Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVII NEW YORK SATURDAY, JANUARY 15, 1916 No. 3

MORE INCOME FOR ELECTRIC RAILWAYS

There would undoubtedly be sale for a certain amount of electric power from the grounded d.c. circuits of electric railways if the insurance companies would consent to allow motors to be installed on such circuits without onerous restrictions. Usually it is such a burden to satisfy the insurance inspectors in such cases that there is little incentive to install electric power when only grounded circuits are available for power supply. A step in the right direction was described in a brief article appearing on page 95 of last week's issue of this paper. The Indiana Inspection Bureau has formulated simple requirements, described in the article, so that the minimum insurance rate can be secured on buildings in which totally inclosed or inclosed-ventilated grounded motors are located, or in which other approved types of motors are inclosed in wire mesh. There are some restrictions regarding dust, etc., in the atmosphere, but all seem very reasonable. It is to be hoped that other bureaus will follow this excellent example.

RUNNING EMPTY FACTORY SPECIALS

The practice of running empty extra cars from a carhouse to a factory district in anticipation of the reverse travel soon to be handled might well be investigated on some properties. Where such lines are routed through a business district or even through a populous residential area the public sometimes feels aggrieved that non-stop cars are operated over routes having a relatively long-interval service, and it is a question how far the company should go toward accommodating local patrons bound toward the industrial district at such times. In some cases, the delay to the heavy extra movement might be very burdensome to the company; in others the small number of passengers thus desiring to travel would not interfere noticeably with the main flow of traffic. To pick up these few passengers would be expedient as an accommodation to the public, and would possibly yield enough revenue to make the additional stops worth while. On the whole, unless it can be pretty clearly shown to be injurious to the quality of service on the line as a unit, we are inclined to favor picking up and discharging local passengers by factory-bound empty specials when such traffic is not sufficiently heavy to warrant decreasing, say a five-minute or ten-minute headway on the regular cars. Though the question cannot easily be settled categorically, in our opinion, it deserves analysis, in which full weight should be assigned to somewhat indefinite but none the less important consideration of the effect upon waiting passenger who were passed by the empty cars.

THE BENEFITS OF "CLOSING UP"

On electric railway systems where one or more changes are necessary in making a journey, as often occurs on the Boston (Mass.) Elevated Railway, experience shows that passengers who take advantage of their opportunities to "close up" on the service, to use a military phrase, often make trips in quicker time than riders who give little or no thought to their movements. This point is well brought out in our issue of Jan. 8, page 77, where the acceleration of traffic resulting from the installation of motor-driven fare registers at Boston prepayment stations is emphasized. Here the passenger who is enough of a believer in "preparedness" to approach the fare box with the proper coin in hand saves seconds in reaching the platform of the station, which well may mean the difference between taking the next car or train and waiting, say, from two to five minutes for another. The successful negotiation of city life is intimately bound up with just this sort of forehandedness, and the passenger who "knows the ropes" is sure to make a better average running time including stops and changes than he or she who simply drifts along with the crowd. In other words, there is a reward for intelligent use of the system. Again, the passenger in a subway train who enters a car which will stop nearest the exit at a distant subway station may likewise shorten his trip. Of course, no company can afford to encourage congestion, and as a matter of fact it is only the habit of taking every open advantage in such trips that is to be commended, such advantages being chiefly attainable by passengers who think about how their positions in cars and stations will affect their connections or exit from terminals. This situation emphasizes the advantage of varying the relative locations of the exits in the different stations so that different parts of the train will be utilized by those who think of these short cuts.

WISE DECISION IN KANSAS CITY

In unequivocal language the Missouri Public Service Commission has approved the new franchise for the Metropolitan Street Railway and the plans for the reorganization of the Kansas City Railway & Light Company, as described in last week's issue. Of the many steps that have had to be taken and retaken, this is about the last, and now there should be a quick reorganization of the street railway system and a placing of the property upon a definitely established basis. According to the Kansas City *Journal*, there has never been a local campaign more vindictive, more unscrupulous or more desperate than that conducted during the last five years by certain interests to injure the railway, embarrass the receivers and ruin the stockholders. The

dispassionate ruling of the State commission, however, should now put an everlasting quietus on such endeavors. Whether the franchise should solve the present undesirable situation and render the street railway and its operation a business free from politics, whether it should preserve to the present owners the value of property now possessed, and whether it should provide adequately for future expenditures and encourage the investment of private funds—these the commission holds to be questions that have been considered and fully answered by the local authorities and electors of Kansas City. The many protests that "go far afield" are not worthy of consideration, and the commission finds no grounds whatever to justify it in seeking to give effect to the sentiments and desires of the franchise opponents. As it points out, both the franchise and the reorganization plan evidence great effort to reach a mutually satisfactory conclusion and apparently mutual concessions, under constant publicity and free discussion, and rightfully no reason is found for not granting the desired certificate of convenience and necessity for the new electric railway system. We hope that this decision means a really permanent settlement of the electric railway question in Kansas City.

COASTING AND ENERGY CONSUMPTION

One of the axioms of electric railway operation prominent in the minds of transportation men for many years is that, within limits, the lower the speed at the point of application of the brakes, the less the energy consumption. The kinetic energy in the car is proportional to the square of the speed, hence the importance of applying the brakes at the lowest possible speed. This means a reasonably high percentage of coasting. The importance of this subject was realized early in the history of electric railroading, and the fundamental rules were laid down in an article contributed by A. H. Armstrong to the Street Railway Journal and published on page 312 of the issue for June, 1898. But while the principles necessary in energy saving are accepted in theory there is still a large field for their application, as is indicated by the large savings secured on roads which install energy meters or devices for measuring coasting time. Many years ago meters were installed on cars in Syracuse, N. Y., with the result that remarkable energy saving was secured by some motormen simply through the emphasizing of the possibility of such saving.

