature is provided by a stop arm operated by the signal mechanism which,



Key Route Signals—Signal Bridge at Tower No. 3



Key Route Signals—Automatic Stop Valve

when the signal is in the stop position, engages the trip arm of a specially designed valve mounted on the tops of all motor cars.

All signal transformers and relay boxes are located on the line of center poles which support the trolley wires, thus making the parts of the signal equipment easy of access for purposes

should be allowed to clear up behind a preceding train, and the towerman then should be slightly tardy in putting his signal levers to normal. The automatic signals near the pier terminal are so controlled as to give the towerman full control of approaching trains, permit switching movements against traffic with full automatic stop protection and prevent the towerman

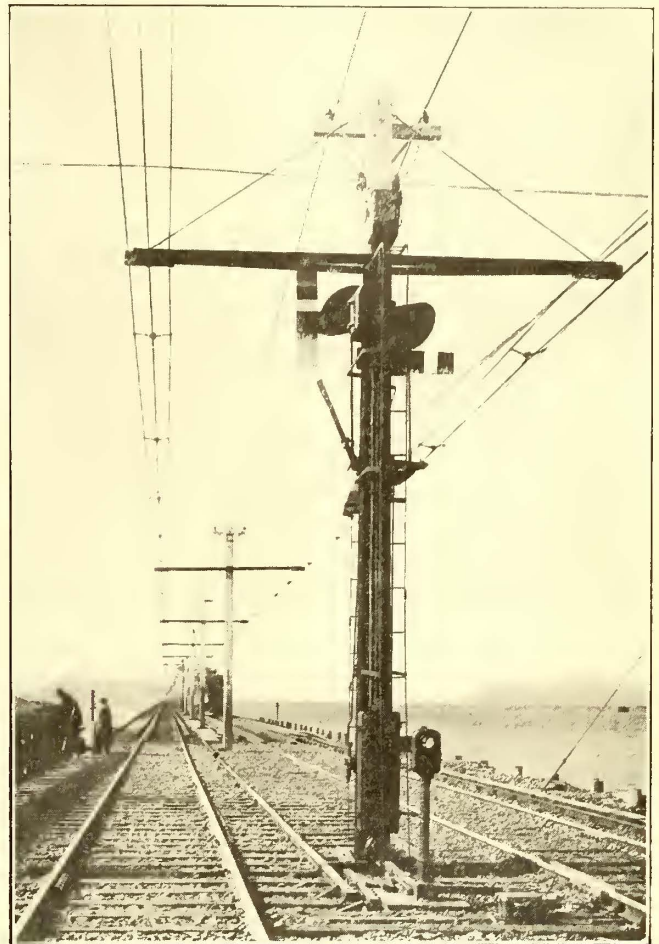
from accidentally tripping the stop valves on approaching trains. All mechanical levers controlling electrically operated signals have been provided with electric locks so connected that a route cannot be released unless the proper signals are at stop and caution. Switch indicators and circuit controllers have been provided on both ends of the two cross-overs on the pier and the indicators show whether or not it is safe to throw the switches, while the circuit controllers will set the proper signals at stop and caution if the track switch is thrown.

AUTOMATIC TRIP FOR TRAIN STOP

The illustration on page 664 shows the appearance of an automatic trip valve as designed by the General Railway Signal Company for providing automatic train stop operation in connection with each of the signals recently installed on the Key Route. The trip valves on the cars are mounted, two per car, on diagonally opposite corners of the car roof, as shown by the engravings, and provision for engaging the stop arm beneath the signal is made by placing the trip arm at an angle, as shown in the engraving of the signal pole and the car outline. The trippers on the cars are designed to reduce the pressure on the train line when a car passes under a signal set at stop. These trip valves mounted on the car roofs are so designed that if tripped the engaging arm will be depressed and held down by the air pressure behind a small piston within the mechanism, the air escaping out of a port which is uncovered when the trip arm is fully depressed. Where the headway is as close as that existing on the portion of the Key Route just protected with signals it would be very awkward if the trips were so designed that it would be necessary for trains to stand still until all of the trips could be restored by hand and the train-pipe pressure raised from zero to full release. To provide against this objection the trips here installed have been designed to be automatically restored by the simple process of reducing the pressure in the train pipe a predetermined amount by use of the motorman's brake valve. When this has been done the trips automatically return to their normal operating positions, and by not allowing a reduction to zero in the train pipe, which would occur before the trips could all be restored by hand, full release pressure can be obtained much quicker, air is saved and the result is that after a train has been stopped it can again be set in motion in a minimum of time.

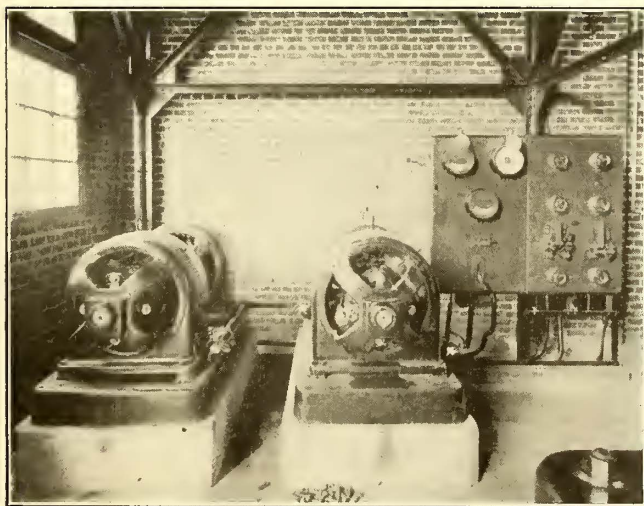
In an installation of this kind it is desirable to take away from the motorman means for affecting the braking distance when a train has been tripped. Otherwise he might, by accident or otherwise, in manipulating his air valve either to charge the train pipe or discharge it, cause his train to overrun the

man is said to be more or less compensated for—that is, if the motorman attempts to offset the effect of the automatic trip by charging his train line the port opening of the trip will open

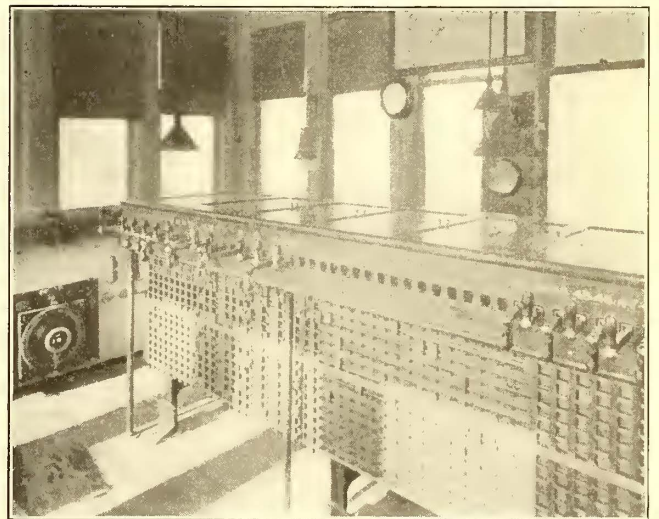


Key Route Signals—Eastbound and Westbound Signals on Same Pole

still wider. On the other hand, if he should attempt to apply the brakes the automatic valve would partly close. These precautions have been effected by connecting a piston to the shaft



Key Route Signals—Motor-Generator Set in Power House for Supplying Signal Current at 1000 Volts



Key Route Signals—All-Electric Interlocking Machine in Tower No. 3

overlap distance in the first instance or cause it to stop too suddenly in the latter case. In the valve designed for the Key Route signal system any such action on the part of the motor-

which carries the trip arm. The shaft operates a rotary slide valve in such a way that when the trip is depressed in the operating direction air comes in behind the piston to hold it against

the spring action until such time as the train-line pressure has been reduced to the predetermined amount. The trip arm will then assume its normal position.

When stop arms are used directly connected to and operated by the semaphore means must be provided to permit operation against current of traffic without permitting the trip arms on the cars to strike every stop arm, as under such operating conditions they will, of course, be in the stop position. Under these circumstances it was not thought advisable to permit the trips to be hooked down, which would mean depending upon human agency to release them before starting to operate with the current of traffic. To meet these objections the trips are so arranged that when a train operates against the traffic the first of the series of stop arms which the trips encounter will cause them to be depressed in the opposite direction from that in which they were depressed when running with traffic, and by the same piston they will be held in such reverse depressed position without permitting the escape of air from the train pipe. When, however, in stopping the train the air pressure has been reduced to a predetermined point all of the trips will again automatically be restored to their normal position ready for service. In other words, in running against traffic the first stop arm encountered will depress all of the trips on the cars in a reverse direction, where they will be held automatically until such time as the train is again stopped, when they will automatically restore to their active position without any attention on the part of the crew or other individuals.

Arrangements are provided whereby the trainmen can "key-by" a signal if it becomes necessary to pass a stop arm in the horizontal position. Depending from the stop arm is a control rod which passes into a cast-iron box mounted on the signal pole at a height of about 4 ft. above the track. When a conductor wishes to key-by a signal in the stop position he inserts in the box a special numbered key which has been furnished him. This key releases the locking mechanism and permits him to hold up the stop arm while his train is passing under. However, his key cannot be removed from the box until the stop arm has again been lowered to the full stop position, so that it will set the trip and operate the air valves on the cars of a following train.

HEARING ON PETITION FOR ADDITIONAL TRANSFERS IN BOSTON

A hearing was given by the Massachusetts Railroad Commission at Boston on April 3 upon the petition of Mayor John F. Fitzgerald, of Boston, for an investigation of the free transfer facilities accorded at certain points on the system of the Boston Elevated Railway Company. The petitioner was represented by Joseph A. Campbell, Boston, and the company by C. S. Sergeant, vice-president, and A. A. Ballentine, of counsel. The petitioners in general asked for additional free transfer facilities in the southern areas of the city proper.

Vice-president Sergeant addressed the board at length upon the transfer problem at Boston, pointing out that the impression that the company has granted free transfers only under compulsion is an entirely mistaken one. Mr. Sergeant said that the road has been much more liberal in general than the law required in arranging free transfers between the elevated train and surface car lines, and in some cases on its own initiative has given free transfers entitling passengers to ride outside the general direction of their journeys. The company understands that by Section 10, Chapter 500, Acts of 1897, the authority of the commission with respect to the ordering of transfer facilities is limited to rides in the same general direction. The company has voluntarily installed free transfer arrangements at some points where the commission is without authority to order such installation. The fundamental principle of the free transfer was stated to be to permit the passenger to ride across the system in one general direction without the payment of an additional fare, but the company has tried to meet the public convenience in local travel by issuing trans-

fers in some cases which are valid on cars running in opposite direction from the cars of the originating line. Complaint had arisen that the company would not issue free transfers good on an intermediate radiating line, but the reason for this was that the two outer radiating lines served the territory well, and the area between the intermediate and the two outer lines was small enough to be readily accessible by a walk from either of the outer lines. At the Dudley Street station, which is a virtual clearing house of surface and elevated traffic, the transfer arrangements are so liberal that traffic originating in one section of the outlying territory is accommodated on a single fare back to that general district through a free bodily transfer at the station and within the inclosure. Such liberal and from many points of view unreasonable accommodations have never been applied to points in the outer sections of the territory, since a fundamental point of operation upon an economic basis presupposes that no passenger can take a car at the center of the city, ride to the outskirts and then return upon the payment of a single-fare unit.

Taking up specific transfer problems, Mr. Sergeant pointed out that the contention that a hardship is suffered by pupils by the absence of a free transfer at the intersection of Massachusetts and Huntington Avenues is easily disposed of. The distance between the intersection of the two avenues and the destination of the pupils is a block, and Mr. Sergeant said that no one but a cripple would wait for an outward car at this point in order to use a free transfer, considering the short distance involved. The fundamental difficulty at this point is the existence of a line of cars which would offer a means of looping back to the originating point on a single fare if a free transfer were in force between lines passing east and west and those running north and south. The company regards such a situation as far more serious on account of its location near the heart of the city than more extensive free transfer arrangements on lines centering at important squares located nearer the outlying districts of the territory served. Mr. Sergeant said that if it were possible to work out a scheme of limited transfers for that district the company would be willing to put the arrangement in force, but he questioned the feasibility of placing distance limitations on transfers. The operating difficulties appear very formidable in view of the magnitude of the traffic. The difficulties of identifying passengers, the problem of ejectment without liability of a damage suit, the accounting for and handling of such transfers by conductors, and the use of unlimited transfers, are serious matters.

Mr. Sergeant stated that the company was willing to establish the desired free transfers at Peabody Square and at River Street, Ashmont, if there was any practical way of limiting their validity. The company was unwilling, however, to give a transfer at an outlying point on one of its radial lines to an inward line. Such a course followed in Ashmont might lead to the possibility of a 40-mile ride for 5 cents—something which would certainly be embraced by the public on summer evenings. Care has to be taken in planning a system of limited transfers to see that the fares in opposite directions over the same route do not differ between the same points. At Talbot and Blue Hill Avenues the company was willing to try limited transfer arrangements if practicable, but at Upham's Corner, Dorchester, where extremely liberal transfer facilities already exist, the company could not in any sense afford to issue free checks between inward and outward cars. Similarly, additional transfer facilities might be issued in the East Boston tunnel provided no arrangement were made which would permit a round trip for a single fare. A fundamental objection to the extension of free transfer facilities is the fact that every transfer increases the opportunity for accident at two points, and it is a question whether the company should be obliged to carry accident insurance to cover such contingencies when only a single fare is received. About one-third of all accidents at Boston arise in connection with the use of transfers. At the close of the hearing it was arranged to hold a conference upon a possible arrangement of limited transfers, the parties in attendance to be the board, the petitioners and the respondent.

TRUNK LINE ELECTRIFICATION

On April 7 W. S. Murray, electrical engineer New York, New Haven & Hartford Railroad, presented a paper on the application of electricity to trunk line operation at a meeting of the American Institute of Electrical Engineers held in Toronto, Ont. Mr. Murray prefaced his discussion of the subject by recommending the adoption of the single-phase system using 11,000-volt, 25-cycle current as a standard for trunk line electrification projects, including suburban and terminal sections. The single-phase system could be used in any situation and he ventured the opinion that there was no trunk line electrification problem to which there could not be applied some construction drawing now in the engineering files of the New York, New Haven & Hartford Railroad. Continuing he said:

"We have made electrification in its various forms work. We can now make it pay. The only possible way that electrification can be made to pay is by electing a system the yearly operating cost of which, inclusive of its maintenance charges, subtracted from the yearly cost of the steam system it replaces leaves a figure which represents a little more than the interest on the capital investment required for the installation of the electrical system. When the board of directors of a railroad company passes favorably upon an appropriation of several millions of dollars to purchase power houses at, say, \$1,000,000 apiece, locomotives at \$30,000 apiece and line construction at \$25,000 or \$30,000 a mile for a four-track system it is not an unfair question for those directors (while they may be interested in eliminating the smoke and dirt incident to the original system replaced, and be glad to have the assurance of the electrical engineer that the time of switching movement of the railroad's equipment in yards, terminal property and main line will be reduced) to ask for a closer analysis than this, and also ask for some specific explanation as to the return each year of a fair percentage of some of the dollars spent."

LOCOMOTIVE CAPACITY

Referring to passenger locomotives, Mr. Murray quoted from his discussion of a paper by Messrs. Stillwell and Putnam, presented before the Institute in 1907, in which he gave the following results of tests of coal consumption per ton mile of steam locomotives in different classes of service: Freight, 0.169 lb.; express passenger, 0.194 lb.; local passenger, 0.335 lb. The horse-power required per ton of train weight was ascertained from the same tests and the capacity of the electric passenger locomotives built to replace the steam locomotives on the New Haven was fixed at 1000 hp. This size of unit had proved entirely satisfactory for the service.

A similar series of freight train tests was conducted to determine the proper size of freight locomotives. These tests on runs of 55½ miles with train weights varying from 720 tons to 1500 tons showed an average evaporation in the locomotive boilers of 6.9 lb. of water per pound of coal. The horse-power developed varied from 655 to 892, with average speeds of from 23.5 m.p.h. to 31.5 m.p.h. The electric freight locomotives which were being built were designed with a capacity of 1400 hp, which provided a large margin above the requirements. This would permit of hauling heavier trains at higher speeds than was possible with steam locomotives. In a recent test electric freight locomotive No. 071 hauled a dead steam locomotive and 37 cars—a total train weight of 1438 tons—at an average speed of 36.5 m.p.h. and developed 1650 hp. The energy consumption was 25.9 watt-hours per ton mile. In local passenger service the same locomotive hauled a 500-ton train with an energy consumption of 58.8 watt-hours per ton mile.

Tests of steam switching locomotives were made in the Harlem River and Oak Point yards for 12 days in 1910. The day's work consisted of an eight-hour shift and the following average results were obtained:

1. Total time of throttle open..... 36.7 per cent
2. Total time engine in motion..... 62.65 per cent
3. Total time engine standing..... 37.5 per cent
4. Rate of water used per hour..... 12,633 lb.
5. Total water used—7.5 hours..... 37,603 lb.

Assuming 40 lb. of water evaporated per hp-hour, which was probably much lower than the actual rate, these averages showed that the average horse-power during the time the throttle was open was 313 hp, but, as the throttle was open only 36.7 per cent of the total time, the average power developed per hour was only 115 hp. These figures suggested:

1. That, in switching, yard speeds could be greatly increased by the use of an electric locomotive of very much less engine capacity than that used in the steam locomotive.

2. On account of the low average rate of energy required for their operation, a central power station will deliver at far higher efficiency the power necessary to the electric switching engine than that obtained from the individual power plant on the steam switching engine itself.

The type of electric switching locomotive which will be used in the Harlem River and Oak Point yards is shown in the engraving on page 668. It is of the quill spring-supported type, and on account of the buffing stresses incident to yard switching the framing and attachments for all of the electrical apparatus are very strong and substantial. The four motors have an hourly rating of 150 hp each, giving the locomotive a total capacity of 600 hp. This locomotive will be tried out in the electrified Stamford yard.

About a year ago a multiple-unit train consisting of four motor cars and six trailers was put in service. There are now under construction four additional motor cars and 12 trailers. These multiple-unit cars will gradually replace electric locomotives for suburban service, and the locomotives so released will be used in express service between New York and New Haven.

The complication of control apparatus to permit of operation on both a.c. and d.c. sections is very marked. All freight and switching locomotives will have single-phase control only, as will the multiple-unit cars to be purchased for the Harlem River branch and the New York, Westchester & Boston. The saving in weight of straight a.c. control over a.c.-d.c. control is more than 8000 lb. per car or locomotive.

LOG OF THE NEW HAVEN ELECTRIC OPERATION

As showing the great improvement in the reliability of electric operation as time had developed troubles and remedies for them, Mr. Murray supplemented his "Log of the New Haven Electrification," presented before the Institute in December, 1908, with figures of train delays for the corresponding six months of 1909. These figures are summarized in the following table:

Month.	Power-House Delays—Min.		Line Trouble Delays—Min.		Locomotive Delays—Min.		Total Delays—Min.	
	1908.	1909.	1908.	1909.	1908.	1909.	1908.	1909.
July	0	0	2,100	170	1,183	153	3,283	323
August	132	0	1,642	548	407	97	2,181	645
September	0	0	942	0	224	219	1,166	219
October	0	54	2,140	204	343	124	2,483	382
November	139	0	103	42	405	95	647	137
December	179	0	194	55	240	315	613	370

The average delay per train in 1909 was 5.25 seconds, as against 27 seconds in 1908. In this connection Mr. Murray said:

"A comparison of the 1909 and 1908 train minute delays is immediately indicative of the fact that even in this short time the disturbing factors of the system had disclosed themselves and had been eliminated. Eighteen months after commercial service was inaugurated our electrical failure report showed a record of over 15,700 miles per engine failure. Between Nov. 2 and 23, 1909, 66,000 electric locomotive miles were run, and this mileage, which is approximately 11 round trips from New York to San Francisco, was accomplished with a total of three minutes' delay. This kind of record is the ground upon which the board of directors of the New Haven road stood in ratifying the system and voting an extension to apply to all service—freight and passenger, inclusive of yards, terminals and main line west of Stamford.

"In the diagram on page 669 is shown an interesting relation between failures for trunk line service of electric and of steam operation. It should be noted in the lower diagram of the figure that the power house failures had practically no effect on engine mileage. On account of the severe handicap that has been placed on the line by steam locomotive stack discharges directly beneath it, a number of failures per 100,000

engine miles are recorded. An elimination of the steam service under the electrified wires will greatly reduce, if not entirely eliminate, failures due to this part of the electrical system. In the upper diagram of the figure is shown the relation of electric engine mileage per failure versus steam locomotive mileage. It is to be noted that the electric locomotive failures are 9 per 100,000 electric engine miles, while the steam locomotive failures, which are an average for all of the divisions of the New Haven, are 21."

DISTRIBUTION SYSTEM

The power house of the New York, New Haven & Hartford Railroad at Cos Cob, Conn., which now supplies current to the main line between Woodlawn and Stamford, will also supply current for the electrified six-track Harlem River branch and freight yards and the New York, Westchester & Boston, as well as for the operation of direct-current trolley lines connecting White Plains, Mamaroneck, Stamford and Bridgeport. The alternating-current distribution system is a unit without substations and no voltage higher than 11,000 will be used. The wires carrying current are sectionalized and breakers controlled from the power house are installed to localize any line trouble without affecting the remainder of the network. Briefly described, the control consists of a single wire, upon which is impressed the normal voltage of the system when a short-circuit occurs anywhere, but not until the automatic resistance at the power station has been cut in series with the line, at which moment the control wire, through transformers, passes current through the tripping coils of the sectionalizing breakers, and the two breakers that are directly feeding the short-circuit are immediately opened. The resistance thus inserted, however, has reduced the short-circuiting current to a minimum and relieved greatly the duty of the opening breakers. The resistance scheme above mentioned has proved itself to be a most valuable acquisition to the system, serving at once to lessen the duty on both generating and distributing apparatus.

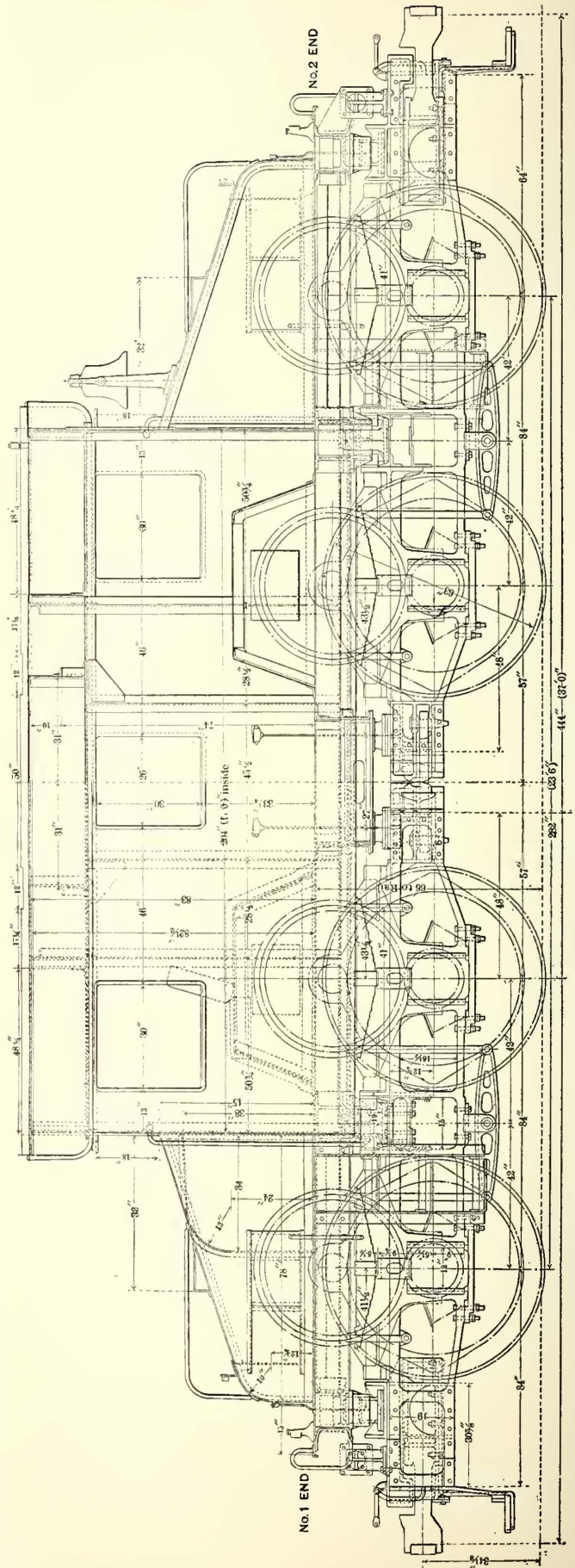
A study has been made of the voltage drop at the ends of the system. During the maximum load period the voltage at Harlem River, 25.6 miles from the Cos Cob power station, will be 9151 volts, which is ample to maintain all passenger and freight trains on schedule. The maximum peak load of the year occurs on "Football Day," when many extra trains are run between New York and New Haven. The peak load on Nov. 19, 1910, was 16,000 kw, and the average drop in voltage at Woodlawn was only 4 per cent.

Referring to storage batteries Mr. Murray said:

"Storage batteries for trunk line electrifications are not economical. This is true whether the propulsion current be direct or alternating. It is true that the storage battery does smooth out the power station load and lowers the rate of cost of producing a kw-hour, but the thing that concerns us quite as much as the rate of cost is the total amount of kw-hours manufactured in payment for the luxury of the battery. A train service requires a certain number of kw-hours. A plant producing these kw-hours will be required to manufacture more energy with than without a battery on its distributing system. In general it may be stated that more kw-hours mean more coal if the efficiency of generation is the same. As a matter of fact, the efficiency of production of electric energy is higher with than without a storage battery on account of the more constant load, but the difference is so small that at least for trunk line conditions it is offset by the increase in output required and the cost of maintenance of the battery. On account of the established reliability of generating equipment the argument for the use of a storage battery for the supply of power in the event of a power station breakdown is now no longer one for serious consideration. In this connection should be noted the importance of freight and switching loads in improving the station load-factor, due both to the physical exclusion of freight trains from main tracks during the hours of passenger peaks and to the latitude of operation afforded in fixing freight schedules."

INSULATION

Mr. Murray laid special stress on the importance of adequate



Side Elevation of 600-hp Electric Switching Locomotive for New York, New Haven & Hartford Railroad

insulation of lines carrying high-tension current. In this connection he said:

"Practice has shown the wisdom of sectionalizing the lines at cross-overs. At these points it is necessary to bring the electrical catenary cables to a dead end and anchor bridges are supplied for that purpose. Oil switches must be provided for cutting in or out as necessity may require voltage on the lines thus dead-ended. In the order of their higher degree of insulation requirements should be mentioned:

- "1. Sectionalizing switches.
- "2. Sectionalizing busbars.
- "3. Dead-end catenary insulators.
- "4. Intermediate catenary insulators.

