

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.
Consolidation of STREET RAILWAY JOURNAL AND ELECTRIC RAILWAY REVIEW

Vol. XLVII

NEW YORK, SATURDAY, APRIL 29, 1916

No. 18

THE THINKING PART

As we view the conduct of practically every large business, there are two duties which have to be performed by those occupying executive positions. One of these is to plan the work to be done, the other is to carry out the plans, or see that they are carried out, after they are made. Our observation of the work of many electric railway officials is that there is a tendency to neglect the planning for the routine of seeing that the work is carried out, in other words, that the executive too often becomes so much wrapped up in details as to be unable to take the broad general view which the property under his direction requires. This situation to which we refer applies to department heads just as much as to general officers. The best results cannot be secured while one keeps his face at the grindstone continuously. No man can properly plan his own work and that of those under his direction unless he has opportunity to view the whole situation in perspective, to study the practice of others in the same line and compare the results they secure with those which he is getting, and to review the objects for which he is striving and consider whether he is attaining them in the most efficient manner possible. In our opinion, the man who does the thinking is working just as hard as the man who does the things which come to him every day, and the chances are that he is accomplishing more for his company. The electric railway business is one which peculiarly calls for the man who can think and takes the time to think.

NEWARK'S NEW TERMINAL OPENS TO-DAY

A fitting prelude to the celebration of the 250th anniversary of the founding of Newark, N. J., is the opening of the new Public Service terminal in which service is being inaugurated as this issue of the ELECTRIC RAILWAY JOURNAL is mailed to its readers. The terminal building is the most conspicuous element in an undertaking which has involved the expenditure of nearly \$6,000,000. This project is being carried out on schedule time, and it will give immediate relief from a most embarrassing congestion of traffic at the business center of the city nearby. The management of the Public Service Railway estimates that it will be twenty-five years before the congestion will again increase to the point where it was a few days ago. The crossing at Broad and Market Streets was one of the most congested points in the country, the rush-hour street car traffic there being as high as 488 cars per hour. After to-morrow this will have been reduced to 326 cars by the rerouting which the terminal makes possible. The

terminal project is a boon to the city, to central New Jersey, of which Newark is the metropolis, and to the company. It also furnishes an inspiring example of foresight and enterprise to the entire industry. The city gains by the reduction in the number of cars on the streets, by the stimulation to business which must result from the arrangements for delivering the passengers from outlying towns conveniently and comfortably at the business center, and by the substantial addition to the group of show places in the community. Central Jersey, through which radiate the railway lines from Newark as a center, gains also, because the terminal is designed largely to expedite the interurban traffic. The railway company gains through the increased facilities for getting cars through the congested center, the decrease in the transferring of passengers and the advertising value of an attractive, busy and convenient traction center.

EDUCATIONAL TRAINING FOR RAILWAY WORK

The letter from G. M. Cameron, who is master mechanic of the New York State Railways, Rochester lines, which is printed elsewhere in this issue, is prompted by a sympathetic and practical interest in the development of young men. The facts advanced are the result of a systematic effort extending over a period of years. A prominent railway manager who has had still wider experience in the same direction has contributed his ideas to the discussion started by Prof. A. M. Wilson's article printed in our issue for April 15. These ideas, with others suggested by Mr. Cameron's letter, are incorporated in this and the following paragraph. On all hands we have criticism of our educational system from the kindergarten up, some of it merited, much of it otherwise. Employers and teachers agree, however, that schooling and working in gainful occupations must be brought closer together, and for at least two reasons: First, pupils must get something of the working atmosphere while they are still in school, and, second, they must carry the spirit of study into their later work. In the one case their studies are abstract and comparatively meaningless, and in the other they fail to grow. With the best that the schools can do, however, the graduate of the grammar school, the high school, the college and even the industrial school is an unfinished product. He must have a post-graduate course in the school of experience. The manufacturing companies and many operating companies are providing this by means of apprentice schemes of one sort or another. The utilities are coming to the same plan, although the difficulties in this field are much greater

than in that of manufacturing. These difficulties, however, must be overcome if the big problems of the future are to be most effectively solved.

THE RAILWAYS' DUTY AS AN EDUCATOR

We realize that one of the obstacles in the way of training young men for railway work, and for other lines of work as well, is their attitude toward work and toward life in general. They do not fully appreciate what schooling is for, anyway. The result is that employers are disgusted many times and conclude that the "3 R's" comprise all the essentials of education, and that the boys who get to work earliest are the most competent employees in the long run. The employer feels that in filling their heads with book knowledge, granting for the purpose of argument that they do this, they lose the ability to get results from people and to realize the true character of every-day problems in this field. On the other hand, and after deeper thought, employers realize that the grade of work to which the average employee can aspire is determined by his education. If, therefore, they are not willing to trust to chance for the backbone of their organization, they must select new human material as they do inanimate material, with a view to its possibilities, and then make the most of it. Among the definite things that can be done are these: Some man or men in each organization can make it a special duty to keep in touch with the efforts of the employees to improve their minds. Some of the latter can be encouraged to do more, and even to stop work for a time to pursue further studies in school. Co-operation with local schools can be fostered by the railway managers. Ambitious young men can be encouraged to consult their superiors to obtain needed counsel. Conditions differ, but the fundamental principle is the same.

A PUBLICITY POLICY NEEDED

Why cannot the electric railways as a whole make a beginning and do something in the way of real publicity? The steam railroads have done excellent work along this line in the past, and they are continuing it at present. During the time when the question of rates was uppermost, the steam railroads sent to the newspapers some excellent material giving facts which told their side of the story. Again, on the question of compensation for carrying the mails, and now in connection with the dispute on wages with their trainmen, they have followed the plan of concerted action for "free and frank publicity." We have recently commented on the practice of the Rockefellers and of other important interests in the same direction. Even departments of the United State government assiduously cultivate the daily papers in the promotion of their policies.

The subject has frequently been discussed at meetings of the American Electric Railway Association, and the plan has always evoked enthusiasm. Companies which understand the value of local publicity work in the case of their own properties have been anxious to have the work carried on in a more general way. Delegates at conventions agree that the electric railway

companies have a convincing story to tell to the public, but the story rarely gets much beyond the convention hall.

The only way to secure publicity is to go at it seriously. Spasmodic attempts are of little or no use. It is something which must be kept up every day in the year and one year after another. There is no mystery about the right way to secure publicity, and if the story is true it is certain to have its effect if told patiently, consistently and thoroughly. The railways believe that their position is just and that they have a real story to tell, but they don't tell it.

The logical body to conduct a campaign of this kind is the American Electric Railway Association through its committee on public relations. A year and a half ago this committee formulated and published the code of principles. This was a step in the right direction, but it was not followed up. Efforts which would have produced results in this field were expended in other directions which are not so important to the industry or to the association. With the membership of the association being increased now by the affiliation of the manufacturers, it is a good time to review the entire question of publicity. With its present composition, the association has a larger scope than it had a year ago, and its policies in all directions should reflect this fact.

WHAT AILS THE ELECTRIC RAILWAYS?

That the electric railways in the United States are not at the present time enjoying unalloyed prosperity is not news to electric railway operators. As we showed in the issue of April 15, sixty-two representative electric railways in 1915 reported a decrease of 1.02 per cent in gross and 0.62 per cent in net. These figures, for companies publishing both annual and monthly reports, are naturally not conclusive as to the entire industry, as we then stated, but our general conclusion that the industry suffered appreciable losses in 1915, even though less than anticipated, is substantiated by a current review of the annual reports of 290 electric railways by *The Commercial and Financial Chronicle*, which calculates a loss of 0.07 per cent in gross and about 1 per cent in net. Coupled with this suspension of the customary progress of electric railway earnings is the fact that new construction is falling off, for the new track built in 1915 was less than in any year since 1907, with a steady decrease since 1910, and the new cars ordered in 1915 were the fewest since 1907, with a similar decrease since 1912. As a natural corollary we are not surprised to find, as noted elsewhere in this issue, that new issues of electric railway securities decreased in amount \$56,658,600 or about 30 per cent in the last year.

Of course, there is the brighter side of this picture, for in the first quarter of this year earnings have shown a marked improvement, car orders have increased in number and volume, and new financing has already gained \$13,115,400 over last year. Yet electric railways are not showing the same prosperity in earnings that other utilities, notably electric light and gas companies,

report, and it does not seem as if the new developments were being viewed with a general feeling of optimism by investors. To a certain extent, to be sure, electric railways have probably passed their long period of a necessarily large percentage of new construction, and it is hardly to be expected that they will continue the same proportional or actual growth as in the early days. On the other hand, there is still an opportunity for extended development in some sections and for extensions in most localities to take care of population growth, but the indications are that these are being restricted by a number of causes that have reduced the profit in electric railway enterprises and thus made them less attractive propositions in the field of competition for capital. The full understanding of these causes and the determination of the proper ways to remove them constitute without doubt the most serious problem now confronting those who are interested in future electric railway development in this country.

In the report of the Bureau of Fare Research recently published, F. W. Doolittle announced several conclusions, based on a study of census statistics, that summarize clearly the most important causes of the present situation. He finds that during the last fifteen or twenty years there has been a great increase in the length of ride for a single fare, while at the same time there has been a reduction of the single fare on account of the increased use of transfers. During this period, construction costs, operating expenses and taxes have risen on account of the increased perplexities of urban life and the substantial character of municipal requirements. During the same time, also, the cost of capital has increased, because of the general rise of interest rates, competition with other forms of investment and agitation against the electric railway industry. As to detailed operating expenses, Mr. Doolittle notes that labor costs have increased, and that the costs of materials entering into the construction and operation of electric railways have also grown, while this latter increase has been accompanied by the necessity on the part of the railways to use more and better materials.

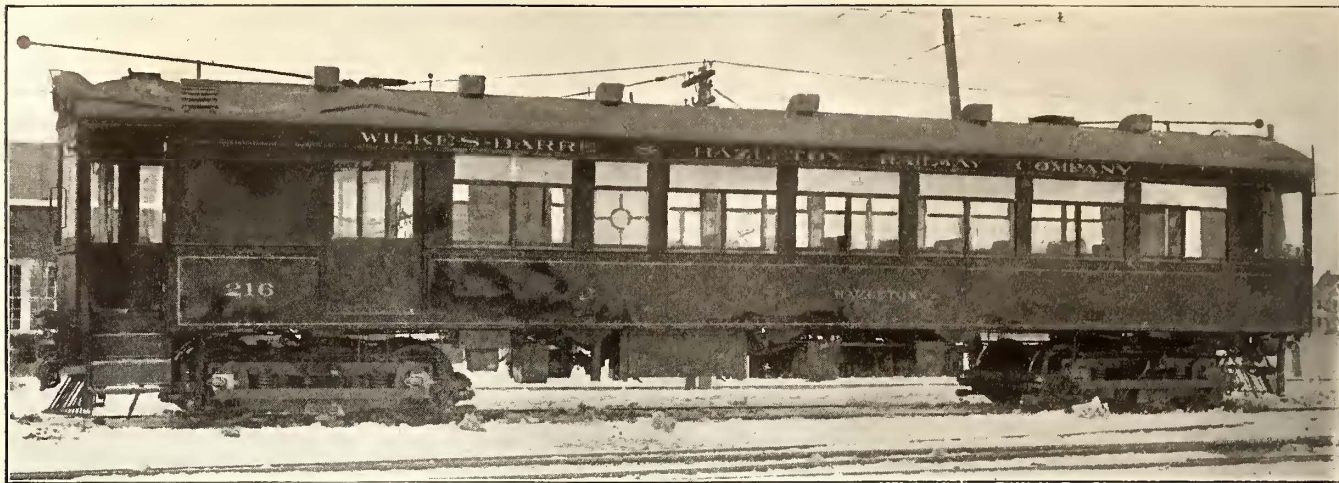
Since 1912, the census year on whose figures these conclusions were based, there has been no improvement in the condition of the electric railway industry. In fact, it is a matter of common knowledge that since that time the cost of labor has gone still higher, and there has been a recent wide increase in the costs of material, accompanied by destructive competition from jitneys and private automobiles. The former competition may pass, but the latter is bound to stay and may even increase with returning business prosperity.

Some of the causes of these increased burdens on electric railways are due to the widespread operation of natural economic forces, and the public could not change them even if it would. Since it suffers, however, from the consequent retarding of railway development through such means, it should be vitally interested in at least the amelioration of the burdens wherever possible. But for some of the other causes of the present situation the public is directly responsible, such as for more rigorous service requirements, higher ex-

penses for paving, as mentioned in the recent petition of the California electric railways to the State Railroad Commission, and for higher taxes. The restrictions thus placed upon electric railway profits through both natural and artificial causes have been aggravated by propaganda started by self-styled advocates of the public interests—mainly ill-considered plans to control and even cut down the rate of return on electric railway investments through limitations on the earning power of the utilities.

The clearly evident fact is that the public as a whole is still without a clear idea of the hazards of the electric railway business and of what the allowed rate of return should be as a basis for fares and as an attractive proposition to investors. In some directions, it is true, there seems to be a growing appreciation of the fact that the industry should not be burdened in its efforts to overcome natural economic changes, but broadly speaking, we believe that the present situation is too widespread for the companies passively to await the general development of a proper public attitude toward transportation lines. If the public must be more fully educated in regard to the causes and the needs of the present situation, the railways owe it to themselves as well as to the public to assist in all possible ways in bringing about a full knowledge of all the factors involved. If the public is beginning to show an awakening conscience against corporation baiting, now is the time to make systematic and concerted efforts to educate the public to a fuller understanding of the whole transportation question.

For instance, the public has for years deemed the 5-cent fare an essential part of street railway practice, but now if the railways are to receive adequate pay for the service rendered, the need of higher fares on some basis to offset the depreciation of the 5-cent fare must be demonstrated. The real cost of transfers, rush-hour service and similar privileges, the effects of increased wages and material costs, etc., should also be thoroughly explained, and an effort should be made to establish the fundamental principle that revenues should be increased whenever new expenses are loaded on carriers by commissions or legislatures. The necessity should also be shown of allowing interurban lines to secure rights for the development of freight and express service in cities, so as to increase their revenues. A campaign throughout the country should be made for a simplified and standardized tax system, so that electric railways may be able to show any inequitable incidence of taxation. Lastly, the public should understand the importance to itself of allowing a rate of return sufficient to attract new electric railway capital in competition with all other industries. These are simply detailed suggestions along certain lines about which we feel there might well be a sustained and more nearly universal publicity. If it were possible to sum up the present situation in one clause, we would say that the public as yet has not been made to understand what electric railway service really costs, and to show this with all fairness and truthfulness is the present and future problem of the industry.



WILKES-BARRE & HAZLETON CAR—EXTERIOR VIEW OF CAR

New All-Steel Cars for the Wilkes-Barre & Hazleton Railway

The Ten All-Steel Combination Passenger and Baggage Cars Recently Delivered Embody the Latest Principles in Construction and Equipment for Cars Designed Especially for High-Speed Interurban Service

THE Wilkes-Barre & Hazleton Railway, Hazleton, Pa., has recently received from The J. G. Brill Company ten all-steel interurban passenger and baggage cars, which embody the latest principles of interurban car construction, both in their general design and attractiveness, and in the completeness of the detailed equipment applied. These cars were built simultaneously with an order for ten all-steel city cars for the Lehigh Traction Company, which is under the same management. The city cars were described in the *ELECTRIC RAILWAY*

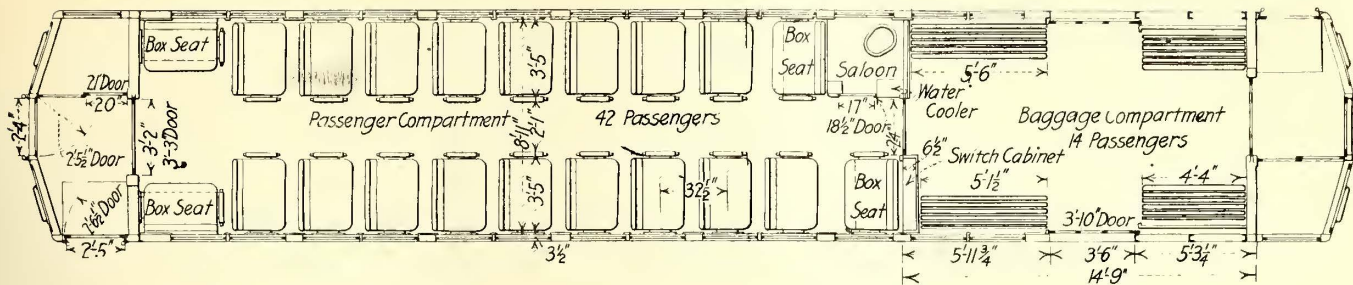
JOURNAL of Jan. 22, 1916. The interurban cars were shipped to the Wilkes-Barre & Hazleton Railway on their own wheels. They are for service between Hazleton and Wilkes-Barre, a distance of 30 miles. This run will be made in forty-five minutes by express cars and one hour by locals. The territory includes a district of unusually attractive scenery, and several stations are much patronized by campers and picnic parties. At Nuangola and Blytheburn are large lakes which form an especial attraction during the hot season. During



WILKES-BARRE & HAZLETON CAR—INTERIOR VIEW OF PASSENGER COMPARTMENT



WILKES-BARRE & HAZLETON CAR—END VIEW OF CAR, SHOWING RADIAL COUPLERS AND COUPLER SAFETY CHAINS



WILKES-BARRE & HAZLETON CAR—SEATING PLAN OF CAR

the vacation season there is also a considerable commuters' traffic from cottages near points along the line to Hazleton or Wilkes-Barre. The general dimensions are as follows:

Length of body.....	46 ft. 3 1/2 in.
Length over vestibule.....	54 ft. 3 1/2 in.
Width over sills.....	9 ft. 6 in.
Height, rail to sills.....	3 ft. 7 7/16 in.
Height, sill to trolley base.....	9 ft. 4 7/8 in.
Truck centers.....	35 ft. 9 in.
Wheelbase of trucks.....	7 ft.
Weight of car body without electrical equipment.....	36,500 lb.
Weight of electric equipment.....	3,842 lb.
Weight of air-brake equipment.....	1,950 lb.
Weight of trucks.....	22,600 lb.
Weight of motors.....	17,040 lb.
Total weight.....	81,932 lb.

FRAMING

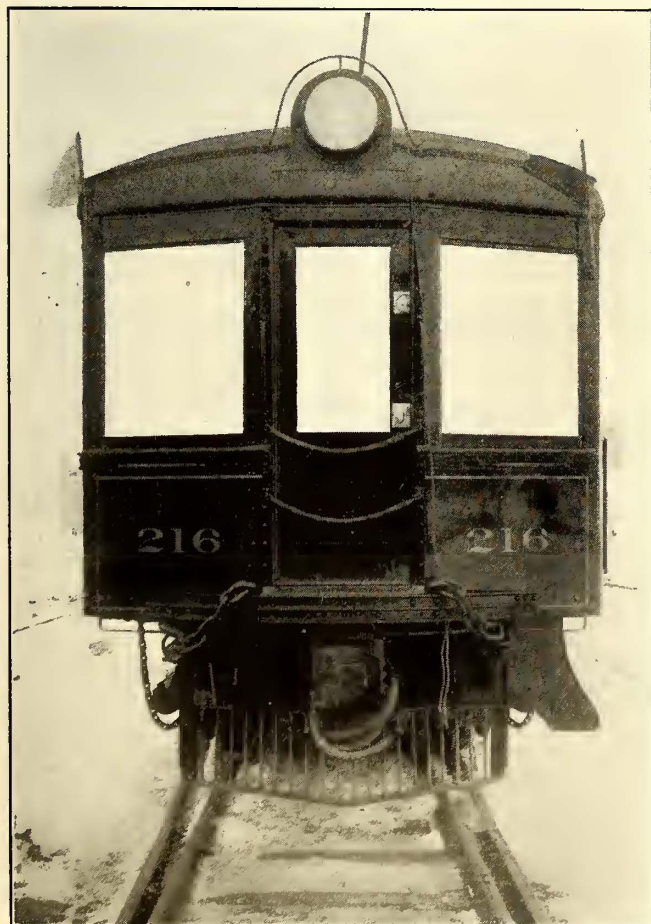
The car bodies, which are of all-steel construction, are mounted on steel underframes designed to keep the weight of the car within a reasonable limit. Side sills of 5-in. x 3 1/2-in. x 5/16-in. angles are secured to 7-in. 15-lb. I-beam crossings, and to 6-in. 8-lb. channels and sills. At the baggage doors these side sills are reinforced properly to take care of the strain that may be

thrust upon the sills, owing to the cut-away side girders. The body posts are of 1 1/2-in. x 2-in. x 3/16-in. and 1/4-in. T's, the table of T-iron being riveted to the angle side sill and reinforced at the belt rail. Side sheets are riveted to the table of T-posts and consist of 3/32-in. blue annealed steel. Window construction is of the pier post and intermediate post type, with a single T-iron representing the intermediate post and a double T-iron representing the pier post. Pier posts are finished on the inside with sheet steel, nickel plated.

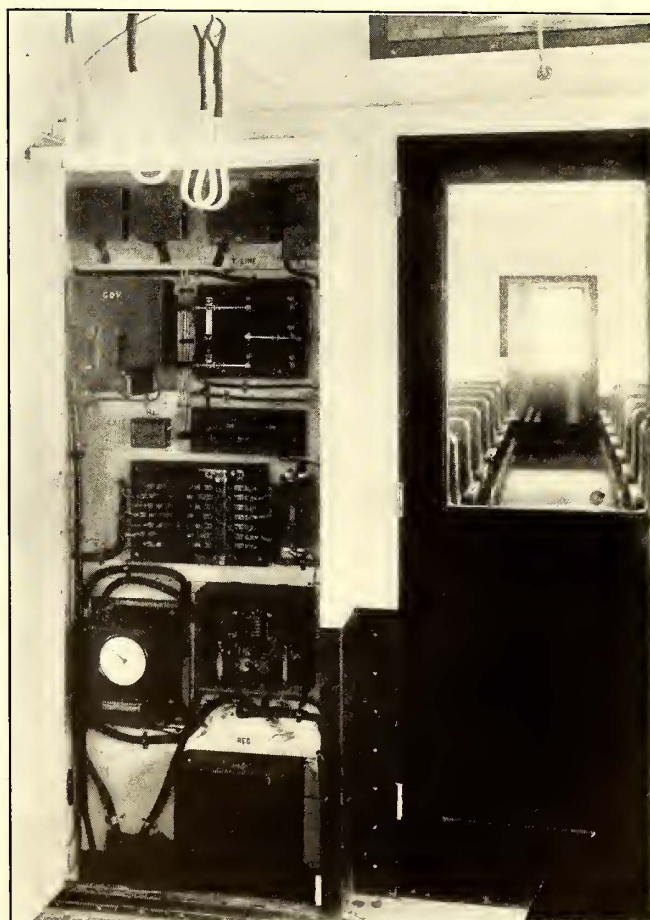
INTERIOR CONSTRUCTION

A transverse steel partition divides the body of the car into a passenger compartment, 31 ft. 5 1/2 in. long, arranged to seat forty-two persons, and a baggage compartment, 14 ft. 4 in. long, with longitudinal slat folding seats to seat fourteen persons, thus giving a total seating capacity of fifty-six.

The interior of the passenger compartment presents a light and pleasing appearance, with its enameled steel and Agasote finish, together with the glazed, ornamental prism glass of the upper window sashes, each of which



WILKES-BARRE & HAZLETON CAR—VIEW OF TRUCK SHOWING THIRD-RAIL CONTACT SHOE AND BEAM



WILKES-BARRE & HAZLETON CAR—SWITCHBOARD CABINET IN BAGGAGE COMPARTMENT

extends in Pullman style over two lower sashes. In this compartment there are nineteen Hale & Kilburn reversible cross-seats, upholstered in Pantasote material, nine on one side and ten on the other, separated by a 25-in. aisle. A longitudinal seat is placed at each side of the vestibule end. The flooring of the passenger compartment is composed of a 3/4-in. layer of compressed cork on No. 12 sheet steel, over which is cemented a sheet of linoleum of green and white block pattern.

This compartment is equipped with a saloon adjacent to the baggage-room partition. An alcove containing a double-walled portable cooler is formed in the wall of the saloon. Sanitary drinking cups are supplied from a drinking cup machine attached to the outside of the saloon wall. Window curtains are made of Fabrikoid material and are equipped with Curtain Supply Company's Ring No. 88 fixtures and Rex all-metal rollers. At each pier post and each intermediate post there is a single-prong, nickel-plated coat hook.

The baggage compartment is provided with hardwood slat seats on each side. These are hinged so as to fold up, and are fitted with a substantial slide bolt to hold them in a raised position. The seats are so hinged that supporting tripod legs are not required, leaving a clear floor space for baggage. The baggage compartment is equipped with twenty hand straps covered with Rico sanitary strap covers. The hand straps are hung from a steel tubing supported by substantial brackets of brass, nickel-plated. Above the compartment partition door, in a glass-encased cabinet, is located an emergency tool outfit.

Hooks for eight mail bags and a support for one portable telephone pole to be used with a Western Electric telephone outfit are attached to the side wall of the baggage compartment. The circuit breaker, governor, switches, watt-meter, heater switch, air and light switches and fuses and other switchboard equipment are located in a cabinet placed against the partition. Vending machines are also installed in the baggage compartment.

Access to the vestibule at each end of the car is by three steps, equipped with Stanwood automobile-type treads. An O. M. Edwards trapdoor covers the step opening when the vestibule is closed. Two porter's hand-step boxes are supplied for each car. Each platform is equipped with Lindstrom emergency brakes. The front of each vestibule has a train door in the center and a stationary window on each side. Entrance to the motorman's cab, which is on the right-hand side of the platform, is by means of a single sliding door with a 20-in. opening.

A Dayton window cleaner is installed on the front window of the cab. Other equipment installed in the cab includes the master controller for the GE Type M multiple-unit control, the control apparatus for the GE straight and automatic air brakes, a conductor's signal valve and whistle, and Electric Service Supplies Company's 12-in. alarm gong operated by air pressure, and a Lord differential, staffless handbrake. Wyoming air sanders are installed under the motorman's seat. Vestibule buffers are protected with Hedley anti-climbers. Below the platform are supplied Tomlinson M.C.B. radial couplers for train operation and metal pilots. Coupler safety chains are also provided for connection between cars.

Control wires and cables are installed in Sherraduct conduit. The heating system is furnished by the Peter Smith Heater Company. The electric heaters are controlled by Railway Utility Company's thermostat set. The lighting arrangement includes seven lamps in the passenger compartment, one lamp in the baggage compartment, and two lamps in the vestibule. Semi-indirect

lighting is obtained. Shade holders and trimmings are of aluminum alloy. Each car is equipped with a Pyrene fire extinguisher.

The exterior of the car is painted black with gold striping. Each car has an individual name and number. The roof is of the plain arched type, and consists of U-shaped carlines of pressed steel, covered with 3/8-in. Agasote. The Agasote roofing has one coat of metallic paint and is covered with No. 8 cotton duck. Ventilation is supplied through six Railway Utility "Honeycomb" ventilators on each side of the roof. General Electric Form J-28 headlights are recessed in a hood at each end of the roof, and covered with sheet-steel housing. Trolley bases are of the US-13-D type.

The car bodies are mounted on Brill 27 M.C.B. 3-X trucks, equipped with four GE-254-A interpole ventilated motors, 160 hp., each inside hung. The trucks have third-rail contact shoes and shoe beams. Wheels are Midvale rolled steel. Side bearings are of cast steel integral with the bolster, and arranged to accommodate the Stucki side bearings. Trucks are provided with clasp brakes, two brakeshoes on each wheel. Smith-Ward slack adjusters are installed.

Safety-First Clock for Boston Subway

At the suggestion of James Smith, superintendent of Division 8, Boston (Mass.) Elevated Railway, the "safety" clock illustrated in the accompanying half-tone has been placed in the Copley Square Station of the Boylston Street subway. The clock has two 24-in. dials and is equipped with five 10-watt, 120-volt tungsten lamps installed in the casing, which is located about 9 ft. above the platform and in full view of all passengers using the west-bound side of the station. As "Safety First" ran one letter short of the requisite dozen, the hour points were marked to read "Safety Always."



ILLUMINATED "SAFETY" CLOCK, COPLEY STATION, BOSTON

Saving Power with Watt-Hour Meters

A Description of the Methods Employed to Effect Reduction in Power Consumption and the Results Obtained by the Tri-City Railway Company, Davenport, Iowa

By F. V. SKELLEY

Assistant Superintendent Tri-City Railway Company, Davenport, Iowa

THE cost of power is one of the largest items included under operating expense and, since it is of such importance, some means should be employed to keep a proper check on the power input for each car. With this idea in mind the management of the Tri-City Railway Company had Sangamo watt-hour meters installed on eighty-eight of its regular cars. The management believed that the average motorman did not realize that he was using more power than necessary and it decided to bring the facts to his attention by comparing his record with those of other efficient motormen who were working under practically the same conditions.

The work of installing meters was started in March, 1915, and by May 15 all cars were equipped and ready for taking energy consumption records. All of these cars are of the double-truck, pay-as-you-enter type and the average car weight is 21 tons. The meters were placed on the vestibule side of the bulkheads of all but ten cars. These did not have bulkheads and the meters were placed on the arch at the end of the monitor roof. The two installations are shown in two of the accompanying illustrations. Cars that had two trolleys required about 40 ft. of No. 0 wire, and the cost of the installation was about \$6.50 per car. All meters were connected in such a way that the power for lights, heaters and compressors was not recorded. This placed the entire responsibility on the motorman for the energy consumed as indicated by the meter.