The results of one of the most elaborate studies of the savings to be secured by coasting that has yet come to our attention are given in an article by C. C. Chappelle printed in this issue. The writer has analyzed conditions on surface lines in two important cities and has worked out the requirements for the most economical operating conditions for the appropriate schedules used in these cities. While the diagrams given may appear formidable at first sight, they are by no means complicated, being mainly a collection of familiar time-speed graphs arranged systematically to permit deductions to be drawn from them.

One of the most interesting and valuable points made clear in these studies is that up to what might be termed the "saturation point" or the bending point of a curve plotted between the two quantities, the per cent energy saving is inversely proportional to the per cent coasting with a factor of unity. In other words, 1 per cent coasting saves approximately 1 per cent of energy. This is an easy figure to remember, and it is said to be borne out by results observed in many cities.

It is hoped that the publication of Mr. Chappelle's article will serve to dispel some of the air of mystery surrounding the time-speed graph, and that it will impel railway companies to consider carefully the possibility of energy saving on their lines by more scientific operation, no matter what means they employ to produce the desired results.

UNCERTAINTY IN THE TRANSPORTATION FIELD

Ivy L. Lee, in a recent address before the American Association for the Advancement of Science at Columbus, Ohio, made an excellent diagnosis when he said that the particular ailment troubling transportation lines to-day is "uncertainty." This seems like a somewhat intangible disease, more psychological than physical, but it is based on factors that have proved a distinct drain on the physical well-being and growth of the carriers.

For instance, for the last fifteen years there has been a steady and disproportionate increase in operating expenses which the carriers, except in years of great depression, have been utterly unable to control. Yet it cannot be ascertained what future expenses will be enforced. Wages are now determined by arbitration awards, but no principles have been established to fix the relative amount of revenues to be disbursed to employees, while taxes are levied without any uniformity or any reference to the other burdens imposed. Enormous expenditures have been required for improved property and equipment, and no one knows to what this tendency will lead. There is no fixed standard for rate-making, and regulatory and legislative requirements in general show a lack of clear-cut and consistent principles. Even when the premises in regulatory cases have been well established commissions have in many cases shown a tendency not to follow them to the legitimate conclusions, with the result that the principles upon which commissions might be expected to act in the future have been much beclouded, and, as one clear-sighted commissioner has said, nothing has been left certain except uncertainty.

The condition is evident; what is the remedy? It sounds absurdly simple to say, "Remove the uncertainty," but it has taken the government years to decide that the whole subject of railroad regulation needs a deliberate and thorough study by a commission in order that a definite declaration of principles may be made for future guidance. We believe, with Mr. Lee, that no work is more demanded now than a complete determination of the legal principles and economic doctrines that are going to be applied for the depletion of transportation revenues and the increase of transportation expenses, whether they occur in steam or electric rail-

way operation. The past has been burdensome, but human nature is optimistic and all this can be forgotten if the future is deemed to hold promise of improvements. In several instances during the last two years there have been sporadic efforts or at least evidences of passive willingness to help transportation finances. We have welcomed these as signs of a returning public sanity on the railway question, but the need is general and the remedy must be general.

As Commissioner Daniels pointed out in his dissenting opinion in the Western rate case, regulation has now reached the point where one of two courses ought deliberately to be chosen and clearly announced. If, as he says, despite increased costs not offset by increased revenues, increases in rates are to be denied, except where in individual cases gross injustice would be thus occasioned, the carriers ought to be apprised of such a policy so that they may find a remedy if they can. If, on the other hand, commissions are to acknowledge in general what they are compelled to admit in detail, then just and reasonable increases should be permitted, not grudgingly but with such fair measure of allowance as will indicate that the transportation industry is entitled in the interests of the public to earnings sufficient to provide a service commensurate with public needs. Which plan is to be adopted? Are carriers to be allowed increased revenues to cover increased expenses forced upon them or incurred to the public benefit? If not, are the carriers to be particularly devoid of any control over those expenses that show the greatest tendency to mount? In other words, what is the vital basis of future regulation to be? Anything would be better than uncertainty.

LARGE VS. SMALL ELECTRIC LOCOMOTIVES

Since the inception of electric operation for freight trains the capacities adopted for electric locomotives have been generally based upon the idea of providing flexibility in operation through the use of numerous small units, which could be coupled together for handling heavy trains when desired, or operated alone for lighter service. On the Norfolk & Western and St. Paul electrifications, however, the reverse of this principle obtains, the locomotives being of such enormous size that they cannot be operated in pairs at the head end of a train. In fact, the provision of multiple-unit control connections for the locomotives are thus made actually unnecessary, and the designers have, obviously, given up the advantage, inherent in electric operation, of "double-heading" locomotives without necessity for additional engine crews and without the objections that accompany the possibility of independent and conflicting action on the part of the two enginemen required under steam operation.

This apparent reversion to the practice of using extremely large units, which is necessarily imposed upon steam railroads, is due not to a general tendency, as might be inferred from the fact that two electrifications have simultaneously adopted the same plan, but rather to special conditions existing on the installations in question. In one case the service is the equivalent of switching and transfer operations on a gigantic scale, not only as regards the capacities of the individual cars that are handled but also because of the average size of the strings of cars involved in all movements. In the other instance the trains will be operated through a sparsely-settled region where local traffic, in comparison with the through business, approaches negligible proportions, thus permitting the practical establishment of a single standard tonnage for freight trains which may be varied only by the introduction of pusher service over ruling grades.

Neither of these conditions is representative of the general average throughout the country. Under circumstances such as those found in the Middle West for example, where way-station work is an important feature of the daily operation, small units have a definite place in the general scheme. Indeed, the use of a 250-ton engine to spot empties at grain elevators or to switch cars in and out of house tracks having old lightweight rail and no ties to speak of would be incongruous, to say the least. There is, in addition, an inherent advantage in the small locomotive unit that exists because of the possibility of accident or failure of a motor or other part of the equipment. Obviously, as the size of the locomotive decreases and the number increases, the necessity for reserve equipment diminishes, and this consideration is indirectly more important with the electric locomotive, in view of its always-ready-to-run characteristics, than in the case of steam operation, which requires reserve equipment in large numbers in any event, because more than half of a steam locomotive's time is regularly spent at the shop or roundhouse.