"As the whole track system leads into the anchor bridge buses a ground on them means an immediate effect on any wire connected to them. This reasoning is applicable to the switch should the ground be on the busbar side, and as the switch is

mate mechanical tensile strength of 50,000 lb. These insulators cost only \$7 apiece, as against \$61, and are capable of withstanding seven times the mechanical strain and three times the electrical strain of the original insulators.

WEAR OF CONTACT WIRE

"Micrometer measurements of the steel trolley wire taken at a point of maximum wear directly in front of one of our low highway bridges where the steel wire is on a gradient of 2 per cent, thus assuring a maximum upward vertical force of contact with the pantograph shoe of the locomotive, show that the actual vertical wear of the wire since its first installation 30 months ago is 0.028 in., which is practically 4.5 per cent per year of the half diameter of the wire (one-half taken to permit the wire to be held in clips). Even on this vertical diameter basis this indicates a life of over 20 years. As a matter of fact, it will be much more than this, for the reason that as the vertical diameter lessens the breadth of contact increases throughout, thus diminishing the rate of vertical wear. Of further interest, too, is the fact that there is practically no corrosion on the wire, for, like the traffic rails in service (only much more so), the wire is constantly covered by a film of grease—due to a generous amount of this material being placed on the pantograph shoe."

HOOSAC TUNNEL CATENARY CONSTRUCTION

A part of Mr. Murray's paper was devoted to a brief description of the catenary construction in the Hoosac Tunnel. The electrification of the tunnel is now rapidly nearing completion and electric locomotive operation has been begun in the approach yards for the instruction of engineers. The introduction of 11,000 volts into this tunnel, with the close overhead clearance that the double-track arrangement requires, afforded an interesting problem in the location and placing of insulators which would insure against any breakdowns between the electrified wires and ground. From the crown of the tunnel is suspended a bracket, as shown in the drawing on page 670. Four insulators, each capable of resisting 150,000 volts to ground, are installed on this bracket. Two of these insulators apply to each track. Their arrangement of support is such as to place them in series, thus giving them a combined dielectric strength of 300,000 volts. The outside insulator holds the track messenger, from which are hung the contact wires below. Some criticism might be offered against using a 150,000-volt insulator where a 40,000-volt insulator might have sufficed. By the expenditure of \$1 more per insulator there was secured practically eight times the insurance from breakdown. The tunnel is 5 miles long. There are 1000 insulators, hence \$1,000 has been spent to secure eight times the protection.

On the approaches to the tunnel the opportunity seemed an excellent one to secure immunity from trouble; 50 cents extra per insulator secured practically three times the protection offered by an ordinary 40,000-volt insulator. The outside insulators before erection were all required to withstand a dry voltage test of 110,000 volts.

Mr. Murray said that he was strongly of the opinion that it was good engineering to spend money on insulation. All of the insulators purchased for the Hoosac Tunnel electrification, inclusive of the tunnel itself and its outside approaches, did not total one-half of 1 per cent of the total expenditure. Insulation was of all things the one most important thing to be right in order to secure continuity of service. It paid a handsome dividend every year.

HARLEM RIVER YARDS

The two large yards at the terminus of the Harlem River branch contain 62.3 miles of track, all of which will be electrified. On account of the extremely small amount of current required per horse-power developed, and on account of the excellent conductor section offered in the gridiron arrangement of the track yards, not a pound of copper will be required throughout this extensive trackage, with the exception of rail bonds. These are to be reduced to the smallest size and only one rail will be bonded, with the attendant result of an extremely low cost compared to main line construction. Cross-catenary spans for the support of the track contact wires will

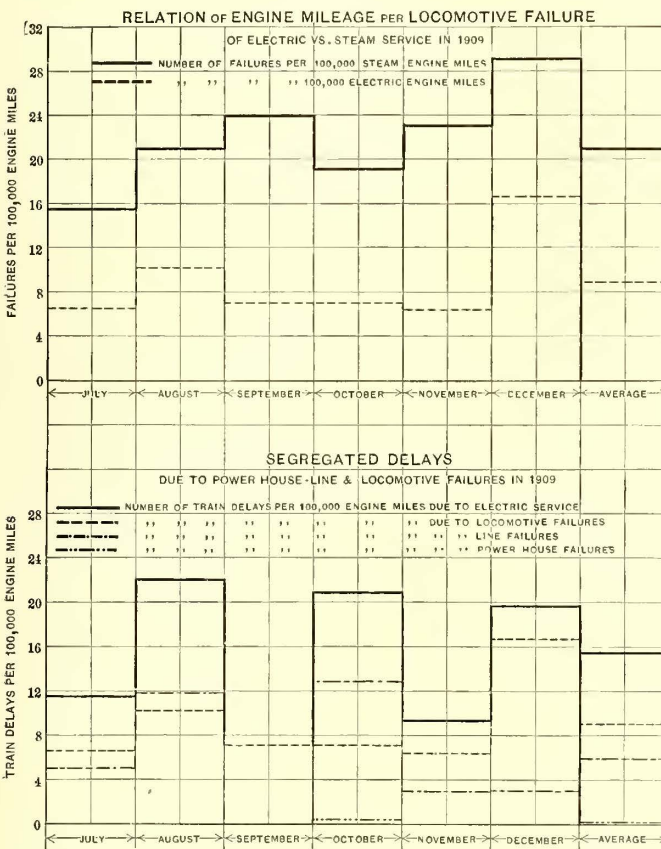


Diagram of Delays to Steam and Electric Trains

a piece of moving apparatus it is the more difficult to insulate and to keep insulated, and is, therefore, cited as the one deserving of the highest consideration of insulation. The dead-end insulator has been mentioned third, but it is in a class essentially its own and is worthy of respectful attention. No insulator throughout the past four years has had our more constant study. The difference between insulators not under and under mechanical strain while performing at the same time their electrical duty is marked. When the New Haven electrification was completed in 1908 the best dead-end insulator then on the market was one rated at 7000 lb. mechanically and 40,000 volts electrically, and cost \$27. We found in a very short time that two of these had to be used in series, which, with the yoke harness, made the cost \$61. It is interesting to note here that in order to secure an insulator strong enough mechanically to withstand a cross-catenary span in the electrification of our Port Chester yard we had to design a yoke to hold two of the above insulators in multiple. To-day we have placed orders for dead-end (or strain) insulators, every one of which is tested before shipment for 110,000 volts under a mechanical strain of 35,000 lb., and they have an ulti-

be used. By a simple system of bridles, which require only one rigid post to hold many tracks, the overhead contact wires are held in proper alignment over the tracks they serve. The cost of yard electrification, as before stated, varies from \$1,500 to \$3,000 per mile of track, depending upon the average number of tracks spanned.

ELECTRIFICATION COSTS

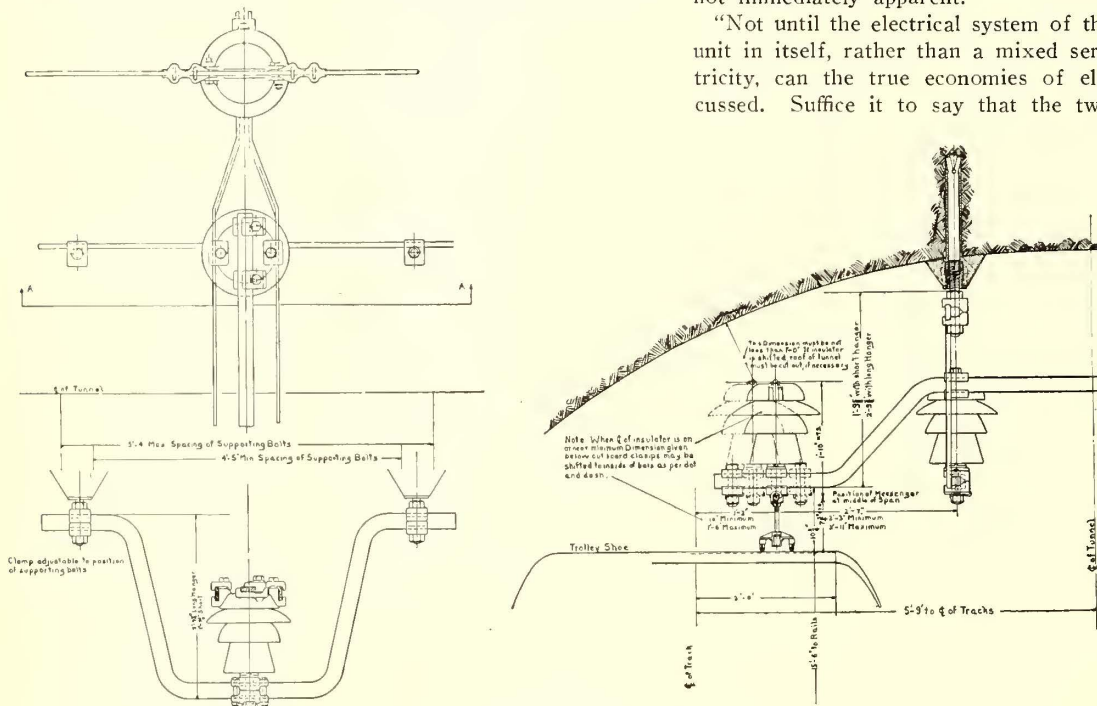
In conclusion Mr. Murray said:

"The question of cost, both with reference to capital investment and operating in connection with electrified lines, is naturally the greatest factor of consideration on the part of railroad companies contemplating the application of electricity to their lines. While, in my opinion, no trunk line electrification can be better served than by the use of single-phase current, it must be conceded that electrification costs must vary with the greatly fluctuating conditions of volume and density of traffic involved. Again, while it would be perfectly possible to state the actual cost involved in handling a train mile by electricity versus a train mile by steam, this information as applying to the New Haven road might be extremely mislead-

structures,' while in the departments of 'maintenance of equipment and transportation expenses' a large credit, if the proper system is selected, may accrue. The balance between the debit and credit columns furnishes the ground upon which it may be said it is either a good or bad investment for the railroad company to electrify; and yet even though the direct returns prove unsatisfactory, it does not follow that the investment is a bad one if considered from a broader standpoint of general policy.

"A careful analysis of the relation between steam and electricity was made in connection with the lines of the New Haven road west of New Haven. Whether or not the policy of the railroad company in electrifying over 300 miles of its trunk line rails, terminals and yards was for financial gain to itself or better service to its patrons, it is reasonable to assume that the application of electricity to cover complete passenger and freight train propulsion and yard switching over the mileage above named, involving the expenditure of millions of dollars, would not have been decided upon by the directors unless the successful and uncompetitive characteristics of the system were not immediately apparent.

"Not until the electrical system of the New Haven road is a unit in itself, rather than a mixed service of steam and electricity, can the true economies of electrical traction be discussed. Suffice it to say that the two great departments of economy lie in the saving of fuel and repairs to the rolling equipment. When the railroads consider trunk line electrification, all important will be the matter of freight movement and the cost and convenience of operation of yards. The ratio of the mileage of yard tracks to the main line tracks in the division run between Harlem River and New Haven is over 55 per cent; and while the New Haven road may be considered to have a high ratio of yard mileage to main line mileage, this condi-



Catenary Insulator Supports in Hoosac Tunnel

ing when considered for other applications. Power houses can be constructed, depending upon the capacity, for from \$90 to \$110 a kilowatt; line construction for one, two, four and six tracks can be erected at costs varying respectively from \$4,000 to \$7,000; from \$8,000 to \$15,000; from \$25,000 to \$40,000; \$40,000 to \$60,000 a mile. The fluctuation in cost for these respective constructions depends entirely upon the standards selected. The cost of overhead yard construction can vary from \$1,500 to \$3,000 a mile, depending upon the number of tracks spanned and the type of construction selected. Locomotives of the passenger, freight and switching type, depending upon the nature of their service, can vary in cost from \$25,000 to \$45,000 a unit. Thus it is seen that it would be impossible to give a usable estimate of electrification cost. Again, the necessity of property acquisitions, which in one case may be nothing and in another a very large sum, all varying in accordance with the environment of the electrification in question, makes such studies individual to specific cases.

"In general, from an electrical operating standpoint, it may be stated that for trunk line properties where a very considerable density of traffic is involved there will be shown a considerable debit in the department of 'maintenance of way and

tion holds true for all the railroads of the Atlantic Coast territory and in any territory including cities and towns in close proximity to each other.

"To discuss electricity versus steam without a recommendation of system in the specific cases of trunk line work, in my judgment, is to launch a ship upon a rough and windy sea without a rudder. An extremely important matter would be omitted if I did not say that my experience with the single-phase system versus other competitive systems affords me the sincere conviction that under practically all conditions of trunk line operation where the traffic is of the same amount and character or indeed much less than that which is comprehended in the mileage that this paper covers its first cost is at the greatest not more than 85 per cent of its next best competitor, and its operating costs are less than the above percentage.

"The above statements should not be taken to mean that all trunk line railroads considering electrification can electrify and save money; indeed, the general application of electricity is impossible. There are, however, roads that must and will electrify. To such railroads it is my hope that the information compiled will be of value."

DISCUSSION ON PUBLIC SERVICE COMMISSIONS

The weekly luncheon of the Electric Club of Chicago on April 5 was followed by an entertaining discussion on public service commissions and the regulation of public utilities. The speaker of the day was to have been W. J. Hagenah, chief statistician of the Wisconsin Railroad Commission. In his absence the subject was introduced by Alderman W. J. Pringle, chairman of the gas, oil and electric light committee of the Chicago City Council, and a member of the committee appointed by the Council to represent it at hearings on public service bills introduced in the State Legislature. Alderman Pringle spoke of the need for just regulation and indicated the purport of the utility bills now before the State Legislature, voicing the opinion that few, if any, of them would pass at the present session. However, he said that conditions were ripe for improved public utility measures and these were to be expected shortly, if not at the present session.

The successful work of the Board of Supervising Engineers of Chicago Traction was described by George Weston, city representative on that board. Mr. Weston outlined the conditions leading to the creation of the board by the Chicago City Council and stated that until now the work of the board had been confined almost entirely to surface transportation. Questions to be answered regarding public utility commissions, Mr. Weston said, were whether one commission should have jurisdiction over the entire State and whether the different classes of utilities should be handled by separate commissions. It was his opinion that the best results could be obtained by the appointment of separate commissions to supervise the workings of specific kinds of utilities. These generally would realize far better results than a single commission having supervision over different classes of utilities, such as railway, gas, light, heat and water.

Mr. Weston pointed out that the success of the Board of Supervising Engineers of Chicago Traction might be attributed largely to the fact that its work was confined to local transportation and that each member of the board had made that subject his lifework and, therefore, should be qualified for membership on the board. The work of this board had been of benefit both to the corporations and to the public. The board had been directed by the ordinances principally to supervise the accounts of the surface railways and the rehabilitation work. The board prescribed the exact form in which the railway should keep its books and had jurisdiction over its accounts. This was necessary in order that the city might know that it received its share of the profits as defined in the ordinances. The work of the board had been carried out with fairness to the public and to the corporations.

Mr. Weston believed that public utility companies should have representation on any other boards that might be organized, as they had had on the Board of Supervising Engineers of Chicago Traction. He had been led to believe, by his experience, that were similar boards to be appointed for each of the other utilities, such as telephone, gas and electric light, the results would be far better both to the public and to the corporations than if one board or commission handled all public utilities and was made up perhaps of board members not trained in the lines of work which they were to supervise.

Frank F. Fowle, consulting engineer, who had fostered one of the bills now before the Legislature, said that reasonable regulation must be mutual; public demands at times were unreasonable and if the rates were limited, then the public service commission should give compensation therefor in some other phase of its work. The utility should have the same right of petitioning the commission that a consumer had. Mr. Fowle held the Wisconsin laws and commission in the greatest respect because the law provided for mutual protection and provided for fixing the rates for given communities. He compared the Wisconsin law regarding rates with that of the New York commission, which fixed only the maximum rate, and he said that it was safer to work toward the Wisconsin plan fixing definite rates.

Mr. Fowle said that the bill which he had drawn for the consideration of the Illinois Legislature called for a single commission to handle the entire State rather than one commission for Chicago and one for the remainder of the State. His reasons for favoring a single commission were that it would be more economical; would have no geographical division of authority; would least be subject to local political interests; would administer the laws according to their bearing on the entire State; would have a broader experience, and would have jurisdiction over composite plants, including those combination railway and lighting organizations which might otherwise have to report to two State commissions and those plants doing business inside and outside of Chicago which also might have to report to two commissions. He said the experience in New York had been that the commission in charge of public utility affairs outside of the City of New York had spent considerably less money than that having jurisdiction only over New York City and because of an opinion that the expenditures of the commission for New York City were too large an investigation had been demanded.

AUTOMOBILE LINE TRUCKS OF THE OAKLAND TRACTION COMPANY

Much interest has been manifested in the two 2-ton tower automobile line trucks which have recently been placed in service by the Oakland (Cal.) Traction Company. It has been found that in case of tie-ups caused by broken wires, fires or other causes this type of auto truck can be depended upon to reach the scene of trouble in one-half the time required by the old cumbersome and jolting horse-drawn line wagon. The direct maintenance cost is small. The gasoline consumption is about 1/3 gal. per mile and about 1 gal. of lubricating oil will serve this machine for about 30 miles.

The dimensions of the auto truck are as follows: 14 ft. long over all; width, 42 in.; frame in back of driver's seat, 9 ft. 4 3/4 in.; height from ground to top of frame (no load), 40



Gasoline Tower Wagon Used in Oakland, Cal.

in.; wheelbase, 120 in. The four-cylinder 32-hp vertical engine is located under the driver's seat; the cylinders are cooled by a blower. The motor control is from spark and throttle levers on the steering wheel. A single-lever speed change is at the right of the driver's seat. The transmission is a sliding gear of selective type which gives four forward speeds and one reverse. The rear or driving wheels are of hickory. They are of the "artillery" type, with 13 spokes, and a 3 1/2-in. dual

endless solid rubber tire. There are two independent sets of brakes besides the clutch brake. The service brake is on the jack shaft and is operated by a foot pedal. The emergency brakes, which are operated by a hand lever, are of the expanding type in drums on the rear wheels. All the brakes are well equalized and are lined with indestructible asbestos fiber woven on wire-mesh base.

The driver's seat is of steel, upholstered with black leather, with soft cushions and tuft back. The gasoline tank is located on the dash and is of 13-gal. capacity. The normal speed of the truck is 18 m.p.h. The trolley wagon tower mounted upon the steel truck is of the "Trenton" type. The trucks were built by the Kelly Motor Truck Company, Springfield, Ohio.

OPERATING RECORD OF HUDSON & MANHATTAN RAILROAD

Statistics of train delays on the Hudson & Manhattan Railroad for eight months of 1910 were printed in the *ELECTRIC RAILWAY JOURNAL* of Nov. 12, 1910. The excellent record of those months, during which the average total train delays were 100 minutes per month, was surpassed in February and March of this year, when the train delays were reduced to 59 minutes and 28 minutes respectively. The number of detentions and minutes' delay classified by departments to which they were chargeable are shown for the two months as follows:

Department.	February.		March.	
	No.	Min.	No.	Min.
Transportation	5	17	1	1
Car equipment	2	3½	2	7
Maintenance of way	2	8	0	0
Signals	5	11½	3	18
Power house	0	0	0	0
Substations	1	7	0	0
Construction	0	0	0	0
Signal construction	0	0	0	0
Miscellaneous	2	12	1	2
	17	59	7	28

The total car mileage in February was 566,000 miles and in March, 614,828. While all departments made a fine showing, the record of car equipment failures is remarkable. Only four failures with a total delay of 10½ minutes occurred during the two months. The cars ran 112,000 miles per minute of delay. The longest single delay in March was 15 minutes due to the freezing of a switch-operating mechanism at Thirty-third Street. With this unusual failure eliminated from the record the total delays from all other causes amounted to only 13 minutes.

In transmitting the report of detentions for March to the heads of departments the following letter also was sent by the general superintendent:

"April 3, 1911.

"To MR. C. S. KLUMPP, Assistant to General Superintendent.

" MR. J. F. O'ROURKE, Supt. of Transportation.

" MR. P. V. SEE, Superintendent of Car Equipment.

" MR. D. SAGE, Chief Engineer, J. C. P. H.

" MR. M. H. COLLINS, Supervisor of Signals.

" MR. L. G. SMITH, Chief Electrician.

"DEAR SIR:—

"I wish to congratulate all of you on the splendid showing your departments made during the month of March.

"Total detentions for March amounted to 28 minutes. This breaks all previous records and is one of which we may feel very proud.

"You all know how hard you have worked to make the above record possible. I do not see any indication of luck in the results. Coming in touch as I do with each department, and knowing the efficiency of your departments, I expected a 'record breaker' for March. However, I was agreeably surprised in it being such a good month, for I must confess it was really better than I anticipated.

"While we may not equal this record again for several months, I am firmly of the opinion that they will be excellent months, and can assure you that I shall not feel bad if in the near future you do even better than 28 minutes.

"Thanking you for the excellent work you are doing and assuring you that it is appreciated by my superiors, myself, and also by the traveling public, I remain

"Sincerely,

(Signed) "E. T. MUNGER,
"General Superintendent."

BOSTON ELECTRIFICATION DISCUSSED BY MEMBERS OF METROPOLITAN BOARD

On April 5 a hearing was given in Boston by the committees on railroad and metropolitan affairs of the Massachusetts Legislature to the report on the electrification of the railroads within the metropolitan district of Boston submitted by the Massachusetts Joint Board on Metropolitan Improvements. The two principal speakers at the hearing were George G. Crocker, who spoke in favor of the minority report, and Prof. George F. Swain, who defended the majority report. Both were members of the Joint Board and both are also members of the Boston Transit Commission. The report of the Joint Board was published in abstract in the *ELECTRIC RAILWAY JOURNAL* for Feb. 4, 1911. The minority report signed by Mr. Crocker and four other members of the board, it will be remembered, did not recommend legislation compelling the electrification of all the standard gage roads within the metropolitan district and suggested that the companies be allowed the greatest latitude with respect to the lines first to be electrified, but it did recommend the establishment by the Legislature of a reasonable date for the commencement of the actual work of construction for electrical operation. The majority opinion, signed by nine members of the board, including Professor Swain, stated that, in the opinion of the board, it was not wise nor in the public interest to enact legislation compelling electrification.

MR. CROCKER'S DISCUSSION

Mr. Crocker first referred to the statement of the Boston & Maine and New Haven railroads, submitted by Vice-president McHenry, that "the records of the New Haven company demonstrate that under present conditions the electric train service [on the New York division] not only fails to earn any interest upon the very large amount of capital invested, but that it has also increased the cost of operation and with the less favorable conditions in the City of Boston it is impossible to escape the conclusion that the deficit in fixed charges and operating expenses will be still greater."

Mr. Crocker said that the New Haven reply said later "present conditions" on the New York division were far from ideal because of the mixed steam and electric service, and that its reply in no place states that a properly planned electrification system would not prove profitable. The railroads claim that the Boston division is spread out much more than the New York division and state that the mileage is 70 per cent greater, but they also admit that the traffic to be handled at Boston is nearly three times that handled at the Grand Central Station in New York. The speaker said that these figures show that the passenger business per mile of track in Boston is greater than the passenger business per mile of track at the Grand Central Station in New York. This was not an unfavorable but a decidedly favorable condition for electricity. He also thought that the fact that many of the lines around Boston were branch lines which naturally require a large number of separate train units was another condition favorable to electricity. Statistics show that the total number of New York Central trains running in and out of the Grand Central Station in New York on week days in summer is 392, whereas the similar figure in Boston from the North and South stations is 1401.

Mr. Crocker did not agree with the conclusion of the majority of the committee that the real estate salvage resulting from electrification, due to the construction of buildings over the tracks of the company, should be considered problematical and hypothetical. He said that at present the railroad companies have at both the North and South stations large areas of valuable land occupied by train sheds and that the area above

these tracks was not simply valueless for any additional use, but was worse than valueless, because the locomotive smoke and gases caused a large annual expense for depreciation and repairs of the train sheds. With electricity these areas would become available for offices and other business purposes. The speaker called especial attention also to the valuable tracts of land in Back Bay, bounded by Boylston Street on one side and Huntington Avenue on the other, occupied by the Boston & Albany Railroad. After electrification this area, with the exception of one story needed for the railroad, could be covered by streets and buildings. He also thought that there would be a large real estate salvage from the electrification of the freight yards.

He also criticised the conclusion of the majority that "the best method of electrification is still undetermined. The science is in a state of rapid change, and standardization is much to be desired before extensive electrification is undertaken." To wait, he said, meant to wait for others to lead the way, and this had not been the method which had given Massachusetts its present standing and reputation. In the development of its railroads, its telephones, its electric railways and its subways it had not waited for standardization. It had created standards and they had generally been good. Another conclusion in the majority report was that a demand for electrification would compel the railroads to postpone other more important improvements, but he said that he could not find in the record any list of such proposed improvements. Could it be the purchase of more steam locomotives and more wooden cars?

He also criticised the conclusion of the majority that electrification, while desirable, was not necessary nor required on grounds of public safety, like air brakes, signals, standard couplings, etc. He thought that freedom from locomotive smoke and gas would have an important bearing on the public health by reducing the diseases of throat and respiratory organs. It is true, he said, that these elements do not kill outright, but he thought that their influence in shortening life was measurable. Statistics had shown that if a man should spend his whole time day and night riding in railroad trains at an average rate of 30 m.p.h., and if he had average good luck, he would not be killed by accident, without his fault, oftener than once in 1500 years, and that he would not receive any injury of sufficient importance to be reported oftener than once in 500 years. But he inquired how long a man would live if he was obliged continuously day and night to breathe the air in the railroad stations in Boston without an opportunity of relieving his lungs by a breath of purer and better air. Many people are now affected by these gases and it may well be that the sum total of all the injury which they do is greater each year than the sum total of the shortening of lives by accident.

Another point in the majority report attacked by the speaker was the claim that the change would be unprofitable to the railroads. He believed that the increased traffic would more than repay the companies and that any question of higher fares could safely be left by both railroads and public in the hands of the Railroad Commission. The railroads had estimated the entire cost of electrification at \$40,000,000, the interest on which at 5 per cent would be \$2,000,000 per annum. The present passenger traffic to and from the North and South stations was in round numbers 60,000,000 per annum. An increase of 20 per cent in this traffic would be an increase of 12,000,000 passengers, and if the average fare paid by them per mile was 1.6 cents, which was the average for the State, and the average ride was 10 miles, \$2,000,000 would be added to the gross earnings. He had noticed from diagrams submitted by the railroads and published in the report that the increase in traffic at the Grand Central Station in New York from 1900 to 1906 was 40 per cent; from 1906 to 1908, during part of which time there was combined steam and electrical operation, it decreased nearly 5 per cent, but from 1908 to 1910, under electrical operation, it increased over 12 per cent, in spite of the confusion attendant upon the rebuilding of the station.

Finally, Mr. Crocker said that the New Haven company, when seeking to control the Boston & Maine system, had declared its intention to carry out important improvements if

unified control was authorized. Prominent among these improvements were the following: "To equip both systems with electricity for a considerable distance near Boston, and by that means increase the convenience of travel and remedy the nuisance of smoke. . . . To connect the South Terminal Station in Boston with the North Union Station by a tunnel in which shall run suburban trains from stations on one system to stations on another." (Report of Commission on Commerce and Industry, page 13.)