METHOD OF KEEPING RECORDS

A special blank form, such as the one shown in the accompanying illustration, is supplied each motorman. On this he records his name, car number, run number, the time and the meter reading at the beginning and end of his run. Motormen are also required to give the miles operated by each car used, and to aid them in computing this, the mileage for each run is posted at the carhouse. When the car is turned in at night a barnman records a check reading of the meter on the dial form, which is shown in one of the cuts on the next page. These records and those of the motormen are sent in

each day, and they give the meter department a continuous record of power consumed and miles operated by each car and motorman.

At the end of every fifteen-day period all records are checked to see that the meter readings are correct and that there are no omissions. Following this the reports for each motorman are collected, and his total miles and kilowatt-hours added for the period. Since the power input of cars working under similar conditions is compared, it is necessary to group the motormen in divisions. After this is done the average kilowatt-hours

Form 1066 Order 50621

TRI-CITY RAILWAY COMPANY
KILOWATT HOUR METER RECORD

Line Date Car No.

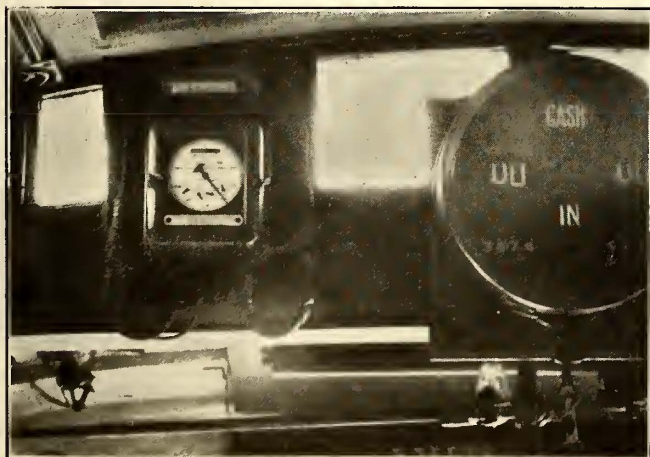
Conductor Motorman

RUN NO.	TIME START	TIME END	LARGE DIAL READING			MILES
			START	END	DIFF.	

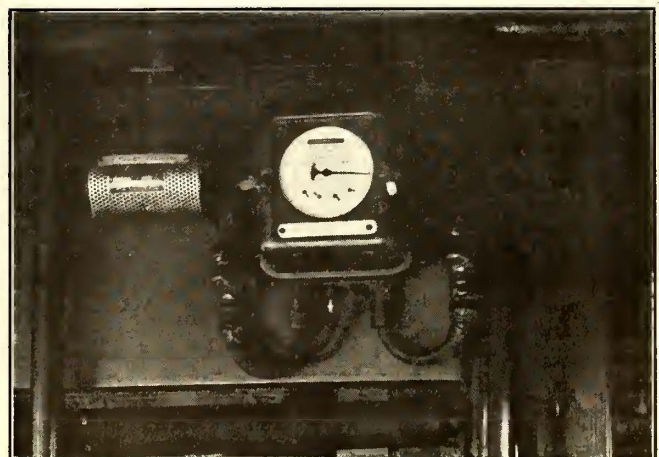
TRI-CITY POWER SAVINGS—MOTORMAN'S DAILY RECORD SLIP

per car-mile for that division is determined. The mileage for each motorman is then multiplied by the average kilowatt-hours per car-mile, and a constant determined, which is called "K" on the record sheet. This constant is the total kilowatt-hours the man would have used if he had been of average ability. The ratio of "K" to total kilowatt-hours consumed gives the motorman's standing.

Records of the standing of all motormen are posted at the carhouse on the first and fifteenth of each month. This is frequent enough to hold the interest of the men, and at the same time it gives average kilowatt-hour per car-mile figures for different kinds of weather and traffic conditions. Frequently these reports are supple-

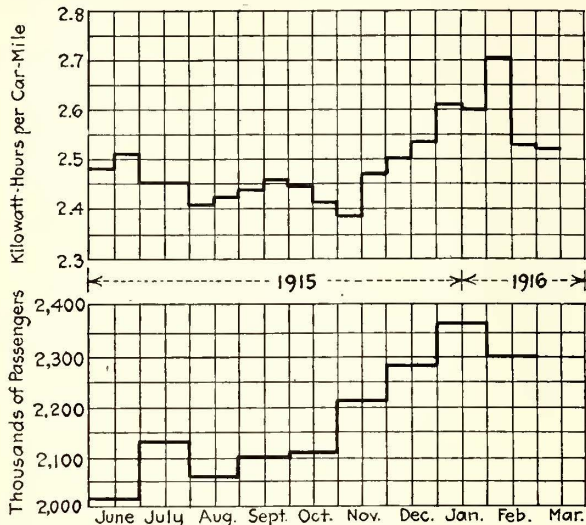


TRI-CITY POWER SAVINGS—METHOD OF MOUNTING METER WITH EXTERNAL RESISTANCE IN END OF MONITOR DECK



TRI-CITY POWER SAVINGS—METHOD OF MOUNTING METER WITH EXTERNAL RESISTANCE ON BULKHEAD

mented by including the number of passengers hauled per car-mile for each man, or the number of stops made per mile by his car. This adds interest to the report and supplies the office with valuable information. The accompanying table is typical of one of these bi-monthly records. The chart below shows the energy input at the car and the number of passengers carried each month from June, 1915, to March, 1916.

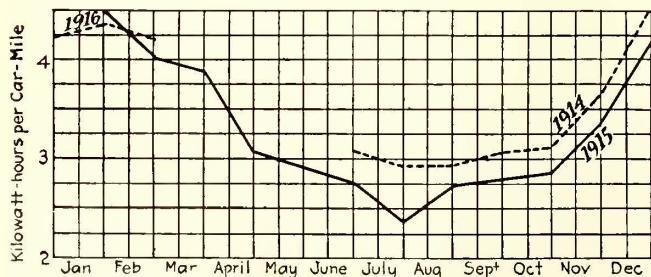


TRI-CITY POWER SAVINGS—GRAPHIC RECORD OF ENERGY INPUT AT CAR AND OF PASSENGERS CARRIED

No special method was adopted in coaching the motormen how to save power. Bulletins were posted at the end of each fifteen-day period, instructing the men in the proper use of the controller and the air brakes, and advising them when to coast. After the meters had been in service for several months the men with low standings were singled out and encouraged to do better. This produced very satisfactory results in saving power without incurring any great expense.

RESULTS OBTAINED

The decrease in energy consumption taken from the substation record of energy supplied to the d.c. busbar, shows that for the year 1914 it was 3.5 kw.-hr. per car-mile, and for 1915 it was 3.34 kw.-hr. per car-mile, or a decrease of 0.16 kw.-hr. The total revenue car-miles for the year 1915 was 4,716,501, making a total decrease



TRI-CITY POWER SAVINGS—ENERGY CONSUMPTION PER CAR-MILE MEASURED AT SUBSTATION BUS FOR 1914 AND 1915

in energy consumption of 754,640 kw.-hr., valued at \$10,187, which represents a saving of 4½ per cent. The meters were not in use until June 1, 1915, so that the actual period of saving was confined to the last seven months of the year. All of this saving could not, however, be credited entirely to the use of meters on the cars because there was also a decrease in the total number of passengers hauled, which had some effect on power consumed. This record of savings for the seven

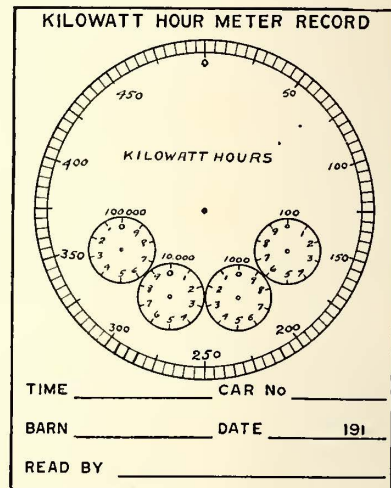
TRI-CITY RAILWAY COMPANY MOTORMEN'S CAR METER RECORDS. FEB. 16 TO 29, 1916 Bridge Line

Name	Total Miles	Total Kw.-Hr.	Kw.-Hr. per Car-Mile	K	Total Passengers	Passengers per Car-Mile	Kw.-Hr. per Passenger	Standing
B. Geertz...	928	2,105	2,268	2,432	12,444	13	0.169	1.155
Hoffman ...	531	1,280	2,410	1,391	9,308	17	0.137	1.086
Guenther ...	1,036	2,520	2,432	2,715	11,852	11	0.212	1.077
Schroeder ..	228	585	2,565	597	2,964	13	0.197	1.020
Boxwell ...	817	2,150	2,631	2,141	12,335	15	0.174	0.995
MacMillan ..	924	2,440	2,748	2,421	10,689	11	0.228	0.992
Padeskie ...	1,001	2,650	2,647	2,623	12,718	12	0.208	0.989
Sarsgard ...	1,000	2,723	2,725	2,621	10,839	11	0.251	0.960
Carstens ...	841	2,295	2,728	2,204	11,154	13	0.205	0.960
Geris ...	1,077	3,000	2,785	2,822	11,380	10.5	0.263	0.940
Dicks ...	1,002	2,845	2,839	2,626	12,333	12	0.230	0.923
Average kilowatt-hours per car-mile.....								2.621

months in 1915 as compared with the same period in 1914 is shown in one of the accompanying charts.

There also has been a remarkable improvement in the adjustment of brake tension at the carhouse during the period the meters have been in use. At the present time when a car leaves the carhouse with improper brake tension, the motorman immediately reports the defect, because if the brakes are tight they increase the power consumption and reduce correspondingly the standing of the motorman. In 1911 this company used an average of 23.95 lb. of brakeshoes per 1000 car-miles, and in 1915 this was reduced to 22.53 lb., which represented a saving of 5¾ per cent.

In one class of service six cars were operating on a line under practically the same conditions, five cars were equipped with modern interpole motors and the sixth car was equipped with less efficient motors of non-interpole type. In order to determine the efficiency of these motors the motormen were interchanged several times and their average energy consumption for each class of motor determined. In this way and by the use of meters it was found that the old motors were 11.7 per cent less efficient than the more modern ones and that the company was losing more than \$200 a year per car by continuing them in use.



TRI-CITY POWER SAVINGS—CARHOUSE-MAN'S DAILY RECORD SLIP

Some very interesting and valuable information was also obtained from the meter records in determining the schedule speed best suited to one particular line. Five cars were operated on a fifteen-minute headway and at a schedule speed of 10.7 m.p.h. The average energy consumption was 2.47 kw.-hr. per car-mile. The service was not satisfactory and it was decided to add one more car and reduce the schedule speed to 8.9 m.p.h. As a result the energy consumption was reduced from 2.47 kw.-hr. per car-mile to 1.93 kw.-hr. The increased platform expense amounted to \$160 per month, but the reduction in total power purchased amounted to \$258, thus making a net saving of \$98 per month. This result was not anticipated, but it shows plainly the necessity of having a check on power consumption when considering a change of schedule speeds.

At the present time the cost of operating the meter department is about \$60 per month. This amounts to

approximately 1 cent per day per motorman, and includes the salary of a clerk and the cost of stationery. Meter failures have added but little to this expense. One has been grounded by lightning, one by water and six were removed to be tested. In connection with the last cause for removal this company has found it advisable to test the meters occasionally to determine the accuracy of the results, because this is very necessary if the interest of the motormen is to be maintained. In keeping these records it has been found that for speed and accuracy the Monroe calculating machine is best adapted for the work.

Electrification of Freight Yards in New York

Plans for West Side Improvement of New York Central Railroad Call for Extensive Reconstruction and the Electrification of All Tracks on West Side of City

DETAILED plans for the West Side Improvement in New York City have been filed by the New York Central Railroad in anticipation of a public hearing to be held on Monday, May 1, the main features of the project, which covers the railroad's 12-mile freight entrance to the city, involving extensive relocation, track elevation, extra trackage, reconstruction of yards, the covering of tracks through several miles of parks, and the electrification of the entire line. The plans, which were outlined in a preliminary account published in the *ELECTRIC RAILWAY JOURNAL* for Jan. 22, 1916, call for an expenditure of approximately \$50,000,000, only part of which is involved by the electrification.

However, as shown by the accompanying general plan of the proposed changes, the project will constitute an electrification of great magnitude and special interest because of the large scale of the freight switching oper-

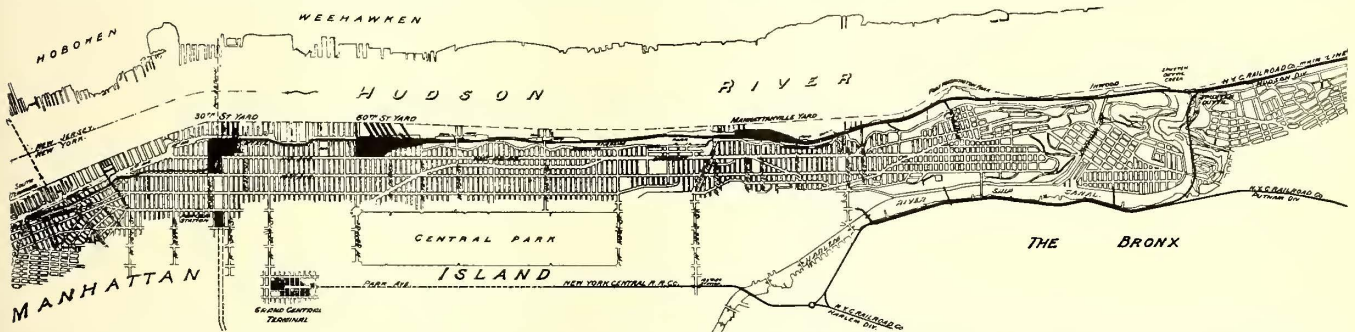
numerous accidents, mainly to persons stealing rides on the trains, and the agitation to remove the tracks from the streets has really been the foundation of the entire improvement. At the present time the whole line is operated by steam.

As compared with the foregoing conditions, when the project is completed, there will be a four-track electrified line for the entire distance. Along the present city parks and a new park that is to be created at the north end of Manhattan Island, the tracks will be covered, and much of the waterfront will be released to the city. The grade crossings will be eliminated, and the tracks will be removed from the streets south of the Sixtieth Street yard, being replaced by an elevated system on Twelfth Avenue from Sixtieth to Thirtieth Street, and on private right-of-way south of the latter point. The yard and local freight facilities will be much improved.

RECONSTRUCTION OF FACILITIES

The reconstruction will begin about 1 mile north of Spuyten Duyvil, where the existing freight tracks will be led up on an elevated structure so that there will be no crossing at grade with the existing tracks where they turn to the east. This elevated structure will connect with a four-track swing bridge, beyond which the tracks will be laid in a cut-and-cover tunnel under the high sections of the island and on elevated structures elsewhere, so that grade crossings will be eliminated. A new yard will be established between 133rd Street and 153rd Street, this providing storage and switching tracks for 700 cars, and below this point six main tracks will be provided. Along Riverside Park the tracks will be completely covered so that the city property may be made available to the water's edge.

At Sixtieth Street the large yard now in existence will be remodeled so that it can be made to accommodate eighty-car trains in halves, new tracks occupying the site of the present engine terminal which will be ren-



WEST SIDE IMPROVEMENT PLANS—MAP SHOWING LOCATION OF PROPOSED FREIGHT TRACKS AND YARDS TO BE ELECTRIFIED BY NEW YORK CENTRAL RAILROAD

ations that will be involved. Only 12 route-miles are included in the plan, but within this distance there are no less than four important yards whose facilities are to be materially elaborated.

At the present time, the railroad company's freight line along the west side of the city leaves the main line at Spuyten Duyvil, where this line turns away from the Hudson River. It crosses Spuyten Duyvil Creek on a low swing-drawbridge, and from this point south to Sixtieth Street it is in the open on the water's edge for most of the distance, crossing at grade two busy thoroughfares that lead to ferries. It runs along the full length of the foot of the slope of Riverside Park, between the park and the river, and complaints of smoke and offensive odors from cattle trains have been rife. From Sixtieth Street south where the line occupies city streets, operation is restricted to low speed with special boxed-in locomotives. In spite of this, there have been

dered unnecessary by the electrification. Further south the present Thirtieth Street yard will also be reconstructed to form a double-decked terminal with warehouses and driveways systematically arranged on both levels and with connections between the two. This structure will occupy eleven city blocks. From this point south there will be only two main tracks which will reach a new terminal bounded by Canal, West, Houston and Washington Streets, the tracks in this section being elevated and on private right-of-way, alignment being sacrificed to bring the road on the cheapest land.

The plans for the improvement have been developed through the collaboration of the engineering department of the New York Central Railroad, and a board of consulting engineers acting for the port and terminal committee of the City's Board of Estimate and Apportionment, consisting of Ernest P. Goodrich, C. W.

Stanford and John F. Sullivan. For the railroad company, G. A. Harwood, chief engineer of electric zone improvements, has been in general charge of all matters pertaining to the permanent construction, the electrical equipment being in charge of E. B. Katté, chief engineer of electric traction.

ELECTRICAL EQUIPMENT

An interview with Mr. Katté in regard to the plans for the electrical equipment that will be used within the newly electrified district brings out the fact that the locomotives that will have to be provided for the electrification will handle two classes of service, namely, road-freight and switching. The former includes the through-freight trains hauled between the yards on Manhattan Island and the steam locomotive terminal at Croton, which constitutes the northern end of the present electric zone. The switching service will cover operation in the various yards, and also most of the local freight work that involves setting out and picking up cars at the towns along the electrified route. At the present time the details for the design of the electric locomotives for these purposes have not been definitely determined, nor has it been decided how many of each type of locomotive will be needed in the different classes of service. However, present indications lead to the belief that approximately seventy-five locomotives will be required for all of the operations involved in both switching and road work.

Under present conditions of operation trains up to seventy cars in length and reaching 3000 tons weight are handled on the West Side tracks. However, most of the trains are 1500 tons or less in weight. Much of the freight traffic is handled at a relatively high speed, not only because the freight is largely of a perishable character, such as foodstuffs, but also because the dense passenger traffic requires the freight trains to keep out of the way of frequent fast movements. These conditions impose rather unusual requirements for the electric locomotives that are to be used. In addition, the runs in all cases will be short, even for the road locomotives, which will operate only between New York and Croton, a distance of 34 miles.

All of the electrical equipment for the locomotives will be insulated for 1200-volt operation, according to the practice adopted by the New York Central Railroad in connection with its last purchase of electric passenger locomotives. This provision has been made on account of the possibility of extending the electric zone farther northward. Pending such extension, the voltage to be used in the new electrified district will be either 1200 or 600 volts, a definite selection not yet having been made. In the event of adopting 1200 volts for the working conductor on the West Side tracks, the voltage on the existing electrified tracks would not be changed, because the new freight locomotives would be designed to operate either on 1200 volts or 600 volts.

Power for the new electrified district will be supplied from three new substations, all of which will be installed on the route covered by the proposed electrification and generally near the large yards. A new 20,000-kw. turbo-generator also will be installed at the railroad company's Yonkers power station, which supplies the northern end of the present electric zone, the southern end being supplied by a station at Port Morris. An interesting fact that appears in connection with this new unit is that although its capacity is 20,000 kw. it will be installed in a space that was originally provided for a future 5000-kw. unit, the saving in space being affected by the extraordinary advances in the state of the art that have been effected within the last decade.

Suggested Regulatory Changes

Committee Appointed by Philadelphia Trade Bodies Makes Preliminary Report on Reasonable Regulation of Railroads

FEDERAL incorporation of interstate transportation companies, the subjection of such companies to federal regulation only, and the reorganization of the Interstate Commerce Commission constitute the main changes suggested by a committee of Philadelphia business men for the improvement of railroad regulation. On March 15, 1915, representatives of ten of the leading trade bodies of Philadelphia met in conference, and a month later a joint committee was organized and a sub-committee appointed to study the question of regulation. The sub-committee communicated with the leading commercial organizations of the country and formulated a report which was recently adopted by the joint committee.

The report does not do more than suggest possible solutions of the regulatory question, and leaves the matter open for further consideration. Among such possibilities are the granting of federal charters to such railroads as might elect to incorporate under the provisions of a federal railroad act, with or without the right to retain certain privileges contained in some of the State's charters, legislation by Congress designed to vest the federal commission with exclusive control of rates whether interstate or intrastate, and to limit carefully the State control over administrative and operative points to matters of purely local concern, and legislation by Congress amplifying the powers of the federal commission so as to intrust to that body all questions whatever, whether of rates or of administration and operation. In order that the federal commission might to better advantage handle the work thrust upon it, it is suggested that one practical method of meeting such a condition would be to create a new body dealing with the administrative matters and working in conjunction with the present commission, which would deal exclusively with rate matters. The country could be divided into districts, and in each district a branch of the commission could be established to deal with local matters, there being an appellate body in Washington to determine questions of fundamental principle and to harmonize the actions of the district tribunals.

The sub-committee concludes that governmental regulation means the assumption by the government of responsibility for the success or failure of railroads, for attempts at regulation which fail in the appreciation of the true afflicted, in constructive method or in technique, may result in the complete disorganization of the lines. Furthermore, regulation cannot be conceived from the narrow point of view of merely reducing rates, for that point of view loses sight of essential needs, both of the railroads and the country at large, and thus naturally defeats its own ends. A proper view of governmental regulation must take into account the encouragement of railroad building and operation, the better mobilization of present facilities and the modification of harmful competition, as well as the prevention of inequalities of service to the public and the enactment of rates greater than those properly chargeable in an open competitive field.

The publicity department of the Illinois Traction System, Peoria, Ill., announces that in order to provide for the proper laundering of the linen head rests used on car-seat backs and other linens used in the company's sleeper and parlor car service, the company will erect its own laundry at Springfield, Ill.

Newark \$6,000,000 Terminal Project an Accomplished Fact

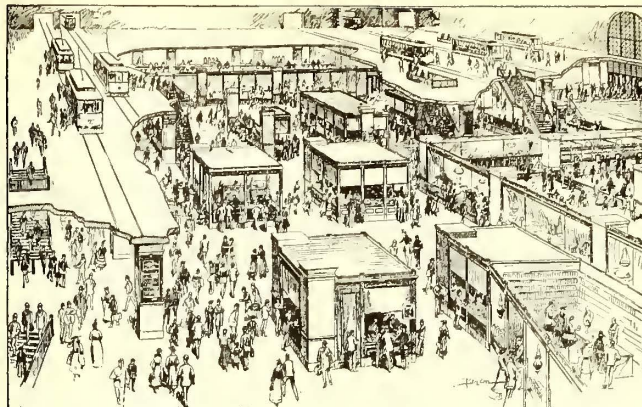
Rerouting of Cars of Public Service Corporation, Made Possible by This New Terminal, Will Eliminate Congestion in Newark's Busiest Centers

EXTENSIVE rerouting plans are being carried out to-day as a result of the completion of the new Public Service Terminal Building in Newark, N. J. Progress on this terminal has been chronicled from time to time in the *ELECTRIC RAILWAY JOURNAL*,* so that the readers are familiar with the details of this great project. In a later issue the history will be reviewed and details of the routing and signal system will be given. The accompanying illustrations show the present appearance of the building and general layout of the ground and elevated floors. The subway floor is not shown in the line drawing.

The terminal building is located less than 1000 ft. from the corner of Broad and Market Streets, one of the most congested two points in the city. It is in the heart of the business district facing on Park Place and within easy walking distance of the Hudson & Manhattan Railroad Terminal. Electric cars enter the terminal from the east over an elevated structure and from the west through a subway. The ground floor, or concourse, is free from tracks and contains the showrooms of the Public Service Gas Company and Public Service Electric Company, checking booth, newsstands, etc.

Above the elevated train floor are six office floors for the use of the Public Service Corporation and of the subsidiary companies which comprise it. Each office floor has an area of 30,000 ft. These floors are of a rather irregular form, due in part to the shape of the plot of ground, which is completely covered by the ground floor, and partly by the desire to secure perfect lighting of the rooms.

*The following references cover in detail the history of the terminal project: *ELECTRIC RAILWAY JOURNAL*, Vol. 41, 1913, Feb. 1, page 223; Feb. 8, page 246; April 26, page 77; May 17, page 904; June 28, page 1173; Vol. 42, 1913, July 26, page 127; Nov. 1, page 992; Vol. 43, March 28, 1914, page 740; Vol. 44, 1914, July 25, page 180; Sept. 5, page 454; Nov. 28, page 1190; Vol. 45, April 24, 1915, page 793; Vol. 46, July 24, 1915, page 151.



PUBLIC SERVICE TERMINAL, NEWARK, N. J.—SECTIONAL VIEW OF CONCOURSE AND ELEVATED TRAIN FLOOR

In considering this terminal and the rerouting of which it forms a part, the peculiar situation of Newark with respect to the surrounding towns must be kept in mind. All of this part of New Jersey is almost continuously built up. Thus while the population of the city itself is but about 400,000, there is a surrounding population sufficient to give a total greater than that of Cleveland, if an equal area was covered within the city limits. These surrounding cities are connected with the new terminal by ten lines. It is to accommodate the traffic to and from these outlying points and to prevent interference between it and the local traffic that the terminal undertaking has been carried out.

Statistics of the Imperial Russian Technical Society show the available water power in European Russia, including Finland, the Urals and Caucasia, to be, roughly, 30,000,000 hp. The potential water power of Germany is about 1,000,000 hp., that of Switzerland 2,500,000 hp., and that of Sweden more than 6,000,000 hp. Of the latter, about 3,500,000 hp. is not yet utilized. In Switzerland 300,000 hp. and in Italy more than 400,000 hp. are utilized, whereas hardly 250,000 hp. is utilized in Russia.



PUBLIC SERVICE TERMINAL, NEWARK, N. J.—PARK PLACE ELEVATION—SHOWING ENTRANCES TO CONCOURSE AND OFFICE BUILDING

Car Design Discussed in Boston

Massachusetts Commission Conducts Hearing at Which Best Car Types for Various Classes of Service Are Considered

A CONFERENCE on car design from the transportation point of view was held by the Massachusetts Public Service Commission at its offices in Boston on April 20. Representatives of all the larger electric railways of the State were present. The conference was called by the board in connection with a petition of the Massachusetts Northeastern Street Railway for approval of plans for twelve new semi-convertible cars resembling in general features the latest type of semi-convertible car designed by E. W. Holst, superintendent of equipment, for the Bay State Street Railway. D. A. Belden, president of the Massachusetts Northeastern, said that the cars desired are planned to meet the average needs of service on the suburban and interurban lines of his system. The seating capacity proposed is forty-four, there being twelve cross and four longitudinal seats. The weight of the car would be about 42,000 lb., and it would be equipped with four motors of about 40-hp. rating each.

Mr. Belden said that instead of passengers entering and leaving by the rear door as at present, the new cars will provide for entrance at the rear and egress from the front door. The cars can be readily adapted to prepayment service. The platform length, 6 ft. 6 in., is somewhat longer than that on the Bay State cars. Straps covered with "Aero" metal are to be used over the longitudinal seats and handles will be provided on the corners of the cross-seats. Mr. Belden said that it is a decided advantage for the conductor's station to be the rear vestibule in case of losing the trolley from the wire during high-speed operation. The estimated cost of these new cars is about \$7,000, complete, and it is planned to operate them between Haverhill and Lawrence, Mass., and also between Haverhill, Amesbury and Newburyport, Mass. It is expected that these cars will furnish satisfactory service in handling the through traffic to and from the shore resorts in northeastern Massachusetts and southern New Hampshire.

ONE-MAN CARS DISCUSSED

Ralph S. Bauer, chairman of the Lynn (Mass.) Chamber of Commerce, then addressed the commission upon the advantages of one-man car service in communities of all but metropolitan class. He contended that every modern street car should be equipped with a fare box, saying that an increase in receipts of 15 per cent may be expected to follow such an installation. Mr. Bauer estimated that if fare boxes should be installed on the entire Bay State system, the receipts of the company would be increased by \$2,000 a day. He urged the commission to require the adoption of the one-man car in cases where it is applicable and cited observations of its utility gathered in a recent trip to Spokane, Wash., Topeka, Kan., Duluth, Minn., Quincy, Ill., Detroit, Mich., Toronto, Ont., and Cleveland, Ohio.