Of course, neither one of these advantages accredited to the small locomotive would offset any great increase in the unit cost or price per pound of tractive effort, which might be expected with a decrease in size. Yet indications at present seem to point to a practically constant relation between electric locomotive price and power, so that a fleet of small engines would cost but little more than a few large ones of the same total hauling capacity. The St. Paul engines, for example, weighing 282 tons complete, are reported to be worth an amount which approximates 18.5 cents per pound, while from published reports on the Butte, Anaconda & Pacific Railway—an installation with similar electrical characteristics—it may be deduced that the 80-ton locomotives there in service cost almost exactly the same pound price.

Here is an increase in bulk of some 350 per cent without a material change in unit cost, and upon the basis that this circumstance is representative of at least approximately normal conditions, the flexibility afforded by the small unit is not appreciably penalized by the matter of cost. If subsequent experience, therefore, bears out present indications the original practice established in electrification, whereby locomotives of only 60 tons or 80 tons weight are adopted as a standard, will be retained generally in future installations where flexibility of operation is a consideration of any importance.

New Car for Public Service Railway

After Careful Study of the Requirements on Certain Lines of This Property the Mechanical Department Has Designed a Type of Car Which Seems to Meet These Requirements—The Sample Car Which Is Herein Described Is Now Undergoing Service Tests

By H. A. BENEDICT
Mechanical Engineer Public Service Railway, Newark, N. J.

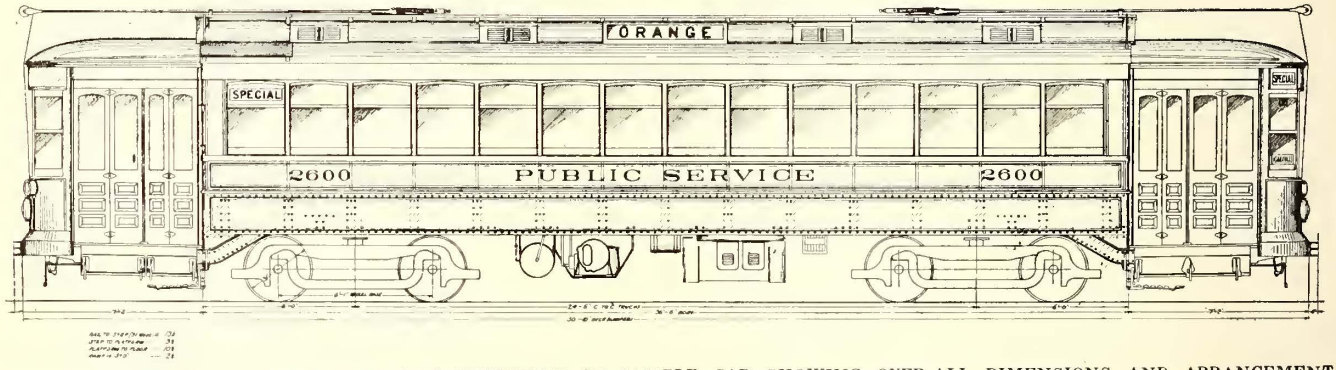
THE Public Service Railway has just completed and put into operation in city service at Newark, N. J., a new car which embodies a number of interesting departures in construction and equipment from the type of car which has heretofore been considered the standard for this system.

The car body has a steel underframe built up entirely of structural shapes and plates, the ¼-in. x 20-in. sill plates with reinforcing angles 2½ in. x 2½ in. x ⅜ in. at the bottom and plates 2½ in. x ⅝ in. at the top taking the entire load. The cross-members serve to stiffen the frame and provide supports for the floor and apparatus under the car. The load is transmitted from the side sills to the trucks by cast-steel bolsters. The steel platform knees are hung on yokes bolted to the end sills, so that they may be easily removed in case a platform is damaged in an accident. Drawbar strains are transmitted directly to the bolsters through the center platform knees, which are attached to the bolster and to the drawhead.

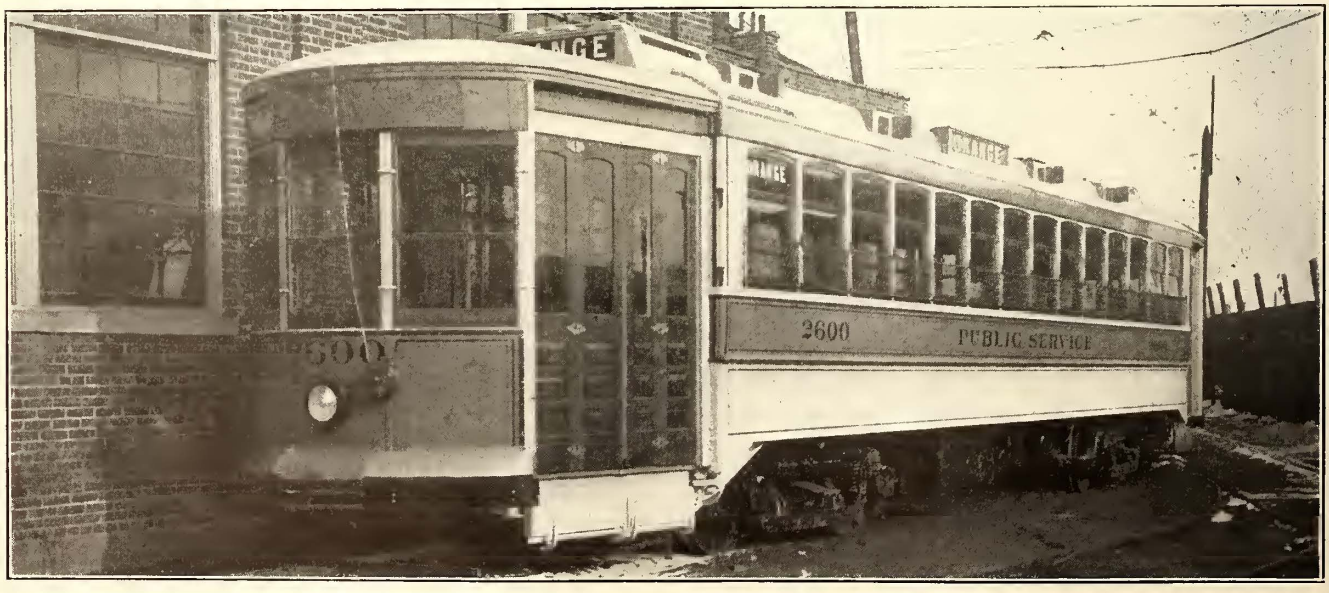
The sill plates are stiffened by soft steel angles 2 in. x 1½ in. x ⅛ in., which serve also as pockets for the ash side posts. The frame of the car body above the sill plates is entirely of wood with the exception of the carlines supporting the roof, which are made of soft steel tees, 2 in. x 2 in. x ¼ in.