Relying on these representations the Legislature had granted the necessary authority. He believed that the New Haven road intended to do what it then agreed to do and had thus far proceeded in good faith and with commendable diligence, and said that under these circumstances an explanation was due as to why he thought compulsory legislation was necessary. It was because the majority report of the Joint Board was of such a character that unless the State expressed its dissent therefrom and announced its intention to hold the company to its professions, the company would have good ground for claiming that it should not be expected to undertake the work. It is true that the New York Central was not under the same obligation to make similar improvements, but it could not afford to lag behind, nor should it be permitted by delay or otherwise to place obstacles in the way. The two systems of the New Haven company carry in and out of Boston six times as many passengers as are carried by the New York Central in and out of Boston on the Boston & Albany Railroad. The New Haven company was courageous and progressive. It proposed to undertake a work which would be epoch-making. It should be encouraged, not discouraged; helped, not hindered; commended, not declaimed against.

Speaking for himself he believed that the time had come when the work should be definitely planned and promptly carried into execution; that the act authorizing the construction of the North and South tunnel connecting the tracks of the New Haven and Boston & Maine systems should be passed; that the city should be given such authority as might be requisite to enable it to build a highway on the same route with the tunnel; that out passenger and freight terminals should be replanned so as to utilize to the best advantage the opportunities which electrification offered, and that if the work as outlined by Vice-president McHenry was carried out wisely and without waste it would prove increasingly profitable to the company and a blessing to the whole community.

PROFESSOR SWAIN'S REPLY

Prof. George F. Swain then defended the conclusions of the majority of the board. He said that in its report a year ago the board had recommended the passage of a resolve provided for study by the railroad companies, but had recommended and suggested no compulsory legislation. The resolve, however, passed by the Legislature was in a different form and required the board to present a bill which should provide for the electrification of all railroads of standard gage in the metropolitan district within a stated time. This was the subject before the board. The majority had reached the conclusion that it was wisest to enact no compulsory legislation. The second minority report agreed in this, but thought further study of the subject desirable. The first minority report thought that some legislation should be passed; with respect to electrification it was rather non-committal but suggested that the time for beginning the actual work should be fixed by the General Court or by some public agency designated by it. There was not, therefore, so much difference between the reports as might be supposed, and he reiterated the statement that the question which the majority had in mind was the suggestion of compulsory electrification of all lines within a stated time. The report had received the approval of some of the ablest electrical engineers in the country.

The majority agreed that electrification was desirable and physically practicable, but showed in its report why economical results from electrification would not be secured under the plan proposed. Hence, the resolution, as originally proposed, would have forced an uneconomical development. On the other

hand, if the roads should be left unhampered they could plan their electrification to such distances as might prove profitable.

He defended other conclusions made in the report and then referred to the request of the New Haven Railroad now before the Legislature to build a tunnel under the harbor and electrify each end of it. He believed that if this permission should be granted the beginning of electrification of the metropolitan district will have been seen, without necessity for further action, and he believed that nothing more was needed at the present time, so far as the New Haven railroad was concerned. As for the Boston & Albany, that company had been expending large sums for a number of years on permanent improvements, and the Interstate Commerce Commission had admitted that the New York Central Railroad Company had thus far suffered a deficit of about \$3,000,000 from the Boston & Albany lease. He thought that before the New Haven tunnel was built the relations between the two companies, now apparently growing closer, might be closer still and the terminal relations of the two might be different from what they were now. Possibly the Boston & Albany trains might use the tunnel. At all events the electrification of one road having begun and been allowed to develop naturally would lead in due time to the, electrification of both.

CAR PULL-INS IN GREATER NEW YORK

The Public Service Commission of the First District, New York, is now issuing comparative monthly reports of the car pull-ins recorded by the electric street railways under its jurisdiction. The accompanying table, which gives the detail figures for February and résumés for January, shows that excellent standards of service are being successfully maintained even during the winter. The table gives the seven large street railway systems in Greater New York, but for some reason no

Railroad with a ratio of 0.44 per 1000 car miles in operating 852,617 car miles; then the Metropolitan Street Railway with a ratio of 0.73 in operating 2,700,839 car miles, and last the Second Avenue Railroad with a ratio of 0.85 in operating 255,044 car miles.

The comparative ratios per 1000 car miles for January, 1911, were as follows: Coney Island & Brooklyn Railroad, 0.14; Union Railway, 0.15; Brooklyn Rapid Transit Company, 0.24; New York & Queens County Railway, 0.25; Third Avenue Railroad, 0.60; Metropolitan Street Railway, 0.78; Second Avenue Railroad, 1.83.

The classification of defect causes for February shows that the plows are much more troublesome than trolley collectors. Thus plow troubles averaged from 21.61 per cent to 53.27 per cent of all defects, whereas the figures for overhead collectors were only 1.67 per cent to 3.03 per cent.

THE CONFERENCE ON GOVERNMENT CONTROL OF WATER-POWERS

A public conference on water-powers and their control by the government was held under the auspices of the power transmission section of the National Electric Light Association at the United Engineering Building, 29 West Thirty-ninth Street, New York, on April 8. Afternoon and evening sessions were held. A feature of the conference was the attendance of Secretary of the Interior W. L. Fisher, who explained the attitude of the present administration toward the development of water-power.

The sessions were opened by Henry L. Doherty, chairman of the transmission section of the National Electric Light Association, who called attention to the fact that there are at present 37,000,000 hp available in the United States in water-

REPORT OF DEFECTIVE STREET CAR SERVICE IN NEW YORK CITY FOR FEBRUARY, 1911.

WEATHER, 50 PER CENT FAIR.

Defective Equipment.	Metropolitan Street Railway.		Third Avenue Railroad.		Brooklyn Rapid Transit Company.		Union Railway Company.		Second Avenue Railroad Company.		Coney Island & Brooklyn Railroad.		N. Y. & Queens County Railroad.	
	No. of Defects.	% of Total Defects.	No. of Defects.	% of Total Defects.	No. of Defects.	% of Total Defects.	No. of Defects.	% of Total Defects.	No. of Defects.	% of Total Defects.	No. of Defects.	% of Total Defects.	No. of Defects.	% of Total Defects.
Found O. K. ....	....	....	18	4.80	1	0.12	36	20.11	....	....	1	1.51	8	7.62
Car body	492	24.79	69	18.39	148	17.67	51	28.49	6	2.78	11	16.67	20	19.05
Motor	267	13.42	13	3.47	309	36.90	28	15.64	55	25.44	34	51.52	33	31.42
Controller	101	5.08	5	1.33	55	6.56	8	4.47	8	3.70	2	3.03	6	5.72
Plow	429	21.61	186	49.60	....	....	....	....	115	53.27	....	....	....	....
Fender .....	....	....	....	....	7	0.84	....	....	....	....	....	....	3	2.86
Wheelguard	87	4.38	10	2.66	57	6.80	13	7.27	1	0.46	3	4.55	....	....
Brake	237	11.94	22	5.87	79	9.43	21	11.73	24	11.11	7	10.62	15	14.28
Truck	179*	9.01	26	6.94	105	12.51	16	8.94	6	2.78	4	6.05	6	5.72
Air motor, etc.	38	1.91	21	5.60	45	5.36	....	....	....	....	....	....	10	9.53
Heater	22	1.11	1	0.27	11	1.31	1	0.56	1	0.46	1	1.51	....	....
Register	134	6.75	4	1.07	1	0.12	2	1.12	....	....	1	1.51	2	1.90
Trolley .....	....	....	....	....	20	2.38	3	1.67	....	....	2	3.03	2	1.90
Totals	1,986	100.00	375	100.00	838	100.00	179	100.00	216	100.00	66	100.00	105	100.00
Mileage	2,700,839	....	852,617	....	3,637,066**	....	690,956	....	255,044	....	386,558	....	401,068	....
Mileage previous month.	3,087,725	....	962,885	....	4,037,255	....	768,159	....	285,822	....	425,946	....	440,819	....
Ratio pull-ins per 1,000 miles .....	....	.73	....	.44	....	.23	....	.26	....	.85	....	.17	....	.26
Ratio pull-ins per 1,000 miles previous month....	....	.78	....	.60	....	.24	....	.15	....	1.83	....	.14	....	.25

*149 cars pulled in for wheel troubles.
**Surface car mileage only.

figures are given on the service of the New York City Interborough Railway, which operates 17 miles in Bronx Borough, and the three lines in Richmond Borough, which operate a total of 64 miles. The table shows that the Coney Island & Brooklyn Railroad gave the steadiest service during February, as its run-ins in operating 386,558 car miles amounted to a ratio of only 0.17 per 1000 car miles. The next best record was made by the Brooklyn Rapid Transit Company, which had a ratio of 0.23 per 1000 car miles in operating 3,637,066 car miles. These companies are followed by the New York & Queens County Railway and the Union Railway, each with a ratio of 0.26 pull-ins for operating 401,608 car miles and 690,956 car miles respectively. It should be noted that all of the four leaders use the overhead trolley and so do not suffer from the plow defects which are so troublesome to the railways in Manhattan Borough.

The best Manhattan record was made by the Third Avenue

power which can be developed at a cost which compares favorably with steam. Of this amount 3,500,000 only have been developed. The country is now annually using in excess of \$200,000,000 of fuel that might be saved by the development of water-power. This cannot be undertaken to-day because of obstacles which are placed by the government and are of no benefit to the government or to the people.

The chief paper of the session was by S. Z. Mitchell, who also attributed the lack of development of water-powers to the present government regulations, which grant only a limited franchise. For every dollar invested in generating stations a power developer may have three or four times that investment in his distributing system and the whole plant would necessarily be inoperative and useless in case of failure to secure a renewal of the grant.

Secretary Fisher explained that the government was maintaining the existing status simply until a policy should be

decided upon. It is anxious to obtain all of the information available on the subject and would welcome any data which the National Electric Light Association could supply.

Calvert Townley, vice-president of the Connecticut Company, New Haven, sent a written communication in which he stated there was considerable water-power in New England yet undeveloped and that all of the water-power development already made had not proved satisfactory commercially. The imposition of high taxes upon water-powers retards development and increases the cost of energy to the consumer.

Other speakers were J. R. McKee, Richmond Lamb, J. G. White, John Bogart, C. F. Scott, R. D. Mershon, F. J. Sprague and D. B. Rushmore.

As a conclusion of the meeting a committee consisting of S. Z. Mitchell, R. D. Mershon, C. F. Scott, P. G. Gossler, M. A. Biedle and C. F. Wallace was appointed to formulate the resolutions expressing the general opinion of the conference. This committee reported the following resolution, which was adopted:

Resolved, That it is the sense of this meeting, convened at the instance of the power transmission section of the national body, that the National Electric Light Association should offer its co-operation with the legislative and executive branches of the national and State governments for the formulation of a definite, constructive policy which will encourage the prompt and fullest development of our water-powers in the public interests; and be it further resolved that to this end it is recommended that the officers of the National Electric Light Association appoint a committee or committees with power to act in the premises, and to invite the co-operation of such engineering, commercial or other bodies as they may deem expedient."

MEETING OF THE INTERURBAN RULES COMMITTEE

The interurban rules committee of the American Electric Railway Transportation & Traffic Association held a meeting at the Blackstone Hotel, Chicago, Ill., on April 11 and 12. Those present were J. W. Brown, Aurora, Elgin & Chicago Railroad; C. F. Handshy, Illinois Traction System; F. A. Boutelle, Puget Sound Electric Railway; W. H. Collins, Fonda, Johnstown & Gloversville Railroad; Alexander Shane, Indianapolis, Columbus & Southern Traction Company, and H. C. Donecker, secretary of the association.

Mr. Brown, chairman of the committee, in his opening remarks said that the meeting which was held in January was for the purpose of determining upon a plan of action. The committee had a very difficult task before it in drafting a code of rules that would be acceptable as a whole to all of the interurban roads. He believed that the committee was unanimous in its approval of the plan of numbering the interurban rules to conform to the American Railway Association standard code.

Mr. Handshy did not believe that it would be possible to get up a code of rules that would be suitable in their entirety for all roads. The majority of the roads needed as simple a code as the committee could compile and he was opposed to including in the code any rules that the electric railroads would not enforce. He thought the majority of roads could use the steam-road rules, but could get along with fewer forms of train orders.

Mr. Shane said that the three roads comprising the Indianapolis-Louisville route had just completed the compilation of a new code of rules. An endeavor was made to omit unnecessary rules wherever possible, although the management realized that a code of rules was in the nature of a book of instructions for men who sometimes had very little experience or knowledge of railway operation. In the State of Indiana the Railroad Commissioners had made it compulsory to include some rules in the books used by the interurban roads operating in that State. These rules have been found very satisfactory. The new code of rules for the Indianapolis-Louisville lines con-

formed very closely to the Denver code. A number of rule books had been examined and what were thought to be the best rules from each were copied. Mr. Shane thought that any standard code of interurban rules would have to be added to or subtracted from to meet local conditions. Such a standard code, however, should contain all the fundamental principles.

Mr. Handshy did not believe that the code of city rules should interfere in any way with the work of drafting a suitable code of interurban rules.

The committee then proceeded to pass on the individual rules included in the Denver code. In the following notes of changes which were approved the references are to the rule numbers and wording of the Denver code. The committee intends, however, to re-number all of the rules so as to make them conform to the numbering of the American Railway Association standard code.

GENERAL NOTICE

The general notice contained in the Denver code was approved, with the addition of Rule 8 to be inserted between the third and fourth paragraphs. Rule 8 refers to the promotion of the company's welfare by employees.

GENERAL RULES

The first sentence of Rule 1 was changed to read as follows: "The head of each department must be conversant with such rules as apply to his department, supply copies," etc. After the sentence ending "the action taken thereon" it was agreed to insert the last sentence of Rule 3. The first sentence of Rule 3 will be eliminated. In Rule 2, after the sentence ending "obey the rules and special instructions," it was agreed to insert the second sentence of Rule 5, and eliminate the first sentence of Rule 5. These changes entirely eliminate Rules 3, 5 and 8. In the heading of Rule 6 the word "correct" was stricken out.

General Rule C of the 1910 code was substituted for Rule 7 in the 1909 code. Rules 9 and 10 were approved and also Rule 11, with the following addition: "Employees must examine and know for themselves that grab irons, brake shafts and attachments, running boards, steps and all other parts of cars and locomotives which they are to use and all mechanical appliances, tools, supplies and facilities of every kind of which they must make use in performing their duties are in proper condition. If not, they must put them so, or report them to the proper person and have them put in order before using."

The last sentence of Rule 12 was changed to read as follows: "Politeness and courtesy must be continually practised by employees. This will prevent controversy and complaint and greatly benefit the service."

In Rule 18 the following sentence was added: "Conductors must enforce this rule."

The last sentence of Rule 28 was stricken out. Rule 29 was revised to read as follows: "When an employee is discharged from the company's service he shall not be re-employed by any department without the approval," etc.

The remainder of the rules under this heading were approved.

DEFINITIONS

Rules 50 to 76 were approved with a number of slight changes, among which were the following:

The heading of Rule 51 was changed to "regular train." In Rules 57 and 58 the words "regular train" were substituted for "scheduled train." Rule 63 was changed to read: "Station: A place designated by name or number at which a train may stop for traffic." In Rule 69 the word "engine" was substituted for "motors." The last sentence of Rule 70 was omitted and the following clause, "and responsible for the safe operation of the train," was added after the word "moved."

The following definitions were added after the definition of a pot signal:

Markers: Signals carried on the rear end of a train indicating that it is a train and that it is the rear end of a train.

Classification Signals: Signals carried on the front end of a train to indicate that the train is a section of a train or an extra.

Rule 81, under the heading of standard time, was omitted.

TIMETABLES

Rules 84 and 85 were combined. In the last line of Rule 88 the words "or below" were inserted after the word "above."

AUDIBLE SIGNALS

Section K of Rule 99 was omitted. Rule 102 was revised to read as follows: "In case of a breakdown or accident which disables a car on a railroad crossing not protected by an interlocking, the conductor," etc.

Rule 106 of the 1910 interurban code was substituted for Rules 103 and 104 of the Denver code with the following modifications: "Section c. Signals of motorman to conductor. Three bells by motorman is signal to conductor that he wishes to back the train. Section d. Four bells is signal to set rear brake."

TRAIN SIGNALS

In Rule 107 the following clause was inserted after the first sentence: "but must be concealed when train is clear of the main track." Rule 119 was amended to read as follows: "A yellow flag by day and a yellow light by night on the right-hand side of the track indicates that the track is in bad condition ——— ft. in advance and trains must operate at ——— m.p.h. until they pass the same kind of a signal on the left-hand side of the track."

SIGNALS

Rules 121, 122, 123 and 124 were eliminated. In Rule 130 the words "but give no proceed signal" were omitted, and in Rule 131 the word "crossing" was omitted after the word "regular."

MOVEMENT OF TRAINS

Rule 203 was amended to read as follows:

"203. A train must not leave its initial station on any division, or a junction, or pass from double to single track without order or clearance, and until it is ascertained from the dispatcher whether all trains due have arrived or departed.

"Where a train register is maintained it shall be the duty of the conductor to register and note carefully whether all trains due have arrived and departed."

Rule 203a was eliminated and Rule 92 of the 1910 interurban code was substituted for Rule 204. Rules 205 and 208 were consolidated into one rule and Rule 206 was amended by striking out the words "between reporting stations." In Rule 210 the distance between following trains was left blank to be filled in by each road. Rule 212 was omitted and the last line of Rule 211 corrected accordingly. A new Rule 214 was approved as follows:

"214. Trains carrying signals to an intermediate point will report to the dispatcher when arriving at that point and will not take down signals or leave that point until the following section arrives, unless otherwise instructed. The dispatcher will not instruct train carrying signals to proceed before the following section for which signals are carried arrives and until he has properly protected the following sections against all opposing trains."

Rule 220 was amended by the addition of the following: "The front end will go back to recover the detached portion, running with caution following a flagman. The detached portion must not be moved or passed until the front portion comes back."

Rule 222 was changed to read: "Yard limits marked by proper boards may be established and within such limits the main track may be used, clearing first-class trains as prescribed by the rules. All except first-class trains must move within the yard limits prepared to stop unless the main track is known to be clear."

In connection with Rules 256 and 258 the committee will insert the rules required by the Indiana commission under the captions which are obligatory in Indiana.

At the conclusion of the morning session on Wednesday Secretary Doncker read a letter from the Canadian Street Railway Association asking what results had been secured in the attempt to standardize operating rules.

An electric railway, 28 miles long, is to be constructed from Hiki to Sujiwara, in Kiushiu, Japan, at a cost of about \$750,000.

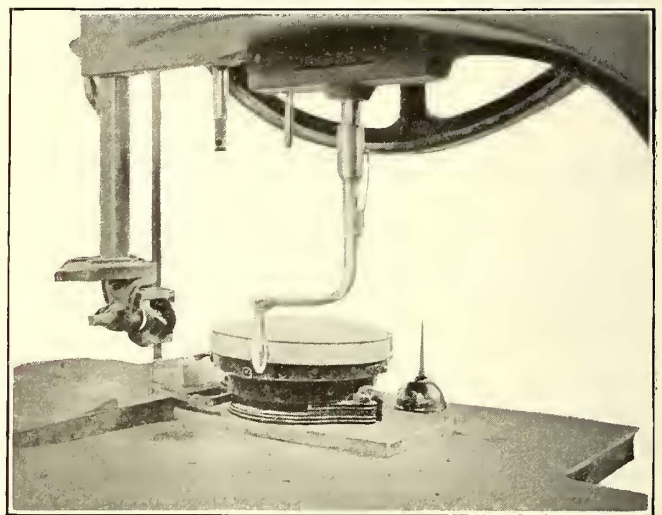
A. I. E. E. MEETING AT TORONTO

A meeting of the American Institute of Electrical Engineers was held on Friday evening, April 7, 1911, in the chemistry and mining building of the University of Toronto. The meeting was called to order by Chairman E. Richards, of the Toronto Section, who introduced Secretary Ralph W. Pope. Mr. Pope made a few remarks on the work of the Institute. President Jackson was then introduced and presided during the meeting.

The paper of the evening was presented by the author, William S. Murray, of New Haven, Conn., and was copiously illustrated with lantern slides. This paper is published in abstract elsewhere in this issue and was discussed by N. W. Storer and B. G. Lamme, of Pittsburgh. About 100 members were present, among those from a distance being President D. C. Jackson, Secretary Ralph W. Pope, W. S. Murray, of New Haven; John Murphy, of Ottawa; H. W. Weller, of Montreal; H. P. Davis, N. W. Storer and B. G. Lamme, of Pittsburgh.

COUNTING ATTACHMENT FOR BAND SAW

The construction departments of the Chicago Railways require a great many wooden shims and wedges and these are cut from scrap timber in the repair shop wood mill. A large motor-driven band saw is used for cutting the wedges. To steady the work and get the wedges of uniform size a beveled block is used to hold the wood while it is being pushed against



Fare Register in Use as a Counter on a Saw Table

the saw. As these wedges are ordered several thousand at a time some special means of counting them as they are cut has been found advisable. Accordingly an old fare register has been rigged up for this use. The register is mounted on a board which quickly can be clamped to the saw table. The ringing arm of the register has been extended to a length of about 8 in. When the register is in place on the board this arm is in such a position that each time a wedge is cut it engages the jig which holds the work. By this means an accurate count is obtained without requiring any attention on the part of the saw operator.

EMERGENCY SUPPLY OF SAND ON CARS

As a precaution against sand hoppers becoming empty on remote sections of the line, the Bristol & Plainville Tramway Company, Bristol, Conn., keeps stored under the seats of each car 24 canvas bags filled with fine gravel. Two bags are sufficient to fill a hopper. Special facilities have been provided for refilling the bags at the carhouse. The substitution of fine gravel for sand not only eliminates all tendency to form lumps in damp weather, but thorough tests have shown that gravel gives better results in stopping a car on a slippery rail.

WRITTEN EXAMINATION FOR TRAINMEN ON CLEVELAND, PAINESVILLE & EASTERN RAILROAD

Written examinations of trainmen have been substituted for oral examinations by the Cleveland, Painesville & Eastern Railroad Company, Willoughby, Ohio.

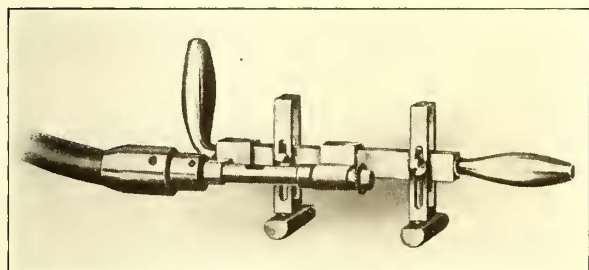
J. C. Espy, superintendent of transportation, states that his practice in the past has been to examine trainmen orally once a year. The questions asked the men have been varied each year, with the object of leading them further and further into questions of operation. Beginning with 1911, however, written examinations on the timetable and book of rules have been substituted.

When oral examinations were given one or two men were examined at a time, but with the change which went into effect this year each man examined was placed in a room by himself until he completed his answers to the questions. In the last oral examination 121 questions were asked; in the written examination there are 116 questions to be answered. The written examinations are checked and any questions not answered in full or properly are taken up with the man individually.

Mr. Espy states that the men are better pleased with the written examination, and that he has been surprised at the evidence of this fact. The new policy has had the good effect of leading the men to discuss the rules.

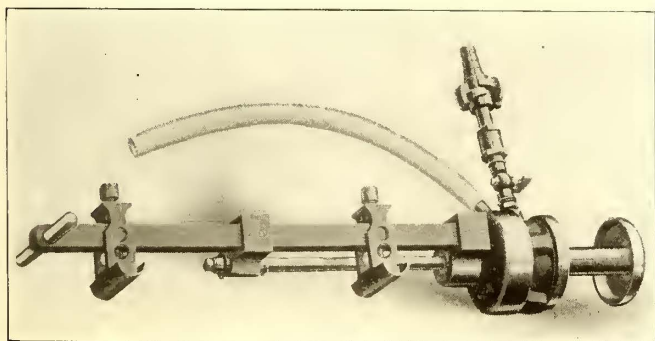
COMMUTATOR SLOTTING TOOLS

The Westinghouse Electric & Manufacturing Company is making two types of commutator slotting tools, one type air-operated and the other motor-operated. Both types are shown



Electric Commutator Slotting Tool

in the accompanying illustrations. Each of the slotting tools comprises a circular saw with adjustable rests for centering the tool. Guides which bear on the commutator face are adjustable on the guide bar of the tool, making it applicable to a large



Pneumatic Commutator Slotting Tool

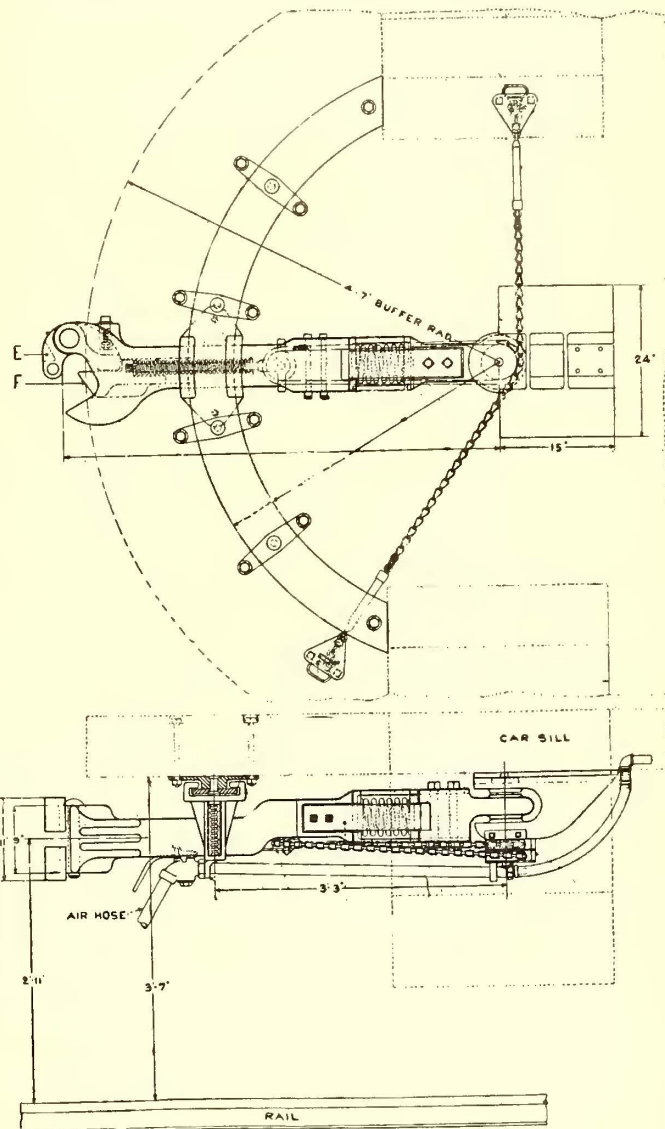
range of commutator sizes. The guides also permit the depth of slotting to be accurately adjusted and maintained. The pneumatic slotter is operated by an air turbine at a pressure of 40 lb. to 80 lb. per square inch. The air turbine forms part of the tool. The motor slotter is satisfactorily operated by a 1/4-hp motor running at approximately 1700 r.p.m. A 5-ft. flexible shaft is provided for connecting the tool to the motor.