A. Stuart Pratt of the Stone & Webster Management Association, Boston, told the commission about the Birney one-man car, recently described in this journal. The speaker regretted Mr. Birney's enforced absence in the West at the time of the hearing but pointed out that while most traction men looked rather askance at the light-weight, one-man car until recently, it is believed that the anticipated difficulties with it have now been solved. The element of danger resulting from the employment of but a single person on a rolling stock unit is overcome by the automatic facilities by

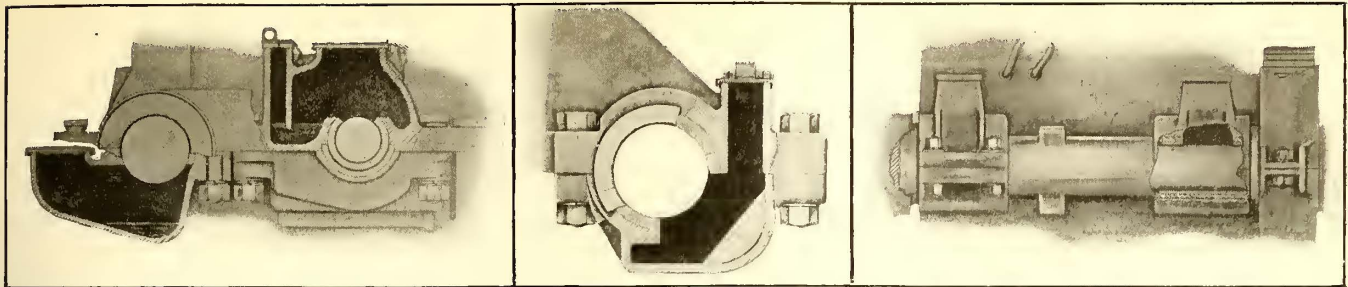
which, in case the motorman should fall unconscious at his post, the controller handle will cut off power, the brakes will be applied, sand discharged upon the rails, the doors opened and the steps lowered. Mr. Pratt said that too many cars weighing from 40,000 to 50,000 lb. are being hauled about in non-rush hours at present, often carrying but from seven to twenty passengers. The single-truck car, he stated, is not well adapted to interurban service. Answering an inquiry relative to the adaptability of one-man cars on the Blue Hill Street Railway, Mr. Pratt said that this line serves a suburban and rural area south of Boston and that it has no business of a strictly interurban character. Its peak loads occur on Sundays and holidays in the summer, when a heavy traffic is handled to and from the Blue Hill Reservation and other outdoor points. The company could not handle its traffic with one-man cars. It now has nineteen cars and its normal schedule weekdays calls for but five. To handle the peak traffic extra men are employed from local factories.

H. B. Potter, assistant to the vice-president Boston Elevated Railway, said that very little opportunity exists for the use of one-man cars on the Boston system, which has few lines not characterized by heavy peak loads. Possibly on a very few lines it could be tried out with some promise of success, but the particular problem of the Boston company seems to be better solved through the use of heavy equipment adequately powered to haul trailers in the rush hours. The center-door trailer used in the prepayment area is giving remarkably good service at Boston. Comparatively few single-truck cars are now used in Boston.

In a discussion on ventilation which then followed, John Lindall, superintendent of rolling stock and shops Boston Elevated Railway, said that preliminary experiments with forced ventilation under the seats had not worked out very satisfactorily at Boston, the present service being largely accomplished by the use of monitor sashes and Perry ventilators. Frank A. Barbey, Boston, discussed the advantages of deck ventilation. In passing, Mr. Lindall remarked that the Boston company has been making studies for a center-entrance motor car suitable for train operation.

Bentley W. Warren, counsel for the Massachusetts Street Railway Association, Boston, stated that street railways have no escape from the necessity of reducing expenses or increasing their income. More "net" is absolutely essential. In this connection, the one-man car is a very important subject for consideration, especially on lines not having a rush-hour traffic. The use of one-man cars on branch and side lines would enable companies to put on more cars and utilize men on the lines of heavy traffic to better advantage. It is a question of redistributing labor rather than of getting along with less men. Some of these cars are now being operated in places as large as any in Massachusetts, except Boston, and the percentage of accidents appears to have actually diminished. The hearing closed with a statement by Mr. Bauer to the effect that in four States where one-man cars had been put on, the opposition of labor was soon overcome when it was found that such equipment shortened the feasible headway, creating more business and leading to the employment of more men.

In thanking the various officials of the electric railways present for attending the conference, Chairman McLeod requested that the commission be kept informed in future as to all contemplated developments of significance in rolling stock design, as the board is desirous of maintaining the most up-to-date possible knowledge of the subject.



TYPE OF AXLE BEARING PERMITTING WASTE TO FALL AWAY FROM AXLE; AXLE BEARING WITH WOOD BLOCKS TO PREVENT WASTE FROM FALLING AWAY FROM AXLE; CAST-IRON SLEEVE CONTAINING AXLE BEARINGS

Progress in Car Equipment Lubrication*

The Gist of the Author's Contention is That "High Maintenance Costs and High Lubrication Costs Go Hand-in-Hand"

By ALFRED GREEN

Mechanical Expert Galena Signal Oil Company, New York

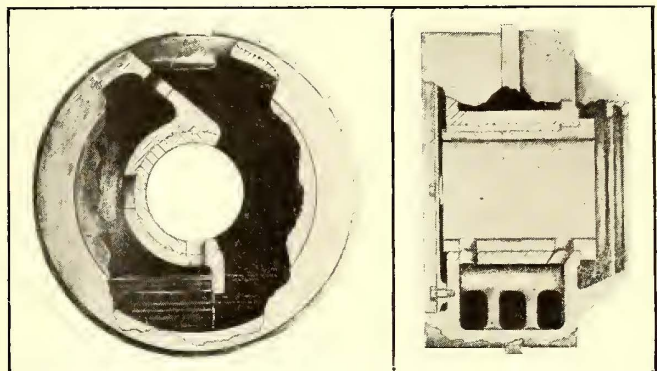
TO insure reliable and economical maintenance, the item of proper lubrication is always important, for no matter how mechanically correct a rapidly-moving part of an equipment may be in design, it will ultimately be doomed to failure if the supply of lubricant for that part cannot be relied upon. The matter of providing proper lubrication has been allowed to drift more or less, having been considered of secondary importance. Concerted action has not been required of those who should be vitally interested in eliminating direct or indirect failures due to lack of proper lubrication.

OLD MOTORS CAN BE ADAPTED TO MODERN LUBRICATION

The original double-reduction motors were equipped with compression cups, as grease was considered the most reliable lubricant. The compression cups gave no end of trouble due to loss or breakage, and eventually a grease receptacle was incorporated directly over the bearing lining as part of the frame casting. As grease required the bearing to heat up before it could be melted and lubricate, the results obtained were very unsatisfactory. Motor designers then constructed the lower part of the motor frame under the bearing so that it formed an oil well, in which were placed pieces of felt secured to springs to keep them pressed against the shaft. Oil was supposed to be fed by capillary attraction while the upper grease chamber fed grease.

Under such conditions the grease soon clogged the self-feeder and retarded or cut off the flow of oil so that the lubrication was not much improved.

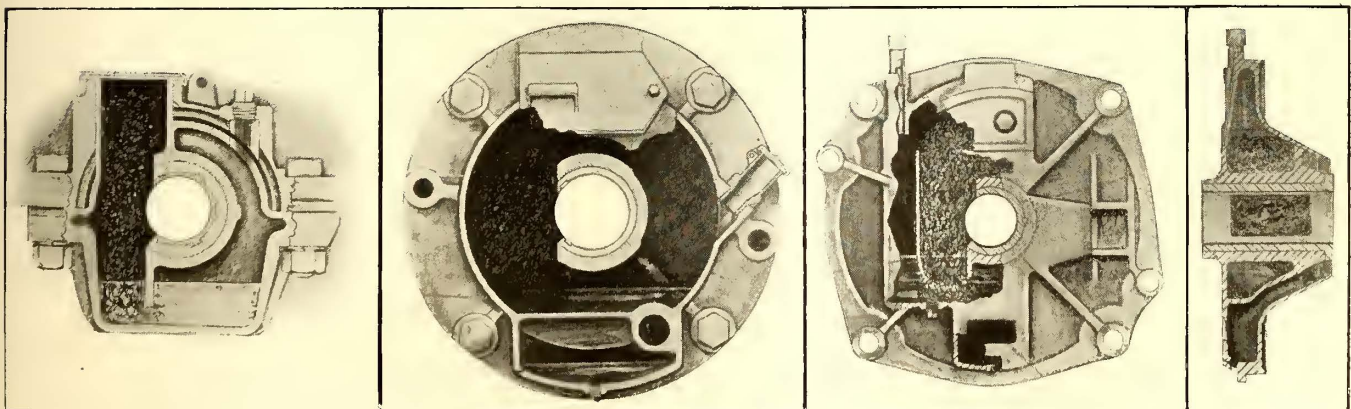
Adaptation of grease-lubricated motors to oil lubrication was first taken up by the electric street railway master mechanics at their convention in 1903, after which a number of roads concluded to adopt oil as the



EXPERIMENTAL ARMATURE HOUSING FOR RE-USE OF OIL

lubricant for their motor equipment. There was no co-operation in the development of an oil cup which would fill all requirements. The result was that a large number of cups were designed and patented, the majority of these being found worthless as far as reliability and economy were concerned.

As many old-type motors are still in service, it is a



MODERN PLANS FOR MOTOR LUBRICATION USING CAPILLARY TYPE FEED DESIGNED TO INSURE AN AMPLE SUPPLY OF CLEAN OIL

*Abstract of a paper presented before the Connecticut Company Section of the American Electric Railway Association on April 4, 1916. See also an article on this subject by Mr. Green in the issue for Feb. 7, 1914. The present paper is to be published complete for general distribution by the Galena Signal Oil Company.

question to some railways whether it is worth while to equip such motors with devices to insure reliable lubrication, because it is possible that the equipment may be discarded within a few years. Some have tried different methods with more or less satisfactory results. Still other roads, realizing that the motors are still good for a few years' service and perhaps more if they can be improved, have decided that it is worth while not only to study conditions and redesign the lubricating facilities, but to provide schedules of lubrication and to put the

The object of this is to keep the oil out of the insulated parts of the electrical equipment, and to prevent surplus or used oil from flowing into the gear case and causing the lubricant there to become thin enough to flow out of the case into the street, leaving the gears without the necessary lubricant. At the same time the elimination of the loss of oil permits the lengthening of time or increase of mileage between lubrications.

When the first cars were equipped with electric motors the gears were protected by mud pans suspended at the four corners to the body of the car with canvas so arranged around the sides as to protect the motor from the mud and water of the street. The only lubrication provided for the exposed gears was applied by hand. As crude as this method may appear it was in certain respects superior to some of the supposed modern methods. Metal cases which are so arranged that the wheel hub extends into the case make it impossible to provide a watertight joint. This construction allows the water and grit picked up by the wheel and running into the case to stay there as an effective grinding agent.

In order to insure the desired results with gears and pinions, it is essential that they be protected from grit and dirt and that they be properly lubricated. They must also be kept in perfect alignment so that the sides of the gear case will not be worn by the sides of the gear rubbing against them. Such rubbing not only destroys the case, but the cuttings remain in the case, stick in the grease, and are picked up by the gear and ground between the teeth. We cannot expect to overcome these difficulties as long as we allow an iron or steel axle collar, located without protection from grit and street dirt, to wear out the thrust end of the axle bearing, whether it is a steel shell babbitted, or a bronze bearing. The resulting wear causes the gear and pinion to get out of alignment, and is disastrous to both gearing and gear case.

Another questionable feature in the majority of present-day gear cases is the hand hole in the top, which some master mechanics think necessary for inspection and lubrication. This is, in reality, an additional entrance way for grit and dirt. In view of the high prices paid for gears and pinions and the importance of keeping them clean, this opening should be considered

more of a curse than a blessing, on surface equipment at least, and it should be permanently eliminated.

AXLE BEARINGS SHOULD BE PROTECTED

For many years street railway motors have been operated with the ends of the axle bearings unprotected from street dirt to the detriment of the bearing and its seat. The dirt forms a grinding compound, wearing out both bearing and axle most expeditiously, producing a noisy equipment with its attendant racking of other parts, and continual extensive renewals.

LUBRICATING SCHEDULE FOR ELEVATED EQUIPMENT

January 1, 1915

ARMATURE BEARINGS

WH-50L and WH-300 type motors are to be oiled on regular inspection, i. e., every 1,000 miles. Pinion end oil level is to be maintained at $2\frac{1}{2}$ in depth on each regular inspection. Commutator end oil level is to be maintained at $1\frac{1}{2}$ in depth on each regular inspection. The depth of oil in oil well is to be measured with brass rule, especially furnished for the purpose. WH-50 B, E and Walker L-15 motors are to have two (2) gills of oil added to the pinion end bearing and one (1) gill to the commutator end bearing on regular inspection. On regular overhauling add three (3) gills to the pinion end and two (2) gills of oil to the commutator end bearing.

MOTOR AXLE BEARINGS

The WH-50 B, E & L, also Walker L-15 and GE-212 are to have one (1) gill of oil added to each bearing twice a month during the summer Coney Island service. All other months of the year, one gill is to be added to each bearing. WH-300 type motors to have oil level maintained at $1\frac{1}{2}$ in depth. Oiling dates to be so arranged as to permit oiling while cars are in for inspection.

MOTOR JOURNAL BOXES

Motor truck journals are to be packed with new saturated waste at the time of overhauling of motors and trucks. The journal waste is to be withdrawn every six (6) months, res soaked and put into service for another period of six (6) months.

TRAILER JOURNAL BOXES

Trailer journal boxes are to be packed with waste taken from the armature, axle and motor truck journals. These boxes are to be repacked every six months after date of overhauling. Old waste removed from trailer journal boxes will be pulled apart and res soaked. Any material found unfit for further service must have the oil removed and the waste destroyed.

INSPECTION

Journal boxes are to have covers opened for observation each regular inspection.

LUBRICATION OF GEARS AND PINIONS ON OVERHAULING

The GE-212, WH-300, also WH-50B, E & L and Walker L-15 gears and pinions are to have from 4 to 6 pounds of gear grease applied on each regular overhauling.

LUBRICATION OF GEARS AND PINIONS ON INSPECTION

On each 4 months' inspection add two pounds of gear grease to the WH-50B, E & L, and Walker L-15 gears and pinions. The GE-212 and the WH-300 gears and pinions are to have two (2) pounds of gear grease added every two months.

COMPRESSOR

(Oiling on Regular Mileage Inspection)

On Christensen B-2 and C-3 type, oil is to be added until it reaches the bottom of the filling elbow. National BB-4 type, oil is to be added until it reaches 2 above bottom of filling elbow. The commutator end armature bearings are to be oiled on inspection. On the WH-D2 and D-4 type, oil is to be added until filled to $\frac{3}{4}$ above bottom of filling elbow. Oil must be drained from gear case and returned to crank case and new oil is only to be added when the oil from the gear case does not meet the required level.

AIR BRAKE CYLINDERS

All cylinders are to be lubricated with Marvin's Air Brake Compound when overhauled. The application of this lubricant should be made after the cylinder, piston and packing leather are thoroughly cleaned, then a thin coat should be applied to the walls of the cylinder with a brush.

EMERY LUBRICATOR

The Emery lubricators are to be inspected on regular inspections and an Emery stick lubricant to be installed when found necessary.

MOTORMAN'S BRAKE VALVE

The motorman's brake valves are to be lubricated with olive oil when found necessary on regular inspection. A few drops to be applied through the stem to lubricate leather and also through plug to lubricate rotary.

CENTER AND SIDE BEARINGS

Ball bearing center plates and roller side bearings are not to be lubricated. Straight surface, cup type center bearings will fall due on dates that cars are placed for overhauling and inspection. All side bearings with exception of those of the roller type are to be given a brush of grease on each mileage inspection.

TROLLEY EQUIPMENT

All trolley wheels are to have the Emery brake cylinder lubricant forced into the hollow axle with pressure guns on regular inspection. Trolley bases are to be lubricated with car oil through stem of stand when found necessary on inspection.

CONTROL EQUIPMENT

For fingers and plates of the upright controllers, use compressor oil as found necessary on inspection and yearly overhauling. The lubricant to be applied with a piece of felt.

For walls of cylinders on both upright and U S G control use Emery brake cylinder lubricant and apply small quantity with hand at the time of overhauling. New leathers and those removed at the time of overhauling are to be soaked in 20 cold test Neatsfoot oil for 48 hours. These leathers are to be treated with Emery lubricant on each controller overhauling or where found necessary on inspection. The Emery lubricant to be thoroughly rubbed into the pores of the leather. Bearings in the upright control are to have a few drops of the compressor oil added as found necessary on regular inspection.

DRAWBAR FACES, BRAKE RIGGING, ETC.

Lubricant to be a mixture of center plate grease and all refuse oils. The mixture to be applied with a brush on every mileage inspection of motor and trailer cars.

LUBRICATION SCHEDULE FOR LARGE PROPERTY SHOWING FAVORABLE COMPARISON BETWEEN OLD AND NEW EQUIPMENT, THE FORMER HAVING BEEN MODERNIZED BY NEW CAPS OR WELDED CUPS OF THE CAPILLARY TYPE

old motors in a favorable position as compared with more modern equipment.

After grease had been discarded as a lubricant, oil was used at first by means of felt feeders, and then by means of wool waste, the latter being found to be the best material. Oil is carried to the bearings by means of capillary attraction, being added at the bottom of the bearing well, picked up and filtered by the wool waste.

On one large railway property experiments are being made with an improved type of housing in which oil is returned to the oil receptacle for further service.

Some of the older type motors had their axles entirely covered by the frame castings, and the axles were readily kept in condition without expensive or extensive replacements. In the majority of motors this feature was neglected, and it is only within the past few years that the value of protecting the entire axle bearing has been appreciated.

On one large property the motors have been equipped with a sheet steel cover which fits the gap between the two ends of the axle bearings, and is fastened to the frame casting by top bolts, the junction between the cover and the motor being made dust tight and water-tight with a felt gasket. This practice has produced gratifying results. On modern motors, however, this feature is cared for by the manufacturer in the design.

On a railway operating between Syracuse and Rochester, N. Y., a test is being made with a cast-iron sleeve containing the bronze axle bearings. This sleeve is placed on the axle before the wheels are pressed on, and extends from the hub of the wheel to the hub of the gear, the wheel being counterbored so as to allow the sleeve to extend somewhat inside, so that the end may be protected from dirt. A fiber ring is placed at each end between the thrust ends of the sleeve and the hubs of wheel and gear, which obviates wear. It is expected that the bearings will wear 100,000 miles, and if this is found to be true the sleeves can be removed without unnecessary expense when this mileage has been made, as the wheels are pressed off and the axles inspected at such times. These sleeves are installed on Westinghouse No. 119, 125-hp. motors, in which type there is sufficient clearance between the axle and the motor frame to accommodate them. Many motors, due to the very scant clearance at this point, could not be supplied with this method of protection. With, perhaps, the use of thin steel tubing or pipe of sufficient diameter and removable bearing fitting it properly, this method could undoubtedly be used with many motors.

Journal bearings, when of proper mechanical design so as to give a bearing pressure of not more than 300 lb. per square inch, and when packed with waste of proper quality which has been thoroughly soaked and drained and which will at all times press against the axle, give very little trouble. On these bearings, the important points are: Proper lining to insure seating to a good, smooth bearing; sufficient side clearance to avoid wiping of the lubricant from the journal, and proper fitting and renewal of the dust guards at the back of the journal boxes.

LUBRICATION OF THE AIR-BRAKE EQUIPMENT

Air compressors of modern design are free from many of the difficulties experienced with the original type of machines. The improvements have been made with the idea of reducing oil losses from the crank case past the piston into the air line. Another source of annoyance is the leakage of oil over the compressor, causing dirt to stick and accumulate and making the appearance anything but desirable. This was often caused by the force with which the oil was thrown by the gear against

the upper part of the gear case and the under part of the armature bearing, causing it to leak past the bearing to the outside. This was brought about through the large opening in the crank case partition which has been eliminated in modern compressors. This allowed the oil to flow into the gear cases in such quantities that unless a high level of oil was maintained in the crank case, the cylinder farthest from the gear was not properly lubricated. As it requires very little oil in the gear case for the proper lubrication of the gear and the pinion, it has been found that with the partition opening closed the oil splashed over the top by the crankshaft is ample.

For the motorman's valve olive oil has been found to give the best results in service for many types of valves. That carefully made and somewhat intricate piece of

Lubricating Schedule for Surface Equipment

January 1, 1915

MOTORS	ARMATURE BEARINGS <i>Lubricant...Electric Car Oil</i>		AXLE BEARINGS <i>Lubricant...Electric Car Oil</i>		GEAR CASES <i>Lubricant...Gear Grease</i>		
	FREQUENCY	QUANTITY COM. END BEAR. ^g	QUANTITY PIN END BEAR. ^g	FREQUENCY	QUANTITY	FREQUENCY	QUANTITY
WH 49 Handbrake	On Inspection	1/2 Gill	1/2 Gill	On Inspection	1/2 Gill	On Overhauling	2 lbs. per Case
WH 68 Handbrake	" "	1/2 "	1/2 "	" "	1/2 "	" "	2 " " "
WH 68 Airbrake	" "	1 "	1 "	" "	1 "	" "	2 " " "
WH 81	" "	1 "	1 "	" "	1 "	" "	2 " " "
WH 93	" "	Raise Oil Level to 2 Inches	Raise Oil Level to 2 1/2 Inches	" "	1/2 "	" "	3 " " "
WH 101	" "	" "	" "	" "	1/2 "	" "	3 " " "
GE 57	" "	1 Gill	1 Gill	" "	1/2 "	" "	2 " " "
GE 64	" "	" "	" "	" "	1/2 "	" "	3 " " "
GE 80	" "	" "	" "	" "	1/2 "	" "	3 " " "
GE 90	" "	" "	" "	" "	1/2 "	" "	2 " " "
GE 234	" "	" "	" "	" "	1/2 "	" "	3 " " "
GE 800	" "	1/2 "	1/2 "	" "	1/4 "	" "	2 " " "
WP 50	" "	1/2 "	1/2 "	" "	1/4 "	" "	2 " " "
							When changing wheels double quantity of gear grease.
TRUCKS	DRIVER JOURNAL		PONY JOURNAL		BRAKE RIGGING	BEARINGS	
SINGLE	Remove all Old Waste from Journal Boxes		On Overhauling	Same as Driver Journal	On Inspection	On Inspection	On Overhauling
MAXIMUM TRACTION	On Overhauling	Replacing it with Properly Soaked and Drained Waste.	On Overhauling	" "	Use Mixture of Old or Used Kerosene Oil and Centre plate Grease Where Required	Use Thin Film of Centre plate Grease	Use No Lubricant on Roller or Ball-bearing Centrebearing
MCB		Not Necessarily New Waste	On Overhauling	" "			On All Others Use Graphite
BRILL 62E			On 18,000 Mile Basis	" "			
GOVERNORS	Governor Piston and Leathers are to be Lubricated with Marvin Air Brake Compound. Place a drop of Air Compressor Oil on Stem.						
AIR COMPRESSORS	Lubricate with Air Compressor Oil on Inspection. Fill Elbows to 1/2 inch from rim.						
BRAKE CYLINDERS	And Slack Adjuster Cylinders are to be Lubricated with Marvin Air Brake Compound. The Application of Lubricant should be After the Cylinder, Piston and Packing Leathers have been Thoroughly Cleaned. Then a Thin Coat of Lubricant must be Applied with a Brush.						
BRAKE VALVES	On Inspection . . . A Few Drops of Air Compressor Oil.						
H & H I EMERGENCY VALVES	On Overhauling . . . A Few Drops of Air Compressor Oil.						
TROLLEYS	On Inspection . . . Apply a Few Drops of Sperm Oil to Stunts. See Book of Rules, Nos. 512-514, 516, 517.						
CONTROLLERS	On Inspection . . . Lubricant Vaseline to be Applied to Contact Fingers and Plates with a Piece of Felt. Use Small Quantity Air Compressor Oil for Bearings.						
C.E. CAR DOOR ENGINES	As per instructions contained in Instruction Bulletin No. 8.						

LUBRICATING SCHEDULE SIMILAR TO THAT ON OPPOSITE PAGE, BUT FOR SURFACE EQUIPMENT

apparatus, the triple valve, requires accurate adjustment so that the different air pressures will be properly balanced and controlled to the end that the moving parts may perform their functions properly and without hesitation. Several lubricants are successfully used on the bushings, pistons and slide valves of triples, but the most important thing, after choosing a lubricant that will not become gummy, is to use it as sparingly as possible. With triples on cars having motor-driven compressors there is a danger that they will be flooded with oil discharged into the system from the crank cases, past the pistons, and that erratic action of the slide valves will be caused thereby.

There are many methods in vogue to keep the center plate thoroughly lubricated. On the old type of plate designed for the use of grease, trouble is experienced by the grease being squeezed out, leaving the plate dry and

dripping and subject to rust. An ideal lubricant is one that will not squeeze out, will not be affected by wheel wash, and will not gather dust and grit. Dry graphite is good but "don't stay put," so that a mixture of graphite and shellac, using as much graphite as can be mixed into the shellac, has been used with satisfactory results. The mixture, applied to upper and lower plates when the trucks are removed from under a car, becomes dry by the time they are overhauled and keeps the plate in good condition from one overhauling to another without further attention. This mixture has also been found satisfactory for ball-bearing plates.

There are many other parts of a car equipment which require lubrication and which cannot be taken up in detail within the compass of this article. Many parts are pneumatically or electro-pneumatically operated, involving the use of leather valves and pistons. The proper lubrication of these has been troublesome, particularly during cold weather, as the leather gathers moisture from the air and freezes, causing sticking and leaking. This trouble is found in pneumatic door engines, pneumatic-electric control apparatus, air-brake

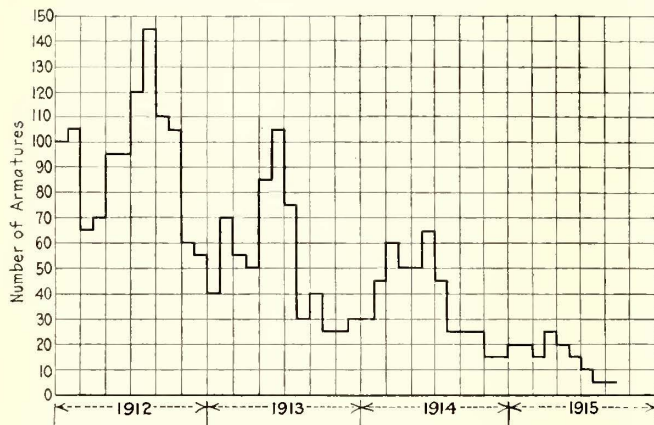


CHART SHOWING PROGRESS IN REDUCTION OF MOTOR ARMATURE DEFECTS CAUSED BY HOT BEARINGS

cylinders. On one large system these troubles have been overcome by the use of a compound worked into the leathers and applied to the walls of the cylinders.

LUBRICATION ON A MILEAGE BASIS

Where the system of lubrication on a mileage basis has been adopted, the results continue to be very satisfactory. This is proved by the decrease in equipment troubles and the economics made possible which were never dreamed of when the equipment was lubricated on a time basis. There is nothing that shows the condition of the electrical and mechanical details of the equipment, more than the defects developed in service and the cost of lubrication per thousand car-miles. There is no greater folly than to attempt to save lubricants at the expense of the moving parts or other parts affected thereby, but it is the height of folly to attempt to overcome mechanical difficulties by flooding oil onto bearings that are absolutely unfit for the purpose for which they are being used, or that are in such a condition as to warrant their removal. High maintenance cost and high lubrication costs go hand in hand. The results obtained on one system are shown below.

	Surface Equipment		Elevated Equipment	
	1909	1915	1909	1915
Total miles operated...	46,026,625	58,582,114	33,494,885	39,945,475
Total number of surface trouble in operation reported	33,386	39,704	21,116	5,311
Average cost of lubrication per 1000 miles, cents	19.2	12.57	19.9	12.66

Water Power and Transportation

Recent Progress in Steam Engineering Has Affected Water-Power Values.

At a meeting of the American Institute of Electrical Engineers, held in Washington, D. C., on April 26, L. B. Stillwell presented a paper discussing the effect upon water-power values of recent progress in the art of producing electric power by steam as well as the proportion which the cost of fuel for steam locomotives bears to the total cost of operation in steam railroad service.

The following table, taken from the Interstate Commerce Commission report for the year ended June 30, 1914, gives the cost of fuel for locomotives and total operating expenses for all railroads of the United States having operating revenues greater than \$100,000 in a year:

	Miles of Line Operated	Cost of Fuel for Locomotives	Total Operating Expenses	Ratio of Fuel Cost to Total Operating Expenses, Per Cent
Eastern District...	62,780	\$104,461,133	\$1,004,620,282	10.45
Southern District...	46,587	33,052,970	348,295,136	9.50
Western District...	136,257	105,286,696	847,397,741	12.40
All Railroads.....	245,624	242,800,799	2,200,313,159	11.05

Table II gives the accounts in steam railroad operating expenses which would be affected by a change from steam to electricity, with the figures for steam and the estimated figures for electricity. These figures are from a table presented by the author and H. S. Putnam in 1907 before the Institute, and the figures for steam operation are the average for five years, from 1901 to 1905, as reported by the Interstate Commerce Commission. The author added that while these are now nearly ten years old, additional operating data of electrified railroads now available are corroborative of their general correctness.

These figures, which are in percentages of the total operating cost, show that the total estimated saving in cost of operation is approximately 18 per cent of the whole, and a saving of one-half in fuel represents about half of this total saving. Reduction in fuel expense secured by utilizing water power would, therefore, under average conditions, affect practically but one-third of the total savings due to electrification.

	Average Operation by Five Years	Estimated Cost of Operation by Electricity
54, Maintenance of way and structures...	21,003	22,354
55, Maintenance of equipment.....	19,524	12,587
21, Engine and roundhouse men.....	9,451	4,710
22, Fuel for locomotives.....	11,292	5,702
23, Water supply for locomotives.....	0.634	0.000
24, Oil, tallow and waste for locomotives..	0.381	0.250
27, Train supplies and expenses.....	1,537	1,000
29, Telegraph expenses.....	1,780	2,000
35, Loss and damage.....	1,112	0.750
36, Injuries to persons.....	1,086	1,000
37, Clearing wrecks.....	0.246	0.200
	68,046	50,553

(The above items are numbered as in the report of the Interstate Commerce Commission, and only items the amount of which is changed by electrification are included.)