The principal dimensions of the car are given in the table on page 115.

The most striking innovation on the car is the compromise-type roof. This is made of ⅜-in. Agasote in eight pieces molded at the factory to the shape required. The Agasote is bolted to the carlines and the joints are covered with canvas imbedded in white lead to make them water tight. To provide the necessary ventilation



NEW PUBLIC SERVICE RAILWAY CAR—SIDE ELEVATION OF SAMPLE CAR SHOWING OVER-ALL DIMENSIONS AND ARRANGEMENT OF SIDE GIRDERS AND PLATFORM KNEES



NEW PUBLIC SERVICE RAILWAY CAR—VIEW SHOWING COMPLETED SAMPLE CAR WITH MODIFIED MONITOR ROOF AND FULLY-INCLOSED PLATFORMS

PRINCIPAL DIMENSIONS OF THE NEW PUBLIC SERVICE CAR

Length over bumpers	50 ft. 10 in.
Length of body	36 ft. 6 in.
Width over side sills	8 ft. 2½ in.
Width over posts	8 ft. 4 in.
Height over all	11 ft. 9½ in.
Rail to first step	14 in.
First step to platform	13½ in.
Platform to floor of car	10½ in.
Ramp in car	2½ in.
Width of aisle	54 in.
Weight complete	45,900 lb.
Seated passenger capacity	50

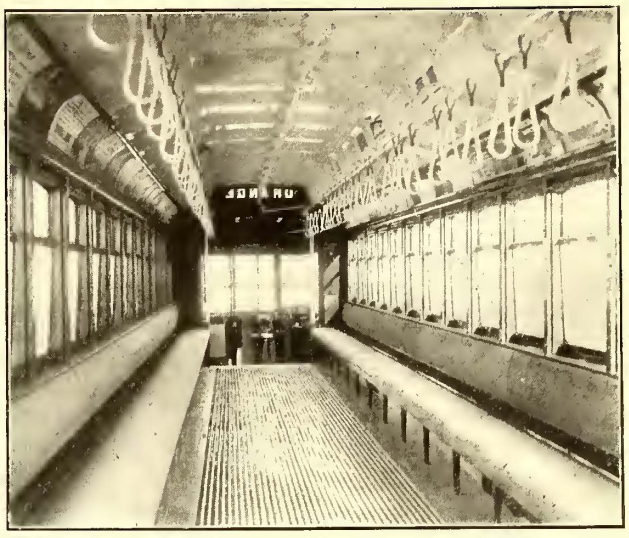
eight specially designed Automatic ventilators are installed on the roof. Hunter route signs of special design, built into the roof, are used to indicate the line over which the car is operating. Hunter destination signs are placed one on each platform and one on each side of the car at the rear end.

In the interior of the car two white enameled iron pipes, one on each side of the car, are used to support the leather hand straps, which are covered with Rico sanitary hand-strap covers. The register rod and signal bell cord are installed one in each of the grab-strap pipes to eliminate troubles due to passengers ringing up fares and pulling the signal bell. Push buttons are installed on each post for passenger signal to motorman. The seats are longitudinal, one on each side of the car, and both the seats and backs are covered with canvas-lined rattan. As there are no doors between the car body and the platform, the bulkhead is cut away as much as possible but still enough is left to protect the seated passengers from drafts when the doors are opened, and a white enamel grab handle is placed at each side for the convenience of passengers moving to and from the platforms.

The interior of the car is finished in natural cherry and gray-white enamel, all of the woodwork being cherry and the inside of the roof, the carlines and all fixtures above the advertising racks being enameled.

Light is provided in the car body by thirteen 23-watt Mazda lamps in a single row over the center of the aisle, and each platform has five additional lamps on separate circuits. Sixteen electric heaters thermostatically controlled are provided to heat the car body, and an additional heater is installed on each platform.