TOMLINSON M. C. B. COUPLER

The accompanying diagram shows the latest type of Tomlinson M. C. B. coupler for electric cars. This coupler has been used on several electric roads for more than a year. The special feature of the coupler is the device for preventing the coupler from uncoupling from vertical displacement.

The contour of the coupler head follows the M. C. B. lines, but on electric cars some device is necessary to prevent vertical uncoupling at sharp changes in grade. In the coupler illustrated this is accomplished by the sliding lock marked *F* in the drawing and the recess *E* in the face of the knuckle. When two couplers are connected the sliding lock *F* seats itself in the recess *E*, where its vertical movement is limited. When this limit of movement is reached the spring drawbar carrier provides all the additional flexibility necessary. At the same time the coupler can intercouple with any other standard M. C. B. coupler. As will also be seen from the drawing, the draft gear has an offset which throws the anchorage casting well up against the sills of the car. This reduces the strain upon the fittings.

The patents for this coupler have been taken over by the



M. C. B. Radial Coupler

Ohio Brass Company, which up to this time has been making the coupler for Mr. Tomlinson, and the Ohio Brass Company is now placing the coupler on the market.

The Winona Interurban Railway, Warsaw, Ind., is improving a public park a few miles north of Peru on the banks of Eel River, with a view to increasing its patronage to the park.

STEAM TURBINE FOR DRIVING MODERATE-SPEED MACHINERY

The De Laval Steam Turbine Company, Trenton, N. J., has developed a high-power, single-gear reduction system for driving d.c. generators and for direct connection to other moderate-speed machinery, such as centrifugal pumps and blowers. A typical example is afforded by the unit shown in the accompanying illustration, Fig. 2.

This set consists of a multi-stage turbine driving a 500-kw,

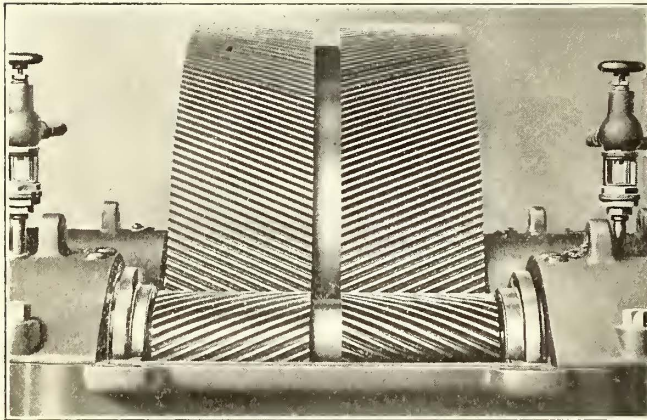


Fig. 1—Gear and Pinion of Multi-Stage Turbine

500 r.p.m., 250-volt, d.c. Crocker-Wheeler inter-pole generator through a pinion and single gear. The speed of the turbine shaft is 3600 r.p.m. Steam is admitted to the turbine first through a strainer case and then through a combined trip and throttle valve, to be seen at the extreme right; next through the adjacent governor valve, and then, after passing through steam nozzles of the standard De Laval type, it impinges upon the blades of the first-stage wheel. Partial admission is used in the first stage, but full admission in later stages. The buckets are non-corrodable and are dovetailed into the rim.

The wheels are mounted upon the shaft by split taper sleeves drawn tightly into place by internal nuts in the wheels. After the wheels are assembled a lock nut on the shaft serves

the periphery of the diaphragm between the first stage and the second stage. These blades are made of "extruded" metal and are fitted onto the cast-iron diaphragm. The diaphragm itself is slightly dished in order to increase its strength to withstand pressure, and to complete it a solid steel band is shrunk over the tips of the guide blades. The steel band is slightly wider than the blades and diaphragm, and as adjacent bands touch each other a complete steel casing is formed which would effectually prevent the possible penetration of parts in case of rupture of the wheels.

The packings surrounding the shaft at the high-pressure and low-pressure ends are more elaborate. The high-pressure packing consists of a long labyrinth, followed by four carbon packing rings. Any steam leaking by the labyrinth packing is piped to one of the intermediate stages of the turbine and utilized, while any steam leaking by the first carbon ring is taken to the exhaust outlet. The packing at the exhaust end of the turbine consists of three carbon rings, steam at reduced pressure being led in between the first and second ring from the outside, which is also done at the high-pressure end. Thus any leakage into the exhaust when vacuum is carried will be of steam, not of air.

The governing mechanism is in duplicate, that is, there is a speed-regulating governor and a speed-limiting or emergency governor. The former is mounted at the top of a vertical shaft driven by a worm gear from the turbine shaft. Through a system of two bell-crank levers and a connecting rod it controls the movement of a vertical double-seated poppet valve similar to that used on standard De Laval turbines. To prevent damage to the valve by overtravel of the governor a spring is inserted in the connecting rod. The same worm which meshes with the worm wheel on the governor shaft meshes with another worm wheel driving the tachometer. The lower end of the governor shaft is connected to an oil pump to supply the bearings and the pinion and gear.

The emergency governor is located in the end of the turbine shaft itself and is ordinarily not in contact with the trip. This trip may also be sprung by hand. The valve spindle may be used as a throttle valve independently of the trip.

The pinion and gear, perhaps the most important and interesting part of the construction, are shown in Fig. 1. The gear is of the double helical or herring-bone type. The pinion is cut from a solid bar of steel and is carried in plain babbitted

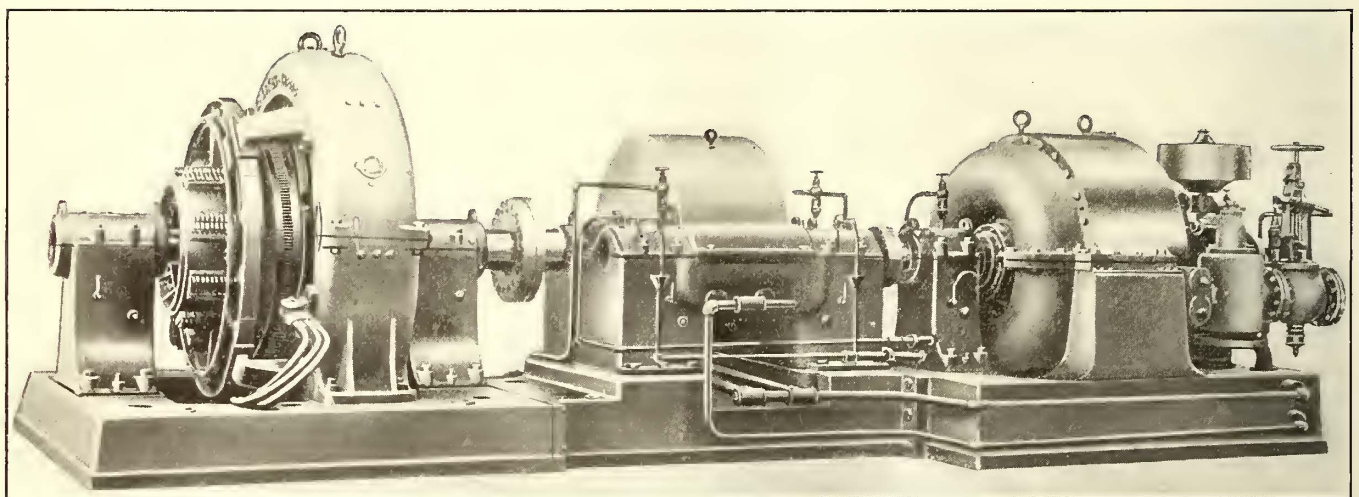


Fig. 2—Multi-Stage, Single-Geared Steam Turbine Driving a 500-kw, 500 R.P.M., D.C. Generator

further to secure them, while rotation of the wheels about the shaft is prevented by a key. The greater blade length required by the increased volume of the steam as it proceeds toward the exhaust is secured both by reducing somewhat the diameters of the wheels and by increasing slightly the bore of the casing.

Upon rebounding from the moving blades the steam again expands by passing between the guide vanes placed all around

bearings supported in a rigid cast-iron frame, which also supports the gear bearings. The pinion bearings are lubricated by sight-feed oilers, the excess oil overflowing to the wells of the gear bearings, which are ring-oiled. The gear consists of a solid cast-iron center upon which two thick steel rings are shrunk. The lubrication of the gear and pinion teeth is accomplished by jets of oil directed at the line of contact on the entering side.

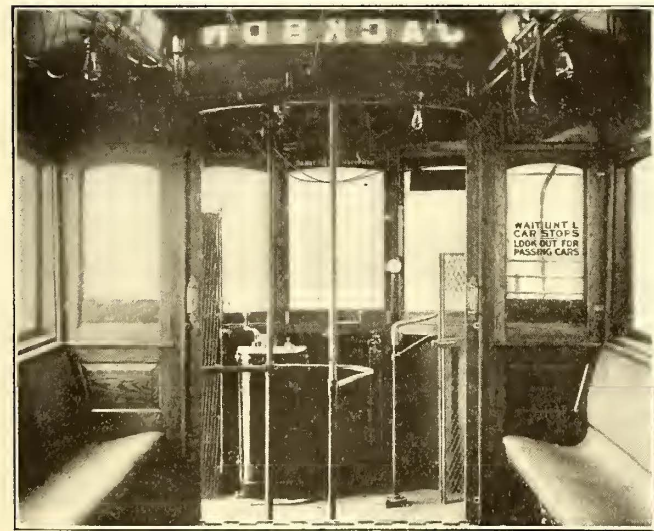
PAY-AS-YOU-ENTER CAR SERVICE IN SAN FRANCISCO

On March 19 the United Railroads of San Francisco began to operate its Sutter-Jackson Street line with 10 new pay-as-you-enter cars. The Cliff House line is now being equipped with the new rolling stock and other lines in the city are to follow. Eighty cars have been ordered for delivery within the next six months. If this type proves a success the company will rebuild its standard closed cars to adapt them for prepayment service. A public inspection of the new cars was given at three prominent parts of the city for two days prior to their entering the service. For several weeks before large notices and handbills to illustrate and explain the pay-as-you-enter system were posted in conspicuous places in the street cars and throughout the city.

The officials of the railroad state that the pay-as-you-enter idea has thus far proved to be successful and a marked improvement over the old style of car. The only protest of note originating on account of the new cars came from the Carpenters' Union (with which Mayor McCarthy is affiliated) because the United Railroads does not allow large packages on prepayment cars. The carpenters complained that they would have to hire an expressman to move their tool boxes from job to job. Hitherto they have been allowed to transport their tool boxes on the cars to and from work. The matter has been referred to the District Council of Carpenters for action.

A city ordinance compels the company to have on top of each car two square illuminated route number signs to display the number designating the route. The figures can be plainly read in the night at a distance of two or three city blocks. Inside each car is a placard giving the names of the lines which correspond to the various route numbers.

The new car bodies are of wood with a $\frac{3}{8}$ -in. steel plate under the panels and were built by the Jewett Car Company, Newark, Ohio. They are 47 ft. 6 in. over the bumpers and 9 ft. wide. The body doors are of the double sliding type, as illustrated. The longitudinal rattan seating has a capacity for 48 passengers. The power cables are carried in a conduit under these seats. An air suction screen, a GE-M.C. automatic gov-

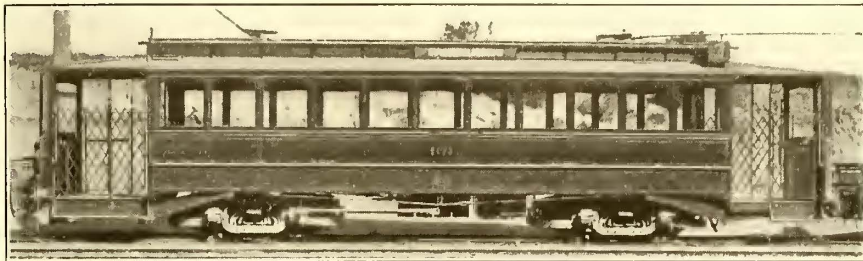


Platform of San Francisco Pay-as-You-Enter Car

ernor and air-operated sanders are also carried under the seats. The motorman's vestibule curtain rolls up; when it is down two end cords with small catches are clasped to fasteners set in the platform floor. The gates on both sides of the motorman's platform are kept closed. The left-hand gate is of the folding type, but the right-hand or front exit gate is a two-section screen, the forward section of which opens on hinges when it is manipulated through a lever by the motorman. On

the conductor's platform only the screen gates are closed. The conductor's dividing rail can be raised from the floor to the roof on two 2-in. steel rods. Cash fares are recorded on Sterling-Meaker registers either by means of a foot-pin in the platform or by a hand-strap overhead, but tickets and transfers can be registered only by means of the handstrap. A push-button signal system is installed.

The electrical equipment was designed especially for the



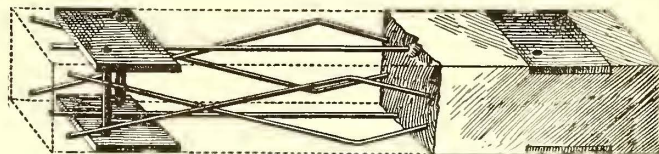
Exterior of San Francisco Pay-as-You-Enter Car

steep hill service of San Francisco as well as for quick acceleration. Four GE-216 50-hp interpole motors are mounted on Standard trucks. The K28-J controller is used on all the new cars. The air-brake equipment consists of a GE-C.P. No. 27 compressor, M.C. governor, G.E. reservoir with safety blow-off valve and National Brake & Electric Company's motorman's valve and gages. A pressure of 75 lb. is used. The emergency handbrake is of the Peacock type.

Among the specialties on these cars are ball-bearing trolley bases; Trolley Supply Company's "Ideal" catcher; Crouse-Hinds Company's incandescent headlights; Hedley anti-climbers and Eclipse fenders.

LOS ANGELES REINFORCED CONCRETE TIE

The Los Angeles (Cal.) Railway has recently purchased from the McDonald Spiked Concrete Tie Company, of the same city, the right to use the McDonald reinforced concrete tie. Several hundred feet of track have already been laid with this tie in Los Angeles, and the railway is preparing to reconstruct 5 miles more in the immediate future. This contract was made after a successful three years' test on a heavy-traffic spur of the Santa Fé Railroad. As shown in the accompanying drawing, this tie as built for street railway service comprises six $\frac{1}{4}$ -in. twisted square steel rods (not riveted) having an elastic limit of 55,000 lb. per square inch; four $\frac{3}{4}$ -in. galvanized sleeves or tubes for the track spikes; two $\frac{1}{4}$ -in. iron bed plates, and a concrete mixture, preferably consisting of four parts clean sharp sand and gravel, one part crushed stone and one part Portland cement. The manufacturer suggests that the plates shall have a coating of asphaltum or coal tar after the tie is made and before it is placed in the ground. The spikes should also be treated with similar anti-rust coatings. It is further recommended that the ties should not be used until about eight weeks after manufacture; also that



Reinforced Concrete Tie

they should be wetted twice a day for the first week, once a day for the second week, three times a week for the next three weeks, but not at all for the last three weeks.

Some experimental ties, 7 ft. x 8 in. x 6 in., were made in Los Angeles for \$1.18 each, but probably this cost could be lowered under favorable conditions. In any event, the fact that these ties are laid 4-ft. centers makes the actual cost per mile approach that of the cheaper untreated wooden ties.

News of Electric Railways

Program of Annual Convention of Arkansas Association of Public Utility Operators

The following program has been arranged for the annual meeting of the Arkansas Association of Public Utility Operators, which is to be held at Little Rock on May 3, 4 and 5, 1911:

MAY 3—10.00 A. M.

Registration of delegates and visitors. 2.00 p. m., Paper, "Effect of Natural Gas Upon Municipalities," by W. L. Wood, vice-president and general manager of the Texarkana Gas, Railway & Electric Lighting Company, Texarkana, Ark.

Paper, "Rate Question Applied to Electric Light & Power Companies," by J. M. Hewitt, president and general manager of the Marianna Electric Light & Power Company, Marianna, Ark.

Paper, "Water," by W. C. McGuire, general manager of the Wilson Water & Electric Light Company, Arkadelphia, Ark.

Discussion.

Automobile ride for the ladies to places of interest.

Theater party at Majestic Theater.

MAY 4—10.00 A. M.

Paper, "New Business of Light and Power Companies," by Minor Woodward.

Paper, "The Railroad Bed Construction for Electric Railways," by D. A. Hegarty, vice-president and general manager of the Little Rock Railway & Electric Company, Little Rock, Ark.

Paper, "Relation Between Contractors and Central Station Operators," by F. C. Bragg, president of the Electric Construction Company, Little Rock, Ark.

Paper, "Municipal Plants of Arkansas," by W. H. Wal-kup, manager of the Municipal Electric Light Plant, Searcy, Ark.

Discussion.

2.00 P. M.

Paper, "General Accounting Public Utility Corporations," by W. J. Tharp, auditor of the Little Rock Railway & Electric Company, Little Rock, Ark.

Paper, "Opinions of Various Cases in Various States Affecting Public Utility Corporations," by L. E. Sawyer, general attorney of the Hot Springs Water, Light & Railroad Company, Hot Springs, Ark.

Discussion.

Visit to power house and shops of the Little Rock Railway & Electric Company.

Trolley ride to Forest Park by courtesy of the Little Rock Railway & Electric Company.

Informal banquet given by Class "B" members of the association.

MAY 5—A. M.

Executive session.

Election of officers and selection of place for next annual convention.

Program of Annual Meeting of Pacific Claim Agents' Association

The annual meeting of the Pacific Claim Agents' Association will be held in Seattle, Wash., on May 21 and 22, 1911. The following program of papers has been prepared for presentation at the annual meeting of the association:

"How Can the Public Be Best Educated in the Prevention of Accidents?" by George Carson, claim agent for the Seattle (Wash.) Electric Company.

"Should a Statement Be Taken from the Injured Party, and When?" by T. G. Newman, attorney for the Whatcom County Railway & Light Company, Bellingham, Wash.

"What Position Should the Pacific Claim Agents' Association Take Regarding the Hooper-Holmes Information Bureau, and What Sort of an Information Bureau Can Be

Established on the Pacific Coast?" by E. H. Odell, claim agent for the Tacoma Railway & Power Company, Tacoma, Wash.

"The Best Method to Employ in Dealing with Grafters in Connection with Claims for Damages," by S. A. Bishop, claim agent of the Pacific Electric Company, Los Angeles, Cal.

"The Organization of the Medical Department of a Large Street Railway," by T. A. Cole, claim agent of the Los Angeles (Cal.) Railway.

"Is It Advisable to Hold Out the Amount of the Physician's Bill in a Settlement with the Claimant and Pay the Physician Direct?" by J. H. Handlon, claim agent of the United Railways of San Francisco.

"What Is the Best Method to Be Adopted by the Association to Enlist as Members More of the Steam Roads?" by A. M. Lee, district claim agent of the Northern Pacific Railroad, Seattle, Wash.

"How Can We Best Diminish the Boarding and Alighting Accidents?" by J. N. Hone, claim agent of the Spokane & Inland Empire Railroad, Spokane, Wash.

Next Meeting of Central Electric Railway Association

At the suggestion of A. L. Neereamer, secretary of the Central Electric Railway Association, announcement is made that the next regular meeting of the association will be held on June 22, 1911, a month later than is customary. At the June meeting, which will be held at St. Joseph, Mich., it is planned to have an especially entertaining and profitable program. As many railway men as possible are requested to attend the meeting in special cars.

Program of Meeting of Missouri Electric, Gas, Street Railway & Water Works Association

The following program has been announced for the fifth annual convention of the Missouri Electric, Gas, Street Railway & Water Works Association, which is to be held at the Jefferson Hotel, St. Louis, Mo., on April 13, 14 and 15, 1911:

APRIL 13—MORNING SESSION.

Convention called to order.

Address of welcome.

Response—R. J. Irvine, president.

Reading of minutes of last meeting.

Election of new members.

AFTERNOON SESSION.

Paper, "Centrifugal Pumps," by W. H. Reeves.

Paper, "Lubrication," by Prof. H. B. Shaw.

EVENING.

Banquet at Jefferson Hotel.

Theater for ladies.

APRIL 14—MORNING SESSION.

Paper, "The Illuminating Engineer."

Paper, "The Electric Vehicle," by Herman Spoehrer.

Paper, "Ornamental Street Lighting," by N. J. Cunningham.

AFTERNOON SESSION.

Paper, "Coal and Water Gas," by P. A. Bertrand.

Paper, "District Steam Heating," by Hal. C. Kimbrough.

Automobile ride for ladies—from Jefferson Hotel.

EVENING.

Sons of Jove Rejuvenation at Union Electric Light Power Company's office.

APRIL 15—MORNING SESSION.

Executive session.

Inspection of Ashley Street plant and other property.

Lunch at Ashley Street plant.

EVENING.

Theater party, to meet at the Jefferson Hotel.

Spring Meeting of the A. S. M. E.

The spring meeting of the American Society of Mechanical Engineers will be held at Pittsburgh, Pa., May 30 to June 2, 1911. The headquarters of the society during the meeting will be at the Hotel Schenley, but the professional sessions will be held at the Carnegie Institute, which is close to the hotel. The first session for the presentation of papers will be on the morning of May 31. The subject will be "The Mechanical Engineering of Cement Manufacture." After the presentation of the paper those in attendance will have an opportunity to visit the plant of the Universal Portland Cement Company. The special train to this plant will stop at East Pittsburgh to permit members to visit the Westinghouse works. On the evening of May 31 there will be a session on machine shop practice at which the subject of assembling small machine parts and the development of milling cutters will be discussed.

On the morning of June 1 there will be a short session with miscellaneous papers, after which an excursion on the river is planned. On the evening of June 1 there will be a reception and dance. On the morning of June 2 papers will be presented which relate to steel works machinery with special reference to blowing engines and forging presses. The convention will close on the afternoon of June 2 with excursions. A session is also planned for the gas power section. The manufacturers of Pittsburgh have extended invitations to their works, and E. M. Herr, chairman, and E. K. Hiles, secretary of the local committee, have under way an extensive program for entertainment. Previous to this meeting the American Foundrymen's Association is to convene in Pittsburgh and an exhibit of foundry appliances, under the auspices of the association, will be held. The International Art Exhibit at the Carnegie Institute at Pittsburgh will be open at the time of the meeting of the American Society.

Franchise Negotiations Begun in Toledo

Actual negotiations between the City of Toledo, Ohio, and the Toledo Railways & Light Company for a new grant in that city were begun on the evening of April 6, 1911. Mayor Brand Whitlock represents the city and President Albion E. Lang represents the company. A meeting was held on the evening of April 4, 1911, but owing to a misunderstanding in regard to the proposed basis of negotiations the company substituted a communication for personal representation. The only thing done at that meeting was to draft a reply to this letter.

Mayor Whitlock consented to consider the question of fare last, as the company insisted that it would regard any negotiations as useless with the rate of fare fixed in the beginning. Both sides agreed to accept the Schreiber ordinance as a basis for the negotiations. The terms of the agreement as fixed by the representatives of the city and the company are to be submitted to the voters of the city for acceptance.

At the meeting on April 6 Mayor Whitlock said among other things: "We meet to negotiate the transportation problems of the city. We approach the subject with the desire to do justice to the city and no injustice to the company. The task will be tedious and laborious, and yet in a way simple. We hope to continue the work until the problem is settled."

Replying to the Mayor, President Long said in part: "We ought to be able to come to a speedy conclusion. We are here as business men to talk to business men. I see no objection to the use of all the information we have. We are not here to drive a sharp bargain. This community should get better advantages from the contract than was possible 25 years ago, because the capital invested then ran the risk of changes which could not be foreseen. To-day the future of American cities is assured. The change from the horse car to the electric car was greater than will be made in land transportation in the future. There always will be chances for economy. The situation is one to be worked out for the greater advantages of Toledo and of the company. We have passed the day of competition in street railways and are ready to conform to the program of the Council. We will meet every day and all day or every

night and all night, as desired. We are anxious to have this pushed forward as rapidly as possible."

The first question considered on the morning of April 7 was the term of the franchise. The Schreiber draft placed it at 12 years. President Lang believed that the necessities of financing demanded a grant for 25 years. Mayor Whitlock stated that 12 years was too short and suggested 20 years. Mr. Lang said that about three years would be required to rehabilitate the system and that the longer the term of the grant the cheaper money could be secured for the needs of the company. He believed that the people preferred good service, even though the fare might not be so low as could be given with indifferent service. The Mayor agreed with him in this. The question of length of term will be taken up again.

The company agreed to surrender all existing franchises on the receipt of a new grant properly phrased by the attorneys. Mr. Lang objected to the provision that in case of doubt the ordinance should be construed liberally in favor of the city. This was left for future consideration. The parties to the negotiations concurred in the suggestion that in the case of certain parallel tracks one of them should be abandoned. The attorneys are to arrange a section of the grant to forestall suits by citizens to prevent such abandonment. Mr. Lang said that the part of the Huron Street line on Chase Street ought to be abandoned and that grade crossings should be eliminated as soon as possible.

Attorney Fuller stated that the section in the tentative grant giving the city power to regulate the laying of tracks and specifying the kind of rails to be used was too broad and that future councils might be disposed to take advantage of it to the detriment of the company. The company also objected to the city specifying fenders and other safety devices. The company felt that it should have a certain amount of freedom in the adoption of the best and most economical devices.

Mr. Lang objected to the section of the tentative draft which gives the city the right to grant joint use of tracks to other companies. He said that such a provision was fatal and that an agreement could not be reached so long as this remained. Mr. Schreiber thought that the city should have the right to grant the use of half the tracks to another company, although the State law permits a new company to use only one-eighth of the trackage of an operating company. Mr. Lang replied that the tendency is to develop a single system with uniform fares. The question was passed for future consideration. The section of the draft relating to consolidations was amended so as to give the city supervisory powers only over operation, although it will prevent an increase of fares through such a step.

It was understood from the resolution adopted by the City Council on the evening of March 31, 1911, that the administration intended to begin the negotiations with the fare at 3 cents and representatives of the company were not present at the meeting of the Council committee of the whole on the evening of April 4. On this account Mr. Lang dispatched a communication in which it was stated that negotiations were out of the question if the rate of fare was retained at 3 cents as fixed in the Schreiber draft, but that the company was willing to proceed along the lines laid down in the letter written by Mayor Whitlock on Dec. 15, 1910, in which it was stated that the discussion of fare would be left to the last. This letter from the company under date of Dec. 15, 1910, was published practically in full in the *ELECTRIC RAILWAY JOURNAL* of Dec. 31, 1910, page 1287, and was subsequently approved by the City Council. After reciting the correspondence between the company and the city which passed under date of Dec. 15, 1910, Dec. 24, 1910, and Dec. 29, 1910, Mr. Lang concluded his letter of April 4, 1911, as follows:

"It would be absolutely futile for this company to enter upon a discussion of any ordinance fixing a 3-cent fare. To do this would simply be to mislead the people of Toledo as to our position. Under a proper system of universal transfers we cannot carry passengers for 3 cents, and if we correctly interpret the reports of your accountants these reports themselves demonstrate that fact. Three-cent fares have not been successful in any American city and cannot be made so in Toledo. We do not think it wise or proper to reduce the wages of our men or impair our service in a vain attempt to carry passengers with universal transfers

for 3 cents, as is proposed in the tentative ordinance submitted to Council. We are ready, however, to take up the subject along the lines laid down in the above-mentioned correspondence."