Mr. Stillwell then pointed out that, broadly speaking, the commercial value of the development of stretches of navigable water by hydroelectric developments, as parts of waterways had less value than formerly to the public as an economic force to compel reasonable railway rates, because railway rates are now subject to regulation.

He then compared the cost of operation of a steam plant, including interest with that of a water-power

plant, assuming in each case the continuous output of 50,000 kw. The steam station was considered as comprising five 12,500-kw. units, one as a reserve. The cost of such a plant at \$63.70 per kilowatt would amount to \$3,185,000, exclusive of the reserve unit. Assuming an annual load factor of 50 per cent, the output of the plant, when fully loaded, would be 219,000 kw.-hr., and its coal consumption, assuming coal to have 14,000 B.t.u. per pound, will require approximately 200,000 tons per annum. The cost of operation would then be as shown in Table III.

TABLE III—COST OF OPERATION OF 50,000-KW. STEAM STATION AT 50 PER CENT LOAD FACTOR AND COAL AT DIFFERENT PRICES

Price of coal per ton	\$1.00	\$2.00	\$3.00	\$4.00	\$5.00
Interest depreciation and taxes at 12 per cent.	\$482,200	\$482,200	\$482,200	\$482,200	\$482,200
Operating labor and material..	175,000	175,000	175,000	175,000	175,000
Annual costs, excluding coal..	\$657,200	\$657,200	\$657,200	\$657,200	\$657,200
200,000 tons coal	200,000	400,000	600,000	800,000	1,000,000
Total annual costs	\$857,200	\$1,057,200	\$1,257,200	\$1,457,200	\$1,657,200
Cost per kilowatt-hour, 50 per cent load factor, cents.....	.039	0.48	0.57	0.66	0.75

For a water-power plant of the same size, assuming an annual operation and maintenance of cost of \$1 per kilowatt, the limit of investment theoretically permissible, with capital charges taken at 9 per cent, 12 per cent and 15 per cent, would be as shown in Table IV. This table is based on the assumption that the flow of water is practically continuous. If an auxiliary steam plant must be constructed to make up for a deficit of hydraulic power in dry seasons, the real value of the water power must be estimated upon a totally different basis. With the exception of the Niagara and St. Lawrence Rivers, there is perhaps no river in the country which is not affected by an occasional period of very low water.

TABLE IV—WARRANTED INVESTMENT PER KILOWATT IN WATER PLANT WITH VARIOUS RATES FOR CAPITAL CHARGES AND FUEL

Coal at.....	\$1.00	\$2.00	\$3.00	\$4.00	\$5.00
(a) Cost per kw., 9 per cent cap. charges	\$179	\$223	\$267	\$311	\$355
(b) Cost per kw., 12 per cent cap. charges	134	167	200	233	266
(c) Cost per kw., 15 per cent cap. charges	108	134	160	186	212

According to Mr. Stillwell, the reduction in cost of steam power, which in recent years has resulted from decreased cost and increased fuel economy of steam plants, has reduced very considerably the limits of investments in water powers which, theoretically at least, were permissible, say fifteen years ago. Within that period the cost of high-grade steam plants of large size has been reduced about \$25 per kilowatt. The amount of coal required to produce a kilowatt-hour has been decreased approximately one-third, and the capitalized value of this saving is a further amount which must be deducted from the investment permissible in developing a water power.

According to the annual report of the Allgemeine Elektrizitäts Gesellschaft, Berlin, Germany, for the year ending June 30, 1915, the shops of the railway department of this company were engaged on comprehensive work on the A. E. G. high-speed railway of Berlin and the completion of the State railway sections between Lauban and Königszelt and Halle and Merseburg. Three locomotives out of twenty-seven on order for the Halle line have been delivered. The Hamburg Elevated Railway would be completed in the current year, but owing to the war it was not possible to put in hand the extensions which were subsequently contracted for.

COMMUNICATION

Co-operation Between Railways and Schools in Educational Work

NEW YORK STATE RAILWAYS

ROCHESTER, N. Y., April 24, 1916.

To the Editors:

I was very much interested in the description of the co-operative engineering courses of the University of Cincinnati by Prof. A. M. Wilson. It is pleasing to note that some progress has been made toward specialized education of electric railway employees. During the past five or six years a great deal of attention has been given to commercial and industrial education and to vocational guidance. The desire for greater efficiency has led manufacturers and business men to devote much thought toward the development of proper means for educating or training employees.

It is to be regretted that electric railway men have not taken a more active part in this work, for there is no industry more in need of specially trained employees than theirs. The schools cannot give any great part of the special training required, but they can furnish the foundation or groundwork. The railway companies must do the practical training work. Heretofore, such work has been done in an unsystematic way, in many cases, and one can readily see that the schools or colleges, through co-operative courses, will encourage and stimulate the railway companies to plan their part of the training work in such a way as to obtain more satisfactory and efficient results. Undoubtedly, a railway organization would be more efficient if the head of each department had some practical experience in the other co-ordinate departments. In order to secure this, an apprentice system becomes necessary. To the persons taking up apprentice work in the various departments, a properly planned, co-operative college course would be an invaluable aid.

I believe that the co-operative college work for training railway employees has for its field the fitting or preparing of persons for the higher, administrative positions, and for this reason should not consist entirely of engineering studies. There should be some instruction in economics, psychology, administration and commercial law as well.

For the training of employees for the minor positions within each department, the so-called "continuation school" method seems admirably adapted. I have tried this out in the mechanical department for several years with very satisfactory results. Our method is to choose boys who have not had the advantage of much schooling but are, nevertheless, ambitious. We shift them around from one class of work to another, giving them a general practical training. During this training period each boy is required to attend the city shop school a certain number of hours per week and to take up a specially arranged course, the nature of which depends somewhat upon his previous education. By some this work has been done entirely at night. Others have arranged for time off during certain days of the week.

This work is not as comprehensive as that outlined in Professor Wilson's co-operative courses but it has a field of its own, in that it aids boys who could not consider the taking up of a complete college course. It has an advantage for the railway company also, as the persons who complete it usually remain with the company as satisfied, efficient employees.

G. M. CAMERON, Master Mechanic.

1916 CONVENTION
ATLANTIC CITY
OCTOBER 9 TO 13

ASSOCIATION NEWS

1916 CONVENTION
ATLANTIC CITY
OCTOBER 9 TO 13

Arrangements to Handle Exhibits at the Convention Are Well Under Way—Semaphore Clearance Signals Were Considered at a Committee Meeting on April 24—Chicago Elevated Company Section Holds First Anniversary Meeting—Denver Tramway Section Meets

General Association Activities

CONVENTION EXHIBITS

A meeting of the convention sub-committee on exhibits was held in Cleveland, Ohio, on April 20. Those of the committee present were: D. W. Smith, Detroit, Mich., chairman; J. J. Stanley, Cleveland; M. B. Lambert, Pittsburgh, Pa.; J. G. Barry, Schenectady, N. Y., and J. J. Dempsey, Brooklyn, N. Y. In addition there were present S. D. Hutchins, Columbus, Ohio, chairman membership committee; E. F. Wickwire, Mansfield, Ohio, chairman entertainment committee; J. C. McQuiston and H. W. Beaumont, Pittsburgh; F. H. Gale, Schenectady, and E. B. Burritt, New York. A general study of the situation was made and sub-committees were appointed to arrange with contractors for the usual equipment, and to prepare plans for decorations.

SEMAPHORE SIGNAL CLEARANCES

A meeting of the joint sub-committee appointed to consider the design of a standard semaphore signal diagram was held in New York on April 24, there being present G. N. Brown, Syracuse, representing the stand-

ing committee on block signals, and C. R. Harte, New Haven, representing the standing committee on power distribution. There had been prepared by the sub-committee a diagram in which a location for semaphore blades and masts had been provided, with special consideration to the standard clearance lines for rolling stock and structures, and this was discussed in detail at the sub-committee meeting, recommendations for presentation to the various standing committees that were interested being formulated with the new diagram as a basis.

FIRST GRADUATES OF CORRESPONDENCE COURSES

The International Correspondence Schools have notified the educational committee of the American Association that Andre Harduck, who is in the employ of the Interborough Rapid Transit Company, New York, recently completed the combined power-house and substation course. John E. Waller, Grand Junction & Grand River Valley Railway, Grand Junction, Col., finished the same course a few days later.

Activities of the Company Sections

CHICAGO ELEVATED SECTION

The first anniversary meeting of this section was held on April 18, in the Edison Building, Chicago, with an attendance of 100. The secretary reported a total of 222 applications received to date, with 185 paid up. At the organization meeting one year previous there were 138 applicants. The increase, therefore, is 61 per cent.

The president announced the appointment of P. V. Lyon, secretary to the general manager, as librarian of the section. He will keep copies of all of the proceedings, copies of committee reports, etc. A scrap book has been started in which are kept clippings of all accounts of the meetings and of section affairs.

Taliaferro Milton, district engineer Electric Storage Battery Company, then spoke on the general subject of "Storage Batteries." He explained the theory and chemical action of the storage battery and went briefly into its history. The different types of plates were described and the particular field for which each type of plate was fitted was illustrated by means of slides. Mr. Milton showed some of the multitudinous uses to which storage batteries are put, from the extremely large batteries used for central station and railway purposes down to the small batteries used for ignition and telephone work.

The method by which discharge and terminal voltage of storage batteries is controlled was of much interest to the members of this section, as the Chicago Elevated Railroads have on their lines nine storage batteries of large capacity in which the discharge is controlled by booster sets. The end-cell method of voltage control for lighting work was interesting because of its contrast to the booster control method.

In conclusion Mr. Milton showed a number of slides of the installation of storage batteries for all types of

service and spoke particularly of the development of the field of the storage battery for the operation of electric vehicles. As a proof of the severe usage the battery could stand without injury a six-volt, 120 amp-hr. battery was short-circuited through steel terminals without any external resistance in the circuit. The terminals rapidly came to a white heat and were melted off, but even with this current many times in excess of the rated output of the battery no injury resulted.

Mr. Milton's talk was of particular value because a great majority of men on these properties come in contact with storage batteries used in power work, control apparatus, telephone or interlocking in their daily duties.

By way of entertainment Frank Devlin, motorman on the Chicago Elevated Railroads, with his two sons seven and nine years old, performed on banjos to the great delight of their audience. The evening was made lively by songs in which the entire gathering joined and the meeting was adjourned by the singing of "America."

DENVER TRAMWAY SECTION

The regular meeting of company section No. 3 was held in Denver on April 20 with an attendance of seventy-five. W. G. Matthews, president of the section, gave a brief introduction to a motion picture trip through the State of Colorado, the films for this trip having been loaned by a local firm. The presentation of the pictures was followed by musical selections, after which an instructive paper on "Bonds and Bonding Practice on the Denver Tramway System" was read by George H. Eveland of the power department. In this paper the writer covered both past and present local bonding practices.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices
in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Portable Testing Apparatus Arranged for One-Man Operation

BY E. D. RANSOM, B.E.

The photographs reproduced herewith show how an inspection shop, maintaining approximately 450 multiple-unit elevated cars, had all of the necessary apparatus for car testing grouped on a small wagon or cart and arranged for operation by one man. By means of batteries, master switch, telegraph keys and jumper connections the operation was made so simple that seven cars could be tested and inspected in four hours, where previously three men had taken the better part of a day.

In addition to the saving in time and labor a complete record was kept, the results of the tests being tabulated on the top of the wagon. On a table located here

the uses made of, and the advantages gained by, the use of such an outfit.

The test wagon has the following apparatus, which is wired up as shown in Fig. 1 and described later: Set of batteries similar to that used in car; dial for use in regulating battery pressure from 2 to 14 volts; series circuit of eight lamps; dial for varying circuit from four to eight lamps; car inspection test set; master controller similar to that used on cars; buzzer for ringing out circuits; telegraph keys to operate limit switch and controller point by point; seven-point jumper for connection of test batteries to car control circuit under test, for operation from master controller on test panel; necessary switch and plug connections.

Fig. 1 shows the test circuits which are as follows: The batteries *B* are connected with plus and minus to bottom posts of the double-pole switch through the contact arm on dial No. 2, by means of which the pressure can be adjusted to 2, 6, 8, 10 or 14 volts. The last position of this arm gives 2 volts through a buzzer to

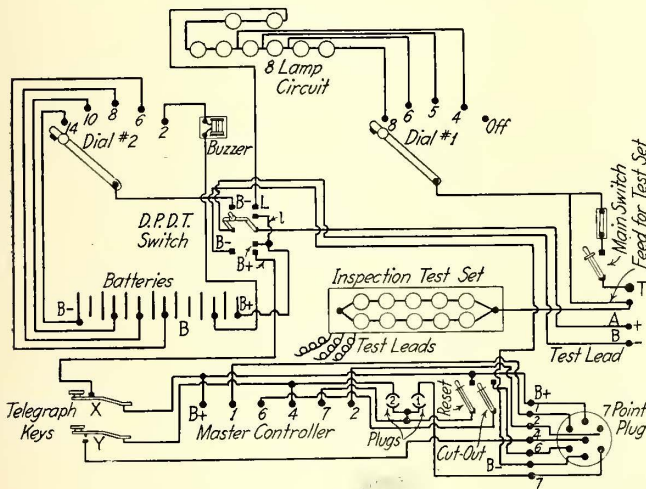


FIG. 1—CIRCUIT DIAGRAM OF TEST SET

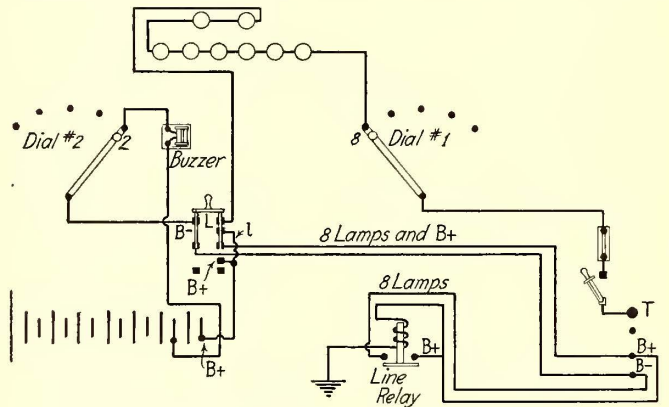


FIG. 2—DIAGRAM OF LINE RELAY CONNECTIONS

standard readings were displayed for comparison with the results of each test, any variation from the standards indicating the presence of trouble. Where previously one man was needed to operate the master controller, another at the limit switch to give the required position of the controller and a third to do the actual testing and inspecting required, now one man can place this wagon alongside the car to be tested, and he has all of the apparatus necessary to operate the controller and make the desired tests right under his hand. By manipulating the several switches and keys he can place the controller on any position required, drop it off and run it up again more readily than if he were in the cab of the car, and he is always where he can see the results of the test being registered on the test apparatus. In addition to all this he can place the wagon directly beside the controller and watch the operation of each switch as he manipulates the controlling keys.

On the system where this wagon is in use the equipment consists of Westinghouse A B unit-switch groups, 251-1-3 switch groups and Westinghouse 131 and 160 upright controllers operated by 14-volt battery control circuits with limit control and line switch protection. The above information is necessary to fully understand

the negative test lead, which is used with the positive test lead whenever a bell circuit is needed.

The eight-lamp circuit is connected to the top right-hand post of the double-pole switch through dial No. 1, by means of which 4, 5, 6 or 8 lamps can be connected in circuit for use in locating grounds and testing line relays, the positive test lead being used.

The blade posts of the double-pole switch are connected to two plugs on the side of the wagon, which are used for lead connections to the equipment as shown at AB in Fig. 1.

From the preceding three descriptions and a study of Fig. 1 it can be seen that when the double-pole switch is thrown to the "up" position it is possible to obtain a circuit of from four to eight lamps on the positive test lead. This position is also used in testing line relays, giving a battery circuit at the same time as lamp circuit, as described later. By having this switch thrown to the "down" position it is possible to obtain from 2 to 14 volts at the seven-point plug on the side of the wagon, first passing through the master, reset and cutout switches, as on a car, and also through controlling telegraph keys. From this seven-point plug a jumper connection is made to a seven-point receptacle

on the car, the car batteries being made inactive so that control operation is then possible solely from the test panel.

The plug shown as "Feed for Test Set" is for a 550-volt trolley connection to this apparatus, the voltage being reduced by two series circuits of five lamps each in parallel, which is a part of the set.

The plugs *P1* and *P2* were inserted, as it was found that, due to the difference in operation of the 131 and 160 control circuits and the *AB* and 251-1-3 switch group control circuits, it was impossible to get beyond the full series position. This was overcome by the plug *P2* which short-circuits the No. 4 and No. 7 wires at the telegraph key *Y* giving the desired result, *P1* being used for all other tests.

From the above it can be seen that on this test wagon are the means to make any test necessary to determine the condition of an equipment under inspection in addition to the visual inspection which is often too much depended upon.

Tests. The test cart is pulled up beside the car to be tested, beside the controller when possible, and a trolley connection is obtained from the car for the main switch *T* which feeds the 550-volt side of the test panel. The seven-point jumper connection is then made to the car receptacle, the car batteries made inactive and the following tests are made:

Test No. 1—General Inspection.—The inspection test set is applied to the car and a general reading is taken of the resistance of each control circuit from line switch to ground through motors and resistance on each position of the controller. The tests made by this will not be described, as they were previously given in an article in the issue of the JOURNAL for June 3, 1914. Although partly a repetition of the statements made in that article it may, for completeness, be well to state here that the car inspection test set is built on the principle of the Wheatstone bridge, namely, the balancing of a known resistance against the car circuit to be measured. Each type of equipment has its standard of resistance readings for each point of the controller, which are displayed on the table for the guidance of the operator. By operation of the controller the resistance from line switch through all control, motor and resistance circuits

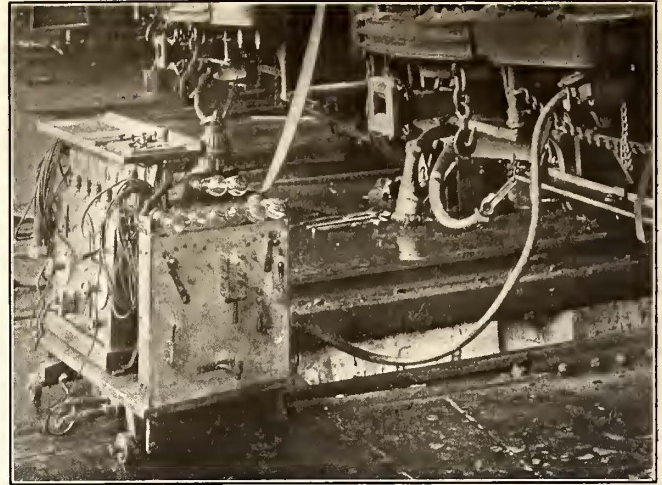


FIG. 5—TEST SET CONNECTED TO CAR

to ground, the actual path of the operating current, is measured. The lead from the test set is attached to the positive side of the line switch and the controller is then operated by means of the apparatus on the test panel. The master controller is advanced to the full series position, after which the points are obtained one at a time by means of the telegraph key which operates the limit switch. The reading taken on each point is entered on a tabular form and by comparison with standard readings any open or short circuit or poor connections can be located. To obtain the full value from this test the writer would suggest that it would be worth the time of the reader, if he is sufficiently interested, to refer to this previous article as the methods used and results obtained are described, especially with regard to the manner of tracing the trouble through each part of the equipment until it is located at the exact point.

Test No. 2—Insulation Leakage.—The inspection test set is also equipped so that any leakage, to the nearest megohm, can be measured and test No. 2 locates any such leakage up to a dead ground. The test lead remains on the line switch, and by advancing the con-

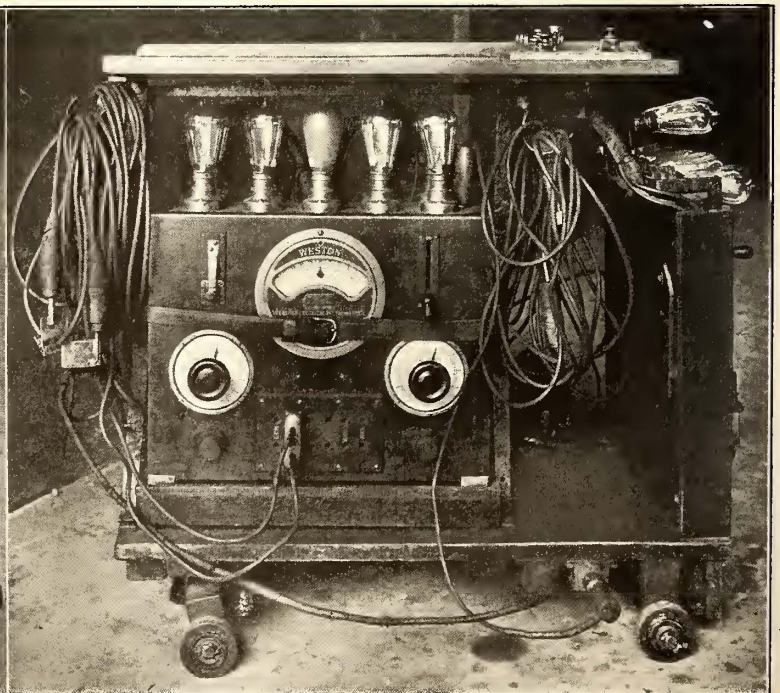
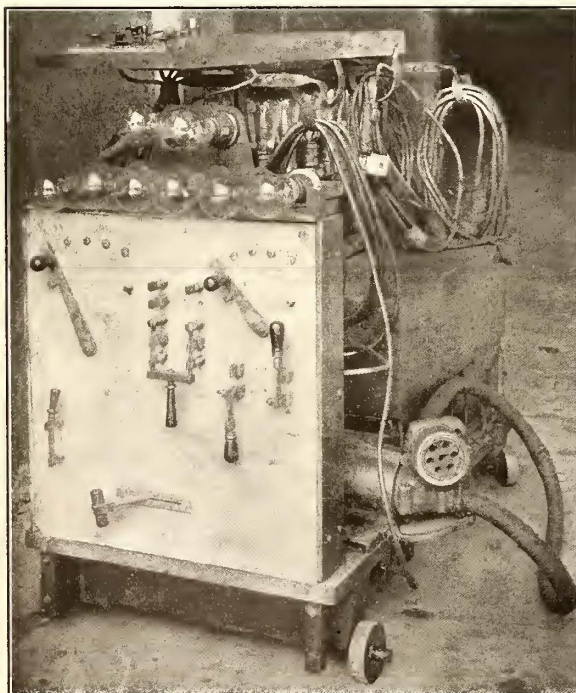


FIG. 3—VIEW OF SWITCHBOARD AND JUMPER. FIG. 4—VIEW OF INSTRUMENT BOARD AND TEST LEADS

troller point by point, the reverse being blocked, any leakage on any point of the control equipment is located.

Test No. 3—Control Operation on Reduced Voltage.—By moving the arm of dial No. 2 to the second position the control voltage is reduced from 14 to 10. The controller is again operated point by point to make sure that at this reduced voltage, which is the minimum allowable operating condition, the control magnets are still active.

Test No. 4—Equipment Leakage.—Controller and resistance frames are tested for grounds by means of a four-lamp circuit. The arm on dial No. 1 is placed on the position next to the last and by use of the positive test lead a four-lamp test circuit is available for use. In fact, by moving this arm to various positions a lamp circuit of any desired practical capacity can be obtained.

Test No. 5—Line Relays.—In accordance with outstanding instructions all line relays are tested on inspection to determine that they will operate in series with eight lamps, this circuit giving approximately the minimum current on which the relay will have to operate in service. The arm on dial No. 1 is placed on the first position, giving eight lamps to the positive test lead which is applied to the line relay coil, the other side of the coil being grounded. Referring again to Fig. 1, it will be noted that the jumper *l* also throws "B plus" on this positive test lead. By placing the arm of dial No. 2 on the last position it throws the buzzer with 2 volts and "battery minus" on the negative test lead. Connections to line relay are then made as shown in Fig. 2, and when the line relay operates, the test operator is notified by the buzzer, thus doing away with the necessity of opening up the relay to make sure of its operation. In addition to this the test affords a check on the secondary contacts.

From the above description it is apparent that the use of this test wagon results in the following advantage: It gives various combinations of lamp tests, buzzer for ringing out circuits, variable battery voltage for testing the controller under operating conditions and, of greater importance, all of the apparatus is grouped on a small portable cart. This cart is also equipped with all the necessary apparatus to operate the multiple-unit equipment from one point, directly at the controller, by one man in the shortest time and with the least confusion, doing away with the previous drawbacks of carrying around the pieces of testing apparatus separately and cluttering up passage ways.

Ladder Track Design

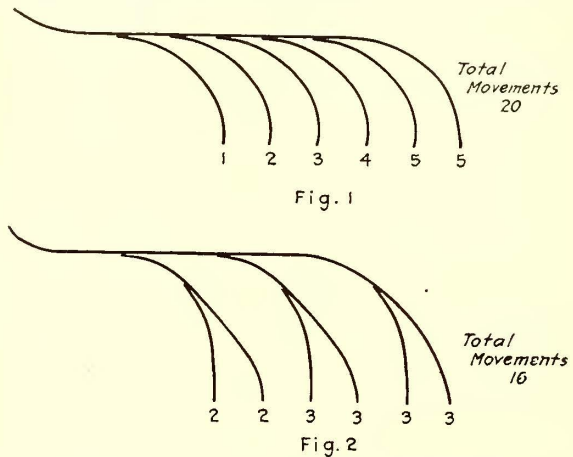
BY N. L. SANOW

New York State Railways, Rochester Lines

In the past very little attention has been paid to the question of the most economical form of construction for ladder tracks, and although it is recognized that a straight ladder having no subdivisions of the diverging tracks is less desirable than a branch-off arrangement, no definite study of the reasons for the difference between the two general schemes seems ever to have been made. The writer has been much interested in ladder track construction on both steam and electric railways and, taking advantage of an opportunity recently offered, made an investigation along this line with the view of obtaining, if possible, tangible data for the most economical design.

The investigation was along one general line, the object of which was to find the method of grouping branch-off tracks from the principal ladder that would call for the least number of total movements of cars over switch, mate and frog in electric railway work (or switch points and frog in steam railway work), when

one car was passed to each of the ladder tracks. On an electric railway such a series of car movements is comparable to the situation existing at a carhouse in which each one of the various tracks contains the same number of cars. When these cars are run out of the house, each one will have to pass over a definite number of frogs, depending upon the position, in the carhouse, of the track upon which the car stood; and as the life of



FIGS. 1 AND 2—DIAGRAMS SHOWING NUMBER OF MOVEMENTS MADE OVER FROGS WITH PLAIN LADDER TRACK AND WITH BRANCH-OFF ARRANGEMENT

a piece of special work is practically dependent upon the number of movements made across it, any arrangement of the ladder which will reduce the number of movements across the frogs and switches will result in reduced maintenance.

The simplest arrangement, and the one that has been taken as a basis for this investigation, consists in a plain ladder, from which each diverging track turns off individually and runs into a separate yard track or carhouse track in the series served by the latter. However, by arranging the yard tracks in groups of two, or three, or more, with each group connected by a single branch-off to the principal ladder track, a great saving in movements may be made. This saving increases rapidly with the total number of tracks in the complete arrangement, even exceeding 50 per cent for installations of moderate size. The extent of the savings are shown in Table I. This indicates the total number of movements that have to be made over frogs in a plain ladder when one car is passed to each of the ladder tracks, and also the saving in the number of movements that may be effected by various groupings

TABLE I—SAVINGS EFFECTED IN CAR MOVEMENTS OVER FROGS BY VARIOUS GROUPINGS OF TRACKS AS COMPARED TO PLAIN LADDER ARRANGEMENT

Number of Tracks in Complete Layout	Total Number of Movements With Plain Ladder	NUMBER OF MOVEMENTS SAVED					
		Number of Tracks in Each Branch-Off					
		2	3	4	5	6	7
6	20	4	4	3	...	...	...
7	27	6	6	6	4	5	...
8	35	9	10	9	8	...	...
9	43	12	14	12	12	10	6
10	54	16	18	18	16	15	12
11	65	20	24	24	21	20	18
12	77	25	30	30	28	25	24
13	90	30	36	36	36	31	30
14	104	34	44	45	44	40	36
15	119	...	52	54	52	50	42
16	135	...	60	63	62	60	54
17	152	...	70	77	77	70	66
18	170	...	80	84	84	80	78
19	189	...	90	96	96	92	90
20	209	...	102	108	108	105	102
21	230	...	114	120	123	120	114
22	252	...	...	135	136	135	126
23	275	...	...	150	152	150	144
24	299	...	...	165	168	165	162
25	324	...	...	180	184	180	180
26	350	...	...	198	204	200	198
27	377	...	...	216	220	220	216

Note.—Boldface figures indicate preferred arrangement.

of the tracks, ranging from two tracks to seven tracks per branch-off. From this table may be noted the peculiarity that the saving in movements increases very sharply with groupings of from three tracks to five tracks, and then drops sharply as the number of tracks in each branch-off increases beyond five. This indicates that the most economical layouts are obtained when the groupings range between three and five tracks, the former figure covering installations having a total of thirteen tracks or less, and the latter being the most economical for layouts having seventeen tracks or more. Between these limits the most economical number of tracks for the branch-offs is four.