The platforms are arranged for pay-on-the-platform operation, a dividing rail separating the boarding from the alighting passengers and supporting the fare box and a stool which may be used by either motorman or conductor or swung out of the way. The register may be operated either by foot or by hand. The doors are all hand-operated and fold inwardly, the entrance and exit doors being independent of each other. This is



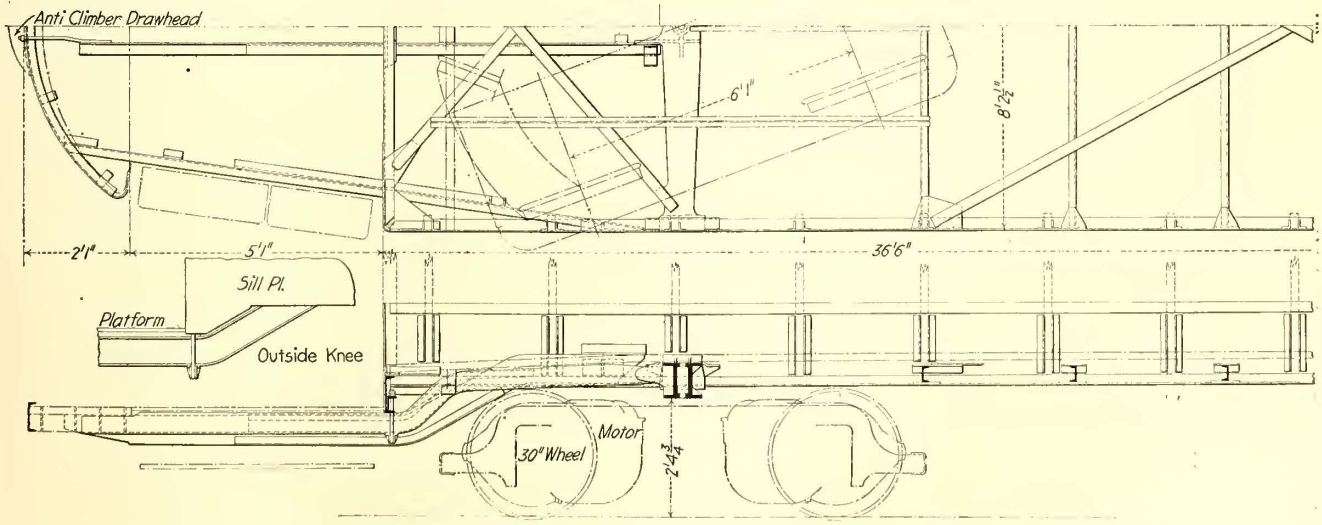
NEW PUBLIC SERVICE CAR—INTERIOR LOOKING FORWARD

the standard platform arrangement for Public Service Railway cars in city service. As there are no bulkhead doors in the car, the motorman will not be allowed to open the platform window in cold weather, so that a double window was provided to prevent frosting on the inside.

The car is equipped with folding steps which operate in conjunction with the doors. These are of a new design, operated by cams, this method of operation being selected to insure the steps being in their lowest position before the doors are open wide enough to permit a passenger to pass through. This will eliminate accidents, which occur with other types of folding steps due to the passenger stepping on the tread when it is partially raised.

The electrical equipment consists of four Westinghouse 307-CA motors of 40 hp. each and HL control, the control being of the new type in which the switch group and reverser are combined in one unit. This is the first equipment of this type manufactured by the Westinghouse Electric & Manufacturing Company and put into service.

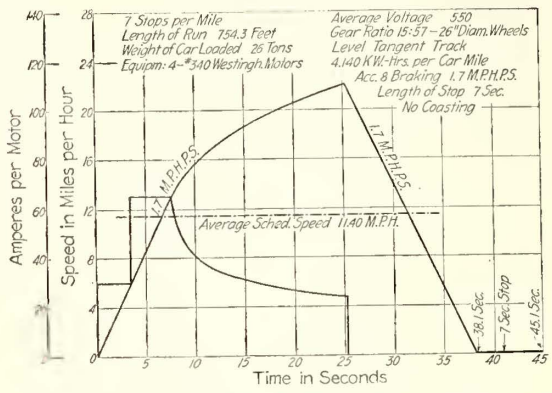
The trucks are the Standard Motor Truck Company's C-50-P having a 6-ft. 1-in. wheelbase and inside-hung motors. General Electric CP-27 compressor and straight air-brake equipment, and H.B. life guards complete the equipment. No arrangements have been made for train operation.



NEW PUBLIC SERVICE RAILWAY CAR—PARTIAL PLAN AND ELEVATION OF UNDERFRAME SHOWING METHOD OF SUPPORTING PLATFORMS

Fundamental Principles of Car Operation Efficiency

Company A



Company B

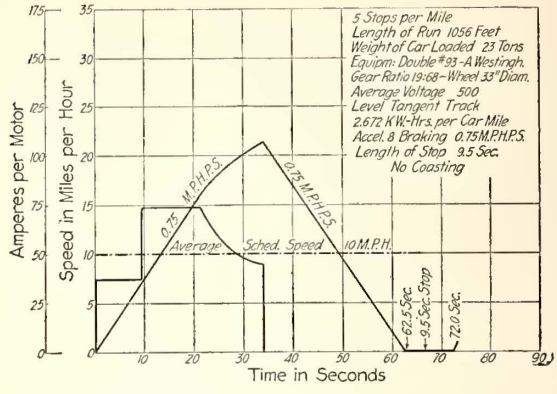
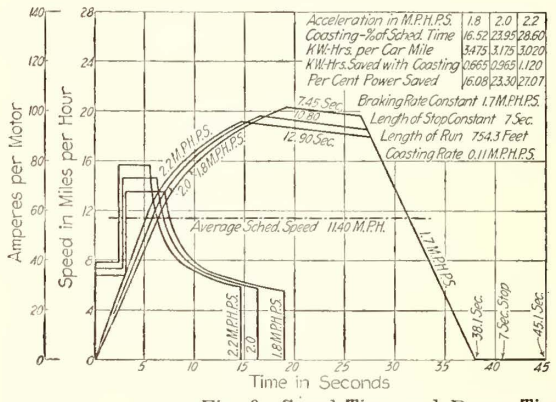