After some discussion the committee formulated and sent to the company the following reply, which resulted in the beginning of negotiations on April 6, 1911:

"The committee of the whole of Council has received your letter of April 4, 1911, in which the Toledo Railways & Light Company renews its acceptance of the proposals contained in the administration's letter of Dec. 15, 1910, and states its readiness to take up the subject along the lines laid down in that letter. The letter of Dec. 15, 1910, referred to reiterated the administration's views as to the practicability of 3-cent fares and proposed a line of negotiations in which the whole question would be publicly discussed between negotiators for the company and the city, leaving until the end the question of valuations and of fare. The resolution adopted in the committee of the whole Council on March 31, 1911, informed your company that the city was prepared with memoranda for its negotiations and again repeated the administration's willingness to take up negotiations along the lines laid down in letter of Dec. 15, 1910.

"Your company's letter of to-day raises certain questions as to the contents of those memoranda. We know of no reason why these objections could not be considered in the negotiations as proposed by the city and twice acquiesced in your company.

"The committee repeats that it is ready to proceed with negotiations along the lines laid down in letter of Dec. 15, 1910, and will meet at the Council chamber on the evening of April 6, 1911, at 7:30 o'clock, and the negotiator for the city will be ready at that time to meet the negotiator for your company. If your company is not then represented the committee will take such other action in the premises as it may deem advisable."

Details of Philadelphia Rehabilitation Program to Be Made Public

A hearing was held before the finance committee of the City Councils of Philadelphia on April 5, 1911, at which the question of the use of the proceeds of the \$10,000,000 loan proposed by the Philadelphia Rapid Transit Company was considered. E. T. Stotesbury, of Drexel & Company, Philadelphia, Pa.; T. E. Mitten, president of the Chicago City Railway; Charles O. Kruger, president of the Philadelphia Rapid Transit Company, and other officers of the company attended. Mr. Mitten presented the following statement, which shows that it is proposed to spend \$11,000,000 before June 30, 1916:

"After providing for the refunding of present outstanding capital obligations of about \$1,600,000 maturing during the next five years, there will remain from the proceeds of the proposed \$10,000,000 bond issue approximately \$8,000,000 of new money available for the company's requirements.

"It is estimated that work to be completed during the 5-year period ending June 30, 1916, will be as follows:

"Thirteen hundred cars of the most modern type.	\$6,500,000
"One hundred and fifty miles of heavy standard track to be required to replace worn-out tracks	4,500,000

"Total cost.....\$11,000,000

"Approximately one-half of this amount, say \$5,500,000, represents the additional cost of new cars and track over that which is to be replaced, and, therefore, is a proper charge to capital account.

"The remaining \$5,500,000 should be charged against current earnings through the renewal account, the company thereby maintaining the physical integrity of the property out of earnings, as it should.

"After deduction of \$5,500,000 for capital expenditures, as above, there should remain about \$2,500,000 available for other improvements, including additional power requirements and extensions."

The members of the committee were of the opinion that a statement should be submitted showing more in detail the work which it is intended to do, and Mr. Stotesbury agreed to submit such a statement. This he did on Monday, April 11.

At the meeting on April 5 Mr. Stotesbury said:

"The whole thing is this: I was asked to go into the board, and I consider it a public duty I owe the company, now that I have accepted the tender, to help the situation. The company has to get the money. The Philadelphia Rapid Transit Company is incurring the obligation; the city will not have to put up a cent. With Councils' consent to the loan the property will be taken care of. I feel sure that it can be rehabilitated.

"Heretofore the property has not been taken care of as it should have been. There has been set aside only 12 per cent for making adequate provisions to take care of the increasing business; this should be increased to 15 per cent. The company needs power, but it has not the money to get it.

"If this money is not put up the company will drift and things will become worse. I do not wish to cast any discredit on the securities. I desire to see them increase in value. The company has no credit to enable it to borrow; the Union Traction Company guarantees the proposed loan. If the money is not forthcoming I do not know what the management will do.

"Both the Philadelphia Rapid Transit Company and the Union Traction Company have voted to float the loan. A voting trust has been established for five years. If Councils are willing to give their consent I will get the best people I can to run the property. As I see it now there should result a change for the better."

The directors of the Philadelphia Rapid Transit Company have decided that the request of the committee of five employees of the company for an increase in wages to 28 cents an hour cannot be granted at this time.

The Proposed Changes in the Cleveland Ordinance

Samuel E. Kramer, the new chairman of the street railway committee of the City Council of Cleveland, introduced an ordinance in the City Council on the evening of April 3, 1911, which embodies a number of the changes in the Taylor grant which were discussed by the special committee of the Chamber of Commerce. It was prepared by Street Railway Commissioner Dahl and is said to be merely a tentative draft upon which to base the amendments that are necessary to the success of the grant. Under the ordinance the company may at once sell bonds to secure funds for betterments and extensions. The stockholders will be protected by a change in the basis upon which the city may acquire the property at the end of the franchise period, the stock value being substituted for an appraised value. The city is given the right of initiative in extensions and betterments and may take a more important part in arbitration of disputes between the company and employees by appointing the company's members of the board of arbitration. No change has been made in the rate of fare.

Members of the committee of the Chamber of Commerce which has been considering proposed changes in the franchise were surprised when Street Railway Commissioner Dahl introduced in the City Council on the evening of April 3, 1911, an ordinance amending the grant. Mr. Dahl informed Chairman Frederick H. Goff that he wished to present a tentative draft to form a basis upon which the Council could work when the recommendations of the special committee were received. For a time it appeared as if the special committee and the Chamber of Commerce would drop the matter entirely, but it is probable now that they will make their report within a short time. The Dahl amendment would authorize the city to purchase the property at the expiration of the franchise at the value indicated by the capital stock, instead of at an appraised value plus 10 per cent. This, it is believed, would take care of the franchise value, which was not provided for in the original grant, and keep the value of the stock at par, so that stockholders would not suffer any loss if the city should decide to purchase the property or name a purchaser. It would also enable the company, it was argued, to secure funds for improvements through the sale of stocks or bonds. The maximum rate of fare was retained under the proposed changes and the right of the city to purchase at any time at the capital value plus 10 per cent was left undisturbed.

Prof. Edward W. Bemis appeared before the special committee of the Chamber of Commerce in a private conference on April 7. He stated that a surplus of \$10,000,000 would accumulate in the 15 years of operation under the Taylor plan. He based his conclusions upon a 4 per cent increase in the population compounded yearly and an 8 per cent compounded traffic increase. Secretary Davies of the company made the amount one-fourth as much. Warren Bicknell and A. B. DuPont will be consulted before the report of the committee is made.

Judge Estep of the Common Pleas Court has declared legal the franchises granted the Cleveland Underground Rapid Transit Company. The court held that the underground rights are not subject to the statutes governing street railways, but come under the head of those governing steam railroads. In regard to the allegation that a passenger terminal under the Public Square would invalidate the city deed to the property the Court ruled that an underground improvement of this kind would not violate any of the limitations imposed by the donor of this property. Attorneys for George B. Harris, who brought the suit, state that the case will be appealed.

The Kansas Utility Law

The Governor of Kansas has signed the bill to create a public utilities commission to succeed the Railroad Commission of Kansas, the passage of which by the Legislature was mentioned in the *ELECTRIC RAILWAY JOURNAL* of March 18, 1911. The official title of the new body is the "Public Utilities Commission for the State of Kansas." It is given authority to supervise and control all the public utilities and common carriers in Kansas, including street railways, suburban railways and interurban railways, and all the powers of the Railroad Commission of Kansas are vested with the new commission.

The officers of the Railroad Commission are to retain their respective offices for the terms for which they were elected. Thereafter the public utilities commission is to be composed of three commissioners to be appointed by the Governor with the consent of the Senate. One of the members of the commission is to be a business man and another is to be experienced in the management and operation of a common carrier or public utility. The first appointees to the public utilities commission are to serve one year, two years and three years, respectively. Upon the expiration of their terms commissioners are to be appointed for three years. After the expiration of the term of the present members each member of the commission is to draw a salary of \$4,000 a year. Not more than two members of the commission are to be of the same political party. There is to be a secretary to the commission, to receive the same salary as the secretary of the present Railroad Commission. The attorney of the Railroad Commission is hereafter to be the attorney for the Public Utilities Commission, and is to receive a salary of \$2,500 a year. Neither the commissioners nor the appointed officers of the commission are to be interested financially in any railroad or other common carrier or public utility. An expert rate clerk is to be employed at the salary of not more than \$5,000 a year.

The commission is empowered to require any corporation under its jurisdiction to establish and maintain joint rates. All corporations under the jurisdiction of the commission are to file with the commission copies of all schedules of rates, joint rates, tolls, fares, charges affecting traffic, and to furnish the commission with copies of all rules, regulations, etc. The commission is empowered to prescribe reasonable rules and regulations in regard to the printing and filing of all schedules, tariffs and classifications of all rates. The commission is empowered to investigate all rates and charges, and to order substituted therefore such rate or rates, fares, tolls, charges, etc., as shall be just and reasonable. All orders and decisions of the commission are to become effective 30 days after service. Public utilities are not to put any changes into effect without the consent of the commission, and not until 30 days after the proposed changes have been authorized by the commissioners. Any corporation which takes exception to any ruling by the commission is to commence action in court against the commission within 30 days from the time the order by

the commission is made. Appeal may be taken to the Supreme Court of the State. Detailed reports of the financial condition of the companies under the jurisdiction of the commission are to be furnished to the commission in such form and at such times as the commission shall require. On Sept. 15, 1912, and on Sept. 15 of each year thereafter the companies are to transmit to the commission a statement giving in detail affairs of the company for the period ended on June 30 preceding. All issues of stocks and bonds are subject to the approval of the commission. Reports of all accidents are to be telegraphed to the commission and the commission is empowered to inquire into all accidents. The law takes effect on its publication in the statute book.

Extensions in Detroit

At its regular meeting on the evening of April 4, 1911, the Common Council of Detroit, Mich., adopted a resolution granting the Detroit United Railway the right to make the extension agreed upon by Mayor Thompson, Corporation Counsel Hally and President Hutchins of the company some days previously, as mentioned in the issue of the *ELECTRIC RAILWAY JOURNAL* of April 8, 1911, page 645. The resolution gives the company the right to build extensions on Hamilton Boulevard, Mack Avenue and Chene Street and to construct the proposed Brush Street loop. One member of Council objected to the company being given the right to charge a fare of five cents on certain cars that will traverse a portion of the Beaubien Street route. The company has been requested to build a north and south line on Junction Avenue.

The 20 large open cars reconverted into cars of the pay-as-you-enter type were put in operation on the Jefferson Avenue line on April 9, 1911. The longitudinal seats have been retained in the reconverted cars, but the new cars which have been ordered will be fitted with cross seats. They will also have folding steps. The car crews will be instructed not to open the doors until the cars are stopped. Conductors will be furnished with hand fare boxes to take the fares of passengers who ride beyond the city limits. The regular city fares will be deposited in the fare box as the passengers enter.

The Detroit Federation of Labor has sent a letter of protest to the Common Council against allowing the cars of the Michigan United Railway into the city over the tracks of the Detroit United Railway. Labor interests insist that the company should enter into proper agreements with the City Council before its cars are allowed to come into the city.

Fiftieth Anniversary of the Massachusetts Institute of Technology

The fiftieth anniversary of the establishment in 1861 of the Massachusetts Institute of Technology at Boston, Mass., was celebrated April 10-11, 1911, in that city. The principal functions consisted of the reading of papers by prominent alumni and professors of the institute and meetings of the alumni and guests on the evenings of April 10 and April 11. The papers read were divided into six sections, as follows: (1) "Recent Industrial Developments," Professor Dugald C. Jackson presiding; (2) "Technological Education in Relation to Industrial Development," Professor Arthur A. Noyes presiding; (3) "Scientific Administration and Management," Dr. Davis R. Dewey presiding; (4) "Scientific Investigation and Control of Industrial Processes and Materials," Professor William H. Walker presiding; (5) "Municipal and Industrial Sanitation," Professor William T. Sedgwick presiding, and (6) "Architecture," Professor F. W. Chandler presiding. The presentation of these papers was preceded on April 10 by a general meeting at which President MacLaurin gave an address on "Some Factors of the Institute's Success." The banquet on April 11 was held at Symphony Hall and the dinner arrangements were in charge of Charles C. Peirce, of the class of '86.

At the banquet Tuesday evening President MacLaurin said that three sites within easy distance of the present location had been offered for the new buildings of the Institute and several further away. Lieutenant-Governor Frothingham spoke of the benefit which the Institute had been to the

State and said that he and the Mayor of Boston had agreed, if the Governor was in doubt in regard to signing the proposed grant, to advise him correctly on the subject. Mayor Fitzgerald expressed the hope, on behalf of the city of Boston, that there would be no penurious policy on the part of the State or failure of private wealth to rally to its support. President Coffin of the General Electric Company acknowledged the debt which the electrical industry owed to the graduates of Technology and of similar institutions. President Lowell, of Harvard, referred to the high standards of education which had always been maintained by the Institute. George S. Smith, president of the Boston Chamber of Commerce, spoke of the intimate relations between the Institute and the business world. Charles W. Eliot, ex-president of Harvard, referred to the force of imagination and inspiration in scientific work. Professor Wm. T. Sedgewick, the final speaker, sketched the changes which had been made in technical education since the establishment of the Institute.

Plans for Underground Railway in Toronto Authorized.—The City Council of Toronto has adopted the proposal of Controller Hocken to have the city engineer prepare plans and specifications at a cost not to exceed \$5,000 for an underground railway under Yonge Street, from the Union Station to St. Clair Avenue.

Another Columbus Dynamiter Sentenced.—Alfred N. Strader, convicted of unlawfully having dynamite in his possession and of having dynamited the South End car house of the Columbus Railway & Light Company, Columbus, Ohio, during the strike last summer, was sentenced to serve 10 years in the penitentiary on April 4, 1911.

Overhead Feed Wires Ordered Removed in Downtown Indianapolis.—The Board of Public Works of Indianapolis, Ind., has ordered the Indianapolis Traction & Terminal Company to remove all its overhead feed wires within a radius of one-half mile of a fixed point in the central part of the city and place them underground.

New Haven to Electrify Another Branch.—In connection with the plan which Charles S. Mellen, president of the New York, New Haven & Hartford Railroad, has proposed for solving the railroad and river front problem at Springfield, Mass., he has announced that the company intends to equip the Tariffville branch of the Hartford & Connecticut Western Railroad between Springfield and Tariffville, Conn., with electricity.

Report Authorized on Boylston Street-Riverbank Subway.—Governor Eugene N. Foss, of Massachusetts, has signed a resolve directing the Railroad Commission and the Boston Transit Commission to report to the present Legislature as to the relative merits of the proposed Boylston Street subway and the proposed Riverbank subway and to report estimate of cost of construction of the Boylston Street route if that is decided on as preferable to the Riverbank route.

Meeting of Association of Railway Electrical Engineers.—The semi-annual convention of the Association of Railway Electrical Engineers will be held on June 16 and 17, 1911, in the Washington Terminal Station, Washington, D. C., and the annual convention of the association will be held in Washington, D. C., on Nov. 6, 7, 8, 9 and 10, 1911. The nineteenth floor of the La Salle Hotel, Chicago, Ill., has been reserved for the meeting on June 16 and 17 and for the exhibits by members of the Railway Electrical Supply Manufacturers' Association.

Electric Power Association Elects Officers.—At the recent regular monthly meeting of the Electric Power Association, composed of officers and employees of the New York Central & Hudson River Railroad, held at the Railroad Men's Y. M. C. A. in New York, R. Morris gave an instructive talk on the application of the three fundamental electrical units to every-day work. The association organized as follows: H. C. Tucker, president; S. H. Grauden and C. G. Cunningham, vice-presidents; G. M. Knickerbocker, secretary, and J. P. Roberts, treasurer.

Electric Railway in Canal Zone.—On Oct. 29, 1906, Henry T. Cook obtained from the municipality of Panama a 50-year franchise to operate an electric railway at Panama and applied to the Isthmian Canal Commission for a franchise to construct an electric railway on the Balboa and

Sabanas roads. The franchise from the city was contested in the courts of Panama, and a decision was rendered favorable to the grantee. A corporation, known as the Panama Public Utilities Corporation, was organized under the laws of Connecticut on July 18, 1910, with a capital of \$500,000, and bonds will be issued to the amount of \$300,000 to obtain money to construct the railway. The rights of Mr. Cook will be assigned to this corporation. The license under which the railway will operate in the Canal Zone was granted to Mr. Cook by President Taft of the United States, under date of Dec. 16, 1910. It provides for the construction, maintenance and operation of a tramway system for the transportation of passengers for profit between the City of Panama, in Panama, and Balboa, the Sabanas, the Hotel Tivoli and Ancon Hospital grounds in the Canal Zone, along routes to be approved by the chairman and chief engineer of the Isthmian Canal Commission.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

IOWA

The Iowa House has passed the Crist bill for a public utilities commission. The bill provides for a commission of five men, of whom the three railroad commissioners shall serve until their present terms expire. They are to have supervision over common carriers within the State, street railways, electric light properties, gas works and water-power sites.

MAINE

The Maine Legislature adjourned sine die on March 31, 1911. The public utilities bill failed to pass. Charters were denied to the Kennebec Dam & Reservoir Company and the Dead River Power & Railway Company. A bill for a State income tax was defeated, but the proposed national constitutional amendment to legalize an income tax was approved. Other measures which were defeated include bills to authorize municipalities to seize by eminent domain any power site or water power needed for municipal purposes, the act to forbid foreign corporations to generate electricity by water power, the act to tax railroads on a valuation basis. New laws which are likely to affect electric railways follow: To allow notice to be given to casualty companies within a "reasonable time" and make void contracts specifying a definite time limit; to allow railroads to furnish free transportation to firemen and policemen; to allow electric railways to be located outside the public ways when the convenience of the public makes it desirable, repealing the present law which allows such location only when location in the public way is not feasible; repeal of general law of eminent domain for railroad locations; to authorize municipal officers, upon petition and after hearing, to order change of location of street railway to another part of the same street, with right of appeal to the railroad commission by either petitioners or railway; to require accidents in shops to be reported to the State Labor Department and authorize the department to investigate accidents; to allow Supreme Court to appoint directors of a corporation in cases of failure of election at the stockholders' annual meeting; to require the retirement first of unissued stock in cases of reduction of stock by corporations; to require notice by mail, unless address is unknown, in cases of sales of corporation stock on execution; to make it a misdemeanor to neglect to pay passenger fare to a common carrier "whether said fare is demanded or not"; a more drastic fire escape law so drawn that electric railway pleasure parks will come within its provisions; to allow physical examination of a railroad to be made by one member of the railroad commission; to require weekly payment of wages; to require street railways to file profiles accompanying location maps; to permit the seizure of property of corporations which are delinquent in paying franchise taxes.

All the electric railway charter bills were enacted except one previously mentioned. The Aroostook Valley Railroad was authorized to acquire and electrify the Presque Isle branch of the Canadian Pacific Railway and to extend its lines from Washburn through Woodland to New Sweden, from Woodland to Caribou and from Washburn westerly to the border of L'Islet County, P. Q., thus affording a short route across northern Maine from Quebec to St. John, N. B. Another act confirms the bond issue by the town of

Presque Isle in aid of the Aroostook Valley. Two-year charters or charter extensions were granted to Bridgton Street Railway, Jonesport Central Railroad, Fairfield & Skowhegan Railroad, Mount Desert Transit Company, Winter Harbor & Easter Railway, Knox County Central Railroad to run from Friendship via Union to Belfast, Scarborough & Cape Elizabeth Railway, Waldo Street Railway, Rumford Falls & Bethel Street Railway, Eastport Street Railway, Hancock County Railway, Lincoln County Street Railway. An alternative act was passed to revive the charter of the Waterville & Winslow Bridge Company to build a bridge by which the Wiscasset, Waterville & Farmington Railroad may enter the city of Waterville. The charter rights of the Atlantic Shore Line Railway were confirmed to the Atlantic Shore Railway, which bought the former at receivers' sale. Propositions to make electric railway securities a legal investment for Maine savings banks in certain instances were refused, but the Governor was directed to appoint a commission to investigate the question of investments for savings banks. The County Commissioners of York County were authorized to co-operate with similar officers from New Hampshire in seizing by eminent domain the toll bridges between Kittery, Me., and Portsmouth, N. H., and between South Berwick, Me., and Dover, N. H., and freeing the same. The South Berwick & Dover bridge is used by the Atlantic Shore Railway. The Kittery and Portsmouth bridge is owned indirectly by the Boston & Maine Railroad, which uses a portion for the railroad, and the electric cars of the Atlantic Shore Railway are not permitted to use it as desired. An alternative bill grants rights for Kittery and Portsmouth to erect a public bridge which, if done, might enable the Atlantic Shore Railway to enter Portsmouth with its cars and abandon the ferry now in use. New charters were granted to Belfast & Augusta Electric Railway and Farmington & Augusta Electric Railroad.

MASSACHUSETTS

A contest developed in the House recently over the acceptance of the adverse report of the committee on street railways upon the Henebery bill to permit cities or towns to grant 20-year franchises to street railways in connection with the transportation of freight, baggage and express matter. Under the present law the electric railway express franchises are granted for an unlimited period. For about two years interests identified with the Worcester city government have sought legislation in favor of limited franchises, but without success. In the House the question came up on a vote upon the committee report. Representative Washburn, of Worcester, chairman of the committee on railroads, contended that the bill would reverse the policy of the State. He said that the unlimited franchise was satisfactory. The House voted to substitute the bill, which includes a provision whereby a company may appeal to the Railroad Commission in case a municipality lying between two others which have granted franchises refuses to take favorable action upon the company's petition for the right to carry freight. If the bill should pass it would deprive the Railroad Commission of its power to grant such franchises in case of ordinary appeals from the adverse action of municipal authorities.

The committee on street railways has reported favorably on House Bill No. 521, accompanying the petition of the Massachusetts Street Railway Association for legislation relative to pole and wire locations of street railways. The bill provides that a street railway may generate and transmit electricity in any city or town in which it may be entitled to operate, and for that purpose may erect and maintain poles and other devices with the permission of the aldermen or selectmen. The committee on metropolitan affairs has reported a resolve in favor of an estimate by the Boston Transit Commission of the cost of removing the elevated railway between the North Station, Boston, and Sullivan Square, and substituting a subway. Widespread interest was aroused last week at a hearing before the joint committee on railroads and metropolitan affairs upon the report of the joint commission on metropolitan improvements upon the advisability of legislation to require the steam railroads at Boston to electrify their lines within the metropolitan district. George G. Crocker, chairman of the Boston Transit Commission, spoke for the minority of the joint commission, which favors electrification.

Mr. Crocker contended that if all the factors were considered electricity would doubtless prove advantageous. The stimulation of traffic by electricity would do much to pay the fixed charges of its installation.

MISSOURI

The session of the Legislature of Missouri which has just ended was remarkable for the amount of time devoted to partisan schemes and investigations. None of the recommendations of the Governor was carried out, and none of the measures introduced at his suggestion and bearing his approval got out of committee with a favorable report. In this way the bill to create a public utilities commission was lost. The Phelps anti-discrimination bill, a measure compelling railroads to schedule reconignment charges; a measure regulating the construction of cabooses, one to give the Railroad and Warehouse Commission power to fix passenger rates within the maximum fixed by the law, and others affecting the running of trains on branch lines constitute about all of the railroad legislation.

OHIO

The public utilities bill introduced in Ohio by Judge Winters was passed by the House on April 5, 1911. As amended the measure provides for a commission to have control over rates of public service companies, except those which receive their franchises directly from municipalities, and to act as a board of arbitration in case of a dispute between municipalities and public service companies. Stocks and bonds may be issued to reimburse the treasury for money expended in betterments, extensions and additions for the five years preceding Jan. 1, 1913, except where such funds were secured by the issue of stocks and bonds. No company would be permitted to hold, except as collateral, more than 25 per cent of the stock of another. Rates would have to be based upon the appraised value of the property. The bill will probably be opposed in the Senate. The Senate has acted favorably upon the Calvey House bill, which would require all companies to vestibule their cars to protect conductors. An amendment to this bill excepts all cars now in use. Governor Harmon has approved the Deaton bill which requires steam and electric railways to keep the weeds cut along their tracks. The Russell bill, permitting both interurban and city railways to sell current for light, heat and power has been reported upon favorably by the House committee to which it was referred. A favorable report has also been made upon the Day bill to require all rights-of-way of a road using the third-rail system to be fenced.

PENNSYLVANIA

The first hearing on the administration public service bill will be given by the judiciary general committee of the House on April 18, 1911. Representative Alter has introduced a bill making false billing a misdemeanor punishable by \$500 fine and six months' imprisonment. In addition to common carriers the Alter bill includes in its provisions persons or corporations engaged "in any other quasi-public business." Another employers' liability bill has been introduced in the House. It provides that the right of injured employees to compensation at the hands of employers shall not be defeated unless it can be shown that employees injured were intoxicated or wilfully negligent. The question of contributory negligence the bill provides is one of fact to be passed upon by a jury, and the power to fix the amount of payments and the length of time they shall be paid is placed with Courts of Common Pleas of the several counties. The Senate passed the Fox bill to allow street railways to lay tracks for temporary use in boroughs without first obtaining the consent of the authorities. The House has passed the bill creating a bureau of public utilities in public safety departments in cities of the second class, namely Pittsburgh and Scranton. The Senate has passed the bill giving the Department of Public Safety of Philadelphia command of traffic routes and movements.

WISCONSIN

Governor McGovern of Wisconsin has signed two public utility bills, the first validating valuations placed on public utilities by the State Railroad Commission not made within the six months required by law, and the second extending the time in which the commission may take valuations of public utilities from six months to one year.

Financial and Corporate

New York Stock and Money Market

April 11, 1911.

To-day's market showed a firm tone with only fractional price variations, most of the declines of the morning being recovered at the close. The market sold off rapidly at noon, but recovered as quickly. Despite this the total transactions for the day were less than 200,000 shares. Optimism is felt in crop reports, which are uniformly favorable.

There is no particular concern felt about the state of the money market. Quotations to-day were: Call, 2¼@2½ per cent; 90 days, 3@3¼ per cent.

Other Markets

A slight flurry in Philadelphia tractions was the result of publication of the plans for rehabilitating the local traction system. A few shares of Philadelphia Rapid Transit and Union Traction changed hands at prices which were from ½ to 1 point down.

Trading in traction shares at Chicago has been light and prices are practically unchanged.

Boston transactions in general have been of small volume, the market remaining dull and prices showing only slight changes. Sales of tractions have been light.

United Railways bonds continue to be the principal traction features of the Baltimore market and some sales were made in to-day's market. General trading was small and price changes are not important.