This table has been made up by a formula which need not be developed here, as the figures may be checked for any particular case by counting the movements. For example, in Fig. 1, which represents a plain ladder with six tracks, the movement of a car to the track farthest to the left involves the passage over one frog. The movement of a car over the track next to this involves the movement over the frog serving the first track and also the frog that leads to the second track. For the third, fourth and fifth tracks the num-

ber of movements over frogs are, respectively, three, four and five, while for the sixth track the number of movements is five, because the last track in the yard does not need to have a separate switch from the main ladder track unless the latter is carried beyond the yard or carhouse, a condition that has not been considered in this study. The sum of these movements over the various tracks comes to twenty.

Now, in the case of a branch-off arrangement, such as that shown in Fig. 2, where six tracks are arranged in three groups of two tracks each, the movement of a car over the first track at the left involves the passage of the frog serving the first branch-off, and also the frog located at the separation of the two tracks making up the group. Thus, the number of movements over the first track is two, and the number over the second track is also two. For the next group of two tracks, including the third and fourth tracks from the left, the movements over frogs are three for each track, as is also the case in the last group making up the arrangement. The total of all these movements comes to sixteen, so that the branch-off arrangement shown in Fig. 2 saves four movements over the plain ladder arrangement shown in Fig. 1. It may be necessary for the total number of tracks in the complete arrangement to be such that it cannot be divided exactly by the number of tracks in each branch-off, and when this is the case the odd tracks should be placed last in the ladder, as a larger number of cars would have to pass the extra frog for this branch-off if it was placed in any other position.

The greatest direct saving to be effected by arranging a ladder track in the most economical manner is

Insulation and Phasing Test Panel

BY G. B. TANIS

Many valuable minutes can be saved during substation trouble by the use of a test panel such as is shown in the accompanying illustration. Such panels have been built and installed in the stations of the Brooklyn Rapid Transit System for testing high-tension cables and have given entire satisfaction. Discharging, phasing, and insulation resistance can be measured without making several connections, by merely closing the proper switches.

A wood stick, with the lead attached to it for making contact with the cable to be tested, is shown at A, while B is a high-tension fuse used to protect the operator and apparatus in case of accidental contact with a live feeder. The insulators upon which this fuse is mounted should be capable of standing the line voltage, but the balance of the insulators and wiring of the panel need only be for 550-volt service, if used in connection with railway work. A voltmeter can be connected to the designated terminals when testing for insulation resistance. The wires marked C and D should be permanently connected to the 550-volt bus and the ground bus respectively. The buttons E and F are connected to the wires as shown, these forming convenient contact points for determining when the lamps are in working order.

A sign containing the following instructions should be placed near the panel:

To discharge or ground cable close switch to position 4.

To measure insulation resistance close switches to positions 2 and 3.

For phasing close switches to positions 1 and 3.

It is understood there are two double-throw switches and these should be closed according to the above instructions. For phasing, the proper phase relation between power and substations can be determined by a prearranged number of lamp flickers.

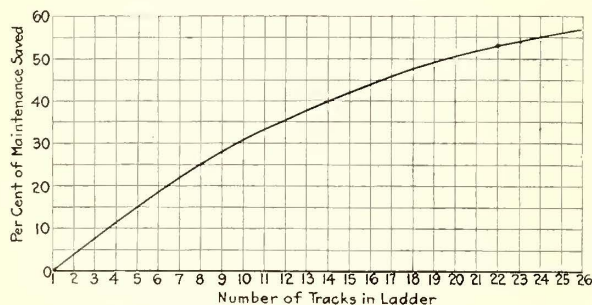
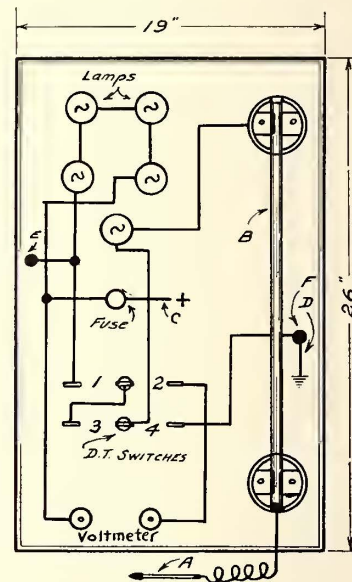


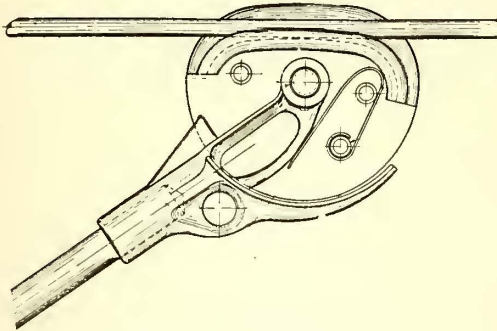
FIG. 3.—DIAGRAM SHOWING RELATIVE SAVING IN MAINTENANCE EFFECTED BY BEST LADDER TRACK ARRANGEMENT



WIRING DIAGRAM FOR INSULATION AND PHASING TEST PANEL

Trolley Shoe Substitute for Trolley Wheel

A trolley shoe with a renewable steel contactor, which it is claimed will run from 7000 to 10,000 miles, has just been put on the market by the Utility Specialties Company, Ltd., Boston, Mass., with Holden & White as sales agents for the Chicago district. This invention is known as the Miller trolley shoe, and it is shown in the

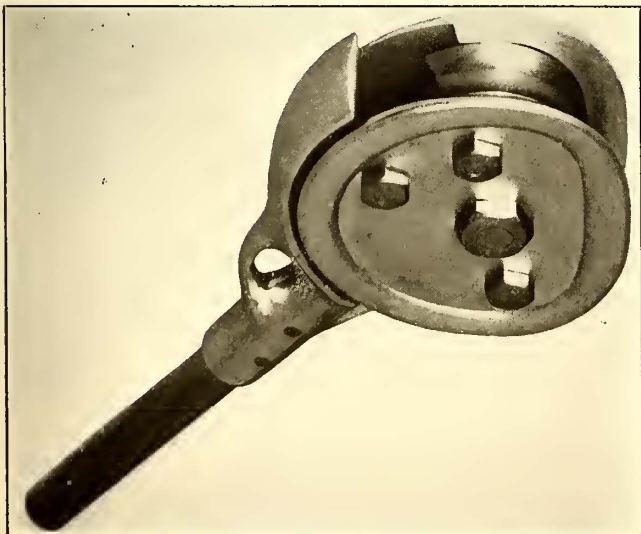


CROSS-SECTION OF TROLLEY SHOE

accompanying illustrations. It consists essentially of a standard trolley harp in which an oval-shaped rocker or shoe is mounted. The shoe is pivoted and fitted with a strong spring so that the contactor automatically assumes full contact with the wire, regardless of the angle between the wire and the trolley pole. The increased area thus obtained, combined with the sliding contact, eliminates arcing.

It is claimed that the secret of this shoe's practicality and efficiency is largely due to the especially constructed renewable contact, which is made of a very close-grained metal, hardened to a specific standard to reduce friction to a minimum. So well has this end been obtained that inspections made immediately after a long, fast run show that the shoe is quite cold. The renewable contact strip is grooved and fits between the sides of the shoe, so that it will not leave the wire except under most extraordinary conditions. This shoe has been found particularly adapted for delivering energy to large-capacity electric locomotives and high-speed passenger motor cars. Incidentally it is claimed that the sliding contact makes sleet shoes unnecessary; in fact, actual service tests during the past winter in New England demonstrated this fact.

Since there are no rotating parts, except the slight



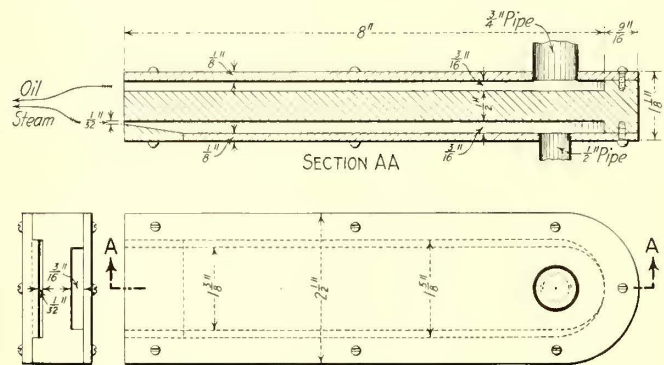
THE TROLLEY SHOE

rocking movement necessary to adjust the contactor to variable heights of trolley wire, no lubricants are necessary. Experience has demonstrated that about 18-lb. tension at the end of trolley pole is sufficient for this shoe to meet all conditions. A number of tests made in different parts of the country also demonstrate that this trolley shoe will follow the wire at crossing frogs, and move forward and backward just as readily as a trolley wheel. Moreover, the quality of steel used in the contactor is claimed to eliminate practically all wear on a copper trolley wire.

New Fuel Oil Burner Used on C., M. & St. P. Locomotives

After the new electric locomotives had been in service some time on the electrified portion of the Chicago, Milwaukee & St. Paul Railway it was determined to experiment with oil burners in an endeavor to develop a device which would improve combustion under the boilers used for generating steam to heat the passenger coaches.

The burner now in use, designed by Frank Sowerby, general foreman at the company's Deer Lodge shops, works satisfactorily with Western oil, it is stated, and burns a smaller quantity of this oil at 1½ cents per gallon than the standard type burner required of Eastern oil at 7 cents per gallon. The time required to heat



SECTION AND PLAN OF C., M. & ST. P. FUEL OIL BURNER

the boiler to blow-off temperature has also been cut down from thirteen to seven minutes.

The accompanying sketch shows the shape and general dimensions of the new burner, which is made of a solid piece of brass, grooved on both faces and fitted with 1/8-in. sheet-copper cover plates. The upper groove or chamber has a uniform cross-section 1 3/8 x 3/16 in. in size, while the steam chamber is 1 5/8 x 3/16 in. in cross-section and reduces to 1 5/8 x 1/32 in. at the outlet. This outlet, however, is adjustable, the lower lip being a separate piece of solid copper fitted into the burner and held in place by screws under which shims can be placed to widen the opening. Both steam and oil chambers are 8 in. long, and the oil and steam feed pipes are 3/4 in. and 1/2 in. in diameter respectively.

During the year 1915 the New York, New Haven & Hartford Railroad sold a total of \$931,861 worth of old scrap. Among the items listed in the sales for 1915 are scrap from old locomotives which brought \$29,779; miscellaneous iron and steel from burned cars, \$13,228; brass and copper \$267,784; waste paper and old records, \$2,601; cement bags, \$13,162, and rope, \$3,133. The weight of all material sold amounted to a total of 133,414,630 lb., or 59,454.7 gross tons.

New Turbo-Generator Unit for Boston Elevated

As announced in the issue of the *ELECTRIC RAILWAY JOURNAL* for March 25, the Boston Elevated Railway, through its engineers, the Stone & Webster Engineering Corporation of Boston, Mass., has awarded a contract to the General Electric Company for a 35,000-kw. turbo-generator to be installed in its South Boston power station by Dec. 1, 1916. The addition of this unit will increase the capacity of the station to 80,000 kw. Provision has been made in the contract for the temporary installation of a 10,000-kw. turbine to facilitate handling next winter's load, in case the manufacturer is unable to complete the specified delivery. The general relation of the new unit to the company's power requirements was reviewed in the issue for March 4, 1916, page 463.

The new generating set will consist of a horizontal single unit, about 45 ft. 6 in. long, 20 ft. wide and 12 ft. 3 in. high, thus occupying about 1/40 sq. ft. per kilowatt of capacity, including both turbine and generator. The machine will operate at 1500 r.p.m. and initially it will be supplied with steam at 200 lb. per square inch and 200 deg. Fahr. superheat, the steam temperature being 588 deg. Fahr. at the throttle. The speed regulation will not exceed 2 per cent above or below normal at any load under 35,000 kw., and the machine will have a capacity of 42,500 kw. for two hours. It will, of course, be operated condensing, but when run non-condensing and exhausting against an absolute back pressure of 18 lb. per square inch, it will deliver 15,000 kw. A Schutte & Koerting throttle valve, actuated at a speed of 10 per cent above normal by a safety governor, will be provided.

The steam guarantee for the turbine at 200 lb., 1500 r.p.m. and 1 in. back pressure, is as follows: 10,000 kw., 12.10 lb. per kilowatt-hour; 15,000 kw., 11.30 lb.; 20,000 kw., 10.85 lb.; 25,000 kw., 10.65 lb.; 35,000 kw., 10.95 lb. For each 10 lb. per square inch increase or decrease in steam pressure the steam consumption is to decrease or increase by 1 per cent from 185 lb. to 210 lb. per square inch, and for each 10.5 deg. increase or decrease in steam temperature between 175 and 225 deg. Fahr. superheat, the steam consumption will vary 0.5 per cent. At 2 in. absolute back pressure the guaranteed steam consumption per kilowatt-hour is as follows: 10,000 kw., 13.20 lb.; 15,000 kw., 12.30 lb.; 20,000 kw., 11.80 lb.; 25,000 kw., 11.60 lb.; 35,000 kw., 11.90 lb. An 18-in. steam pipe will be required for the unit, with a 10-ft. x 16-ft. exhaust.

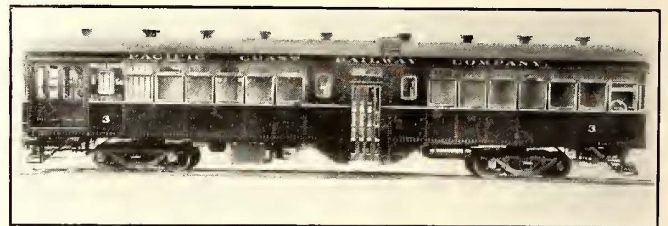
The generator will be of the two-pole type, delivering 25-cycle power at 13,200 volts, three-phase. It will have a continuous capacity of 35,000 kva. and a two-hour capacity of 42,500 kva. The regulation of the generator when operated at full load and 100 per cent power factor will not exceed 32 per cent, and when operated at 70 per cent load and at 100 per cent power factor, 24 per cent. Not less than 55 sq. ft. of air-inlet opening will be required with an equal area of discharge opening. The commercial efficiency guarantee of the generator is 97 per cent at one-quarter load; 98.25 per cent at one-half load; 98.75 per cent at three-quarter load, and 99 per cent at full load, not including friction and windage, which approximate 250 kw. The exciting current required is 675 amp. at 125 volts, at full load and 100 per cent power factor, the exciting current at 90 per cent power factor and full load being 710 amp.

With the air at 40 deg. C., the maximum temperature of the armature is not to exceed 100 deg. C., at 35,000 kw. continuously, or 125 deg. C. at 42,500 kw. for

two hours. The field temperature by resistance measurement is not to exceed 125 deg. C. for either load; the collector ring and brush temperature, by thermometer, will not exceed 60 to 70 deg. C., or that of the bearings, 70 to 80 deg. C. At full load and 40 deg. C. 70,000 cu. ft. of air per minute will be required for ventilation. The generator reactance is to be about 8 per cent of the rated voltage at rated continuous output. The shipping weight of the unit will be 946,000 lb., the completed weight, 860,000 lb., and the weight of the heaviest piece (armature) 190,000 lb. To remove the field 24 ft. of straight pull will be required.

Steel Passenger Car for Pacific Coast Railway

The Pacific Coast Railway, San Luis Obispo, Cal., has recently purchased the steel passenger car shown herewith for its short line between Santa Maria and Guadalupe, Cal., some 13 miles in length. Energy is purchased from the Midland Counties Public Service



STEEL PASSENGER CAR FOR PACIFIC COAST RAILWAY

Corporation. The chief business on the line is that of handling sugar beets for the Union Sugar Company during the fall of the year. The most interesting feature of the car is that it is of the standard Southern Pacific type but adapted to a 3-ft. gage. It is equipped with Westinghouse narrow-gage commutating-pole motors and H L control.

Air-Operated and Electric Mechanisms for Railway Structures

The National Pneumatic Company, Chicago and New York, which is well known to the electric railway field because of its pneumatic and manual door and step control, announces that it is also prepared to design and build pneumatically-controlled mechanisms for any purpose where such mechanism would give better results than hand or electric operation. It has already done considerable work in the installation of pneumatic devices for opening and closing the windows of power stations and shops from a distance. One notable installation of this kind is to be found in the power house of the Commonwealth Edison Company, Chicago, where sectional pivoted windows in three vertical groups are operated by means of pneumatic cylinders. In general, each window of such installations can be operated from individual cylinders, or whole groups can be manipulated from a master cylinder. The control is from a small valve which can be placed at any point most convenient for operation. Almost any variety of combinations can be arranged.

This company, through its associate, the Burdett-Rowntree Manufacturing Company, has also available much experience in the construction of electric dumbwaiters. Such dumbwaiters are well worth a place in electric railway structures, especially in the storerooms department.

NEWS OF ELECTRIC RAILWAYS

500 BILLS BEFORE NEW YORK GOVERNOR

Brief Review of Some of the Important Measures Affecting the Railways

Some of the important measures passed by the Legislature of New York at the session concluded recently were referred to in the *ELECTRIC RAILWAY JOURNAL* of April 22, page 792. Again the spectacle was witnessed of jamming bills through at the last moment. The legislators, however, were no respecters of persons. The Governor's legislative program as set forth in his message to the Legislature was killed practically in toto. As for the program of Mayor Mitchel of New York, there were saved from that only a few stray measures. Most of the legislation passed was not peculiarly the Mayor's own, but proposals of other interests in the city to which he gave his support. In all more than 500 bills await action by the Governor.

In the action taken at Albany in the full-car bill matter in particular, a rebuke is regarded as having been administered to Mayor Mitchel. The anti full-car bill, known as the Simpson act, although it is peculiarly a New York City measure, will go to Governor Whitman instead of to the Mayor for final executive action. The Simpson bill was designed to nullify the order issued by former Health Commissioner Goldwater prescribing the number of passengers that may be carried on surface cars. Commissioner Goldwater, whose order has been retained in force by his successor, was supported in his action by Mayor Mitchel. It is generally accepted that the Goldwater order was merely an effort on the part of the local city administration to secure over the heads of a recalcitrant Public Service Commission relief which the local administration, of different political faith from the majority of the members of the commission, regarded as essential to its best political interests. In commenting on the passage of the Simpson bill Public Service Commissioner Whitney said: "Our observation has been that the full-car order has only resulted in crowding parallel lines. When the Simpson bill becomes a law we will try to see that enough cars are operated to carry the passengers."

So far as public service legislation was concerned, practically all the measures advocated by New York City taxpayers and the Thompson committee were killed and a few measures, disapproved by the Public Service Commission and the city of New York, were passed. The legislation championed by Public Service Commissioner Whitney to hasten rate decisions was killed. There were two important bills in this program. One took away from the public service corporations the right of review by certiorari and the other provided that a rate reduction decision must be effective as of the date the complaint was filed instead of as of the date of final decision, after the courts had settled all appeals. The bill to give the Board of Estimate of New York City power to separate the construction and regulatory work of the Public Service Commission and throw the construction work into the hands of a commission appointed by the Mayor, was passed. The measure was disapproved by the Public Service Commission. The Thompson bill, making the Mayor and Comptroller members ex-officio of the boards of directors of the Brooklyn Rapid Transit Company and the Interborough Rapid Transit Company was defeated, as was the Maerkle bill to give the Public Service Commission supervision over companies acting as holding companies for public service corporations.

The workmen's compensation bill was amended. Chief of the changes were the provision permitting longer working hours for women in cannery factories, and a clause giving the State insurance department certain limited supervision of the moneys in the State insurance fund. The attempt to make that fund a separate and independent State department was defeated.

The safety first movement received a great boost in the passage of the Cromwell-Kelly bill. The measure relates

only to New York City, but its advocates hope for its extension to include other cities. The police were keen for this measure, but the automobile interests are deadly opposed to it. Under it all operators of motor vehicles in New York City will pass under a license system, rendering them liable to the revocation of their licenses for cause. Automatically, as it were, all operators will receive licenses. Control is lodged wholly in the power of police magistrates to revoke a license for cause.

The Legislature has passed and Governor Whitman has signed a bill which will prohibit an inspection of a corporation's stock book by any holder of less than 5 per cent of outstanding stock whose possession of shares has not been of record for at least six months.

The State constabulary bill passed the Senate on April 17. It provided for two troops, 116 men in all, and carried an appropriation of \$250,000, half the force and half the appropriation asked for in the original bill introduced by Senator Clinton T. Horton of Buffalo for Governor Whitman. The committee on rules of the assembly decided, however, not to report the measure out.

The effort to repeal the full-crew train law failed.

At the eleventh hour of the session the Legislature put through the Thompson and Ellenbogen bills, which in different ways affect the operation of the west side lines of the New York Central Railroad. The Thompson bill prohibits the use of steam locomotives on Manhattan Island after Jan. 1, 1919. This would compel the New York Central to have its west side lines electrified by that time or run the risk of having this done by the city authorities at the expense of the company. The Ellenbogen bill makes the operation of trains at grade on the west side of Manhattan a public nuisance and authorizes the removal of the tracks if the company fails to file plans for their removal from the surface within seventeen months. Plans looking toward the electrification of these lines are reviewed at length elsewhere in this issue.

PUBLIC MAY PASS ON CLEVELAND WAGES

Fielder Sanders, Street Railway Commissioner of Cleveland, Ohio, on April 21 suggested a novel method of determining whether the demand of the motormen and conductors of the Cleveland Railway for increased wages and better working conditions shall be granted. He said that as the public must pay the bill, the car riders should decide whether the rate of fare be increased to cover the additional expense. Mr. Sanders said that a fare of 4 cents, or three tickets for 10 cents, with a 1-cent charge for transfers, would be necessary to cover the expense, if the men were granted the wages and conditions they demand. He said that under the Tayler franchise the employees of the railway were as much public employees as the firemen and policemen. Mr. Sanders said he had not considered methods of securing an expression from the patrons.

J. J. Stanley, president of the Cleveland Railway, has refused to make a counter proposal to the demand of the men for an increase of wages to 40 cents an hour and a revision of the schedules which would give 90 per cent of the men a work day of eight hours or more. He did, however, offer to consider a new agreement or such a revision of the schedules as would not greatly increase the operating expenses. He said that any increase in wages that would necessitate an advance in the fare was a matter to be considered by the city. The company's shop men have also made a demand for an increase in wages of 5 cents an hour.

Mr. Sanders said on April 18 that a partial review of the check of East Cleveland car riders made recently would indicate that the average ride is much longer than the average ride inside the city of Cleveland, and that the people of the suburban city may be asked to pay an increased fare. East Cleveland has a contract with the company for the same fare paid in the city until the franchise expires.

THOMPSON COMMITTEE APPROPRIATION REFUSED

The application made to the Legislature of New York for the expense of the Public Service Commission investigation by the Thompson committee was denied as the result of a deadlock between the Senate and Assembly. The committee has no money, but it has unlimited power of investigation until July 1. The Senate on April 21 refused to accept the Assembly amendment to the Senate resolution passed some days previously appropriating \$50,000 to pay the obligations already incurred and to provide for the expense of the investigation to July 1. The Assembly rules committee had previously amended the Senate resolution reducing the appropriation to \$25,000 and providing that it should be used to pay outstanding obligations, and that the investigation should terminate at once. When this resolution was handed down in the Senate on April 21 with the Assembly amendment Senator Thompson moved that the Senate refuse to concur, and asked for the appointment of a conference committee. The Assembly appointed a conference committee. These two committees met but could find no ground of compromise. The representatives of each house stood firm in support of the action previously taken. Speaker Sweet said that it was the purpose in reducing the appropriation and amending the resolution to stop the work of the Thompson committee. He said:

"When Senator Thompson came to the Legislature early in February and asked for an extension of time he told us that his committee was on the verge of making sensational exposures. He has failed to fulfill that promise. He has exposed nothing that will aid the Legislature in determining legislative action. That is the purpose of appointing an investigating committee."

Senator Thompson, chairman of the investigating committee, promptly denounced the Speaker and announced that the committee would resume its investigation on May 1. There have been no sessions of the committee now for more than two weeks.

250 STATE DIRECTORS NAMED TO MOBILIZE NATION'S WAR RESOURCES

The committee on industrial preparedness of the Naval Consulting Board of the United States, through the engineers of the country, is preparing an inventory of the country's manufacturing and producing resources as a first step in industrial preparedness. Two hundred and fifty state directors have been appointed from the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Chemical Society. Of the directors appointed the following are well known in the electric railway field:

Wynn Meredith, Sanderson & Porter, and A. H. Babcock, Southern Pacific Company, California; W. C. Spruance, Jr., and Charles L. Reese, E. I. du Pont de Nemours & Company, Delaware; John H. Finney, Aluminum Company of America, District of Columbia; R. W. Hunt, consulting engineer, Chicago; Dr. W. F. M. Goss, University of Illinois, Urbana, and P. Junkersfeld, Commonwealth Edison Company, Illinois; F. S. Hunting, Fort Wayne Works of the General Electric Company, Indiana; Carl P. Nachod, Nachod Signal Company, Kentucky; M. S. Sloan, New Orleans Railway & Light Company, Louisiana; H. D. Bush, Carnegie Steel Company, Maryland; A. D. Little, A. D. Little, Inc., Massachusetts; H. H. Crowell, Michigan Railway, Michigan; W. R. McKeen, McKeen Motor Car Company, Nebraska; W. K. Freudenberger, Railroad Commission of Nevada, Nevada; J. Brodie Smith, Manchester Traction, Light & Power Company, and Hugh K. Moore, Berlin Mills Company, New Hampshire; Farley Osgood, Public Service Electric Company, New Jersey; James G. White, J. G. White & Company, and William McClellan, New York; William S. Lee and Charles I. Burkholder, Southern Power Company, North Carolina; Samuel G. McMeen, Columbus Railway, Power & Light Company, Ohio; O. B. Coldwell, Portland Railway, Light & Power Company, Oregon; Paul Spencer, United Gas & Improvement Company, Pennsylvania; L. W. Downes, D. & W. Fuse Company, Rhode Island; W. B. Tuttle, San Antonio Traction Company, Texas; B. T. Burt, Rutland Railway,

Light & Power Company, Vermont; John Harisberger, Puget Sound Traction, Light & Power Company, Washington; L. E. Strothman, Allis-Chalmers Manufacturing Company, and A. W. Berresford, Cutler-Hammer Manufacturing Company, Wisconsin.

P. R. T. ADVANCES WAGES.

The co-operative committee at a meeting held on April 20 determined in company with the management of the Philadelphia (Pa.) Rapid Transit Company that the condition of the 22 per cent fund is now such as to make possible an advance of 1 cent an hour to all of the conductors and motormen so that effective on May 1, 1916, the new scale will read as follows: New men, 26 cents; after one year's service, 27 cents; after two years' service, 28 cents; after three years' service, 29 cents; after four years' service, 30 cents; after five years' service, 31 cents.

When the Stotesbury management took charge of the property in April, 1911, the motormen and conductors were receiving a maximum wage of 23 cents an hour, making the total increase in the maximum wage since then 8 cents. All of this has been accomplished by the use of the 22 per cent funds and through the work of the co-operative committeemen and the superintendent of time-tables by keeping closely in touch with the requirements of increased service to the public as determined by the traffic checks and by following closely the desires of the motormen and conductors in the make-up of runs.

During the five years immediately preceding the incoming of the Stotesbury management an average of 369 men a month were discharged or left the service for other causes. During the past five years under the co-operative plan an average of only 82 men a month were discharged or left the service for other causes. About 75 per cent of the total number of trainmen are now drawing the maximum of 30 cents an hour and will be immediately eligible to the maximum rate of 31 cents an hour under the new scale. Within the next few months an additional 5 per cent of the men will enter the maximum rate class, so that approximately 80 per cent of the men will then be drawing the maximum rate of 31 cents an hour.

Announcement is also made of increases in wages among the mechanical and electrical employees. These men do not receive their pay from the proceeds of the 22 per cent fund.

MR. ANDERSON ATTACKS REDUCTION IN PUBLIC SERVICE COMMISSION

George W. Anderson, United States District Attorney at Boston, Mass., and a former member of the Massachusetts Public Service Commission, appeared before the ways and means committee of the Massachusetts Legislature during the week ended April 29 in opposition to the proposed reduction of the board from five to three members. Mr. Anderson pointed out that the law organizing the commission in 1913 was designed to place the members of the board on the same plane of power and importance as that occupied by a judge of the Superior Court. He said that the board in the Bay State Street Railway fare case was engaged in one of the most important rate cases ever tried in New England and one of the greatest rate cases ever tried in this country outside the Interstate Commerce Commission. On this account the nominal saving of about \$18,000 a year in salaries resulting from a reduction of the commission's membership would be false economy. Moreover, any such change would interfere with the efficiency of the board. In closing, Mr. Anderson said:

"The work of the commission can be done only by men who are giving their entire time and attention, or substantially that, to it and are left with a feeling of security provided they perform their duty. The minute you put that commission or any other commission engaged in the performance of these difficult duties into the field of partisan politics, you destroy utterly the whole system of public regulation of privately owned public utilities. No one will be able to rely on anything permanent or stable if legislation of this kind is to be passed."

Much other opposition to the bill developed at the hearing, which was continued to April 27, at which time Chairman McLeod of the commission was expected to address the committee.

ELECTRIFICATION OF IOWA ROAD PROPOSED

The Muscatine, North & South Railway, a steam road between Muscatine and Burlington, Iowa, will be reorganized and may be converted into an interurban electric railway. Officials and stockholders of the company will meet in Davenport about May 1 to effect the reorganization. E. H. Ryan, Davenport, the president, has just returned from a Western trip and is preparing the plans for reorganization. The road is now in the hands of Maurice Dailey, Muscatine, as receiver.