Fig. 1—Speed-Time and Power-Time Graphs for No-Coasting Conditions



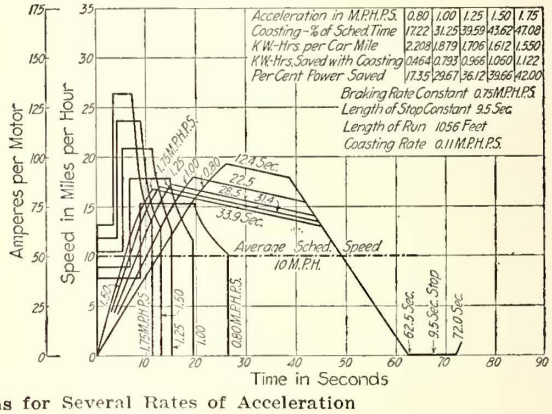
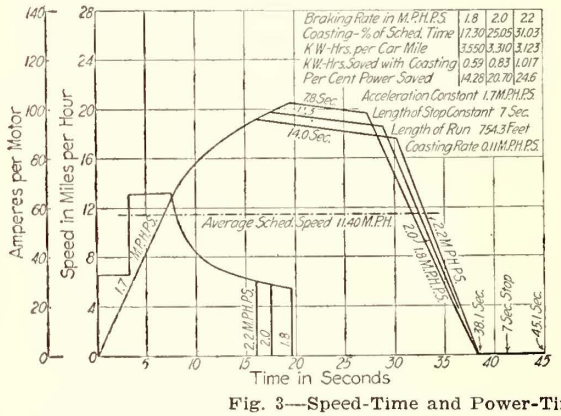


Fig. 2—Speed-Time and Power-Time Graphs for Several Rates of Acceleration



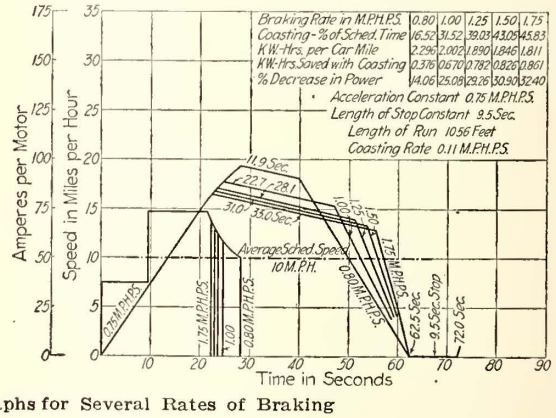
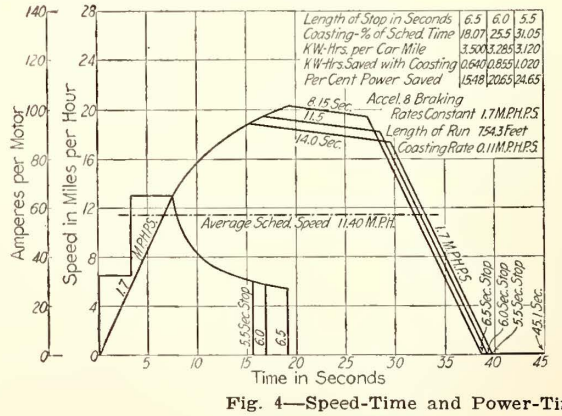


Fig. 3—Speed-Time and Power-Time Graphs for Several Rates of Braking



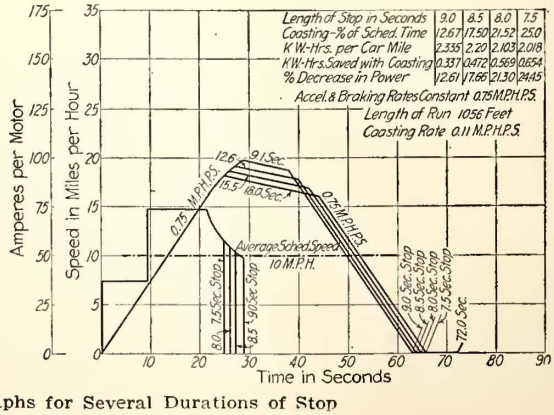


Fig. 4—Speed-Time and Power-Time Graphs for Several Durations of Stop

Fundamental Principles of Car Operation Efficiency

A Study of the Practical and Technical Principles Involved in the Use of the Time-Element Factors in Railway Operation, Particularly in Determining the Most Economical Rates of Acceleration, Braking and Speed from the Standpoint of Power and Platform Costs

By C. C. CHAPPELLE
Consulting Engineer and Vice-President Railway Improvement Company

EVERY traction company executive and his operating staff are confronted with the necessity for increased economies in operation on account of the greater cost of money needed to meet the constant demand for new capital, and because the general business depression and the competition of the automobile tend to curtail gross earnings. Obviously, increases in gross earnings are not to be expected under conditions generally existing.

In searching for means of reducing operating expenses attention would naturally first be directed to the motor, but the manufacturers of motor equipment cannot be expected to secure efficiencies substantially higher than those already obtained. Economies are, of course, obtainable through reduction in weight of cars and equipment, and the possibilities of one-man operation are well recognized.

Unfortunately in the average case the investment in present equipment is so large that it is rarely practicable to write off the cost of old equipment with the economies obtainable from the new. It follows, therefore, that the logical method of increasing net earnings is to reduce operating expenses by securing increased efficiency with either old or new equipment.

One of the greatest needs of the present time in the railway field is a better understanding of the principles involved in the attainment of the high efficiencies desired, and of the practical application of these principles to the ordinary every-day operations of electric railway systems.

The first point to remember in this connection is that time is the essence of railroading before and after construction. Success depends upon the efficiency with which railway operations are performed in established intervals of time.

In considering and analyzing the effective utilization of time on a railway in operation we must apply the same principles which are used in determining by calculation the power and equipment requirements of a railway prior to its construction.

In determining the capacity of the necessary power plant and selecting the motor equipment for the rolling stock of a projected road, speed-time and energy diagrams based on the proposed schedule speeds, average number of stops per mile, etc., form the basis of the calculations. This same method is applied by motor manufacturers in determining the suitability of new equipment for the average conditions of roads which are actually in operation.