Quotations of traction and manufacturing securities as compared with last week follow:

	April 4.	April 11.
American Light & Traction Company (common).....	a295	a298
American Light & Traction Company (preferred).....	a107	a108
American Railways Company.....	a43¾	a44
Aurora, Elgin & Chicago Railroad (common).....	a44	a44
Aurora, Elgin & Chicago Railroad (preferred).....	a88	a88
Boston Elevated Railway.....	a129½	a128
Boston Suburban Electric Companies (common).....	a16	a16
Boston Suburban Electric Companies (preferred).....	a73	a75
Boston & Worcester Electric Companies (common).....	a10	a11
Boston & Worcester Electric Companies (preferred).....	a43	a44
Brooklyn Rapid Transit Company.....	a78¾	a77¾
Brooklyn Rapid Transit Company, 1st ref. conv. 4s.....	a84¾	a83¾
Capital Traction Company, Washington.....	a126½	a126½
Chicago City Railway.....	a190	a190
Chicago & Oak Park Elevated Railroad (common).....	3	3
Chicago & Oak Park Elevated Railroad (preferred).....	a90	a93
Chicago Railways, ptcptg., ctf. 1.....	a24½	a23
Chicago Railways, ptcptg., ctf. 2.....	a10	a10
Chicago Railways, ptcptg., ctf. 3.....	a5	a5
Chicago Railways, ptcptg., ctf. 4.....	a132	a130
Cincinnati Street Railway.....	a94¾	a97
Cleveland Railway.....	a96	a96
Columbus Railway (common).....	*a101½	a100
Columbus Railway (preferred).....	a76¾	a76¾
Consolidated Traction of New Jersey.....	a105	a105
Consolidated Traction of N. J., 5 per cent bonds.....	a30	a30
Dayton Street Railway (common).....	a105	a100
Dayton Street Railway (preferred).....	a71	a71½
Detroit United Railway.....	a148½	a150½
General Electric Company.....	a133	a133¾
Georgia Railway & Electric Company (common).....	a91	a90
Georgia Railway & Electric Company (preferred).....	19	18¾
Interborough Metropolitan Company (common).....	53½	53¾
Interborough Metropolitan Company (preferred).....	78¾	78¾
Interborough Metropolitan Company (4½s).....	22¾	21½
Kansas City Railway & Light Company (common).....	70	70
Kansas City Railway & Light Company (preferred).....	138	139
Manhattan Railway.....	a17¾	a17
Massachusetts Electric Companies (common).....	88	87¾
Massachusetts Electric Companies (preferred).....	23¾	23
Metropolitan West Side, Chicago (common).....	69¾	70
Metropolitan West Side, Chicago (preferred).....	*15	15
Metropolitan Street Railway, New York.....	a110	a110
Milwaukee Electric Railway & Light (preferred).....	a71¾	a71
North American Company.....	*a43¾	a45
Northern Ohio Light & Traction Company.....	23	23
Northwestern Elevated Railroad (common).....	63¾	63¾
Northwestern Elevated Railroad (preferred).....	a53¾	a53
Philadelphia Company, Pittsburgh (common).....	43	a43
Philadelphia Company, Pittsburgh (preferred).....	19½	a18¾
Philadelphia Rapid Transit Company.....	84	a83¾
Philadelphia Traction Company.....	a100½	a100½
Public Service Corporation, 5% col. notes (1913).....	a106	a105½
Public Service Corporation, ctf. s.....	a107	a106½
Seattle Electric Company (common).....	a98½	a98
Seattle Electric Company (preferred).....	71	70
South Side Elevated Railroad (Chicago).....	a10¾	91½
Third Avenue Railroad, New York.....	a8	a7¾
Toledo Railways & Light Company.....	a108½	a108½
Twin City Rapid Transit, Minneapolis (common).....	a46¾	a46¾
Union Traction Company, Philadelphia.....	18¾	18¾
United Rys. & Electric Company, Baltimore.....	a46	a46
United Rys. Inv. Co. (common).....	a74¾	70
United Rys. Inv. Co. (preferred).....	a38	a37
Washington Ry. & Electric Company (common).....	a89½	a89
Washington Ry. & Electric Company (preferred).....	a90	a90
West End Street Railway, Boston (common).....	a103	a103
West End Street Railway, Boston (preferred).....	a67	a66
Westinghouse Elec. & Mfg. Co.....	a121	a117½
Westinghouse Elec. & Mfg. Co. (1st pref.).....		

aAsked. *Last sale.

Annual Report of the Public Service Corporation

A statement of earnings and expenses of the Public Service Corporation of New Jersey and subsidiary companies for the year ended Dec. 31, 1910, follows:

Gross earnings of leased and controlled companies.....	\$27,672,847
Public Service Corporation of New Jersey income from securities pledged and from miscellaneous sources.....	1,532,347
	29,205,194
Operating expenses and taxes.....	14,611,300
	14,593,894
Bond interest and rentals of leased and controlled companies..	10,558,243
	4,035,651
Fixed charges of Public Service Corporation of New Jersey...	1,835,356
Net income.....	\$2,200,295
Less amounts set aside as reserves:	
By Public Service Corporation of New Jersey.....	\$125,000
By Riverside & Fort Lee Ferry Company.....	5,000
	130,000
Surplus	\$2,070,295

From this surplus dividends of 5 per cent, or \$1,250,000, were paid during the year on the capital stock.

Thomas N. McCarter, the president, says in part in his statement to shareholders:

"During the year the corporation general mortgage 5 per cent sinking fund 50-year gold bonds were listed upon the New York Stock Exchange, and since the close of the year the capital stock of the corporation has also been listed.

"On Oct. 1, 1910, the corporation sold to Drexel & Company, of Philadelphia, \$4,000,000 of 5 per cent three-year collateral gold notes, secured by deposit of \$5,000,000 of general mortgage bonds. The proceeds of the notes were required to pay the cost, in part, of betterments of and extensions to the properties of the corporation and its subsidiary companies during the year.

"During the summer the Public Service Railway sold \$450,000 equipment trust series 'B' certificates, the proceeds of which were used to pay for, in part, 100 new cars built by the Cincinnati Car Company, which have been delivered and are in service and giving complete satisfaction.

"Prior to July 1, 1910, the electric business of the corporation was operated directly by the corporation itself, whereas the gas business of the corporation was operated by the Public Service Gas Company, all the capital stock of which, except directors' shares, is owned by the corporation, and the railway business of the corporation was operated by the Public Service Railway Company, 99.24 per cent of the capital stock of which is owned by the corporation.

"On June 13, 1910, the Public Service Electric Company was formed and all the capital stock of this company, except directors' shares, is owned by the corporation. All the leases of the electric properties held by the corporation were assigned by it to the new company, and the electric stations and substations of the railway company were also leased to it, so that the entire electric business of the corporation, including the generation, distribution and sale of current, is now carried on by the Public Service Electric Company, making the organization of the corporation uniform in its three departments.

"During the year the corporation purchased 97.79 per cent of the common stock of the New Jersey & Hudson River Railway & Ferry Company, operating approximately 48.44 miles of railway in Bergen County, connecting with the existing lines of Public Service at Paterson on the west, Kearny near Newark on the south, and intersecting other lines of Public Service at Hackensack, Grantwood and Fort Lee.

"This property thus complements the existing lines of Public Service, and, it is believed, will form a most valuable acquisition to its railway system. Furthermore, it was the only substantial railway property in the northern section of the State not already controlled by Public Service.

"The more important of the improvements completed during the year 1910 are the Hoboken terminal, which has been put into service and which is probably the most thoroughly equipped street railway terminal in the country, consisting of a large double-decked station, both levels of which are used for the arrival and departure of cars; a large addition to the West Hoboken carhouse, providing facilities for 80 additional cars, and a substantial addition to the Marion electric generating station. In addition to the

100 cars purchased from the Cincinnati Car Company the Public Service Railway constructed during the year 10 new cars in its Plank Road shops. These cars are also in service. The extension of the Jackson Avenue line in Jersey City to the Greenville car house would have been completed had it not been for injunction proceedings instituted by a property owner. These proceedings are still pending, but it is hoped they will not prevent the early completion of the line.

"Taxes paid during the year amounted to \$1,422,698, an increase over the year 1909 of \$197,116. In addition to this the corporation contributed large sums to the municipalities in the form of new pavements, street paving repairs and street improvement assessments.

"During the year the corporation moved into its capacious new office building located at Broad and Bank Streets, Newark. The building is most admirably located, and well adapted to the purposes of the corporation. On the eleventh story a luncheon room has been provided, where luncheons are furnished daily to some 600 employees of the corporation, without expense to them.

"The wage scale put into effect for motormen and conductors, Jan. 1, 1910, as fully outlined in last year's report, has been adhered to, including the promised increase effective Jan. 1, 1911.

"Perhaps the most significant event connected with the business of the corporation during the year 1910 was the promulgation on Dec. 27 of an insurance, sick benefit and pension fund, effective Jan. 1, 1911. The plan has been received enthusiastically by the entire working force of the corporation.

"It is estimated that the application of this system will cost the corporation approximately \$50,000 per year for the first few years, and more thereafter, as the pension list grows. The system has been put into practical operation and it is believed that it not only contains all the features of a fair, liberal and humane policy on the part of the corporation towards its employees, but that it will also serve to foster and increase the cordial relations already existing between the corporation and those working for it.

"The fire insurance carried at the present time is \$23,263,442, and the annual premium thereof \$124,145, an average rate of 53 cents per \$100.

"On July 4, 1910, the act of the Legislature changing the name of the State Railroad Commission to the Board of Public Utility Commissioners, and prescribing the powers and duties thereof, became effective, and the commission forthwith assumed jurisdiction over the affairs of the public utility corporations of the State.

"It is a pleasure to say that the commissioners have entered upon their duties seriously, and with a due regard to the importance of the interests to be supervised by them, and that the relations of the companies owned by this corporation with said commission have been and are both cordial and agreeable."

The capital expenditures for the corporation and subsidiary companies amounted during the year to \$6,657,507, of which \$2,470,373 was for the railway.

Earnings of the railway properties have increased as follows:

1903*	\$4,471,244	1907	\$10,705,392
1904	8,415,278	1908	11,086,353
1905	9,488,358	1909	12,114,412
1906	10,086,933	1910	13,308,726

*Seven months only.

Traffic statistics compare as follows:

	1908.	1909.	1910.
Revenue passengers.....	219,421,974	238,171,257	258,746,130
Transfers and passes.....	74,688,628	81,548,978	82,652,558
Total passengers.....	294,110,602	319,720,235	341,398,688
Percentage of passengers using transfers	23.0	23.0	22.1
Average fare per passenger.....	3.70	3.72	3.78
Car mileage.....	39,519,972	40,890,360	42,632,760
Car hours.....	4,598,714	4,747,729	4,961,608
Passengers per day.....	803,581	875,946	951,721
Passenger receipts per car mile—cents	27.56	29.08	30.29
Passenger receipts per car hour... ..	\$2.37	\$2.50	\$2.60

The total track mileage was 759.6, and the number of cars available for operation \$2060, of which 1530 were closed and 530 open. During the year 27.86 miles of track were reconstructed with new rail and 7.196 miles were reconstructed with the same rails. Extensions of 4.567 miles were built.

Annual Report of the Duluth-Superior Traction Company

Earnings and expenses of the Duluth-Superior Traction Company for the year 1910 compare with the previous year as follows:

	1910.	1909.
REVENUES.		
Revenue from transportation.....	\$1,082,815	\$972,508
Other revenue.....	8,767*	25,097
Total revenue.....	\$1,091,582	\$997,606
EXPENSES.		
Ways and structures.....	\$49,994	\$42,571
Equipment	52,872	47,457
Traffic	786	910
Conducting transportation.....	366,185	345,873
General and miscellaneous.....	134,238	122,999
Total operating.....	\$604,075	\$559,810
Net revenue from operation.....	\$487,507	\$437,795
Interest on debt and taxes.....	190,779	172,365
Surplus available for dividends and depreciation....	\$296,728	\$265,429
Dividends, preferred stock.....	\$60,000	\$60,000
Dividends, common stock.....	157,500	70,000
Total dividends.....	\$217,500	\$130,000
Surplus from operation.....	\$79,228	\$135,429
Per cent total operating (including taxes and renewal appropriations) to total earnings.....	65.77	65.73

*Other revenue for 1910 shows a reduction of \$16,330, as compared with 1909, which is due to profits resulting from invested surplus funds during the year 1909.

C. G. Goodrich, the president, says in his report:

"There was expended in new construction during the year \$145,200.

"There was expended during the year in renewals and charged against renewal funds \$55,988. The direct appropriation to this fund was \$54,579. The renewal fund now amounts to \$309,103.

"On Sept. 1 your directors increased the regular quarterly dividend on the common stock from 1 per cent to 1¼ per cent, thus placing the common stock on a 5 per cent annual dividend basis. Your directors believe the company will be able to maintain this rate of dividend.

"During February both the common and the preferred stock of the company were listed on the New York Stock Exchange.

"Under date of May 1, 1910, the Duluth Street Railway (the operating company) issued its mortgage or deed of trust securing an issue of \$2,500,000 general mortgage 20-year 5 per cent gold bonds, due May 1, 1930; \$390,000 of these bonds have been sold and the proceeds from the sale of \$300,000 used to establish a reserve fund as provided for in the trust deed. This fund is invested in high-grade 5 per cent bonds and short-time notes. The proceeds from the sale of \$90,000 of these bonds were applied against the cost of new construction during the current year."

Passenger traffic compared as follows in the two years:

	1910.	1909.
Revenue passengers carried.....	21,624,039	19,431,381
Transfers redeemed.....	4,036,815	3,778,780

Atchison Railway, Light & Power Company, Atchison, Kan.—The Atchison Railway, Light & Power Company has been made a part of the Western Railways & Light Company, and is being operated under the supervision of H. E. Chubbuck, general manager of the holding company. The Atchison property serves a population of 18,000 with electric and gas lighting mains and about 15 miles of street railway track on which cars are operated with a normal headway of 15 minutes. The power house is a brick structure with an engine room 60 ft. x 90 ft., and a boiler room 46 ft. x 76 ft. The six boilers are gas fired and are rated at 1000 hp. Three simple Corliss engines drive three d.c. and three a.c. generators, all belted. The power station has a mercury arc rectifier plant. The rolling stock includes the following: Five American Car Company single-end semi-convertible cars, six American Car Company double-end closed cars, two St. Louis Car Company closed double-end cars, four St. Louis Car Company single-end open cars, and eight utility cars. The rolling stock repair department has a shop 40 ft. x 130 ft., near which is a storage barn 36 ft. x 130 ft. The lighting department of the Atchison Railway, Light & Power Company has 121 electric street arcs and 2210 gas service meters.

Belton & Temple Traction Company, Belton, Tex.—The Southwestern Traction Company has been incorporated with

a capital stock of \$165,000, to succeed the Belton & Temple Traction company, the sale of the property of which under foreclosure was noted in the *ELECTRIC RAILWAY JOURNAL* of May 14, 1910.

Brooklyn (N. Y.) Rapid Transit Company.—William A. Day and George E. Ide have been elected directors of the Brooklyn City Railroad to succeed the late Edward Merritt and James McKeen.

Central California Traction Company, Stockton, Cal.—The Central California Traction Company has filed amended articles of incorporation which provide for an increase in the capital stock of the company to \$2,500,000, 24,301 shares to be common stock and the remaining 699 shares to be preferred stock, par value of \$100 per share. A meeting of the stockholders of the company has been called for May 8, 1911, to vote on the question of increasing the stock to \$4,000,000, of which \$3,000,000 is to be common stock and \$1,000,000 preferred stock.

Chicago (Ill.) Railways.—Gross earnings for the year ended Jan. 31, 1911, were \$14,064,709 as compared with \$12,442,882 in the preceding year. Expenses were \$9,845,296 as compared with \$8,710,017. From the balance of \$4,219,413 in 1911 there was deducted interest at 5 per cent on the valuation, or \$2,865,531, leaving a net income of \$1,353,882. In the division of this amount the City of Chicago received \$744,635 and the Chicago Railways \$609,247. From the balance of \$3,732,865 which remained in the preceding year after the payment of expenses, there was deducted \$2,275,719 for interest on the valuation of the property, leaving a net income of \$1,457,146. In the division of this amount the City of Chicago received \$801,430 and the Chicago Railways Company \$655,716. The gross income of the company from all sources last year was \$3,816,108 as compared with \$3,114,637 for the preceding year. The total deductions last year were \$3,542,858 as compared with \$2,818,750. The net income was \$273,250 as compared with \$296,157. The number of passengers carried last year was 488,490,104, of which 276,750,953 were revenue passengers, 4,147,736 free passengers and 207,591,415 were transfer passengers. For the preceding year 427,138,380 passengers were carried, divided as follows: Revenue, 245,510,655; free, 4,303,145; transfer, 177,324,580.

Delaware & Hudson Company, New York, N. Y.—The annual report of the Delaware & Hudson Company for the calendar year 1910 refers as follows to the electric railways in which this company is interested: "Increases in net operating revenues were as follows: Hudson Valley Railway, \$31,874; Schenectady Railway (including electric express), \$94,564; Plattsburgh Traction Company, \$268,70. The United Traction Company, of Albany, shows a decrease in net operating revenues of \$47,661, the Troy & New England Railway a decrease of \$566, and the Mechanicsville power plant a decrease of \$20,424. The decrease in the net return of the United Traction Company is mainly due to increase in pay of all employees and to the unusually heavy fall of snow in 1910, which increased the charges for removal of snow and the cost of maintenance of equipment. Dividends of 4 per cent for the year 1910 were declared on the capital stock of the United Traction Company, 6½ per cent on that of the Schenectady Railway, 4 per cent on the capital stock of the Troy & New England Railway and 5 per cent on that of the Plattsburgh Traction Company."

Fort Dodge, Des Moines & Southern Railroad, Boone, Ia.—Judge Smith McPherson, of the District Court of the United States for the Southern District of Iowa, has granted the Fort Dodge, Des Moines & Southern Railroad permission to issue \$500,000 of receiver's certificates to defray expenses amounting to \$230,000 and to provide for further improvements.

Fort Smith Light & Traction Company, Fort Smith, Ark.—H. M. Byllesby & Company, Chicago, Ill., have arranged to refinance the Fort Smith Light & Traction Company, and the entire issue of \$2,200,000 of 5 per cent refunding bonds, dated March 1, 1911, and due March 1, 1936, but callable in whole or in part on any interest date at 105 and interest, has been taken by Lee, Higginson & Company, Boston, Mass., by whom they are being offered for subscription at 93¼. The \$1,500,000 of consolidated 5 per cent bonds due in 1944, and the \$650,000 of 6 per cent notes due in 1913

will be called and paid at once at 102 and 101, respectively, out of the proceeds.

Interborough Rapid Transit Company, New York, N. Y.—The Interborough Rapid Transit Company has announced that it will take up on May 1, 1911, the \$4,584,000 of 5½ per cent notes of the company which mature at that time.

Interstate Railways, Philadelphia, Pa.—J. A. Rigg, president of the Interstate Railways, has announced that all the subscriptions to the new issue of \$1,000,000 of 6 per cent cumulative preferred stock of the company have been made in full. Of this amount \$500,000 has been paid for in cash by the common stockholders, and \$500,000 has been taken in exchange for the overdue coupons of the 4 per cent bonds of the company. The last instalments of the subscriptions were due April 1, 1911, and were met.

Lancaster County Railway & Light Company, Lancaster, Pa.—The Lancaster County Railway & Light Company has purchased the property of the Lititz Electric Light, Heat & Power Company.

Milwaukee Northern Railway, Cedarburg, Wis.—The Wisconsin Railroad Commission has authorized the Milwaukee Northern Railway to issue \$1,500,000 par value of 5 per cent bonds to be secured under the terms of a mortgage executed by the company to the First Savings & Trust Company, Milwaukee. The bonds are to be issued for not less than 75 per cent of the par value. The company has been empowered also to issue 4000 shares of first preferred cumulative stock of the par value of \$100 per share and 6000 shares of second preferred non-cumulative stock of the par value of \$100. The stock is to be sold at not less than par. The stock and bonds are to be sold to supply the company with funds with which to purchase and retire an outstanding bonded indebtedness of \$2,500,000.

Oakland & Antioch Railway, Oakland, Cal.—The Oakland, Antioch & Eastern Railway has been incorporated with an authorized capital stock of \$10,000,000 to take over the Oakland & Antioch Railway, which was placed in operation recently, and extend the road from Antioch to Stockton.

Oklahoma Railway, Oklahoma City, Okla.—The Oklahoma Railway has filed with the Secretary of State of Oklahoma a certificate of the increase in the capital stock of the company from \$3,000,000 to \$15,000,000 authorized by the stockholders at a meeting on Feb. 24, 1911. Of the \$15,000,000 of stock \$5,000,000 is to be preferred and \$10,000,000 common. The amount of authorized bonds has been increased from \$3,000,000 to \$12,000,000.

Philadelphia Company, Pittsburgh, Pa.—The Philadelphia Company has authorized an issue of \$1,400,000 of 5 per cent convertible notes. The capital stock of the company is \$47,000,000. According to the report of the company for 1910 there were outstanding bonds and notes to the amount of \$28,047,000, consisting of \$5,559,000 of first and collateral trust 5 per cent bonds due in 1949; \$15,138,000 of consolidated and collateral trust 5 per cent bonds due in 1951; \$2,350,000 of collateral trust 6 per cent notes due in various amounts up to 1918, and \$5,000,000 of 6 per cent convertible debentures due in 1919.

Salisbury & Spencer Railway, Salisbury, N. C.—Control of the Salisbury & Spencer Railway is reported to have been secured by W. J. Oliver, Knoxville, Tenn., and others through the purchase of the holdings of W. F. Snider, president of the company, and others.

Springfield (Mass.) Street Railway.—A bill has been introduced in the Massachusetts Legislature to provide for the purchase of the Springfield Street Railway by the Berkshire Street Railway, a subsidiary of the New York, New Haven & Hartford Railroad. The name of the new company is to be the Springfield & Berkshire Railway.

Washington, Baltimore & Annapolis Electric Railway, Washington, D. C.—The Public Utility Commission of Maryland has signed an order granting authority to the Washington, Baltimore & Annapolis Electric Railway, in accordance with the company's reorganization plan, to transfer its franchises and physical properties to a new corporation and to issue stock to discharge obligations incurred by both. In addition to permission to take over the properties of the Anne Arundel Electric Railroad the Washington, Baltimore & Annapolis Electric Railway asked to be allowed to issue \$3,000,000 of 5 per cent bonds at par, \$1,369,512.75

par value of non-cumulative preferred stock at 6 per cent and \$1,500,000 common stock of the Anne Arundel Electric Railroad in payment of obligations. A trust mortgage of \$7,500,000 from the Washington, Baltimore & Annapolis Electric Railway to the Cleveland Trust Company has been filed for record. It covers all of the property, rights and franchises of the company, and is to secure the issue of an equal amount of first mortgage gold bonds dated March 1, 1911, payable March 1, 1941, and bearing 5 per cent interest. The mortgage states that \$5,000,000 of the bonds will be issued immediately to acquire the Anne Arundel Electric Railroad. The remaining \$2,500,000 will be used for improvements and extensions.

Washington & Rockville Railroad, Washington, D. C.— George H. Harries, vice-president of the Washington Railway & Electric Company, has issued a statement in part as follows in regard to the appointment of a receiver for the Washington & Rockville Railroad at the instance of the Washington Railway & Electric Company, as noted in the ELECTRIC RAILWAY JOURNAL of April 8, 1911, page 649: "From its beginning the Washington & Rockville Railroad has been an insolvent concern. Its continued existence was possible only through the financial and executive support given it by the Washington Railway & Electric Company. A fare-reducing act passed by the Maryland Legislature at its 1910 session threatened arbitrary and serious diminution of the Washington & Rockville Railroad's earnings, rendering necessary defensive action in the courts. This litigation had already been so expensive, and promised to be so much more expensive, that it was deemed proper and advisable to dismiss the suit for injunction and to ask for such relief as could only be had through the operation of the road by the court, a proceeding that has been long delayed but which would ultimately, no matter how the suit should terminate, have to be entered upon. Rational business administration clearly demanded immediate action looking to the collection of the money due from the Washington & Rockville Railroad, probably to be obtained only through the sale of the property."

Dividends Declared

Brooklyn (N. Y.) City Railroad, quarterly, 2 per cent.
Public Service Investment Company, Boston, Mass., quarterly, 1½ per cent preferred.
Rio de Janeiro Tramway, Light & Power Company, Rio de Janeiro, Brazil, quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY.						
Period.	Gross Revenue.	Operating Expenses.	Net Revenue.	Fixed Charges.	Net Income.	
1 m., Feb. '11	\$41,900	*\$20,872	\$21,028	\$12,379	\$8,649	
1 " " '10	39,922	*20,196	19,726	11,712	8,014	
8 " " '11	397,407	*178,731	218,676	96,585	122,091	
8 " " '10	383,422	*173,043	210,379	93,093	116,476	
CHATTANOOGA RAILWAY & LIGHT COMPANY.						
1 m., Feb. '11	\$69,264	*\$39,447	\$29,817	\$19,311	\$10,506	
1 " " '10	61,122	*36,802	24,320	17,868	6,362	
2 " " '11	142,798	*82,257	60,541	38,424	22,117	
2 " " '10	127,068	*77,568	49,500	35,795	13,705	
GRAND RAPIDS RAILWAY.						
1 m., Feb. '11	\$81,836	*\$48,687	\$33,149	\$15,121	\$18,028	
1 " " '10	78,468	*44,850	33,168	15,076	18,542	
2 " " '11	173,903	*99,723	74,180	30,222	43,958	
2 " " '10	164,820	*93,916	70,904	31,123	39,781	
LAKE SHORE ELECTRIC RAILWAY SYSTEM.						
1 m., Feb. '11	\$76,258	*\$48,132	\$28,127	\$34,782	*\$6,656	
1 " " '10	70,877	*47,276	23,601	34,847	*11,246	
2 " " '11	160,828	*97,489	63,338	69,410	*6,072	
2 " " '10	149,871	*95,815	54,056	69,118	*15,062	
LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY.						
1 m., Feb. '11	\$31,096	*\$27,661	\$3,435	\$13,187	\$9,752	
1 " " '10	29,894	*23,724	6,170	14,616	8,446	
8 " " '11	359,232	*224,787	134,445	105,033	29,412	
8 " " '10	358,060	*209,290	148,770	116,054	32,716	
PADUCAH TRACTION & LIGHT COMPANY.						
1 m., Jan. '11	\$21,787	\$11,592	\$10,196	\$7,752	\$2,444	
1 " " '10	22,741	14,476	8,266	7,070	1,196	
12 " " '11	248,792	141,248	107,544	86,956	20,589	
12 " " '10	231,037	137,975	93,062	81,671	11,391	
SAVANNAH ELECTRIC COMPANY.						
1 m., Jan. '11	\$53,803	\$35,040	\$18,763	\$18,754	\$0	
1 " " '10	48,898	31,068	17,831	17,818	13	
12 " " '11	637,261	420,206	217,055	215,949	1,106	
12 " " '10	602,725	391,162	211,563	210,002	1,562	
WHATCOM COUNTY RAILWAY & LIGHT COMPANY.						
1 m., Jan. '11	\$33,437	\$19,057	\$14,381	\$10,556	\$3,825	
1 " " '10	36,202	22,741	13,460	8,957	4,503	
12 " " '11	408,396	230,009	178,387	111,045	67,342	
12 " " '10	409,721	231,085	178,636	99,936	78,700	

Traffic and Transportation

Increase in Wages in Grand Rapids

Benjamin Hanchett, president of the Grand Rapids (Mich.) Railway, has issued a statement to the employees of the company announcing an increase in wages effective on May 15, 1911, in which he says in part:

"One year ago I had the pleasure of advising you that the directors of the Grand Rapids Railway authorized an increase in your wage scale of 10 per cent and I am now pleased to be able to inform you of a further increase, as stated below, which makes a total advance in the schedule of wages since 1907 of 25 per cent. The new rate goes into effect May 15, 1911, as follows:

"For service as conductors or motormen, one year or less, 23 cents per hour.