Officials of the Tri-City Railway & Light Company, which is controlled by the United Light & Railways Company, have been approached by officials of the Muscatine, North & South Railway relative to the question of power. B. J. Denman, vice-president of the Tri-City Railway & Light Company, and assistant general manager of the United Light & Railways Company, says it is possible a traffic arrangement will be made to establish through service from Clinton to Burlington, Iowa. He admits having looked over the Muscatine, North & South Railway, but says there is not the slightest possibility of the United Light & Railways Company taking the line over. He has expressed the opinion that with economies in operation through electrification and with more frequent service the road can be made to pay.

SUSPENDED MONORAIL LINE PROPOSED IN NORTHERN CALIFORNIA

The Clear Lake Suspended Monorail Company has applied to the Railroad Commission of California for authority to build and operate a monorail transportation system starting from the line of the California Northwestern Railway at Hopland and extending to Lakeport, 24 miles distant, via Kelseyville. The construction proposed is the Shoemaker high-speed flexible monorail type. The company is incorporated for \$50,000, of which \$26,400 has been subscribed and paid in. It is planned to take over from the Clear Lake Railroad right-of-way property and franchises. Construction will be carried out with the proceeds of an issue of first mortgage 6 per cent gold bonds, to an amount sufficient for that purpose. The Clear Lake Railroad expended more than \$50,000 in construction work. The directors of the new company are L. H. Boggs, Kelseyville; Andrew Smith, Finley; S. E. Brookes, Hopland; F. D. Flint, San Francisco, and M. S. Sayre, Lakeport.

SEATTLE COUNCIL OPPOSES RAILWAY PURCHASE

William Hickman Moore, chairman of the judiciary committee of the City Council of Seattle, Wash., R. H. Thomson, chairman of the city utilities committee of the Council, and C. B. Fitzgerald, chairman of the finance committee, who were appointed by the Council to report on the advisability of the city becoming a bidder for the property of the Seattle, Renton & Southern Railway, which is to be sold at receivers' sale on May 1, have recommended to the Council that the city enter no bid for the property. According to the city officials serious obstacles lie in the way of the city acquiring the railway. The court order provided that the successful bidder must abide by a contract entered into by the receivers with the Puget Sound Traction, Light & Power Company to purchase power for the operation of the line from that company until April, 1926. Sec. 2 of the bond ordinance provides that in the event the Seattle, Renton & Southern Railway is purchased by the city of Seattle, it will be on an appraisal made by the Board of Public Works. In the same section it is provided that power for the operation of the railway by the city shall be obtained from the municipal light and power plant, on terms to be fixed by ordinance. Under the order of sale approved by Judge A. W. Frater no bid for less than \$1,200,000 is to be considered by the court. The city has a bond issue of \$375,000 available at this time for the purchase of the line. The fact that it is proposed to sell the line in its entirety brings up the question of the right of the city to acquire or operate a street railway outside the city. Hugh M. Caldwell, corporation counsel of the city, will be directed by the Council to attend the proposed sale on May 1, and notify all bidders that the city has certain claims against the company.

REASONS FOR COURT DECISION ON TOLEDO FARES

In the account of the settlement of the strike of the employees of the Toledo Railways & Light Company, Toledo, Ohio, which appeared in the *ELECTRIC RAILWAY JOURNAL* of April 15, page 745, brief mention was made of the order by Judge Killits in the District Court of the United States for the Northern District of Ohio, Western Division, allowing the company to increase its fares to meet the increase in wages of the men and set up with the added revenue a special fund for improvements.

The conditions in Toledo are peculiar. The franchises there have expired and the company is operating under sufferance, pending a settlement of the franchise controversy. The company, previous to the strike, which was declared on March 28 and settled on April 9, without any attempt being made to operate cars, was charging 3 cents during the rush hours morning and evening and selling six tickets for a quarter with a cash fare of 5 cents. It appeared to the court that if the cash fare was fixed at 5 cents, the ticket fares at six for a quarter, the fare for children under eight years of age 1 cent and the 3-cent rush-hour fare eliminated, the increase in the gross revenue of the company would be 12 per cent and that approximately one-half of the increase would be required to meet the advance in wages granted to the men. The court accordingly ordered such rates to be put into effect, and directed that the remainder of the increase not needed to meet the added wage charge be placed with John Craig, Toledo, as custodian at weekly intervals until further order of the court and be disbursed by him in acquiring new cars and equipment. A bond of \$25,000 was required from Mr. Craig. It was, of course, provided that the 3-cent fare tickets outstanding at the time of the strike and purchased in good faith by patrons of the company should be accepted by the company for transportation under the terms of the temporary permit under which the company operates.

As the company was without franchise rights appeal for redress was made to the federal court, which assumed authority although the company was not insolvent or in the hands of receivers. Judge Killits said that it was only within narrow limits that the court could have anything to say about fixing fares; that this was a legislative function of the city, and that, ordinarily, the only question for the courts to pass upon would be reasonableness of fares fixed by the City Council. On the other hand, if the city refused to accept the terms fixed by the court, the only recourse for the city was to order the company to cease operation and remove its rails from the streets. It was made clear that the federal court order was only for a working agreement, pending some settlement of the franchise issue.

The patrons of the company accepted the increase in fare as a reasonable and necessary contribution toward better service and higher wages for the men. There were no demonstrations in opposition to the change. A remarkable feature of the whole controversy was the unanimously cordial recognition by the local press of the spirit of frankness manifested by the company throughout the negotiations leading to the settlement.

CINCINNATI BELT LINE AUTHORIZED

The proposal to issue bonds to the amount of \$6,000,000 for the construction of a rapid transit belt line in Cincinnati was approved by the voters of that city by about eight to one on April 25. This belt line, when completed, will open the way for all the interurban railways to reach the business section of the city. Heretofore they have been compelled to stop at the city limits and transfer their passengers to the local street cars. In addition the belt line will bring in two other roads. Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, has assured the Rapid Transit Commission that his company will arrange to extend its line to Cincinnati. A new company has been incorporated to build a line between Dayton and Cincinnati through an undeveloped territory, but this hinged on the approval of the rapid transit bond issue also.

The action at the election indorses the previous action of the local rapid transit commission in adopting what is known as modified plan No. 4. The route of the proposed line under this plan was referred to in the *ELECTRIC RAILWAY JOURNAL* of Dec. 25, 1915, page 1271.

Municipal Ownership Proposal in Sherbrooke.—The Sherbrooke Railway & Power Company, Sherbrooke, Quebec, is reported to have made an offer to the City Council to sell the road for \$250,000 or lease it to the city for twenty-five years at a semi-annual rental of \$9,000. At the end of this period the system would become the absolute property of the city.

Revision of Cincinnati Franchise Proposed.—On April 22 the first of a series of public meetings was held in the Council chamber at Cincinnati, Ohio, for the discussion of the proposed revision of the terms of the franchise of the Cincinnati Traction Company, including the rate of fare. The Rogers law, under which the franchise was granted, provides for a revision this year.

Norumbega Park Extension.—The Norumbega Park Company, which operates the well-known pleasure resort of the Middlesex & Boston Street Railway at Auburndale, Mass., has purchased 12 acres of land adjoining the park and plans to erect an administration building with pavilion for meetings, dancing, etc. A baseball diamond will probably be laid out on the new property. Carl Alberte is manager.

National Civic Federation Issues Profit-Sharing Report.—Ralph M. Easley, chairman executive counsel of the National Civic Federation, has announced that the report on "Profit-Sharing by American Employers," which has been in preparation during the last twelve months, is now ready for distribution. This report can be secured at the main office of the federation, 1 Madison Avenue, New York City, for \$2.

Suggestion That Cleveland Railway Build Its Own Cars.—At a meeting of the street railway committee of the Cleveland (Ohio) City Council last week, the proposition of authorizing the Cleveland Railway to build 100 cars in its new shops on Harvard Avenue was discussed. Fielder Sanders, Street Railway Commissioner, said that 100 cars would be needed soon and it was at this point that the plan was proposed of authorizing Terrance Scullin, master mechanic of the company, to bid on the cars with the manufacturers.

Payment on Over-Expenditures Prevents Decrease in Cleveland Fare.—The operating report of the Cleveland (Ohio) Railway for March shows an ordinance surplus of \$85,016, which would have brought the interest fund up to \$738,512, or above the point at which the 1-cent charge for transfers would have been dropped. Under the agreement made with the city some time ago, \$300,000 is to be withdrawn from the fund and applied to the payment of over-expenditures in the maintenance and renewal fund, which will prevent the reduction of fare. Periodical payments on this deferred debt will prevent a change in the fare for some time to come.

Public Service Girls' Basketball Team Wins Championship.—Among the athletic teams under the direction of W. H. Shepherd, athletic manager of the Public Service Railway, Newark, N. J., is a basketball team comprised of stenographers and mileage clerks from the accounting department. William McWalters, who like Mr. Shepherd is in the time-table department, was coach. The team has just won the championship among the girls' team of Central New Jersey, including those from churches of various denominations, the General Electric Works at Harrison, and the Overbrook Insane Asylum (nurses). The Public Service team won eleven out of fourteen games played.

Toledo Conscience Fund Enriched.—The conscience fund of the Toledo Railways & Light Company, Toledo, Ohio, was swelled recently by the largest sum ever turned in. A Toledoan appeared at the cashier's window and handed in \$6. When questioned he stated that it was car fare, and said that his conscience had been bothering him since he learned, through the court's statement, that the company could not operate for 3 cents per passenger. The man is quoted as follows: "I was in the franchise fight two years ago because I really thought the company could do business for 3 cents, and I refused to pay any more. Of course, I rode free like all the rest. As near as I could figure it up, I owed the company about \$6 for free rides." The largest sum turned in heretofore was 25 cents.

Buffalo Suburban Line Negotiating With Employees.—Demands for a substantial increase in wages and changes

in working conditions were made recently upon officials of the Buffalo & Lake Erie Traction Company, operating between Buffalo, N. Y., and Erie, Pa., by platform men, members of the Amalgamated Association of Street & Electric Railway Employees. The company offered an increase of 1 cent an hour, but this was rejected. Several conferences were then held between representatives of the employees and officers of the company, but no agreement was reached and negotiations have been temporarily broken off. The agreement under which the men are now working expires on May 1. The union was organized three years ago at the time of the strike of platform men on the city and interurban lines of the International Railway, Buffalo. The present scale of wages is 23 cents an hour for the first year; 25 cents for the second; 26½ cents for the third; 28 cents for the fourth; 29 cents for the fifth, and 30 cents an hour thereafter. The men are now asking for 25 cents an hour for the first year; 28 cents for the second; 32 for the third, and 35 cents an hour thereafter.

PROGRAM OF ASSOCIATION MEETING

Central Electric Railway Association

A. Benham, president of the Central Electric Railway Association, has announced the midsummer meeting and excursion of that association in a bulletin just distributed from the office of the secretary, A. L. Neereamer, Indianapolis, Ind. A steamer trip is to be made in connection with the June meeting of the association. The meeting will be held on the steamer. The committee in charge has arranged the following itinerary:

The Chicago, Duluth & Georgian Bay Transit Company's steamship South American, one of the finest passenger cruising steamers on the Great Lakes, has been chartered for a three days' cruise for the exclusive use of the association and its invited guests. The South American is scheduled to leave Toledo, Ohio, at 11 o'clock a. m., on June 27. It will proceed from Toledo through Lake Erie and the Detroit River to Detroit, reaching Detroit about 3.30 the same afternoon, and will leave Detroit at 4.30 p. m. It will then proceed through Lake St. Clair, the River St. Clair and Lake Huron, and it is expected to reach the "Soo" at about 12.30 o'clock of June 28. The steamer will proceed through the locks into Whitefish Bay and return and will leave the "Soo" about 4 o'clock in the afternoon. It is expected to arrive at Mackinac Island not later than 5 a. m. on June 29, and to leave there at 10 o'clock the same morning. A stop at Harbor Springs, one of northern Michigan's noted health resorts, will be made from 2 o'clock to 4 o'clock, June 29. The South American will be due at Holland at 7.30 a. m. on June 30. At this point those who desire to do so may take the cars of the Michigan Railway. The steamer will then proceed to Benton Harbor, at which point it will be due at 11.30 a. m. on June 30. This will be the end of the regular cruise, but the steamer will proceed from Benton Harbor to Chicago, where it is due about 4.30 p. m. on June 30.

Tickets for the trip on the steamship, including meals and berth for the three days, from Toledo or Detroit, to Benton Harbor, will cost \$18 each. Those desiring to proceed from Benton Harbor to Chicago may do so upon the payment of 75 cents additional. Children under twelve years will be charged half the full fare. Tickets may be secured from John Benham, vice-president of the International Register Company, 15 South Throop Street, Chicago. The rule of first come first served will be made in making the assignment to rooms. All the rooms on this ship are outside rooms. Checks for the value of tickets should accompany all requests for stateroom reservations and must reach Mr. Benham on or before June 23. The name and address must be given in the application for each person who is to use a ticket. Nearly all the rooms have two berths and applicants for accommodations should indicate with whom they desire to share a stateroom.

The executive committee of the association has directed that any member of the association may invite for the trip any friend he desires. Officers and employees of all electric railway lines within the territory of the association are invited by the association to participate in the trip, whether or not they are members of the association.

Financial and Corporate

ELECTRIC RAILWAY FINANCING

New Issues Decreased \$56,658,600 in 1915, but Gained \$13,115,400 in First Quarter of 1916—Bankers Say They Are Not So Popular as Other Utility Issues

How electric railways share in the new financing in this country is always an important question, but it is even more so now after a year of besetting ills like 1915 and after three months in 1916 with reports of general improvement. To show how these conditions have been reflected in electric railway financing, this journal has made a review of financial statistics contained in the *New York Journal of Commerce*, *The Commercial and Financial Chronicle* and general banking reports, and arranged the data shown in the accompanying tables. In general the results indicate that electric railway financing showed a decrease of \$56,658,600 or almost 30 per cent in 1915 as compared to 1914, but that for the first quarter of the present year the new issues rose \$13,115,400 or about 49 per cent above those of the same period last year. This gain, besides being helped by the general improvement in market conditions, was no doubt primarily caused by the facts that development activity, greatly suspended in 1915, became quickened with the first reports of bettered utility earnings in the last part of 1915, and that to some degree electric railways endeavored to take advantage of the reinvestment market existing at the first of this year on account of the very fat industrial disbursements then made.

It might not be very wise to expect, however, that electric railway new financing will maintain this percentage of increase throughout 1916. Such financing has by no means been completed, of course, as an examination of merely the probable refunding issues for this year will show. In 1916 there are \$80,575,100 of electric railway bond and note maturities, almost all of which will probably be refunded and only a small part of which has been thus cared for during the first quarter. Besides the refunding issues therefore still to come, there will undoubtedly be some actual new financing for additional equipment, improvements and even extensions, as the companies give up their retrenchment policy of the last year. In general, however, conditions in the electric railway field are such that one should expect only a fair improvement at most in an investment market where the prosperous industrials are making themselves felt so strongly.

Before pointing out some of the detailed features of the accompanying tables, it may be said that the figures cover only securities which have been actually issued and were listed by the financial papers mentioned. No foreign loans are included, although these have reached enormous totals and greatly lessened the supply of investment money. Moreover, in separating electric railways from other public utilities an effort has been made to retain in the former group only those companies doing a purely transportation service. On this basis it will be seen from Table I that the steam railroads, the electric railways and the other public utilities all suffered decreases in 1915 as compared to 1914, but the losses were felt more by the last two classes on account of the smaller totals involved, the percentage losses being approximately 12 per cent for steam lines, 30 per cent for electric railways and 32 per cent for other utilities. The net result for the year would have displayed marked corporate economy along development lines if it had not been for the large industrial increase of 193 per cent. This, combined with a slight increase of 2 per cent in municipal issues, gave a small net gain amounting to a little more than 0.4 per cent for the year.

For the first three months of 1916, however, a gain in other-than-industrial lines became evident. Most of the 49 per cent increase for electric railways came in January. Electric railways and other utilities picked up more rapidly than did the steam lines, which continued their losses

through January and February, only to have them more than counterbalanced by the extensive new financing in March. Industrials continued their large increases, so that the complete results for the quarter showed gains in all corporate lines approximately as follows: Steam railroads, 6 per cent; electric railways, 49 per cent; other public utilities, 32 per cent; manufacturing companies, 480 per cent, and miscellaneous, 220 per cent. New municipal issues increased about 3.5 per cent, the net gain for all issues for the quarter being about 57 per cent.

In addition to examining the amounts of new securities recently issued, it may be well to note the various classes of securities utilized by the various groups during the first quarter of 1916, as shown in Table II. With the reports spread broadcast of a favorable bond market, it is not surprising to find that the bond issues at \$340,827,400 led the

TABLE I—NEW CORPORATE AND MUNICIPAL ISSUES*
Calendar Year

Class	1915	1914	Change
Steam railroads....	\$644,793,900	\$738,575,300	—\$93,781,400
Electric railways....	135,423,000	192,081,600	—56,658,600
Other public utilities....	188,457,100	277,158,000	—88,700,900
Manufacturing companies.....	309,186,300	105,545,000	+203,641,300
Miscellaneous.....	157,491,100	123,158,000	+34,333,100
Total corporate issues.....	\$1,435,351,400	\$1,436,517,900	—\$1,166,500
States, counties and municipalities....	475,745,258	466,375,261	+9,369,997
Total issues.....	\$1,911,096,658	\$1,902,893,161	+\$8,203,497

Class	1916	1915	Change
Steam railroads....	\$39,621,000	\$66,360,000	—\$26,739,000
Electric railways....	22,662,500	12,050,000	+10,612,500
Other public utilities....	66,075,400	37,453,500	+28,621,900
Manufacturing companies.....	37,111,200	8,042,900	+29,068,300
Miscellaneous.....	27,306,100	3,700,000	+23,606,100
Total corporate issues.....	\$192,776,200	\$127,606,400	+\$65,169,800
States, counties and municipalities....	53,034,700	31,088,964	+21,945,736
Total issues.....	\$245,810,900	\$158,695,364	+\$87,115,536

Class	1916	1915	Change
Steam railroads....	\$73,823,000	\$163,652,100	—\$89,829,100
Electric railways....	12,479,000	11,307,000	+1,172,000
Other public utilities....	17,875,000	28,525,000	—10,650,000
Manufacturing companies.....	110,027,300	22,342,000	+87,685,300
Miscellaneous.....	89,350,000	38,420,000	+50,930,000
Total corporate issues.....	\$303,554,300	\$264,246,100	+\$39,308,200
States, counties and municipalities....	28,871,951	38,127,500	—9,255,549
Total issues.....	\$332,426,251	\$302,373,600	+\$30,052,651

Class	1916	1915	Change
Steam railroads....	\$147,758,100	\$16,000,000	+\$131,758,100
Electric railways....	5,480,900	4,150,000	+1,330,900
Other public utilities....	42,150,300	29,065,000	+13,085,300
Manufacturing companies.....	35,690,000	1,200,000	+34,490,000
Miscellaneous.....	41,312,500	6,912,000	+34,400,500
Total corporate issues.....	\$272,391,800	\$57,327,000	+\$215,064,800
States, counties and municipalities....	38,331,274	50,881,600	—12,550,326
Total issues....	\$310,723,074	\$108,208,600	+\$202,514,474

Class	1916	1915	Change
Steam railroads....	\$261,262,100	\$246,612,100	+\$15,190,000
Electric railways....	40,622,400	27,507,000	+13,115,400
Other public utilities....	126,100,700	95,043,500	+31,057,200
Manufacturing companies.....	182,828,500	31,584,900	+151,243,600
Miscellaneous.....	157,968,600	49,032,000	+108,936,600
Total corporate issues.....	\$768,722,300	\$449,179,500	+\$319,542,800
States, counties and municipalities....	119,697,925	115,683,900	+4,014,025
Total issues.....	\$888,420,225	\$564,863,400	+\$323,556,825

*This table shows in a combined but slightly rearranged form the statistics originally appearing in the *Journal of Commerce* and *The Commercial and Financial Chronicle*.

list of new issues, while notes at \$206,916,100 and stocks at \$220,978,800 ranked about even. The most encouraging feature from the electric railway point of view is the fact that out of the total of \$40,622,400 of new electric railway issues for the quarter, \$30,859,000 represented bonds. In view of the world-wide unsettled financial state investors are still looking for short-term notes at high interest rates, and some of the electric railways had to meet this demand, although not to the extent of a large total. A few electric railways and other utilities were able to sell some stocks, although naturally the largest portion of the new stock issues is found in connection with the industrials. In general bond issues predominated for the transportation lines, both steam railroads and electric railways, while the industrials favored stocks.

Complete statistics are not available to show the exact average yield for which the various electric railway securities have been put out, but some readers may be interested in a brief mention of certain specific issues. The Chicago City Railway recently sold \$1,000,000 of 5 per cent first mortgage bonds at 99½ and interest; the Chicago Railways, \$1,500,000 of 5 per cent first mortgage bonds at 97½ and interest; the Manhattan Railway, \$4,523,000 of 4 per cent second mortgage bonds at 89 and interest to yield 4.5 per cent; the Schenectady Railway, \$2,256,000 of 5 per cent first mortgage bonds at 101 and interest to yield 4.94 per cent; the Des Moines City Railway, \$2,280,000 of 5 per cent general and refunding bonds at 97½ and interest to yield 5.2 per cent, and the Monongahela Valley Traction Company, \$1,000,000 of 5 per cent first and refunding bonds at 94 and interest to yield 5.45 per cent. The yields on these electric railway bonds, it will be observed, run from 4.5 per cent to 5.45 per cent. The short-term note issues have generally been put out at higher rates, such as the \$750,000 of Winnipeg Electric Railway 6 per cent two-year notes at par and interest; the \$750,000 of Dallas Electric Company 6 per cent five-year terminal notes at 99.5 and interest to

become more discriminating, and bankers now dealing with them have found that this discrimination takes the form of a preference for lighting or other public utility securities or for the securities of companies whose service is of a combined lighting and transportation character.

Many individual electric railway issues, however, still carry their appeal to the investing public and no difficulty seems to have been experienced in placing the purely railway issues recently brought out by the large investment houses. It was remarked, however, that these houses examine carefully all security proposals coming to them, and their very purchase of a particular issue indicates that it possesses certain talking points which will probably enable it to be placed in the competitive market, in spite of the general leaning toward utility issues other than those of electric railways. In other words, the investment banker is said to be confronted with a slight prejudice on the part of his client against electric railway securities, and the ease with which this feeling can be overcome, if at all, depends entirely upon the margin of safety and general prospects that the banker can show for each particular railway property. For this reason the known conservatism exercised by a banker in making his financial investigations will probably find direct reflection in the rapidity of sale for an issue. Investment bankers endeavor to be conservative about all their offerings, but it is felt that this attribute becomes of greater importance when used in connection with issues belonging to a class that has been touched by suspicion in the investor's mind.

The investment bankers with whom a representative of this paper talked generally believed that the comparative unpopularity of electric railway securities is due to fundamental conditions existing in the industry. Electric railways are more in the hands of labor than are other utilities; they are more intimately connected with the public and are therefore held to more drastic rules of operation, and they furnish a commodity which is dispensed with more easily in times of industrial depression than is the commodity supplied, for example, by lighting and water companies. Furthermore, they deal with a business that is restricted, *i. e.*, they are not able, except within very narrow limits, to expand their traffic and increase their receipts through business campaigns and similar efforts, while unprofitable extensions of service may be continually forced upon them. Besides this limitation of paying business, there is the handicap of the fixed fare, combined with increasing burdens of operating cost over which the railways have no control. The combination of all these fundamental factors makes the margin of profit upon which an electric railway operates very small, and causes the carrier to be very susceptible to any influence even temporarily cutting into its earnings. Thus, it is asserted, the competition of the jitneys clearly demonstrated the vulnerability of electric railways, and as a result the investor of to-day feels a lessened inclination to buy electric railway securities unless he is convinced by expert advice that a particular issue is an exception to what he imagines is the rule. This is in quite a contrast, it is said, to the eagerness with which the investor takes up electric lighting, gas and other utility issues about which he has fewer, if any, preconceived derogatory notions.

Of course, there is a more cheerful aspect of the question, for electric railway issues during the first quarter of 1916 have been selling better than last year at the same time, but this may be, it is said, largely only a natural consequence of the general investment improvement in the later period. According to the investment bankers, the feature of the market to-day is a steadily increasing demand for public-utility securities, but more especially those of the electric light and power and gas companies. Electric railway securities have fallen behind in popularity, and if the future holds advanced prices for such issues, the gains, as one banker tersely says, will probably come after other utility gains. Jitney competition has gone, but this is not sufficient. The public must be educated to a realization of what electric railway service really costs, to a willingness to pay adequately for such service and to a knowledge of the need for new railway capital and the attractions that must be offered to the investor in the competitive market. If this can be done, it is thought that the investor may be easier to convince.

TABLE II—CLASSES OF NEW CORPORATE SECURITIES IN 1916

	Bonds	Notes	Stock
<i>January:</i>			
Steam railroads.....	\$33,000,000	\$6,621,000	.....
Electric railways.....	21,350,000	1,100,000	\$212,500
Other public utilities....	9,946,000	52,050,000	4,079,400
Manufacturing companies	550,000	4,750,000	31,811,200
Miscellaneous.....	2,000,000	15,256,100	10,050,000
Total.....	\$66,846,000	\$79,777,100	\$46,153,100
<i>February:</i>			
Steam railroads.....	\$42,538,000	\$15,285,000	\$16,000,000
Electric railways.....	7,229,000	5,250,000	.....
Other public utilities....	17,875,000	.....	.....
Manufacturing companies	50,300,000	20,000,000	39,727,300
Miscellaneous.....	15,200,000	12,000,000	62,150,000
Total.....	\$133,142,000	\$52,535,000	\$117,877,300
<i>March:</i>			
Steam railroads.....	\$82,494,100	\$63,814,000	\$1,450,000
Electric railways.....	2,280,000	.....	3,200,900
Other public utilities....	27,690,300	7,800,000	6,660,000
Manufacturing companies	6,100,000	2,240,000	27,350,000
Miscellaneous.....	22,275,000	750,000	18,287,500
Total.....	\$140,839,400	\$74,604,000	\$56,948,400
<i>Quarter:</i>			
Steam railroads.....	\$158,032,100	\$85,720,000	\$17,450,000
Electric railways.....	30,859,000	6,350,000	3,413,400
Other public utilities....	55,511,300	59,850,000	10,739,400
Manufacturing companies	56,950,000	26,990,000	98,888,500
Miscellaneous.....	39,475,000	28,006,100	90,487,500
Total.....	\$340,827,400	\$206,916,100	\$220,978,800

yield 6.12 per cent; the \$2,300,000 of American Railways 5 per cent three-year notes at 100.5 and interest, and the \$2,750,000 of United Railways & Electric Company 5 per cent five-year notes at 99 and interest to yield 5.25 per cent.

In connection with all the foregoing data, the ELECTRIC RAILWAY JOURNAL has endeavored to ascertain what is the real position of electric railway securities in the present investment market. Interviews with many representative bankers dealing in public utility securities have elicited the general conclusion that electric railway security issues, while not at all discredited in the ordinary sense of the word, are nevertheless not at the present day as attractive as they formerly were. Investors have in recent years

ANNUAL REPORTS

Commonwealth Power, Railway & Light Company

The combined results of operation of the properties of the Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., for the years 1914 and 1915 follow:

	1915	1914	Per Cent Inc.
Gross receipts	\$14,590,123	\$14,006,484	4.17
Operating expenses	6,964,679	6,761,891	3.00
Gross income	\$7,625,444	\$7,244,593	5.26
Fixed charges, including taxes and dividends on outstanding preferred stocks of subsidiary companies	5,329,857	5,000,859	6.58
Net income, available for dividends, replacements and depreciation....	\$2,295,587	\$2,243,734	2.31
Dividends on preferred stock.....	960,000	960,000	...
Balance	\$1,335,587	\$1,283,734	4.04

The new electric railway between Grand Rapids and Kalamazoo was completed early in the year, and passenger service was established between the two cities on May 17, 1915, and also on the line between Allegan and Battle Creek, the electrification of which is fully completed. Freight service was established on Aug. 16, 1915. The passenger terminals are located in the business centers of the respective cities, trains entering Grand Rapids over the company's own right-of-way into its own terminal, located within 600 ft. of Campau Square, the business and hotel center of the city. It is expected that during 1916 a substantial amount of business will be done in the way of handling heavy freight, which would result in a material addition to the company's earnings.

The foregoing statement includes the complete earnings for the calendar year of all properties with the exception of the new railway lines, earnings of which are included from July 1, 1915. The receipts of all the subsidiaries showed a gratifying increase of \$583,639 or 4.17 per cent, while the gross income, owing to a smaller increase in operating expenses, rose \$380,851 or 5.26 per cent. On the other hand, the fixed charges, including taxes, increased \$328,998 or 6.58 per cent, so that the net income gained only \$51,853 or 2.31 per cent. The taxes paid by the company and its subsidiaries during 1915 alone amounted to \$823,776 as compared to \$788,008 in 1914, an increase of 4.54 per cent. This increase would, however, have been materially greater were it not for the fact that during the year several subsidiary companies were combined, greatly simplifying the corporate relations between the holding company and its operating subsidiaries, reducing the number of such subsidiary companies by eighteen and eliminating duplicate payments under the federal law upon income passing from one company to another, thereby effecting a material saving in such taxes.