As a basis for such diagrams seven average operating characteristics must be assumed or determined for each car route of a system as follows:

1. The average weight, including average load, of a typical car equipped with typical motors operating with a given gear ratio.
2. The average schedule speed.
3. The average number of stops per mile.
4. The average length of a run, that is, 5280 ft. divided by the number of stops per mile.
5. The average schedule time of a run, that is, the time required to cover the average length of a run at the average schedule speed, including the time consumed in making the average stop.
6. The average trolley-wire voltage.
7. The average gradient and degree of curvature of line.

With the above data in hand for two typical roads, designated herein respectively as Company A and Company B, the accompanying sets of diagrams have been prepared to show the inter-relations of the quantities which affect economical car operation. The studies have been made for level and tangent track, but the several factors shown will remain in the same relative proportions if modified to meet the condition of average gradient and degree of curvature. Each study embraces a series of sixteen diagrams and these have been reproduced in such a way as to permit ready comparison.

Each study begins with the "no-coasting" conditions for the case in hand. These comprise the minimum equal rates of "straight line" acceleration and of braking which will enable the car to cover the required distance in the length of time corresponding to the average schedule speed. The straight-line acceleration is that which is determined by the rate of cutting out the starting resistance. After the starting resistance is all cut out the car continues to accelerate at a constantly reducing rate as the motor counter electromotive force rises. For the no-coasting there is a definite energy consumption, which can be readily calculated from the voltage, current and duration of the "power on" period.

Fig. 1, Company A case, shows the no-coasting conditions for a 754.3-ft. run under conditions existing in that city, while Fig. 1, Company B case, shows the no-coasting conditions for a 1056-ft. run. In the first case, 4.14 kw.-hr. per car-mile are required for a 26-ton car making a schedule speed of 11.4 m.p.h. with seven stops per mile. To do this without coasting requires 1.7 m.p.h.p.s. as the rate of acceleration and of braking. The length of stop is seven seconds. In Company B case the energy consumption is 2.672 kw.-hr. per car-mile for a schedule speed of 10 m.p.h. with a 23-ton car, five stops per mile and a stop of nine and one-half seconds' duration. A lower rate of acceleration and braking, 0.75 m.p.h.p.s., is all that is required for no-coasting conditions in this case.

Factors Affecting Energy Input

Before attempting to analyze the diagrams based upon those for no-coasting conditions, it should be noted that the energy input required to operate a car of given weight and equipment, of given gear ratio, at a given average schedule speed with a given average num-

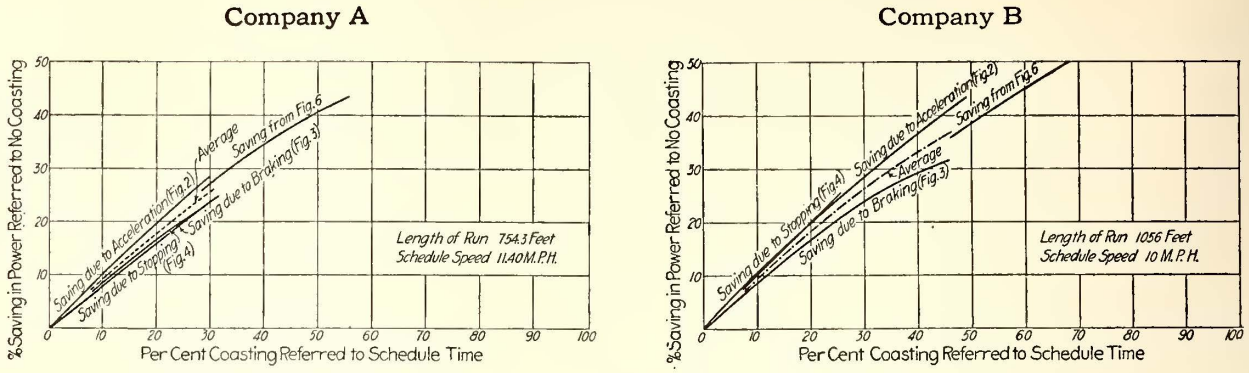


Fig. 5—Curves Showing the Relation of Power Saving to Per Cent Coasting

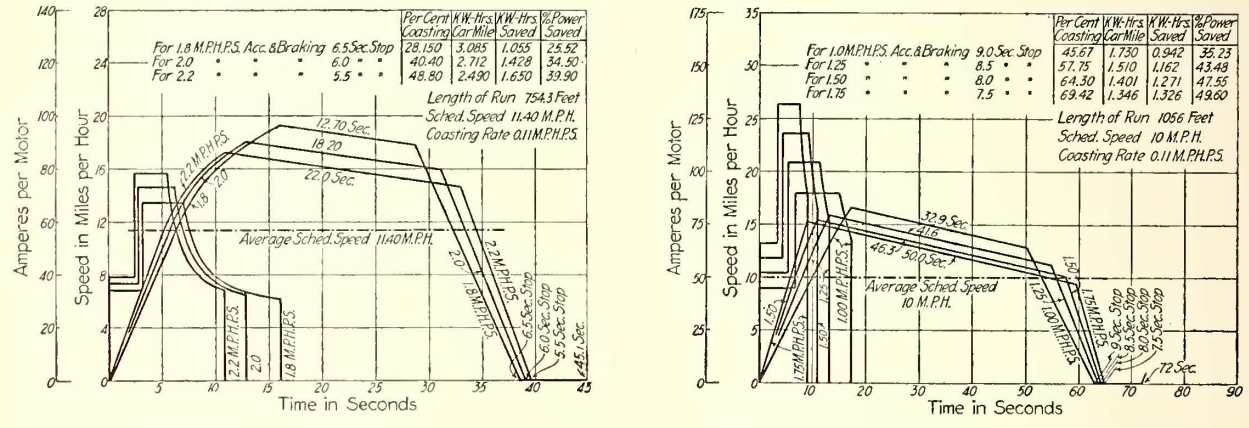


Fig. 6—Speed-Time and Power-Time Graphs for Several Rates of Acceleration and Braking and Durations of Stop