"For service as conductors or motormen for one year and up to two years, 24 cents per hour.

"For those men who have served the company as motormen and conductors for more than two years, 25 cents per hour.

"Conductors and motormen serving on the extra list who report at all change times and at time of starting out trippers, as ordered by the carhouse foreman, will be credited with enough additional time to make their wages for that day at least \$1.50, even though they are not called on to perform service to this amount. This additional compensation, under the conditions named, for men on the extra list goes into effect April 1.

"Motormen and conductors during their student time of 13 days and 10 days respectively will, of course, work without compensation as in the past, but such men who remain in the service for one year continuously will receive pay at the rate of \$1.50 per day, payable at the end of the year, for such service, and this rule applies to all new men who started on or after Jan. 1, 1911.

"As you have been advised on previous occasions, it is the desire of the management to consider your welfare in every way and you can help along this line by earnest co-operation and attention to duty. You should keep in mind when in charge of a car that you are the company's representative and that the public forms its opinion of the company by the treatment it receives from the motormen and conductors. I therefore rely upon the exercise of your best judgment and assistance in raising the standard of service and in other ways working for the best interests of the company."

Excellent Accident Record of the Lehigh Valley Transit Company

R. P. Stevens, president of the Lehigh Valley Transit Company, Allentown, Pa., was interviewed recently by one of the local papers at Allentown in regard to the excellent showing made by the company as disclosed by the accident report for January and February filed by the company with the Pennsylvania Railroad Commission. Mr. Stevens said in part:

"We not only have a clear record for January and February, but it is worthy of note that for the past year, although our cars traveled 3,593,389 miles, equal to about 1200 times across this country from New York to San Francisco, or 143 times around the world, and over 23,000,000 passengers were handled, not a passenger or an employee was killed. We doubt if there is a road in the country running the mileage and carrying the number of passengers we have that can equal this record.

"I attribute this record very largely to the class of men we have in our employ and their length of service and experience. More than 50 per cent of our motormen have been in our employ five years or more, and more than 25 per cent have been with us more than 10 years. This fact is remarkable.

"Of course, in addition to this, however, we must give proper credit to the efforts and co-operation of the heads of all departments to keep down the accident list. We have men in our employ devoting all their time to devising ways and means to avoid these unfortunate occurrences. We have also received much favorable criticism on our present

campaign of teaching the school children how to avoid accidents. These accidents are generally the most distressing kind, and if grown-ups would use the same care that we now feel the children will it would go a long way toward reducing the number of accidents. During the past month our men have spoken to more than 38,000 school children in the cities and towns along our lines on 'how to avoid accidents' and endeavored to impress it on their minds so the impression will be lasting."

"Come to Sarnia."—The Sarnia (Ont.) Street Railway is distributing a folder entitled "Come to Sarnia," which is compiled and printed by the Canadian Printing Company, Sarnia. Sarnia is located at the point where Lake Huron meets the St. Clair River. The pamphlet contains views in and about Sarnia reached by the lines of the Sarnia Street Railway.

Car License Fees in Reading.—The Reading (Pa.) Transit Company has paid its car license tax for the fiscal years of 1911-12, as required under the ordinance passed last August by Councils. The corporation paid \$720. This is at the rate of \$10 a car truck. An affidavit was taken that 72 trucks is the total number in use on all the lines under the control of the company. For the last fiscal year the company paid for 69 trucks, or \$690.

Fare Changes at St. Lawrence.—On March 2, 1911, the St. Lawrence International Electric Railroad & Land Company, Alexandria Bay, N. Y., will cancel local one-way fares in both directions between State Road and Kavanaugh's, Gulf Hill, Sauerwein's, Alexandria Center, Hass, Brown's Crossing, Bickelhaupt's and Redwood, and thereafter fares from and to Alexandria Bay will apply from and to State Road. The advance in each instance is 5 cents. On the same date the round-trip fares between all local stations will be canceled and no round-trip fares will be in effect thereafter.

Decision Which Requires Exchange of Transfers in Seattle.—With two judges dissenting, the Supreme Court of Washington has affirmed the decision of the King County Superior Court in the case of A. G. Linhoff against the Seattle, Renton & Southern Railway, holding that the appellant company must issue transfers to the lines of the Seattle Electric Company and accept the transfers from the same company. The settlement for transfers is to be made on the basis of 2½ cents on the 5-cent cash fares and 1¼ cents on the tickets offered by school children, which tickets are sold for 2½ cents each by both the companies concerned.

Plan to Divert Long Island Suburban Traffic.—It is stated that an agreement has been reached between the Pennsylvania Railroad and the Interborough Rapid Transit Company, New York, N. Y., in reference to transit extensions in Queens and that the suburban traffic of the Long Island Railroad is to be diverted from the station of the Pennsylvania Railroad at Thirty-third Street and Seventh Avenue, New York, by way of the Queensboro Bridge and the Steinway Tunnel. At Woodside, just outside the limits of Long Island City, a new station to cost about \$150,000 will be erected. A route not heretofore considered has been adopted for the line which is to run to New York through the Steinway Tunnel. The capacity of the tunnel is estimated at 20,000 passengers an hour, and that of the bridge at 28,000 passengers an hour.

Traffic Circulars in Baltimore.—The United Railways & Electric Company, Baltimore, Md., has printed the third edition of its circular entitled "Chartered Cars for Private Parties." This circular is devoted entirely to the subject of chartered cars and outlines the service which the company offers. There are interior and exterior views of private cars of the company. "Seeing Ourselves as Others See Us" is a booklet in which opinions are set down which have been expressed by prominent people about Gwynn Oak Park. "Excursions by Trolley to Gwynn Oak Park" is somewhat different from "Seeing Ourselves as Others See Us" in that it tells how the park may be reached and shows scenes in the Park. Another circular issued by the company bears the title "Excursions by Trolley to Bay Shore Park."

Traffic Department of the Consolidated Companies in Los Angeles.—Reference has been made from time to time recently in the *ELECTRIC RAILWAY JOURNAL* to the changes in the personnel of the electric railways in Los Angeles which have been merged. The traffic department of the Pacific Electric Railway, Los Angeles-Pacific Company and Los Angeles & Redondo Railway is organized as follows: D. W. Pontius, traffic manager; D. A. Munger, general agent passenger department; F. L. Meneley, chief clerk passenger department; B. L. Dowell, traveling passenger agent; E. L. Taylor, traveling passenger agent; T. J. Day, chief clerk freight department; F. C. Weeks, traveling freight agent; C. V. Means, contracting freight agent; E. C. Thomas, advertising agent; C. M. Pierce, manager personally conducted trolley trips; W. H. Dempster, assistant manager personally conducted trolley trips.

"The Road of To-day."—The Chautauqua Traction Company, Jamestown, N. Y., has published a folder entitled "The Road of To-day." The cover shows a scene in colors along the company's lines and a scene in black of Lake Chautauqua by moonlight. Views are also presented of Celeron Park, Lakewood and Chautauqua. There is a map of the company's lines between Jamestown, Mayville and Westfield, and also a map on which are shown the railroads which connect with the lines of the Chautauqua Traction Company. During the summer cars are operated every 40 minutes, with extra cars at frequent intervals. During the winter cars are operated every hour. Through tickets to Chautauqua Institution, Jamestown, Lakewood, Celeron, Mayville and all points on the Chautauqua Traction Company's line are sold by agents of all principal railroads, enabling passengers to purchase through transportation and check their baggage to destination.

Safety Measures in Chicago.—In the monthly report of the city attorney of Chicago to the corporation counsel it has been suggested that if all the cars were painted a light orange color rather than the present olive green the safety of pedestrians who cross the streets would be increased. Cars with inclosed rear platforms similar to those now being given a trial by the Chicago Railways also are approved in the report, which says: "When cars of this type supersede the present models getting on or off cars while they are in motion will be impossible." It is pointed out that 63 accidents occurred during March in this manner. The general report for March states that all accidents in connection with street car operation resulted in the death of five persons and injury to 226. In 73 of the accidents persons were injured while trying to cross the tracks ahead of approaching cars. The report states that one-half of the total number of accidents came from causes wherein fully 75 per cent of the victims might have escaped injury had they used a little precaution. The Illinois House of Representatives has passed the O'Toole bill to require all entrances and exits to Chicago street cars to be closed while the cars are in motion.

Extension of Time Under Fender Ordinance in Portland, Ore.—A resolution has been passed by the City Council of Portland, Ore., to extend for one year, or until July 1, 1912, the time in which the Portland Railway, Light & Power Company is required to equip all of its cars with automatic fenders in accordance with the provisions of the ordinance passed by the Council in the fall of 1910. The requirements of the device necessary to meet the terms of the ordinance were given in the *ELECTRIC RAILWAY JOURNAL* of Nov. 26, 1910, page 1076. Subsequently Mayor Simon vetoed the resolution. In a long statement which he issued the Mayor said in part: "It abounds in whereases and recitals and sets forth that the present type of fender in use on lines of the Portland Railway, Light & Power Company is better than the device provided by State law. It provides for a pilot type of fender for interurban cars. It attempts to legalize operation of freight cars over the company's lines within the city limits, which authority is not contained in any of the franchises held by the corporation and does not belong in a fender ordinance. It extends the time for equipping the street cars with the Nelson automatic fender from July 1, 1911, until July 1, 1912. While the street car company and the fender concern have reached an agreement perfectly satisfactory to them, the general public must have consideration."

Personal Mention

Mr. George W. Delany has resigned as auditor of the Lexington & Interurban Railways, Lexington, Ky.

Mr. R. H. Fish has been appointed traffic manager of the Oakland & Antioch Electric Railway, with headquarters in Concord, Cal.

A. W. Price has been appointed auditor of the Lexington & Interurban Railways, Lexington, Ky., to succeed Mr. George W. Delany, resigned.

Mr. L. E. Moe, who has been connected with the Portland, Eugene & Eastern Railway, Portland, Ore., since the road was placed in operation, has been appointed general manager of the company, a newly created position.

Mr. G. E. Barber has been appointed superintendent of the Ohio Electric Railway at Springfield, Ohio, to succeed Mr. W. G. Williams, resigned. Mr. Barber was formerly a dispatcher in the office of the company at Springfield.

Mr. W. N. Keiser has resigned as electrical engineer of the Union Electric Company, Dubuque, Ia., effective on May 1, 1911, to become connected with the G. W. Parsons Company, Newton, Ia., manufacturer of contractors' machinery.

Mr. George Kidd, London, Eng., one of the secretaries of the British Columbia Electric Railway Company, Vancouver, B. C., will make his home in that city for a year, taking up the duties formerly performed by Mr. Francis Hope, assistant general manager, who is going to London, Eng., temporarily.

Mr. William D. Norton has resigned as first assistant secretary of the Public Service Commission of the First District of New York to become connected with the Commonwealth Edison Company, Chicago, Ill. Mr. Norton has been first assistant secretary of the commission since that body was created in 1907.

Mr. N. A. Kemmish has resigned as electrical engineer of the Lincoln (Neb.) Traction Company to become general manager of the municipal electric lighting and pumping station at Alliance, Neb. Mr. Kemmish, who has been with the Lincoln Traction Company for the last seven years, is a graduate of the University of Nebraska.

Mr. L. M. Levinson, who has been general manager of the Mineral Wells (Tex.) Electric System since August, 1910, has resigned to become general superintendent of the syrup and sugar plantation of Pennick & Ford, Ltd., New Orleans, La. Before becoming connected with the Mineral Wells Electric System Mr. Levinson was for 11 years general manager of the Shreveport (La.) Traction Company.

Mr. William E. Rolston, superintendent of power and shops of the Cleveland, Southwestern & Columbus Railway, has resigned to become connected with the Des Moines City Railway, Des Moines, Ia. Mr. Rolston has been superintendent of power and shops of the Cleveland, Southwestern & Columbus Railway for the past two years and a half. Previous to that he was master mechanic of the company.

Mr. R. W. Levering has been appointed superintendent of the Lafayette division of the Ft. Wayne & Northern Indiana Traction Company, Ft. Wayne, Ind., the successor of the Ft. Wayne & Wabash Valley Traction Company, to succeed Mr. S. J. Ryder, who has been appointed acting superintendent of the Ft. Wayne division. Mr. Levering was formerly connected with the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind.

Mr. S. J. Ryder, who has been superintendent of the Lafayette division of the Ft. Wayne & Northern Indiana Traction Company, Ft. Wayne, Ind., the successor of the Ft. Wayne & Wabash Valley Traction Company, has been appointed acting superintendent of the Ft. Wayne division to succeed Mr. E. M. Raver, resigned. Mr. Ryder has been for several years superintendent of the Lafayette city lines for the Ft. Wayne & Northern Indiana Traction Company. He was sent to that city from Ft. Wayne, having been advanced from the position of carhouse foreman.

Mr. S. H. Waddell, formerly auditor of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., has been elected secretary and treasurer of the company, to succeed Mr. Mark G. Hibbs, resigned, and will in the future

act as secretary, treasurer and auditor of the company. Mr. Waddell became connected with the Pittsburgh, Harmony, Butler & New Castle Railway as auditor on Feb. 15, 1910. Previous to that time he was engaged principally in the iron and steel business with the Mellon and Frick interests and held the position of secretary, assistant treasurer and auditor of the Union Steel Company previous to its absorption by the United States Steel Corporation in 1902. Mr. Waddell was also engaged in public accounting.

Mr. Clinton L. Bardo, who resigned recently as superintendent of the electric division of the New York Central & Hudson River Railroad at New York, has been appointed assistant to the general manager of the Lehigh Valley Railroad, with offices at South Bethlehem, Pa. Mr. Bardo was born at Montgomery, Pa., on Oct. 24, 1867, and began his railway career as an extra operator with the Pennsylvania Railroad. In November, 1904, he became freight trainmaster of the New York division of the New York, New Haven & Hartford Railroad, and from December, 1905, to June, 1907, he was assistant superintendent of the same division. Since June, 1907, he has been superintendent of the Grand Central Station and the electric division of the New York Central Railroad. Over this division between the terminal and the Mott Haven yards, 4½ miles, there are 700 train movements a day.

Mr. C. J. Pearson, until recently in charge of freight and passenger accounts for the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has been appointed division freight and passenger agent of the Michigan United Railways with headquarters at Jackson, Mich. Mr. Pearson started his railroad career as a messenger with the Cleveland, Cincinnati, Chicago & St. Louis Railway at Anderson, Ind., and continued with that company in various capacities until he became bill clerk. In 1903 he resigned from the Cleveland, Cincinnati, Chicago & St. Louis Railway to take charge of the freight accounts for the Indiana Union Traction Company at Anderson. In 1905 Mr. Pearson became State cashier of the Central Union Telephone Company at Springfield, Ill., but in 1906 he returned to Indiana and took charge of the freight and passenger accounts of the Terre Haute, Indianapolis & Eastern Traction Company.

Mr. Miles Bronson, superintendent of the Mohawk division of the New York Central & Hudson River Railroad at Albany, N. Y., has been appointed superintendent of the electric division of the New York Central & Hudson River Railroad at New York to succeed Mr. C. L. Bardo, whose appointment to the Lehigh Valley Railroad is announced elsewhere in this column. Mr. Bronson was born at Sandusky, Ohio, on May 8, 1875. He entered railway service in 1890 as a clerk in the law department of the Grand Trunk Railway at Detroit, Mich. For five years he was stenographer to the general solicitor of the Grand Trunk Railway, and from May 30, 1895, to April 27, 1898, he was secretary to the president of the New York, Chicago & St. Louis Railroad. From April 27, 1898, to Nov. 1, 1900, he was successively secretary and assistant to the president of the New York Central & Hudson River Railroad. On Nov. 1, 1900, he was appointed superintendent of the Harlem division of the New York Central & Hudson River Railroad, with offices at White Plains.

Mr. J. W. Brown, superintendent of transportation of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., has been appointed assistant superintendent of transportation of the Public Service Railway, Newark, N. J., effective on May 15, 1911. Mr. Brown has been connected with the Aurora, Elgin & Chicago Railroad since August, 1910. Prior to that time he was superintendent of transportation of the West Penn Railways, Connellsville, Pa. He entered the service of the McKeesport, Wilmerding & Duquesne Railway, McKeesport, Pa., about 12 years ago as night car dispatcher. He also served as electrician and later as power station engineer of this company. When the Pittsburgh, McKeesport & Connellsville Railway, Pittsburgh, Pa., was formed Mr. Brown was made master mechanic of the McKeesport division of that road, and later was promoted to the position of division superintendent. When the transportation department of this company was organized in 1903 Mr. Brown was appointed superintendent of transportation of the company. Mr. Brown is chairman of

the committee on interurban rules of the American Electric Railway Transportation & Traffic Association.

Mr. I. C. Fetter has resigned as general claim agent of the Wilmington & Philadelphia Traction Company and the Southern Pennsylvania Traction Company, Wilmington, Del., to become claim agent of the Reading (Pa.) Transit Company, which operates the railways and light plants in Reading, Norristown and Lebanon. Mr. Fetter was admitted to the bar in 1881, and was city clerk from 1890 to 1895. He was appointed claim agent of the Reading Traction Company in 1895. When the United Power & Transportation Company was formed in 1899 and acquired the Wilmington, Trenton, Chester, Norristown, Wilkes-Barre, Reading, Lebanon and other systems, he was made general claim agent and continued in that capacity until the Interstate Railways was formed. This company acquired still other properties, and Mr. Fetter remained in its service until 1910, when the properties were leased. In July, 1910, he became connected with J. G. White & Company, Inc., New York, N. Y., they having leased the lines in Wilmington, Chester and Delaware County previously operated by the Interstate Railways, and was appointed general claim agent of the Wilmington & Philadelphia Traction Company and the Southern Pennsylvania Traction Company. Mr. Fetter resigned from the Wilmington & Philadelphia Traction Company because of the opportunity that was afforded him to return to Reading, where he had lived for more than 30 years.

OBITUARY

Owen Leibert died at his home at Bethlehem, Pa., on March 26, 1911. Mr. Leibert was connected with the Bethlehem Steel Company, South Bethlehem, Pa., for 38 years, resigning in 1891 as chief engineer.

Tom L. Johnson died at Cleveland, Ohio, on April 10, 1911, after a long illness. He was 57 years old. Mr. Johnson was born in Georgetown, Ky., and was thrown upon his own resources when he was 15 years of age. He began his street railway career in the office of the Louisville (Ky.) Passenger Railway about 1872. This property was controlled by Biderman du Pont, the father of Mr. A. B. du Pont, who later was a very close associate of Mr. Johnson. While connected with the Louisville Railway Mr. Johnson invented a fare box which came into general use before the present system of fare collection was established. With the du Ponts and others he purchased the railway system in Indianapolis. Later he became interested in the Southern Railway of St. Louis and in a 4-mile line at Cleveland, running to Brooklyn Village. Later the former line was sold to the Hamilton interests and that at Cleveland became part of the Cleveland Railway System. In the early 80's Mr. Johnson invented the girder rail. The Johnson Company, of Johnstown, Pa., was formed and built its own rolling mill. In 1894 the Johnson Company was taken over by the Lorain Steel Company and the rolling mill was moved to Lorain, Ohio, but the manufacture of special work was continued at Johnstown. Mr. Johnson, however, was not an officer in either the Johnson Company or the Lorain Steel Company. After the flood at Johnstown, Pa., Mr. Johnson and his associates rebuilt and operated the street railway there. In 1887 Mr. Johnson built on Park Avenue, Brooklyn, a cable line which was afterward acquired by the Atlantic Avenue Railroad Company. About 1893 Mr. Johnson and his brother, the late Albert L. Johnson, with the assistance of R. T. Wilson & Company, constructed the Nassau Electric Railroad, which is now part of the Brooklyn Rapid Transit System. Mr. Johnson was treasurer of this company. About 1895 R. T. Wilson & Company and Mr. Johnson became interested in the property which is now a part of the Detroit (Mich.) United Railway. On the advice of the late Henry George, Mr. Johnson entered politics, running first for Congress, but was defeated. Later he was elected and served two terms from 1890 to 1894. In 1901 he was elected Mayor of Cleveland. In 1903 he ran for Governor and was defeated, but was re-elected Mayor in 1905 and continued in that office until 1910. The use that Mr. Johnson made of the power that was vested in him as Mayor of Cleveland in the negotiations with the Cleveland Electric Railway and the history of the failure of the Municipal Traction Company, Cleveland, Ohio, Mr. Johnson's device to establish 3-cent fares in Cleveland, are familiar to the readers of this paper.

Construction News

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

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

RECENT INCORPORATIONS

***Inter-Counties Railway, Modesto, Cal.**—Application for a charter will be made by this company in California to build an electric railway from Modesto to Crow's Landing and Newman, and from Modesto to Turlock, Merced, Madera and Fresno. Capital stock, \$5,000,000. Directors: A. W. Maltby, Concord; J. F. Peters, Charles Harris, William H. Langdon, Modesto; A. T. Nelson, Stockton, and L. G. Worden, Merced.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—Incorporated in California to take over the Oakland & Antioch Railway and extend it to Stockton. Capital stock, \$10,000,000. S. L. Naphtaly, treasurer. Directors: A. W. Maltby, Concord; Lawrence Arnstein, John R. Selby and A. J. Krutmeyer, San Francisco. [E. R. J., March 18, '11.]

***Elberton & Eastern Railway, Augusta, Ga.**—Application for a charter has been made by this company in Georgia to build a 50-mile electric or steam railway between Elberton, Tignall, Washington and Lincolnton. Capital stock, \$500,000. Incorporators: M. A. Pharr, of Washington; James A. Moss, W. J. Adams and J. J. Wilkinson, of Tignall; W. O. Jones, W. F. Anderson, J. H. Blackwell, L. M. Heard, R. L. Cauthen and Z. B. Rogers, of Elberton.

***Osceola & Southwestern Railway, Osceola, Ia.**—Incorporated in Iowa to build an electric railway to connect Laclede and Hopeville.

Little Falls & Johnstown Railroad, Little Falls, N. Y.—Incorporated in New York to build a 27-mile electric railway between Little Falls and St. Johnsville, via Ephratah and Johnstown, where it will connect with the Fonda, Johnstown & Gloversville Railroad, Gloversville. Capital stock, \$300,000. Among the directors are: Lorenzo O. Bucklin, Little Falls; Frederick Englehardt, St. Johnsville; James P. Argersing, Johnstown; J. L. Hees, Fonda, and Henry D. Harmickell, New York.

***Hellertown & Richlandtown Street Railway, Hellertown, Pa.**—Application for a charter has been made by this company in Pennsylvania to build a 6-mile electric railway to connect Hellertown and Richlandtown. All rights-of-way have been secured from Hellertown borough limits to the Richlandtown borough limits. Capital stock, \$360,000. Officers: A. R. Trumbauer, president; Jacob Apple, secretary, and W. B. Frankenfield, treasurer.

***Northumberland County Traction Company, Sunbury, Pa.**—Application for a charter has been made by this company in Pennsylvania to build an electric railway through Northumberland, Sunbury, Union, Snyder, Montour, Columbia, Lycoming, Schuylkill and Luzerne Counties. John C. Johnson, Philadelphia, and J. F. Schaffer, Sunbury, are the solicitors.

***Elizabethton, Milligan & Johnson City Electric Railway, Johnson City, Tenn.**—Chartered in Tennessee to build an 8-mile electric railway between Johnson City, Milligan College, Oak Grove and Elizabethton. Capital stock, \$25,000. Incorporators: W. G. Payne, James H. Smith, A. B. Brannon, W. C. Burchfield, J. N. Inders and J. G. Burchfield.

FRANCHISES

Los Angeles, Cal.—The Los Angeles Railway has reported to the City Council that it is ready to build a cross-town railway in Los Angeles whenever a favorable route is offered. The route proposed by the company is from Fourth Street and Vermont Avenue south to Jefferson, thence east to city limits. A resolution was adopted by Council referring matter to Board of Public Utilities.

Oakland, Cal.—The Oakland Traction Company has received a franchise to build its tracks on Hopkins Street from Fruitvale Avenue to Redwood Road, in Oakland. The company has withdrawn an application for a franchise in East Sixteenth Street and the Scenic Boulevard, and has filed a new one, which substitutes Ignacio Avenue for the Boulevard.

San Francisco, Cal.—The Southern Pacific Company has asked the City Council for a 50-year franchise for two extensions of its tracks between Townsend Street and Channel Street, in San Francisco. This application is preliminary to extension of the line to Market Street and Stuart Street.

Turlock, Cal.—S. N. Griffith, representing the Turlock Traction Company, Modesto, has asked the Board of Trustees for a 50-year franchise to build its tracks through Turlock. This proposed 4-mile electric railway will connect Turlock and Denair. [E. R. J., April 1, '11.]

Wilmington, Del.—The Wilmington, New Castle & Southern Railway, New Castle, has received a franchise from the Street Directors to build from Front Street and Market Street, in Wilmington, to the city line along the causeway, where the line will continue on to New Castle.

Wilmington, Del.—The People's Railway, Wilmington, has received a franchise to extend its tracks in Wilmington to King Street wharf, from its present termination on Front Street and King Street.

Atlanta, Ga.—The Atlanta Northwestern Railroad has asked the City Council for a franchise to build its tracks over certain streets in Atlanta. This projected 47-mile railway will connect Roswell, Alpharetta, Cummins and Atlanta. John M. Ponder, Forsyth, president. [E. R. J., April 10, '10.]

St. Boniface, Man.—The Manitoba Rural Railways, St. Vital, has received a franchise from the City Council to build its railway through St. Boniface. Work will begin soon. It will connect Winnipeg, St. Boniface, St. Vital and Emerson, 5 miles. Charles E. Lewis, Minneapolis, Minn., president. [E. R. J., March 25, '11.]

Baltimore, Md.—The Hagerstown & Clear Spring Railway, Hagerstown, has asked the Public Utilities Commission in Baltimore for permission to build its proposed 25-mile electric railway to connect Hagerstown and Clear Spring, Md., and Mercersburg, Pa. L. N. Downs, Hagerstown, is interested. [E. R. J., Jan. 21, '11.]

Bessemer, Mich.—The Gogebic & Iron Counties Railway & Light Company, Ashland, has received a franchise from the City Council to build an electric railway through Bessemer. This railway will connect Ironwood and Bessemer. M. M. Reid, general manager. [E. R. J., March 4, '11.]