It is interesting to note that of the increase of \$583,639 in gross receipts the largest amount, or \$519,918, came from electric, heating and water companies. This represented an increase of 10.13 per cent over the preceding year. Gas companies showed increased receipts of \$65,566 or 2.52 per cent, while the old interurban lines had the smallest increase in both amount and percentage, i. e., \$20,123 or 1.16 per cent. The street railway lines lost \$169,171 or 4.30 per cent and miscellaneous railway revenues dropped off \$55,439 or 9.31 per cent. The new interurban lines for their first period of operation showed total receipts of \$202,641. The detailed comparative receipts for the various operating divisions are given in the following table:

	Per Cent of		Per Cent of		Increase	Per Cent Inc.
	1915	Total	1914	Total		
Gas	\$2,670,456	18.30	\$2,604,889	18.60	\$65,567	2.52
Electric, heating and water (a) ...	5,650,816	38.73	5,130,897	36.63	519,919	10.13
Railway—						
Street	3,764,070	25.80	3,933,242	28.08	*169,171	*4.30
Interurban—						
(old) ...	1,762,226	12.08	1,742,103	12.44	20,123	1.16
(new) ...	202,641	1.39	.....	.....	202,640	...
Miscellaneous	539,914	3.70	595,353	4.25	*55,439	*9.31
Total	\$14,590,123	100.00	\$14,006,484	100.00	\$583,639	4.17

*Decrease. (a) Electric sales to subsidiary distribution and railway companies are eliminated.

The year's street railway earnings were adversely affected by operation during the spring and summer months of jitneys in a number of cities. Their operation has, however, fallen off very materially, as reflected in the fact that the earnings for November and December showed increases over the same months of 1914 of 3.99 per cent and 8.27 per cent, respectively, although a portion of this increase should be attributed to generally improved business conditions. The decrease in miscellaneous railway earnings was largely due to the falling off in park and resort business during the summer, owing to the excessive cold and rainy weather during July and August. During 1915 the street railway subsidiaries carried 81,464,051 revenue passengers, a decrease of 4,429,285 or 5.16 per cent, while the old interurban traffic of 8,769,915 revenue passengers represented a loss of 419,186 or 4.56 per cent. The new interurban lines carried 418,047 revenue passengers after their opening.

General Electric Company

The condensed profit and loss statement of the General Electric Company, Schenectady, N. Y., for the twelve months ended Dec. 31, 1915, follows:

Sales billed	\$85,522,070
Cost of sales, including all operating, maintenance and depreciation charges.....	76,898,183
Profit from sales billed.....	\$8,623,887
Interest and discount	\$1,434,269
Income from securities owned	1,554,843
Sundry revenues	694,996
Total	\$3,684,108
Interest on debenture bonds.....	570,086
	\$3,114,022
Net income	\$11,737,909
Dividends paid	8,129,918
Net surplus for the year.....	\$3,607,991
Surplus at Jan. 1, 1915.....	20,084,879
Surplus at Dec. 31, 1915.....	\$23,692,871

The value of orders received by the company for electrical apparatus and devices in 1915 was \$98,385,891, an increase of \$14,637,370 or 17 per cent over that of 1914. This increase was largely due, it is said, to the general revival of business in the latter part of the year. These figures are exclusive of orders for special war munitions, which in 1915 amounted to \$33,980,000. These orders were so restricted as to interfere as little as possible with the regular product of the company. The percentage of profit from these orders will probably be less than that of the average of the company's output.

The total sales billed for 1915 were \$85,522,070 as compared to \$90,467,691 in 1914. The sales billed are not a good basis of comparison, however, on account of unfilled orders that are carried over into another year. For example, if a large volume of unfilled orders had not been carried over into 1914 from 1913, the effect of the general depression of 1914 on the company's business would have been more evident. The real condition of the industry was shown by the fact that in 1914 the value of orders received decreased 25 per cent below the 1913 figure, and in just the same way the improvement in the last year is evidenced by the increase of 17 per cent in the value of the orders in 1915 as compared to those in 1914.

The company followed its customary practice in writing off against income account its total expenditures in 1915 for patents, applications for and licenses under patents and other outlays relating thereto, amounting to \$838,455. The patent account is carried at \$1, as in previous years. Stocks, bonds and other securities are carried at a valuation of \$32,916,593, of which \$19,687,965 represents securities of subsidiary companies, and \$13,228,628 those of public utility and other companies. The current accounts and notes receivable are carried at \$19,619,216.

The sale of several small factories substantially offset the manufacturing floor space added in 1915, and plant expenditures, amounting to \$4,485,068.81, were chiefly for improvements in existing construction and equipment and the purchase of special tools and machinery which are subject to a high rate of depreciation. Because of the nature of these expenditures and on account of the liquidation of the book value of the factories sold the reduction in the plant account for the year was \$5,985,069.

BOSTON ELEVATED REDUCES DIVIDEND

At a meeting on April 24 the directors of the Boston (Mass.) Elevated Railway declared a dividend of one-half of 1 per cent for the quarter ended June 30, making the dividend rate for the fiscal year 5 per cent. The dividend is payable on May 15 to stockholders of record of May 5. The stock fell 68 as a result of the action of the directors. This is a drop of nine points below the April 22 closing quotation. In a statement to stockholders, W. A. Bancroft, president, said:

"On July 26, 1915, near the beginning of the current fiscal year, the directors wrote you as follows: 'The net income of the company has been seriously affected by the large increase in the cost of labor and materials and by the large burdens which have been constantly imposed upon the company, and in the judgment of the directors it is not likely to be sufficient to provide for continuous 6 per cent dividends, unless some relief is afforded either by an increase in the unit of fare or otherwise.'

"The experience of the year has proved this statement to be only too true. We wrote you that the rate of 6 per cent per annum is the rate to which, at least, we believe you are entitled, and we have accordingly paid during the last three years at that rate up to the final dividend for each year, paying in all 5 per cent during the year ending June 30, 1914, and 5.5 per cent during the year ending June 30, 1915. As the last dividend of the year is payable on May 15 to stockholders of record May 5, we are obliged to estimate the earnings of the last three months of the fiscal year to end June 30, 1916, and base the final dividend upon that estimate, having in mind, of course, provision for maintenance, depreciation and other possible increases in operation, calculating, also, as closely as we can, our probable gross income.

"We have concluded that the highest rate we can pay this fiscal year is that of 5 per cent per annum, and have declared accordingly a dividend of one-half of 1 per cent (50 cents) for the quarter ending June 30, 1916, making, with the 4.5 per cent heretofore paid, 5 per cent for the year. We have retrenched in our operating as far as is consistent with safety and the accommodation of our patrons. The constant increase in the cost of labor, of material, of rental and interest is felt, of course, in the net which we are able to show. We repeat that in order to provide sufficient net earnings the company must have some relief, 'either by an increase in the unit of fare or otherwise.'"

ELECTRIC RAILWAY EARNINGS IN 1915

In its annual review of the electric railway industry *The Commercial & Financial Chronicle* of April 22 reports that the influence of jitney competition for 1915 seems to have been comparatively slight for the industry as a whole. Moreover, the losses to the electric lines from this source are said to have occurred almost entirely in the first six or seven months of the year, the situation in the closing months being radically changed for the better. For the railways as a whole it seems that the gross earnings for 1915 were only a trifle lower than in 1914, and the falling off in net earnings was also relatively small.

From the annual reports of 272 companies it has been calculated that the gross earnings in 1915 were \$513,967,674 as compared to \$514,028,402 in 1914, a decrease of \$60,728 or 0.01 per cent. Of the 272 lines 148 showed decreases in gross aggregating \$10,726,907. The net earnings for the entire group were \$194,893,975 in 1915 and \$196,921,712 in 1914, a decrease in this case of \$2,027,737 or 1.03 per cent. In all 131 companies reported decreases in net to an extent of \$10,937,946. In 1914 the gross earnings were able to show a slight increase of 0.87 per cent, with a decrease of 0.53 per cent in net. The poorer showing of the electric railways in the last calendar year is thus evident.

Besides the railways previously mentioned eighteen companies reported on gross earnings alone. Thus for 290 lines the gross earnings totaled \$530,682,406 in 1915 as compared to \$531,077,160 in 1914, a decrease of \$394,754 or 0.07 per cent. By using for these eighteen companies the average operating ratios of the 272 lines, it is calculated that the aggregate net earnings of the 290 companies reached \$201,-

232,201 in 1915 as compared to \$203,453,091 in 1914, this being a decrease of \$2,220,890 or a little more than 1 per cent. If there are included also the companies reporting for the year ended June 30, the decrease for 344 lines becomes 0.28 per cent for gross earnings (total in 1915, \$567,901,652), and 1.43 per cent for net earnings (total in 1915, \$214,319,303). These showings are poorer than those of 1908, which was by far the worst year between 1905 and 1913, inclusive. The year 1915 is the first one showing decreases in both gross and net, and the only other decrease at all was in net in 1914.

Cities Service Company, New York, N. Y.—A syndicate consisting of Montgomery, Clothier & Tyler; Kissel, Kinnicut & Company; J. & W. Seligman & Company, and White, Weld & Company, is offering at par and interest, yielding 6 per cent, a new issue of \$14,000,000 of first mortgage and collateral trust sinking fund 6 per cent gold bonds of the Empire Gas & Fuel Company dated May 1, 1916, due on May 1, 1926. The payment of principal, interest and sinking fund installments is unconditionally guaranteed by the Cities Service Company.

Detroit (Mich.) United Railway.—The Detroit United Railway has declared a quarterly dividend of 1¾ per cent, payable on June 1 to stock of record May 16. This places the stock on a 7 per cent basis, being an increase of one-quarter of 1 per cent over previous quarterly declarations.

Northern Electric Railway, Chico, Cal.—The reorganization committee of the Northern Electric Railway on April 13 adopted a resolution to file an application with the California Railroad Commission requesting a hearing on the readjustment plan. This is taken to amount in effect to a declaration of the plan as being operative. The time for making deposits has been extended one month to May 15.

Public Service Corporation of New Jersey, Newark, N. J.—The financial statement for March issued by Public Service Corporation of New Jersey shows a gross increase in business amounting to \$491,610, over March of the previous year. This represents a gain of 17 per cent. The balance available for amortization, dividends and surplus, after payment of operating expenses, fixed charges, sinking fund requirements, etc., was \$380,205. The increase in surplus available for dividends over the corresponding month of 1915 was \$167,802. For the three months ended March 31, 1916, the gross increase in total business was \$1,229,242. The balance available for amortization, after payment of operating expenses, fixed charges, sinking fund requirements, etc., was \$1,212,927. The increase in surplus available for dividends over the corresponding period of 1915 was \$303,557.

Scioto Valley Traction Company, Columbus, Ohio.—The Ohio Public Utilities Commission has approved the request of the Scioto Valley Traction Company to issue \$200,000 of preferred stock, the proceeds to be used to purchase a similar amount of stock of the Columbus Depot Company, which will erect a depot in Columbus. The stock must be sold at not less than 97 and the proceeds must be invested in the depot stock at not less than 97. The stock of the depot company is to be held in the treasury of the traction company and not sold, except by authority of the commission.

Southern Traction Company, Inc., Bowling Green, Ky.—Application has been made for the appointment of a receiver for the Southern Traction Company, Inc., which recently succeeded the Bowling Green Railway.

United Railways, St. Louis, Mo.—Application has been made by the United Railways to the Missouri Public Service Commission for authority to issue \$1,000,000 in bonds, each upon the Merrimac River Railroad and St. Louis & Suburban Railroad, owned and operated by the United Railways. The bonds are to be issued under a general mortgage upon the properties of the companies with the Mississippi Valley Trust Company as trustee. The mortgages were executed in 1903. The quarterly report of the company for the three months ending March 31, as filed with the city register, shows an increase of approximately 3,500,000 in the number of passengers carried, as compared with a similar period last year. The company carried a total of 56,951,611 passengers in the three months, of whom 1,040,879 were half-

tending to show that the jitneys would not seriously injure the business of the railway. He read from the company's testimony to show that the net reduction in revenue during the last year was only \$200,000 and that the company had still been able to show a profit of \$900,000 on its operations.

All of the commissioners present took an active part in the arguments. At the close of the hearing Commissioner Emmet, who presided, announced that Charles R. Barnes, the electric railway expert of the commission, had made the most elaborate and extensive survey of transit conditions in Rochester that had ever been made in New York. Mr. Emmet said that though not a matter of testimony the commission would, of course, be guided in its decision largely by these figures and other data gathered by its own expert.

LOW FARE ORDER RESCINDED

Railroad Commission of Wisconsin Restores Superior Fares, Which Were Reduced in 1912.

The Railroad Commission of Wisconsin issued an order on April 20 rescinding the order of the commission made on Nov. 13, 1912, under which the Duluth-Superior Traction Company was required to reduce fares in Superior. In its rescinding order the commission says:

"The respondent, it appears, has reached the stage when improvements in the service, especially extensions, are required. There has been relatively only a small increase in the track mileage for the last twelve years, or since 1904, while the population, it is estimated, has increased 30 per cent and passenger traffic in the neighborhood of 80 per cent during that time. These increases compared with the increase in track mileage of from 21.55 miles in 1904 to 23.54 at present, an increase of a little more than 9 per cent, indicate the situation to a certain extent. The most urgent extension at present which the public demands and the company is desirous of making is the one to the dock front involving an estimated cost in excess of \$90,000.

"It is fair to estimate that when all the needed improvements in the service have been made and the paving obligation fulfilled, from \$125,000 to \$175,000 will have been added to the plant value within the next few years. Upon the basis of the net earnings for the period 1910-1915 inclusive the rate of return upon the increased plant value will slightly exceed 6 per cent."

The commission points out that prudence would indicate that the public desired these improvements rather than a decrease of railroad fare. Extensions would be impossible unless the reduced-fare order were rescinded. The order is rescinded on the understanding that the improvements mentioned are to be made.

The original order of the commission, issued on Nov. 13, 1912, fixed the rate of fare in Superior at six tickets for 25 cents. No reduction was ordered in the cash fares. The original order and the decision were reviewed in a six-page article which appeared in the *ELECTRIC RAILWAY JOURNAL* of Nov. 23, 1912, page 1067.

JITNEY LICENSING BILL FOR MASSACHUSETTS

After extended deliberation the committee on mercantile affairs has introduced a bill into the Massachusetts Legislature providing for the licensing and regulation of motor vehicles carrying passengers for hire and not running on tracks or rails. Under the terms of the bill municipalities may impose reasonable license fees, make regulations for the operation of such vehicles within their own limits, and impose suitable penalties for the violation of such regulations, provided, however, that no such motor vehicle shall thus be operated until the proprietor of the business in which it is to be operated shall have executed and filed with the treasurer of such city or town, and renewed or increased from time to time as may be required, a bond running to such treasurer and approved by him, in such sum as the municipality may reasonably require, conditioned to pay any final judgment against the principal named in the bond for any injury to person or property, or damage causing the death of any person by reason of any negligent or unlawful act on the part of the principal, his or its agents, employees or drivers in the use or operation of such vehicle. Any person injured or damaged may sue on this bond in the name of such city or town treasurer, and damages so recovered shall

go to the person injured or damaged. The bill is to take effect in cities upon its acceptance by the city council and in towns upon its acceptance by the voters. The bill was passed by the House on April 20.

M'KINLEY LINES ASK INCREASE IN FARES

H. I. Green, general solicitor of the Illinois Traction System, appeared at a public hearing before the Aldermen of St. Louis, Mo., on the night of April 18 on the proposed ordinance to permit the company to increase the fare between St. Louis and the tri-cities and also to grant it certain track rights. Mr. Green said that since the completion, five years ago, of the McKinley Bridge, over which the lines operate into St. Louis, they have been run into that city at a loss. Mr. Green expressed confidence in the willingness of the Aldermen of St. Louis to deal fairly with the company, and said that the company would "throw all of its cards on the table." Additional freight facilities were needed by the lines. The rates asked and on file with the Interstate Commerce Commission were not remunerative at present, but could probably be made so if the facilities in St. Louis were increased. An agreement was finally reached with the Aldermen by which the company will not oppose a delay of a month, if necessary, to give the city and the members of the board time to reach a decision as to whether the rate question can be solved by a new ordinance or the presentation of evidence before the Interstate Commission.

The hearing before Examiner Wilbur La Roe, Jr., of the Interstate Commerce Commission in regard to the increase in fares proposed by the Illinois Traction System over the St. Louis bridge was commenced at the Planters' Hotel, St. Louis, on April 22. B. E. Bramble, general auditor of the Illinois Traction Company, testified in regard to the losses sustained by the company since 1910 in the operation of the bridge. He said that in 1915 the Illinois Traction Company advanced to the bridge and terminal company \$153,000. Mr. Bramble estimated that even if the advances as now on file with the commission were allowed, there would still be a deficit in the operation of the line into St. Louis.

Mr. Green for the company said that it was hoped through the increase in fares asked of the commission and by the intensive development of both the passenger and freight business to overcome the deficit at which the company was now operating. He said that when the present rate was established the fare in Illinois was 3 cents a mile, but that it had since been reduced to 2 cents. This had materially affected the earnings.

E. D. Bell, superintendent of the local lines of the company, said that the proposed increase would affect 82 per cent of the patrons of the entire system, but that 59 per cent of these would be furnished with commuters' books containing tickets good for fifty-two rides for \$3. This would make the increase of fare for all workers on the East Side less than 1 cent. The tickets contained in these books would be good between 5 a. m. and 8 a. m. and between 4 p. m. and 6.30 p. m. Others who crossed the bridge at times not specified in the tariff schedule proposed by the company would be furnished with six rides for 50 cents. The occasional passenger would be the only one to pay an additional fare of 5 cents to go beyond Venice.

At the continuation of the hearing on April 24 both Mr. Green and L. E. Fischer, a consulting engineer of St. Louis and former general manager of the Illinois Traction System, testified. Mr. Fischer said that it was extremely unlikely that any extension of the present facilities could be made unless fares were increased so as to provide additional revenue. He also said that the bridge had been built with the expectation that it would develop business between central Illinois points and St. Louis. This had proved not to be the case. He said that the Illinois Traction System by city ordinance was limited for freight service to the use of a parcel of land belonging to it near the bridge; that its freight trains were limited to two cars each, and that the company was prohibited from bringing a car of a steam road west of Ninth Street. He reviewed the efforts made to obtain the passage of an ordinance to authorize the company to occupy half of Hall Street near the bridge so that physical connection could be made with the line of the Terminal Railroad Association. Only 150 ft. of track was needed to make this connection.

BAY STATE FARE HEARINGS CONTINUING

Cross-examination of R. M. Feustel, valuation expert of the Bay State Street Railway, Boston, Mass., was the outstanding feature of the fare hearings before the Public Service Commission during the week ended April 29. The time was largely occupied by counsel for the remonstrants to the proposed fare increase in endeavoring to secure the assent of the witness to various theories bearing upon the treatment of depreciation. At a recent session Chairman McLeod stated that B. J. Arnold, who has been employed by the commission to make an independent investigation of the Bay State property, will shortly complete his report and that he will probably be present for examination as a witness in the future. Counsel James F. Jackson, for the petitioners, stated that President P. F. Sullivan and other officials of the company will testify in the case if needed.

In the course of the hearings Mr. Feustel stated that no definite standards of overhead charges during construction can be cited as accepted by all electric railways. In a study of rolling stock depreciation on the Bay State system it was found that the average age of single-truck open cars was 14.9 years. Attempts on the part of the remonstrants to make the witness commit himself relative to the feasibility of using one-man cars on the Bay State system were generally unsuccessful. The witness maintained that he had not conducted an investigation of the road from the traffic point of view, but that he and his staff had confined their work almost entirely to the valuation of the Bay State property. In the course of the hearings the point was brought out that the open type of car has not entirely gone out of fashion and that the Public Service Railway of Newark, N. J., will shortly complete a number of such cars.

Freight Service Proposed for Cleveland Suburban Line.—A daily freight service will be inaugurated by the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, early this summer.

Massachusetts Commission Suspends Fare Increases.—The Public Service Commission of Massachusetts has suspended the proposed fare increases on the Bristol & Norfolk Street Railway and the Massachusetts Northeastern Street Railway from May 1 to July 1, and has suspended the proposed increase on the Bay State Street Railway from May 1 to Sept. 1.

Hoboken Fare Hearing Continued.—At the sessions on April 19 and 20 before the Board of Public Utility Commissioners of New Jersey in Jersey City on the application before the commission to require the Public Service Railway to operate at a 3-cent fare in Hoboken counsel for the company cross-examined witnesses for the city as to the methods which were pursued in reaching their conclusions with respect to property values and the number of passengers carried. The case will be continued on May 24 and 25.

Detroit Experimenting With Transfer Printing Machine.—The Detroit (Mich.) United Railway is experimenting with a new transfer printing machine on one of the Hamilton line cars. The machine prints from a roll of white paper, does away with all punching and is expected to enable the conductors to issue transfers more expeditiously than under the old way. Where double transfers are requested, under the rules the transfer issued will be stamped "transfer," and on its surrender to the conductor of the second car a transfer to the final line will be issued.

Bus Rights Granted in Watertown.—The Public Service Commission for the First District of New York has granted a certificate of public convenience and necessity to the Watertown Transportation Company for the line of buses which it has been operating for a number of years through the residential section of Watertown, and for which certificate it applied after gaining the consent of the municipal authorities under the jitney law passed last year. As the Black River Traction Company does not operate in the district served by the buses it made no objection to the granting of the certificate.

Arranging Through Rates Out of Louisville.—The Board of Trade of Louisville, Ky., has issued a statement as follows: "All of the eight or ten electric railways in interest, with one exception, have practically agreed on rates out of

Louisville to northern Indiana and southern Michigan and on the division of these rates among themselves. The only exception is our Louisville end of the line and the companies there have submitted a different proposition to the lines for discussion. As soon as the difference shall have been adjusted we will have through traffic arrangements with every electric railway running out of Indianapolis."

Seattle Heating Case Concluded.—At the hearing before the State Public Service Commission in Seattle, Wash., on April 17, G. A. Richardson, superintendent of railways of the Puget Sound Traction, Light & Power Company, stated that the company planned to expend \$7,500 in putting sashes and windows on the rear ends of open cars. He expressed the opinion that this would give better results than the same amount expended in heaters. It was conceded by the proponents of heating in cars that heaters were unnecessary in cars running on short-haul lines. J. B. Howe, attorney for the company, offered to show that the earnings of the company were only a little more than 3 per cent on the investment. He was overruled by the commission. Chairman C. S. Reynolds stated that the question before the commission was one of service and not of rates. The case was then concluded.

One-Man Cars Approved for Lockport.—Opposition to the operation of one-man cars in Lockport on the International Railway has been withdrawn by the City Council, and plans and specifications for the construction of a new passenger terminal in Lockport for the Buffalo & Lockport; Lockport & Olcott and Buffalo, Lockport & Rochester interurban lines are now being made. This settlement brings to an end a four-year controversy between the city and the railway company. After the adoption of the ordinance the International Railway obtained an injunction, and the matter is still pending in the courts. The action on the part of the City Council rescinding the ordinance ends the litigation in the courts. A referendum vote of members of the Lockport Board of Trade made recently showed almost unanimous sentiment in favor of one-man cars because of the frequency of the service over all lines.

Janitors Become Traffic Guardians.—Louisville papers have been printing the recent news article carried by the ELECTRIC RAILWAY JOURNAL on the proposal that janitors of public schools be authorized to serve as traffic officers while school children are going to and coming from schools. It was used as favorable expert comment on the idea and has been credited with helping the decision of the Board of Education and the Board of Public Safety to give the plan a trial at four of the schools of the city where conditions are typical. These are yet to be selected. The plan will be tried out during the remainder of the present school year and if it proves practicable it is said that the system will likely be extended next year to all schools where passing vehicles constitute a menace. In this connection the Board Commissioner of Public Safety at Lexington, Ky., has provided traffic policemen who will take their stands near the Johnson and the Maxwell public schools during the noon recesses and at the hours of closing in the afternoons. This precaution is, however, principally to protect the children from the danger of passing automobiles.

Jitney Victim Fails to Recover from Railway.—In Judge Kavanaugh's court at Portland, Ore., on April 14, a jury brought in a verdict entirely exonerating the Portland Railway, Light & Power Company from responsibility for injuries to a woman incurred in a collision between a street car and a jitney. The woman who sued was one of five jitney passengers more or less badly injured. A sixth passenger was killed. The jitney driver, prior to engaging in that business, had never operated an automobile in his life. He had been running his car six weeks when the accident happened. It had been raining the morning of the accident. The jitney was not equipped with chains. The pavement was slippery and the driver had to seek the cobblestones between the tracks for traction. He turned into the tracks ahead of a car moving south and lost control of his automobile a few feet in front of another car moving north. The inevitable collision carried the automobile backward 40 ft. against the car coming from the opposite direction. The case was the first in Portland in which a jitney victim sought to recover from the street railway. The suit was for \$25,000.

Personal Mention

Mr. Joseph R. Sterling, for the last eight years chief engineer of the Inter-Urban Railway and the Des Moines City Railway, Des Moines, Iowa, has resigned to become associated with the Des Moines Asphalt Paving Company.

Mr. Bion J. Arnold, chairman of the Board of Supervising Engineers, Chicago Traction, has been appointed a member of the Federal Naval Consulting Board to succeed Mr. Henry A. Wise Wood, resigned. Mr. Arnold received this appointment as a member of the American Society of Aeronautical Engineers. He is also a member of the National Reserve Corps of Engineers, organized by the American Society of Civil Engineers.

Mr. J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, Joliet, Ill., has been elected president of the Universal Concrete Products Company, Chicago, Ill., formed to manufacture concrete poles for railway and lighting companies. Mr. Blackhall will not resign as general manager of the Chicago & Joliet Electric Railway, but will devote most of his time to organizing and putting the new company in operation.

Mr. W. H. Wood has been appointed superintendent of power plants of the Baltimore & Ohio Railroad, with headquarters at Baltimore, succeeding Mr. T. F. Foltz, resigned. Mr. Wood was formerly with the American Writing Paper Company, Holyoke, Mass., where he had charge of the steam boiler plants. He was born in October, 1875, and was graduated from the University of Arts and Sciences in 1898, following which he was connected with the Standard Steel Company, at Burnham, Pa. From July 1, 1899, to May 1, 1914, he was associated with Mr. A. C. Wood, a consulting engineer.

Mr. W. H. Heun, superintendent of transportation of the Chicago & Joliet Electric Railway, Joliet, Ill., has been appointed general superintendent of the company and will take over some of the duties formerly handled by Mr. J. R. Blackhall, general manager. He will have complete charge of the property in Mr. Blackhall's absence. Mr. Heun has been with the Chicago & Joliet Electric Railway more than twenty-one years. He started with the company as a conductor. Later he accepted a clerical position in the receivers' office, was advanced to receiving clerk, then to cashier, and was appointed superintendent of transportation in 1903.

Mr. John H. Lucas, who has been connected for many years with street railway and electric light companies in Kansas City, Mo., has been elected president of the Kansas City Light & Power Company. Mr. Lucas established a law office in Kansas City in 1879, the firm name being Johnson & Lucas. He early became identified with the legal department of the street railway, becoming general counsel for the cable railway and later for the other street railway organizations as consolidation was effected, being counsel for the Metropolitan Street Railway since 1902. When the Kansas City Electric Light Company was organized in 1884, he became counsel for that company. He continued as legal adviser for both companies through the recent receivership, handling the usual detail of legal work and assisting in the reorganization plans.

Mr. E. Fears has just been placed in charge of the maintenance of electric equipment on the Chicago, Milwaukee & St. Paul Railway, with headquarters at Deer Lodge, Mont. Mr. Fears is a graduate of Purdue University and subsequent to graduation he served as a machinist's apprentice on the Denver & Rio Grande Railroad, later becoming roundhouse foreman on the New York Central Railroad. When the latter railroad commenced operation of its electric zone in 1905, he was made general foreman of electric equipment, in which position he remained until two years ago, when he went with the Portland, Eugene & Eastern Railway to take charge of rolling stock maintenance. Recently the scope of his duties was extended to include the rolling stock of 200 miles of steam operated track of the Southern Pacific Railroad. On the Chicago

Milwaukee & St. Paul Railway he will be responsible for the electric locomotives operated over 440 miles of route, constituting the most extensive electrification in the world at the present time.

Mr. C. B. Wells has resigned as assistant to the manager of the Denver (Col.) Tramway, and has accepted the position of publicity manager with the Knight-Campbell Music Company, Denver, one of the largest and best-known music concerns in the West.

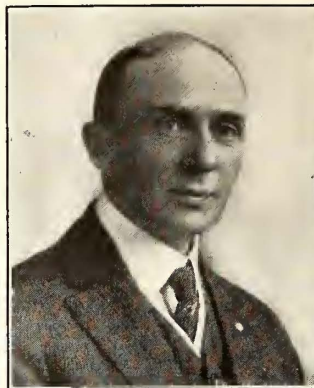


Photo by Kirkland Studio
C. B. WELLS

Mr. Wells was in the employ of the Denver Tramway and its predecessors for more than twenty years. He held the positions of general office man, chief clerk, superintendent of transportation and assistant to the general manager. As assistant to the general manager, to which position he was promoted on June 1, 1914, he assumed charge of the editorial work and management of the *Tramway Bulletin*. This line of activity fell naturally within his ken, for he had always taken the greatest interest in the trainmen, their clubs and their general welfare. Mr. Wells has been deluged with expressions of kindly feeling from the trainmen, and it has been a pleasure to him to know that he had the loyalty of the men and that their relations with the operating department were so cordial. His numerous private interests in Denver and his ranch rendered it impossible for him to consider railway employment elsewhere.

Mr. Richard T. Sullivan, whose appointment as manager of railways of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, was noted in the *ELECTRIC RAILWAY JOURNAL* of April



R. T. SULLIVAN

15, was born in Newton, Mass., and was educated in the public schools there, the Massachusetts Institute of Technology and Harvard University, taking the degree of electrical engineer at Harvard in 1906. He has since been identified with Stone & Webster and for the last eight years has been general superintendent of the city and interurban railways of the Houston (Tex.) Electric Company. In addition to his duties in that position he has been engaged in various investigations and reorganizations

which have necessitated his absence from Houston for extended periods. This work has taken him throughout the Pacific states and to many of the principal cities of the North and East. During his residence in Houston Mr. Sullivan made a host of friends. He took an active part in civic affairs and was prominent in the club and social life of the city. The properties at Youngstown with which Mr. Sullivan has become connected comprise about 200 miles of interurban and street railway lines extending in two states and serving principal centers. The city railways are located in Warren, Niles and Youngstown, Ohio; and New Castle and the Sharon district in Pennsylvania. In addition to these centers the suburban and interurban lines serve Lowellville, Leavittsburg, Girard, Struthers, Mineral Ridge and Poland in Ohio; and Farrell, Wheatland, West Middlesex and Sharpsville in Pennsylvania, including intervening territory in the Mahoning and Shenango valleys in Ohio and Pennsylvania. This territory is the center of an important iron and steel district extending up the valleys of the two rivers and is about 300 miles in extent.

Construction News

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

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

RECENT INCORPORATIONS

***Choctaw Power & Light Company, Portland, Me.**—Incorporated to construct and operate railways. This company will presumably succeed to the property of the Choctaw Railway & Lighting Company, sold under foreclosure on April 8. Capital stock, \$1,250,000. Incorporators: S. I. Gould, C. H. Tolman, J. T. Fagin and S. D. Rumery, Portland, and E. L. Jones, Gorham.

***Dayton, Middletown & Cincinnati Traction Company, Dayton, Ohio.**—Incorporated to construct an electric line between Cincinnati and Dayton via Sharonville, Westchester, Germantown, Reading and Bond Hill. Among those interested in the proposed line are J. G. Miller, Westchester; Ben Horwitz, Middletown; L. T. Palmer, Middletown; G. A. Anderson, Monroe, and R. H. Billingslea, Bethany.

FRANCHISES

Hartford, Conn.—The Connecticut Company has asked the Council for a franchise to double track Park Street between John and Laurel Streets and Capitol Avenue between Park Terrace and Sigourney Street.

Atlanta, Ga.—The Georgia Railway & Power Company has asked the Council for a franchise to construct an extension from its line on North Boulevard, near Tenth Street, along the Boulevard to Orme Circle.

Columbus, Kan.—The Oklahoma & Interstate Railway has received a franchise from the Council to construct a line in Columbus. John R. Rose, Oklahoma City, president. [Nov. 27, '15.]

Detroit, Mich.—The Highland Park & Royal Oak Railroad has been granted a franchise by the taxpayers to construct a line from Highland Park to Royal Oak. Robert E. Barber, Highland Park, is interested. [April 1, '16.]

Cincinnati, Ohio.—The West End Rapid Transit Company has received a franchise from the Council to construct and operate a line between Anderson's Ferry and the west line of Race Street at the intersection of Third Street, in the heart of the business district. This line will give the Cincinnati, Lawrenceburg & Aurora Electric Street Railway an entrance to the city. [April 1, '16.]

Green Bay, Wis.—The Green Bay & Eastern Railway has asked the Wisconsin Railroad Commission for a certificate of necessity and convenience for the construction of its proposed line from Green Bay to Manitowoc, with extensions eventually north to Sturgeon Bay and south to Sheboygan. William M. Willinger, Manitowoc, president. [Feb. 12, '16.]

TRACK AND ROADWAY

Birmingham Interurban Development Company, Birmingham, Ala.—Surveys have been begun of this company's proposed line from Birmingham to the Warrior River and Jasper. The first survey work is being done from Nichols' Fish Trap to Jasper under the supervision of C. J. Rogers, engineer. The company, it is reported, will probably accept the survey made by City Engineer Julian Kendrick and County Engineer George H. Clark for the route from Birmingham to Nichols' Fish Trap. [April 15, '16.]

Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala.—This company reports that it expects to purchase slides, swings and amusement outfits at once.

Calgary (Alta.) Municipal Railway.—Commissioner Graves has estimated that the cost of constructing an extension to the Sarcee Military Camp will be \$6,000.

Martinez & Concord Interurban Railway, Martinez, Cal.—The Martinez & Concord Interurban Railway has filed with the Railroad Commission of California an application for authority to issue 1050 shares of its common stock at not less than \$45 a share; \$125,000 face value of its first mort-

gage bonds at not less than \$90, and \$125,000 of its cumulative participating stock at not less than par. The stock is to be issued only as an equivalent amount of first mortgage bonds is paid and cancelled. The company also asks to issue to Clifford McClellan for promotion services 201 shares of its common stock. The company proposes to locate its main line along Escobar Street and Peyton Road, to the easterly limits of Martinez at Fairview; thence over private rights-of-way to the Associated Oil Company's plant near Avon, thence to a connection with the Oakland, Antioch & Eastern Railway and Bay Point & Clayton Railway at Government Ranch, 2 miles south of Bay Point, and 3 miles north of Concord. The total length of the proposed line is 6½ miles. It is for construction of this railroad that authority is asked for the securities mentioned above, and the bonds are proposed to be issued under a deed of trust to the Merchants Trust Company of San Francisco.

Atlanta & Anderson Electric Railway, Atlanta, Ga.—Surveys have been begun of this company's proposed line from Atlanta to Anderson, S. C. J. L. Murphy, Atlanta, is interested. [March 25, '16.]

***Blue Ridge, Ga.**—Plans are being considered to construct an electric railway from Blue Ridge to Copper Hill. H. P. Mulkey, Blue Ridge, is interested.

Chicago, Peoria & Quincy Traction Company, Peoria, Ill.—At a recent meeting held in Quincy directors of the Chicago, Peoria & Quincy Traction Company authorized the president and secretary of the company to enter into a contract with A. C. Black and E. S. Woolner of Peoria to finance and build the road. The proposed electric line has been surveyed and the right-of-way secured. John L. Soebbing, Quincy, president. [Aug. 14, '15.]

***Tampico, Ill.**—Plans are being made to construct an electric railway from Tampico to Geneseo. W. T. McCaskey and E. L. Tobie, Chicago, are the promoters.

***Valley Traction Company, Elkhart, Ind.**—It is reported that this company will construct a 9-mile interurban line. H. E. Bucklin, Elkhart, president.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company will extend its line west on Main Street to Berry Street instead of Barr Street, as was originally planned.

Hutchinson (Kan.) Interurban Railway.—In order to maintain street car traffic on Fourth Avenue East while the street is being paved, the Hutchinson Interurban Railway will construct about 1 mile of track on that street. It is intended to pave one-half of the street at a time, and the temporary track will be laid on one side while the portion of the paving, including the regular car track, is being laid.

McComb & Magnolia Light & Railway Company, McComb, Miss.—A report from this company states that it is now building 11 miles of track on its proposed line to connect Summit, McComb, Fernwood and Magnolia. S. M. Jones, Laurel, president. [March 25, '16.]

Kansas City (Mo.) Railways.—This company is reconstructing its Brooklyn Avenue line. Temporary tracks have been laid between the permanent track and the curb, and street railway traffic has not been interfered with.

Mexico Investment & Construction Company, Mexico, Mo.—At a recent meeting of the Commercial Club of Mexico a resolution was made to offer the Mexico Investment & Construction Company \$7,500 to place in operation its 4½ miles of line south of Mexico and to extend the line as far as Brown's Corner, 12 miles.

St. Louis & Jennings Railway, St. Louis, Mo.—This company, organized about four years ago with a capital of \$15,000, operating an electric line between Jennings and Pine Lawn, St. Louis County, recently increased its capital to \$300,000, with a view to extending its lines to the business district of St. Louis. The road will soon ask the city for a franchise to enter the city near Wellston. The road is 2½ miles long and is operated by electric power from the Mississippi River dam at Keokuk, Iowa. The extension would cost \$125,000 and add 5 miles to the line. Pine Lawn is 1½ miles north of Wellston. The road holds a franchise for 1½ miles of line in north St. Louis. The company is also considering an extension to Ferguson, 2¾ miles north of Jennings.

United Traction Company, Albany, N. Y.—This company has completed plans for improvements in Albany this summer to cost about \$60,000. The plans include the reconstruction of track and repaving in Washington Avenue between Eagle and Lark Streets and in Lark Street between Washington Avenue and Madison Avenue. The company will spend about \$35,000 upon similar work in Troy within the next few months.

New York Municipal Railway, Brooklyn, N. Y.—The Public Service Commission for the First District of New York on April 20 adopted the plans and forms of contract for the construction of three lines of the five sections of the Fourteenth Street-Eastern District transit line for operation by the New York Municipal Railway Corporation under the dual system contracts. Bids for Section No. 4 will be opened on May 16, for Section No. 1 on May 18 and for Section No. 5 on May 22. Each section must be completed sufficient for operation within twenty-two months from the delivery of the contracts, although twenty-six months will be allowed for the completion of all other work. The contract on the tunnel section was let two months ago and work was begun on the Brooklyn side two weeks ago.

Columbus Railway, Power & Light Company, Columbus, Ohio.—This company has asked permission of the State Board of Agriculture to lay double tracks on East Eleventh Avenue for a distance of about 900 ft. for the purpose of improving the transportation service to State fair patrons. It also asks that a loop be built on the fair grounds. This will probably be necessary because of the fact that the Big Four Railroad at that point expects to eliminate the grade crossing on Eleventh Avenue.

Dayton, Ohio.—Plans are being considered by the Cincinnati, Hamilton & Dayton Railway to operate electric motor trains on its branch between Dayton and Mandale, extending through Delphos and Spencerville.

Hillsboro, Cynthiaana, Bainbridge & Chillicothe Traction Company, Hillsboro, Ohio.—A meeting has been called for May 15 for the purpose of electing a new board of directors and increasing the capital stock of the company to \$500,000. Work on the construction of the proposed line from Hillsboro to Chillicothe will be begun within a few months. [March 25, '16.]

Sand Springs Railway, Tulsa, Okla.—This company has awarded a contract to J. S. Greer, Sand Springs, for the construction of 4 miles of second track from Crib Siding to Tulsa, including a steel span bridge 50 ft. long near Tulsa.

Southern Oregon Traction Company, Medford, Ore.—The city of Medford has proposed a substitute plan for the construction of an electric railroad from Medford to the Blue Ledge mine and this proposal, it is reported, has been accepted by the Bullis interests, which have agreed to take over the line upon its completion. According to the new plan, the city will bond itself for \$300,000, but the proceeds will be devoted to the construction of the line instead of partly going to purchase the railway now operating between Medford and Jacksonville. The Southern Oregon Traction Company agrees to pay the interest on the city bonds thus issued, and to purchase the bonds from the city at the end of five years.

Philadelphia, Pa.—The work of placing the steel columns for the Frankford Avenue elevated line has been begun at Front and Callowhill Streets. Work on the superstructure from Callowhill Street to Girard Avenue must be completed by May 13. The contract for the entire line is divided into sections and must be completed by Oct. 31. The cost of the first section, on which work is now in progress, is \$261,400. The remainder is to cost \$1,488,600.

Temple & Marlin Interurban Railway, Temple, Tex.—The Marlin-Temple Interurban Promotion Company has been chartered to construct this company's line between Marlin and Temple. S. D. Hanna, Temple, engineer. [Jan. 29, '16.]

Appalachian Power Company, Bluefield, W. Va.—Work has been begun by this company on the construction of an extension of its line on East Princeton Avenue from Lee Street to the county road bridge, where it will connect with the Princeton-Bluefield Electric Railway. The Appalachian Power Company has closed a contract with the Princeton-Bluefield Electric Railway to furnish energy to operate the railway to the county seat.

SHOPS AND BUILDINGS

Cairo Railway & Light System, Cairo, Ill.—This company is remodeling its interurban station at Ninth Street and Commercial Avenue, Cairo.

Union Traction Company of Indiana, Anderson, Ind.—The building occupied as an interurban station by this company in Anderson has been sold and the company will either lease the Van Petten room at the northeast corner of Thirteenth and Meridian Streets or it will proceed with the erection of a temporary station on its building site at the corner of Twelfth and Meridian Streets.

Louisville (Ky.) Railway.—A small cyclone visited the western half of Louisville on April 20 and besides doing damage of considerable general extent, blew the roof off the carhouse at Twenty-seventh and Chestnut Streets, depositing it on the trolley wire in front. This broke the wire and put the system out of commission for a time.

Kansas City, Mo.—The Interurban Central Station Company of Kansas City has been incorporated in Missouri to construct a union terminal for interurban electric railways entering Kansas City. The capital stock of the company is \$2,000, to be increased later as the plans of the company develop. It is reported that an option has been obtained on the block bounded by Ninth and Tenth and McGee and Oak Streets, and the plans call for a six-story station and office building. The incorporators of the company are W. C. Scarritt, R. A. Long and C. C. Peters, vice-president of the Emery-Bird, Thayer Dry Goods Corporation.

Buffalo, Lockport & Rochester Railway, Buffalo, N. Y.—Plans and specifications are now being made for the construction of a new passenger terminal in Lockport for the Buffalo & Lockport, Lockport & Olcott and the Buffalo, Lockport & Rochester interurban lines.

Cleveland & Youngstown Railway, Cleveland, Ohio.—The Terminal Company has been incorporated to construct a union depot, office building and hotel at Cleveland, in connection with the Cleveland & Youngstown Railway, which also holds a franchise for a freight terminal in the Cuyhoga River Valley. Capital stock, \$10,000, to be increased to \$50,000,000 later.

Scioto Valley Traction Company, Columbus, Ohio.—The Public Utilities Commission of Ohio has approved the request of the Scioto Valley Traction Company for the issue of \$200,000 preferred stock, the proceeds of which are to be used to purchase a similar amount of stock of the Columbus Depot Company. This will enable the latter to begin the construction of an interurban station at Columbus within a few months. It is stated that between \$800,000 and \$1,000,000 will be expended on the new station.

POWER HOUSES AND SUBSTATIONS

Orleans-Kenner Electric Railway, New Orleans, La.—This company will construct a substation at Kenner. The electrical machinery for the substation and material for a distribution system in Kenner has been ordered. The cost is estimated at \$10,000.

Morris County Traction Company, Morristown, N. J.—This company will install new rotary transformer equipment in its substation near Dover.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—A new substation to take care of all electrical requirements of the New Castle district will be erected in New Castle by the Mahoning & Shenango Railway & Light Company. The substation will be 100 ft. long by 70 ft. deep, two stories high, and will be of steel, concrete and brick construction. It will be used to transform the electrical current from the Lowellville plant of the company. The contract for the erection of the substation has been let to the Stone & Webster Engineering Corporation. The cost is estimated at \$150,000.

Oklahoma (Okla.) Railway.—This company reports that it has purchased one 3700-kva. Westinghouse turbine and will purchase 1000-kw., 60-cycle rotaries in various sized units. The company will construct two substations.

Monongahela Valley Traction Company, Fairmont, W. Va.—This company reports that it will install one 1150-kw. generator, driven by gas engine, in its central power plant.

Manufactures and Supplies

INSULATOR MARKET REFLECTS DEARTH OF NEW RAILWAY CONSTRUCTION

Although the insulator manufacturer reports large aggregates of orders for insulators, the present electric railway demand includes only a small proportion of the total business, owing to the small amount of new construction. Renewal orders for broken or defective insulators are being received from time to time at about the usual rate, but no great general increase of demand for new extensions is anticipated while the present prices of copper, steel and labor continue so exorbitant as to repel investment of new capital. The prices of insulators are stated to have risen during the last few months from 20 to 40 per cent, varying greatly according to the amount of malleable-iron castings and galvanized-iron materials used in connection with the insulators. The excessive cost of labor and raw materials have been chiefly responsible for the high quotations on the finished product. In addition to the well-known increase in the price of cast iron, the price of the insulating material proper has also increased, the pottery business of one large plant being said to be greater than at any other previous time.

Deliveries of insulators are extending over a greatly varied period of time, depending on the quantity ordered or already on order for any one particular pattern for which the number of pattern molds is limited, and also on the delay through railway congestion in shipments of hardware material to the manufacturer. Good deliveries on low-tension material are reported. An order for, say, 100 units of certain patterns for which the demand is not already too great may take only about ten days; while on the other hand a large order for high-tension insulators may take from five to six months to complete. In one case orders for high-tension suspension insulators for various electrical purposes, some of which are holding over from last year and amounting to about 500,000 units, are expected to complete delivery some time before next September. Strenuous efforts are being exerted by the insulator manufacturer to assure good deliveries by accelerating the shipment of patterns from the foundries, although much avoidable delay in obtaining raw materials is being occasioned by railway congestion, shortage of labor and other labor troubles.

ROLLING STOCK

Connecticut Company, New Haven, Conn., expects to place an order for sixty-two cars within the next ten days.

Muskegon Traction & Light Company, Muskegon, Mich., has ordered five cars from the Cincinnati Car Company.

Rutland Railway, Light & Power Company, Rutland, Vt., has ordered one double-truck car from The J. G. Brill Company.

Louisville (Ky.) Railway has ordered eighty-six 203-A motors from the General Electric Company to replace old equipment.

Great Falls (Mont.) Street Railway is expecting to purchase seven new steel cars. The electrical equipment has been ordered.

Indianapolis Traction & Terminal Company, Indianapolis, Ind., is reported as having ordered twenty-five interurban cars from the Standard Steel Car Company.

Moncton Railway, Light & Gas Company, Moncton, N. B., expects to purchase two single-truck, pay-as-you-enter one-man cars from the Preston Car & Coach Company.

New York State Railways, Utica, Lines, have ordered sixteen 49-ft. 6-in. car bodies from the Cincinnati Car Company, through the W. R. Kerschner Company, Eastern agent.

Monongahela Valley Traction Company, Fairmont, W. Va., noted in the ELECTRIC RAILWAY JOURNAL of April 22 as having ordered eight new cars, has placed this order with The J. G. Brill Company.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has purchased ten all-steel, double-end,

center-entrance cars, duplicates of their 1915 order, from the Niles Car Manufacturing Company.

Hutchinson (Kan.) Interurban Railway will purchase two new sets of motors which will be placed on the cars now in use. The smaller motors now on those cars will be removed and assembled on new one-man type cars.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., noted in the ELECTRIC RAILWAY JOURNAL of April 8 as having ordered four single-truck, center-entrance, arch roof, steel car-bodies from the Southern Car Company, has specified the following details for this equipment:

Seating capacity.....40	Push buttons.....Consol.
Seats,	Hand straps.....Rico
Heywood Bros. & W., re-	Fare registers.....Ohmer
versible, rattan covered	Life guards.....H. B.
Motors.....Two G. E. 247A.	Trolley catchers.....O. B.
Control,	Sanders.....O. B., air operated
K-10 N, with auxiliary con-	Signs.....Keystone, illuminated
trollers	Heaters.....Consol.
Air brakes,	Headlights....."Golden Glow"
Nat'l Brake Co., Bungalow	Trucks,
type	Phila. Holding Co., 15-ft.,
Hand brakes.....Peacock	radial
Door-operating mechanism,	
	Southern

City Light & Traction Company, Sedalia, Mo., has specified the following details of equipment for the eight double-end closed motor cars recently ordered from the American Car Company:

Seating capacity.....32	Gongs.....Brill Dedenda
Length of body...18 ft. 3 1/2 in.	Hand brakes,
Length over vestibule 29 ft. 1 in.	Amer. Car Co.'s, with Giant
Width over sills.....7 ft. 10 in.	drum
Width over all.....8 ft. 1 in.	Heaters.....Consol.
Height, rail to sills...21 13/16 in.	Headlights....."Golden Glow"
Sills to trolley base...8 ft. 6 in.	Motors...2 G. E. 258, inside hung
Body.....Semi-steel	Sanders.....Elec. Ser. Sup. Co.
Interior trim.....Polished bronze	Sash Fixtures...O. M. Edwards
Headlining.....Carline finish	Seats...Brill Winner, reversible
Roof.....Plain arch	Seating material,
Underframe.....Metal	Pressed steel type, with
Air brakes.....West.	cherry wood cushions and
Cables.....G. E.	backs
Curtain material,	Step treads.....Feralun
Pantasote, motorman's cur-	Trolley catchers,
tain only	Elec. Ser. Sup. Co.
Destination signs.....Hunter	Trolley base.....G. E.
Life guards.....H. B.	Trucks.....Brill 21-E., single
Gears and pinions.....G. E.	Ventilators.....Brill exhaust

TRADE NOTES

Edward B. Smith & Company, Philadelphia, Pa., have removed their offices to 1411 Chestnut Street.

Union Switch & Signal Company, Swissvale, Pa., announces that its Montreal office is now located in Rooms 510 and 510A, Canadian Express Building, Montreal, Quebec.

U. S. Metal & Manufacturing Company, New York, N. Y., has been appointed general Eastern agent for the Johnson fare box manufactured by the Johnson Fare Box Company of Chicago.

B. A. Clements, formerly Western railroad representative of Worth Brothers, Chicago, has been elected vice-president of the Rome Merchant Iron Mills, with headquarters at 30 Church Street, New York.

E. R. Mason, formerly in the railway-supply business, Grand Central Terminal, New York, has disposed of his business and has been appointed assistant sales agent for the Ohio Brass Company, Mansfield, Ohio.

Brown Hoisting Machinery Company, Cleveland, Ohio, has appointed its vice-president, Alexander C. Brown, to the position of general manager, succeeding Richard B. Sheridan, who has resigned to accept another position.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has sold to the Leckie Fire Creek Coal Company of Bluefield, W. Va., sixteen 5-ton Baldwin-Westinghouse gathering locomotives. The locomotives are equipped with special ball-bearing motors and motor-driven reels.

Davis-Bournonville Company, Jersey City, N. J., has appointed Henry Cave to take active charge of its research department. Mr. Cave will retain his interest in and act in an advisory capacity to the Cave Welding & Manufacturing Company, of which he is president. The Davis-Bournonville Company will sell directly to its customers in the New England States. Sales offices will shortly be established in Boston and other New England cities.

Peter Witt, formerly street railway commissioner, Cleveland, Ohio, has been allowed twelve claims covering the front-entrance center-exit type of car, which he introduced on the lines of the Cleveland Railway in January, 1915.

Royalties are being claimed for the use of this car, and Mr. Witt announces that 150 of this type are now in operation in Cleveland and that the New York State Railways have just ordered eighty-five cars of this type.

United States Department of Commerce, Customs House, New York, N. Y., has opened a visitors' book containing the names of all traders from foreign countries who register there and do not for some special reason desire their business to remain private. The book is intended to assist manufacturers in this country and their agents and to give an idea of the manner in which buyers in all parts of the world are turning to the United States. The book is open to inspection at the office of the bureau.

International Register Company, Chicago, Ill., has received from the Boston (Mass.) Elevated Railway an order for 128 motor-driven coin registers, including 118 Type C-25 and ten Type C-26, making the total number of motor-driven coin registers in use or ordered by this company 658, of which eighty-seven are used at the subway and elevated stations and 571 on the surface cars of the company. These motor-driven coin registers were fully described in the *ELECTRIC RAILWAY JOURNAL* for Jan. 8, 1916.

Worthington Pump & Machinery Corporation, New York, N. Y., recently organized under the laws of Virginia, on April 25, was declared the successor in ownership of the properties of the defunct International Steam Pump Company, the joint reorganization committee plan having become effective. Securities of the new company will be exchanged for certificates of deposit of securities in the old company. All of the new company's stock has been placed under a voting trust to continue for five years. The voting trustees are L. L. Clarke, G. G. Henry, P. Jackson, R. W. Leigh and C. H. Sabin.

L. B. Morris, who has been district sales manager at New York of the Cambria Steel Company, has been made manager of sales of the New York district for the Cambria Steel Company, the Midvale Steel Company and the Worth Brothers Company, with headquarters at 165 Broadway. **H. W. Hayes** has been made manager of sales for the three companies in the Boston district, with headquarters in the Massachusetts Building. **Mr. Hayes** has been district sales manager at Boston for the Cambria Steel Company. **Edson S. Harrin**, who has been in charge of the export department of the Midvale Steel Company, has been made manager of sales of the three companies in Philadelphia territory, with headquarters in the Widener Building. **L. E. McLain**, who has been district sales manager for the Cambria Steel Company at Pittsburgh, becomes manager of sales of the three companies in that district, with offices in the Oliver Building.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has been experiencing a strike at its shops, which has grown until at the time of going to press the plants of the company were shut down with something like 15,000 men out of work. No formal demands, Chairman **Guy E. Tripp** said in a statement on Saturday last, were made on the company by the striking employees, although it is understood that the men desired an eight-hour day with an increase in wages. Only last December the company made an advance in wages of 10 per cent. The men now working on a fifty-six-hours-a-week schedule, it is said, want the forty-eight-hour schedule at the same wages as for fifty-six hours. The Westinghouse works of the Pittsburgh district are known to be committed as opposed to the reduction of working hours at the present time. Following rioting early in the week, the managers of the Westinghouse Air Brake Company and of the Union Switch & Signal Company closed down their plants on Wednesday, owing to their inability to protect their employees from violence.

ADVERTISING LITERATURE

General Electric Company, Schenectady, N. Y., has issued a bulletin containing illustrations and descriptions of its series brackets and fixtures for incandescent street lighting. A type of side-light bracket, adapted especially for use for 600-volt railway circuits, is illustrated. This manufacturing company has also issued a bulletin describing the Novalux street lighting units for Mazda series lamps.

Shaw Lightning Arrester & Insulator Works, Newark, N. J., have issued a folder presenting a few illustrations and data on Shaw third-rail and line suspension composition

insulators which have been designed and manufactured for a number of traction and power companies in this and foreign countries. This company has also issued Bulletin A16, which describes and illustrates their molded insulation and lightning protective equipment.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has issued a sheet which reproduces the profile of a tool steel pinion used in city service which was finally worn out only after 248,804 miles of service, or ten times as much life as the untreated pinion, which averaged 24,740 miles in the same service. The tool steel pinion was guaranteed for 100,000 miles. The company has also issued another sheet which indicates graphically the great increase of orders which it has received yearly since beginning business in 1907.

Stone & Webster Engineering Corporation, Boston, Mass., has issued a booklet entitled "Work Done and Work Doing" which lists construction contracts of this company completed or in progress, February, 1916. This work includes steam power stations amounting to 424,670-kw. capacity; water-power developments amounting to 292,450-kw. capacity; 1194 miles of transmission lines; sub-stations amounting to 304,885-kva. capacity, 697 miles of railway construction and a large amount of building and gas plant construction.

Spray Engineering Company, Boston, Mass., has distributed a booklet entitled "What Spray Engineering Company Has Done and Is Doing," covering work completed or in progress up to March, 1916. The booklet shows geographically the number, character and size of installations in the various States, covering the list of Spray cooling ponds in parks, supplemented by a list of companies using Spray air washers in connection with washing and cooling the air for steam turbines. Electric railways and central station companies are among the largest users, but many other industries are also represented by large installations. The company has cooling pond installations in thirty-five States, Canada, Mexico, Cuba and South Africa, also air washer installations in twenty-one States.

NEW PUBLICATION

American and Foreign Investment Bonds.—By **W. L. Raymond**. Published by Houghton Mifflin Company, Boston, Mass. 324 pages. Cloth, \$3 net.

"American and Foreign Investment Bonds" is an addition to the series of books on finance and business issued by the publisher. The new work is, as the publisher describes it, a complete, practical and up-to-date guide for the investor and business man, showing just what factors must be considered in determining the investment value of every class of bonds, foreign, government and domestic. It is divided into seven chapters, three of which, namely, those on railroad, public service corporation and industrial bonds, appeal particularly to readers of the *ELECTRIC RAILWAY JOURNAL*. The other chapters are devoted to the consideration of the field of investment, to United States and foreign government bonds, state bonds, and county, municipal and district bonds. The regulation of public service corporations by state commissions affects the safety of the bonds of these corporations and for this reason the author in his chapter on public service corporation bonds has discussed state regulation of public utilities at considerable length. A noteworthy feature of this chapter is a table of states with commissions having jurisdiction over electric railway, gas, electric light and power, and telephone companies. This table is intended to indicate the scope of the jurisdiction of such bodies and gives in footnotes the laws and chapters. The change in regulation from direct legislative enactment in fixing standards of service to giving commissions general authority over such matters is reviewed. **Mr. Raymond** says that no hard and fast rules can be laid down for estimating a fair value of the property upon which a fair rate of return shall be allowed, but that the very purpose of having regulatory commissions is to make possible the determination of each case on its merits, with due regard to certain general conditions. As for the stability of public service corporation bonds, **Mr. Raymond** points out that the decline in the prices of these securities during the past ten or fifteen years has been much less than in the cases of state, municipal and railroad bonds. As for industrial bonds the author concludes that the conditions surrounding such issues prompt greater care in their selection than do the conditions surrounding any other well-known class of investment bonds.