Buhl, Minn.—A. C. Gillette, representing the Mesaba Electric Railway, will ask the Council for a franchise to build its tracks in Buhl. Work on this proposed 36-mile railway will be begun as soon as the weather permits. It will connect Hibbing, Chisholm, Buhl, Kinney, Virginia, Eveleth and Gilbert. Oscar Mitchell, president. [E. R. J., Jan. 7, '11.]

Hibbing, Minn.—The Northern Traction Company has asked the Village Council for a 25-year franchise to build its tracks over certain streets in Hibbing.

St. Paul Park, Minn.—The St. Paul Southern Electric Railway has received a franchise from the Village Council to build its tracks along Pleasant Avenue to Pullman and Laurel, and thence to the village limits. The County Commissioners have granted this company franchises to build its tracks through Central Point and Frontenac. This company will build a 60-mile electric railway to connect St. Paul, Hastings, Red Wing and Lake City. W. L. Sonntag, St. Paul, general manager. [E. R. J., March 18, '11.]

St. Louis, Mo.—The St. Louis, Arcadia & Jefferson County Railroad, St. Louis, has received a 50-year franchise from the Municipal Assembly to build its tracks in southwest St. Louis. This is part of a plan to build an interurban railway into the district south and west of St. Louis. E. A. Hildenbrandt is interested. [E. R. J., Feb. 4, '11.]

Virginia City, Mont.—The Virginia City Southern Electric Railway has received a franchise from the City Council to build its tracks through Virginia City. This is part of a plan to build a 12-mile line between Virginia City and Alden. Karl Elling, president. [E. R. J. April 23, '10.]

Zanesville, Ohio.—The Zanesville & Meigs Valley Traction Company has asked the County Commissioners for a franchise to build an electric railway from Zanesville to Parkersburg. It will extend from Zanesville to Beverly, via McConnellsville. H. D. Blodgett, Zanesville, general manager. [E. R. J., June 18, '10.]

Toronto, Ont.—The Toronto Railway has received a franchise from the Ontario Railway and Municipal Board to build a loop on Louisa Street and to extend its line on Lansdowne Avenue and on several other streets in Toronto. Work will begin at once. This company will ask the Ontario Railway and Municipal Board for permission to extend its tracks on Spadina Avenue south of King Street, in Toronto.

Corvallis, Ore.—The Albany Interurban Railway, Albany, has asked the City Council for a franchise to build its tracks through Corvallis. It will connect Albany, Sweet Home, Lebanon, Brownsville, Holley and Corvallis. P. A. Young, general manager. [E. R. J., Dec. 3, '10.]

New York, N. Y.—The Public Service Commission, Second Division, has approved the franchise granted by the Board of Estimate for the Third Avenue Railway to build an extension in St. Ann's Avenue, Bronx, from 161st Street to Southern Boulevard, and thence south through Southern Boulevard.

Port Chester, N. Y.—The Public Service Commission, Second District, has authorized the New York & Stamford Railway to exercise a franchise granted by the Port Chester Council permitting it to construct a single-track line in and through North Regent Street, South Regent Street and Putnam Avenue.

Lansdowne, Pa.—The Terminal Street Railway has received from the Borough Council a franchise to build its railway through Lansdowne. This line will be operated by the Philadelphia Rapid Transit Company as soon as it is completed. It will begin at the terminal at Sixty-ninth Street and will extend through upper Darby, East Lansdowne and Lansdowne, and will connect with the tracks of the Darby and Lansdowne division of the Philadelphia Rapid Transit Company, which will make a direct line from Sixty-ninth Street and the Market Street elevated lines and Darby. Frank B. Rhoades, Media, and John Taylor, Wolfenden, are interested.

Providence, R. I.—The Rhode Island Company, Providence, has asked the Town Council for a franchise to double-track its line on Broadway.

Longview, Tex.—J. C. Turner, Longview, has received a franchise from the City Council to build an electric railway over certain streets in Longview. This is part of a plan to build a belt line around Longview.

Salt Lake City, Utah.—The Utah Light & Railway Company has received a franchise from the County Commissioners to extend its tracks on the Upper County Road to Halliday, and to extend its West Temple line in Salt Lake City.

Olympia, Wash.—P. H. Carlyon, Olympia, has asked the City Council for a franchise to build an electric railway in Olympia.

TRACK AND ROADWAY

Montgomery (Ala.) Traction Company.—Contracts will be placed during the next three weeks by this company for building a 2-mile extension from Washington Street to Carter Hill Road. W. J. Ginnavan, Montgomery, general manager.

Owens River Valley Electric Railway, Bishop, Cal.—This company advises that it is in the market for material for a 4½-mile electric railway to connect Bishop and Laws, and extending to Round Valley, a distance of 12 miles. The company will purchase power. Capital stock, authorized, \$200,000. Stock, issued, \$107,250. Officers: Harry Shaw, Bishop, president; Curtis Hillyer, San Francisco, secretary and treasurer, and Raymond Spaulding, Bishop, chief engineer. [E. R. J., March 25, '11.]

San Joaquin Valley Electric Railway, Stockton, Cal.—This company has ordered 300 tons of 75-lb. steel rails to be delivered in Stockton for building its railway between Modesto and Stockton.

Sierra Construction Company, Willows, Cal.—This company plans to build an electric railway from Woodland to Redding, on the west side of the Sacramento Valley. A. S. Lindstrom, Willows, is interested. [E. R. J., April 8, '11.]

Atlanta, Griffin & Macon Electric Railway, Atlanta, Ga.—This company is said to have secured financial backing for building its 80-mile railway between Macon and Atlanta.

Construction will begin at once. Rights of way have been secured. [E. R. J., Jan. 22, '10.]

Atlanta & Carolina Railway, Atlanta, Ga.—This company has awarded the contract for grading the first section of this railway between Atlanta and Conyers to Adams & Sturm, Columbus, Ohio, and work will begin within a month. The right-of-way has been secured from Atlanta to Augusta, and both cities have granted franchises. M. Mason, Atlanta, president.

***Jackson, Ga.**—It is reported that the Georgia Power Company, Jackson, is considering a plan to build an electric railway from Montezuma via Oglethorpe to Miona and Reynolds, Ga.

Pana, Girard & Jacksonville Interurban Railroad, Springfield, Ill.—This company advises that it has secured about three-quarters of the right-of-way. W. O. Myers is in charge of the construction. Work will be pushed vigorously to completion this summer on its line, which will connect Pana, Girard and Jacksonville. At a meeting of the directors J. J. Stowe, Girard, was chosen president and Charles Russell, 125 La Salle Street, Chicago, secretary. Headquarters, Springfield. [E. R. J., March 28, '11.]

Indianapolis, Columbus & Southern Traction Company, Columbus, Ind.—This company has begun double-tracking its line from a point three-quarters of a mile south of Indianapolis to Columbus. It is the purpose ultimately to double-track from Columbus to Seymour. General Manager Shane will supervise the work.

Indianapolis & Delphi Traction Company, Indianapolis, Ind.—This company is preparing to let a contract for the construction of its 75-mile railway to connect Sheridan, Carmel, Westfield, Burlington, Flora and Delphi. Henry L. Smith, Board of Trade Building, Indianapolis, general manager. [E. R. J., Apr. 8, '11.]

Indianapolis, Nashville & Southern Traction Company, Indianapolis, Ind.—Officials of this company have conferred with the officials of the Indianapolis, Columbus & Southern Traction Company with a view to making a traffic agreement between the roads. They plan to build from Nashville to Greenwood, and connect there with the Indianapolis, Columbus & Southern Traction Company. It is said that the survey from Nashville to Greenwood has been completed and the company will let a contract for the construction of the line at once. The same company is also promoting an 8-mile spur that will be built from Nashville to Fruitdale. This spur will be built immediately. John A. Johnson, Indianapolis, is interested. [E. R. J., Aug. 13, '10.]

Vincennes, Washington & Eastern Traction Company, Vincennes, Ind.—This company has let a contract to build its line between Vincennes and Loogootee. Work is to begin on April 20. Joseph L. Ebner, Vincennes, is interested. [E. R. J., May 14, '09.]

Tri-City Railway & Light Company, Davenport, Ia.—This company states that it will soon build its extension from Davenport to Muscatine. J. G. White & Company, Inc., operating managers.

Osage, Ozark & Springfield Electric Railway, Fristoe, Mo.—This company advises that it will begin construction as soon as it has secured financial backing for its proposed 80-mile electric railway to connect Warsaw and Springfield via Fristoe, Cross Timbers and Buffalo. Money has been subscribed for preliminary surveys. The power stations of the company will be located at Warsaw and Bennetts Springs. E. E. Trippe, Fristoe, is interested. [E. R. J., April 1, '11.]

Metropolitan Street Railway, Kansas City, Mo.—This company is said to be in the market for 2,500 tons of 70-lb. and 80-lb. rails. The company has completed and placed in operation an extension from the Metropolitan power house on Second Street and Grand Avenue, Kansas City, to Sheffield.

Wildwood & Delaware Bay Shore Line Railroad, Trenton, N. J.—This company advises that it has begun the construction of its line to extend through Wildwood and across the state to Delaware Bay and there connect with the Wilmington, Delaware & Philadelphia Railway. This railway will also connect with the Philadelphia & Reading Railroad. The company will award contracts for bridge

work and for sand pumping. Its power station will be located at Rio Grande and it will operate 12 cars. Bonds issued, \$562,500. Officers: Curtis T. Baker, Wildwood, N. J., president; George N. Smith, Holly Beach, vice-president; J. Dubois, Wildwood, secretary; R. W. Ryan, treasurer; Slaughter & Hann, 1208 Real Estate Building, Philadelphia, Pa., general manager and purchasing agent, and H. E. Weir, chief engineer. [E. R. J., Dec. 17, '11.]

Kingston (N. Y.) Consolidated Railroad.—This company will reconstruct a mile of track and overhead work within the next few weeks.

New York Central & Hudson River Railroad, New York, N. Y.—The New York Public Service Commission, Second District, has decided on the plans for the elimination of the grade crossing on the Harlem division of this company in Bronxville, made necessary by the electrification of this railroad. The plan adopted provides for the construction of an undergrade crossing, 50 ft. wide, at about the present location of the present station. The cost will be about \$150,000. The commission has also ordered the elimination of the Main Street grade crossing in Irvington. An overhead crossing for pedestrians is to be constructed on the line of the present Main Street crossing. The total amount of this improvement will be about \$80,000.

***Delaware, Ohio.**—A delegation from the Commercial Club of Delaware appeared before the finance committee of the Ohio Senate last week and urged that the State build an electric line between Delaware and the Girls' Industrial Home, a distance of 8½ miles. It is estimated that the cost would be \$133,000, exclusive of rolling stock and power plants.

People's Electric Railway, Muskogee, Okla.—This company advises that it has begun the construction of its 300-mile railway to connect Muskogee, Tulsa, Fort Gibson, Claremore, Bartlesville, Wagoner and Oklahoma City. The company's power station and repair shops will be located at Muskogee. Capital stock, \$200,000. Officers: G. W. Risser, Oklahoma City, president; W. N. Patterson, Muskogee, vice-president; Samuel Spaulding, Muskogee, secretary, and T. H. Martin, Muskogee, treasurer. [E. R. J., April 1, '11.]

Interurban Railway, Clearfield, Pa.—This company advises that it has completed surveys and will begin work on its projected line within three months. Six straight gasoline and gasoline-electric cars will be operated. The line will be 19.8 miles long and will connect Philipsburg, Blue Ball, Wallacetown, Bigler, Woodland, Clearfield and Hyde City. The repair shops will be at Philipsburg. Capital stock authorized, \$500,000. Capital stock issued, \$200,000. Bonds authorized, \$500,000. Officers: W. Ellis Schomo, Clearfield, president and purchasing agent; A. C. Lansbery, vice-president; P. H. Ferguson, Philipsburg, secretary and treasurer. [E. R. J., Nov. 12, '11.]

Johnstown (Pa.) Traction Company.—This company expects to begin work soon on repairs to the line which will cost approximately \$40,000. New curves and switches will be installed at Main Street and Clinton Street. New rails will be laid. Similar work will be done on the stretch of Franklin line.

Philadelphia (Pa.) Rapid Transit Company.—This company contemplates building an extension between Germantown and Roxborough via the new Walnut Lane Bridge.

Eastern Pennsylvania Railway, Pottsville, Pa.—This company has begun surveys for building an 18-mile extension from Pottsville to Frackville and Shenandoah.

Sherbrooke Railway & Power Company, Sherbrooke, Que.—Contracts have been placed by this company for building 5 miles of track in Sherbrooke.

Bristol (Tenn.) Traction Company.—This company will place contracts during the next month for building two extensions in Bristol and a loop in the western section of Bristol. It will also build an extension to Virginia Park and will standardize 10 miles of its line to the Park at Holston River. Fred Dulaney, Bristol, general manager.

Bonita Valley Rapid Transit Railway, Pleasanton, Tex.—This company is in the market for steel and ties. It has already built about 7,000 ft. of heavy work. It will build from 5 to 25 miles of track between Jourdanton and Pleas-

anton. The motive power will probably be gasoline. C. S. Young, San Antonio, superintendent. [E. R. J., Mar. 11, '11.]

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—This company is considering plans for building a passenger station or the northeast corner of Greenleaf Avenue and Penn Street, in Whittier.

Southern Pacific Railroad, Los Angeles, Cal.—This company has decided to locate its main passenger terminal at the foot of Market Street on the block bounded by Market, Mission, Steuart and Spear Streets, in Los Angeles.

Sacramento Electric, Gas & Railway Company, Sacramento, Cal.—Plans are being considered by this company for enlarging its car houses in Sacramento.

Tri-City Railway & Light Company, Davenport, Ia.—This company will build soon a new carhouse and repair shop in Rock Island.

Boston & Northern Street Railway, Boston, Mass.—The car house of this company situated off Ocean Avenue at Crescent Beach, Revere, was destroyed by fire on April 11. The entire structure 60 ft. x 150 ft., eight open cars and several snow plows were burned. The loss is estimated to be about \$30,000.

Cincinnati, Georgetown & Portsmouth Railroad, Cincinnati, Ohio.—This company's station and carhouses on Canal Street and Dumont Street, in Cincinnati, were destroyed by fire on April 5. The loss is estimated to be about \$35,000.

Western Ohio Railway, Lima, Ohio.—This company has completed and has opened for business its new freight station on Wayne Street, in Lima.

Eastern Pennsylvania Railway, Pottsville, Pa.—This company is making extensive alterations to its carhouse at Palo Alto. A new storeroom is being built under the carhouse and the former store rooms in the western wing are being altered into clubrooms for the employees. C. F. Crane, general superintendent.

Chicago, Burlington & Quincy Railroad, Deadwood, S. D.—This company is considering plans for building a depot at Downer's Grove, Ill., and one at Princeton, Ill. The structures are each to be one-story, of brick construction, and the cost of each is to be about \$20,000.

POWER HOUSES AND SUBSTATIONS

Montgomery (Ala.) Traction Company.—This company will place contracts during the next three weeks for building a power house in Montgomery. W. J. Cinnavan, Montgomery, general manager.

Phoenix (Ariz.) Railway.—This company is now building a new substation in Phoenix. The machinery to be installed will consist of a 100-kw motor generator set with transformers, oil switches, switchboards and necessary auxiliary apparatus.

Kokomo, Marion & Western Traction Company, Kokomo, Ind.—This company will place contracts during the next few weeks for building a new power plant. It expects to purchase 1000-hp boilers, stokers, a 200-ft. smokestack, coal-handling apparatus and other equipment necessary to the enlargement of its plant in Kokomo.

Tri-City Railway & Light Company, Davenport, Ia.—This company expects to purchase soon coal-handling apparatus for its power house at Moline.

Central Pennsylvania Traction Company, Harrisburg, Pa.—This company will purchase during the next six weeks new engines and generators with a capacity from 1000 to 1500 kw for its power plant in Harrisburg. Frank B. Musser, Harrisburg, general manager.

Sherbrooke Railway & Power Company, Sherbrooke, Que.—This company has placed contracts for building a substation in Lennoxville. It has purchased three 100-kva transformers, switchboard, etc.

El Paso (Tex.) Electric Railway.—The Stone & Webster Engineering Company of El Paso has been awarded the contract for erecting a steel and concrete addition to the power plant of this company. A new generating and power plant will be installed in the new part, doubling its capacity at a cost of \$250,000.

Manufactures & Supplies

ROLLING STOCK

Montgomery (Ala.) Traction Company expects to purchase 10 new trucks.

Ogdensburg (N. Y.) Street Railway, it is reported, will purchase a number of open cars.

Bristol (Tenn.) Traction Company is in the market for four new city cars and two suburban cars.

Vancouver (B. C.) Power Company has ordered six Brill 27-MCB trucks from the G. C. Kuhlman Car Company.

British Columbia Electric Railway, Vancouver, B. C., has ordered two 45-ton locomotives from the Westinghouse Electric & Manufacturing Company.

Utica & Mohawk Valley Railway, Utica, N. Y., has placed an order with the G. C. Kuhlman Car Company for four 34-ft. 4-in. Brill semi-convertible combination passenger and smoking cars and eight 30-ft. 11-in. Brill semi-convertible pay-as-you-enter cars.

Indiana Union Traction Company, Anderson, Ind., has recently purchased from the Dorner Railway Equipment Company three new 13-bench open trailer cars, mounted on Taylor trucks; two 14-bench rebuilt open trailer cars, mounted on Brill 27-G trucks, and one 8-bench rebuilt open motor car.

TRADE NOTES

John Langan, of the Okonite Company, New York, N. Y., has resigned. His retirement from active business to take a much-needed rest is due to a recent illness.

C. H. Pearson has accepted a position in the hoist department of the Yale & Towne Manufacturing Company. Mr. Pearson was formerly connected with the Noera Manufacturing Company, Waterbury, Conn.

McKeen Motor Car Company, Omaha, Neb., has recently shipped a 70-ft. motor car to the Southern Pacific Railroad. This is the thirtieth car to be received by the Southern Pacific Railroad. All of them are in daily service on its lines in California and Nevada. The company has also received an order from the Sand Springs Interurban Railway for one 70-ft. car.

Wendell & MacDuffie Company, New York, N. Y., which has recently been appointed sole Eastern agent for the St. Louis Car Company, has appointed Charles A. Remelius, chief engineer of the company, in full charge of the car department. Mr. Remelius was formerly connected with the Public Service Railway and the Pay-As-You-Enter Car Corporation.

Wonham, Sanger & Bates, New York, N. Y., have taken the American agency for the helio-chronometer, about which they have issued a circular. The helio-chronometer is a device by which time is told from the sun, but, unlike the ordinary sun dial, it gives accurate time without calculation or allowances of any kind. Wonham, Sanger & Bates believe that this device will prove of interest in electric railway parks.

Gregory Electric Company, Chicago, Ill., is building an addition to its works to be completed July 1, 1911, that will double the capacity and also the storage space of its present plant. The addition will be brick and steel construction of the same type as the present buildings. A brass foundry will be added and also another Whiting 20-ton electric crane installed, to take care of the large volume of business that this company is doing.

Canadian Westinghouse Company, Hamilton, Ont., has transferred Chas. F. Gray, who for the past five years has been superintendent of construction, with headquarters at Hamilton, Ont., to the Winnipeg office of the company, to take charge as chief engineer of the construction staff, erecting switching and transforming apparatus, at Winnipeg's new 60,000-hp hydroelectric plant at Point du Bois, Manitoba, and the terminal station and substations in Winnipeg.

Southern Car Company, High Point, N. C., is being reorganized. J. Elwood Cox, of High Point, has interested in the property J. B. Duke, who is connected with the Southern Power Company and several electric railways; W. G. Brokaw, R. W. Morrison and Abraham Cook, the two latter

having been associated with the St. Louis Car Company. The company has increased the capital stock to \$200,000 and has purchased 12 acres of ground adjoining the property of the present plant, on which it will construct several large buildings and which will greatly increase the capacity of the plant.

United States Metal Products Company, New York, N. Y., which is a consolidation of the J. F. Blanchard Company and the John W. Rapp Company, and was incorporated in Massachusetts with \$6,000,000 common and \$2,000,000 seven per cent cumulative preferred stock authorized, for the manufacture of metal doors, window frames, interior trim, etc., has plans under way for an addition to its Rapp plant at College Point, N. Y. This will involve the erection of a shop 250 x 600 ft., a dock 75 x 600 ft. and an employees' bath house 50 x 60 ft. The officers of the company are John W. Rapp, president; H. C. Randall, C. J. Hale and A. J. Connell, vice-presidents; C. A. Leonard, secretary, and E. B. Wires, treasurer.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has received orders from the Johnstown Passenger Railway for five two-motor equipments, with type K-11 control; Toledo, Bowling Green & Southern Railway, for four four-motor equipments consisting of No. 304 interpole motors and type HL unit switch control; Georgia Railway & Electric Company, for six additional two-motor equipments, with type K-35 control; City Railways, Dayton, Ohio, for 10 two-motor equipments consisting of No. 306 interpole motors and type K-36 control; Nashville Railway & Electric Company, for four two-motor equipments consisting of No. 307 interpole motors and type K-35 control; Cincinnati Traction Company, for nine four-motor equipments consisting of No. 303-A interpole motors and type HL unit switch control, and from the Fairmount & Clarksburg Railway, for four additional four-motor equipments consisting of No. 306 interpole motors and type HL unit switch control.

Transportation Utilities Company, New York, N. Y., has been organized, with its main office at 30 Church street, to represent directly the Acme Supply Company and the General Railway Supply Company. The territory of this company in the steam railroad field will include all roads running east of Chicago and St. Louis, and in the electric railway and building trade fields the United States, Canada and Mexico. Among the devices and materials which this company will handle are steel doors, Flexolith composition flooring, metallic sheathing, diaphragms, vestibule diaphragm attachments, vestibule curtain rollers, weather strips, vestibule curtain shields, vestibule curtain hooks, Tuco car curtains and fixtures, National steel trap doors and lifting devices, standard roofing, vestibule curtain catches, roller deck sash ratchets, Imperial car window screens and Acme vestibule curtain handles. The company will be represented in Baltimore, Md., by H. B. Chamberlain, 704 North Fulton Avenue., and in Chicago, Ill., by John T. Morton, No. 703 Steger Building. W. L. Conwell is president and treasurer of the company, but this does not imply a severance of his connection with the Westinghouse Electric & Manufacturing Company. R. M. Campbell is also connected with the company.

Hale & Kilburn Company, Philadelphia, Pa., has been incorporated to take over the property and business of the Hale & Kilburn Manufacturing Company, for which Edward B. Smith & Company, Philadelphia, Pa., together with two New York banking houses, have underwritten the securities. The capital stock consists of \$2,206,000 first preferred 7 per cent cumulative stock, \$2,293,400 second preferred 7 per cent cumulative stock and \$4,000,000 common stock. The officers and directors of the company are: Francis H. Greene, president, of whom mention was made in the *ELECTRIC RAILWAY JOURNAL* of March 18, 1911; Robert B. Caverly, vice-president. The directors are: Albert H. Wiggins, Henry S. Hale, Otis H. Cutler, F. H. Eaton, A. M. Kittredge, W. H. Marshall, J. S. Coffin, E. H. Fallows, Winthrop Sargent, W. H. Davis, A. H. Lockett, W. F. Cutler, Herbert H. Dean, Francis H. Greene and Robert B. Caverly. Mr. Wiggins is president of the Chase National Bank of New York; Mr. O. H. Cutler, president of the American Brake Shoe & Foundry Company; Mr. Eaton, president of the American Car & Foundry Company; Mr.

Kittredge, president of the Barney & Smith Car Company, and Mr. Marshall, president of the American Locomotive Company. Dividends on the first preferred stock are payable quarterly from April 1, 1911. It is preferred as to both assets and dividends. After March 10, 1914, the second preferred stock is convertible into first preferred, provided the net earnings for the two years preceding shall have been at least 50 per cent in excess of dividends on both classes of stock. The preferred and common stocks have equal voting power, but in the event of default of dividends for four successive quarters on either class of preferred, the voting power of the common is suspended. The first preferred and the common stock have been placed in a voting trust for three years, and are represented by voting trust certificates.

ADVERTISING LITERATURE

Templeton, Kenly & Company, Chicago, Ill., have issued Catalog No. 13 on "Simplex" jacks, for use particularly by railroads, industrial plants, contractors and engineers.

Railway Improvement Company, New York, N. Y., has issued a folder entitled "Power Pointers," which gives several reasons why the use of the coasting time recorder results in a saving to railroads.

Canton Culvert Company, Canton Ohio, has issued a folder calling attention to its new catalog on "Acme" corrugated metal culverts and also containing several illustrations of culverts now in use.

Barber Car Company, York, Pa., has issued a post card, part of which is printed with sympathetic ink, so that when the card is exposed to the light a clear picture of the "Barber" center entrance car is brought to view.

H. W. Johns-Manville Company, New York, N. Y., has published the "J-M Roofing Salesman" for April, 1911. The publication contains several interesting articles and also a number of illustrations of buildings roofed with J-M asbestos roofing.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has issued Circular No. 1517, which contains a reprint of a series of advertisements on railroad electrification which appeared in the technical magazines from Jan. 1, 1911, to Mar. 1, 1911.

General Vehicle Company, Long Island City, N. Y., has published "Elec-Tricks" for March, 1911, containing an article on "G. V. Electrics in United States Postal Service," and also illustrating and describing the operation of G. V. electric trucks under the most severe conditions.

Hess-Bright Manufacturing Company, Philadelphia, Pa., has issued sheets 1-A, 2-A, 18-B and 34-A, Series 336, on "Mounting for Radial Load without Thrust," "Mounting for Combined Radial and Thrust Loads," "Mounting Directions" and "Electric Motor and Other Two Journal Mountings."

W. N. Matthews & Brother, St. Louis, Mo., have printed the third edition of "Matthews' Telephone Line Construction Book." Besides the data which have been retained from the previous edition, about 30 pages of new specifications and diagrams have been added. In addition the book contains four interesting articles on "Flexibility in the Cable Plant and How to Obtain it at the Minimum Cost," "The Murray, Fisher and Varley Loop Tests," "Wire Transpositions" and "Underground Conduit Construction."

The J. G. Brill Company, Philadelphia, Pa., has published the *Brill Magazine* for March, 1911. It contains a biographical sketch of Charles S. Sergeant, vice-president of the Boston Elevated Railway. The sketch is accompanied with an excellent portrait of Mr. Sergeant as a supplement. Among the feature articles are the following: "Conditions Which Govern the Type of Car for City Service, Mexico City, Mex.," "Shipment of Double-Deck Cars to Concepcion, Chile," "Prepayment Semi-Convertible Cars for Macon, Ga.," "Express Cars for Fairmont & Clarksburg Traction Company," "Single-Truck Semi-Convertible Cars for Madison, Wis.," "Open Cars for Danbury, Conn.," "Semi-Convertible P-A-Y-E Cars for Benton Harbor, Mich.," "Supplements to the Brill Magazine," "Test of the Brill Half-Ball Hanger by the Philadelphia Rapid Transit Company," "Manufacturer's Inspection and Test of Trucks" and Part III of "A History of The J. G. Brill Company."