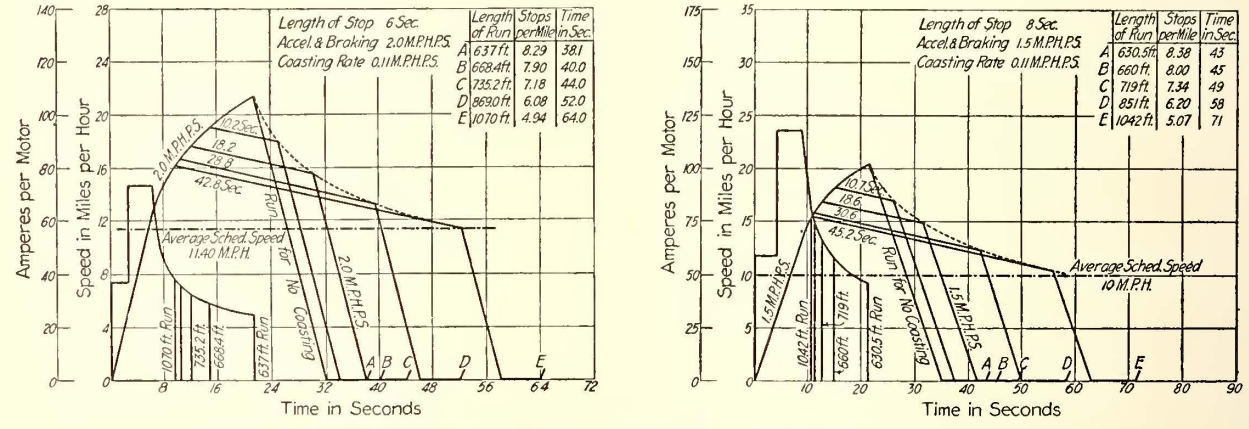


Fig. 7—Speed-Time and Power-Time Graphs for Several Numbers of Stops Per Mile

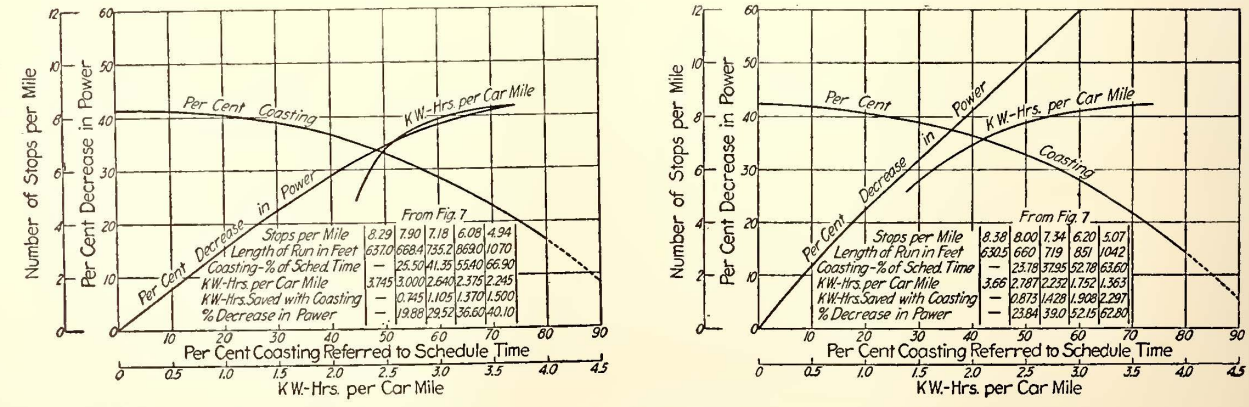


Fig. 8—Curves Showing the Relation of Stops Per Mile to Energy Consumption and Per Cent Coasting, and Per Cent Coasting to Power Saving

ber of stops per mile and a given average trolley voltage is affected solely by the following factors: The duration of acceleration, the duration of braking, and the duration of stops. It will be noted that all of these are time-element factors. The effects of the variations in these elements are illustrated in Figs. 1 to 6, in the Company A and Company B diagrams.

Fig. 1 has already been explained. Fig. 2 shows how coasting can be increased and power saved by increasing the rate and decreasing the duration of acceleration. Fig. 3 shows how similar results can be produced by increasing the rate of braking. Fig. 4 shows how slight decreases in the duration of stop permit increased coasting and decreased power consumption. The results illustrated in the preceding figures are exhibited in Fig. 5 in convenient form for study and show the relation of per cent coasting to per cent energy saving by the three individual methods of saving energy, that is, increasing the rate of acceleration, increasing the rate of braking and decreasing the duration of stops. The average ratio of per cent coasting to per cent energy saving, that is, the saving which could be expected from suitable combinations of these three factors, is also indicated in Fig. 5. This curve might be termed the "coasting characteristic" for this particular case. The results of combining all of the factors which contribute to energy saving are illustrated in Fig. 6.

A study of the diagrams mentioned above demonstrates the following as the effects of variation in these time-element factors of acceleration, braking and duration of stop on the power input:

1. The maximum energy input and maximum speed occur when these factors are such as to permit "no coasting time."

2. The energy input and the maximum speed both decrease as the time of acceleration is decreased, that is, as the rate of acceleration is increased. Obviously the limitation for the rate of acceleration, within limits of motor equipment, are the slipping of the wheels on the one hand and the comfort of the passengers on the other. In practice the discomfort of the passengers results more from irregularity than rapidity of acceleration.

3. The energy input and the maximum speed obtained both decrease as the time of braking is decreased, that is, as the rate of braking is increased. The limitations of braking are the skidding of the wheels and the comfort of the passengers. Here also the discomfort of the passengers results more from irregular than rapid braking.

4. The energy input and maximum speed attained both decrease as the time consumed in the stop is decreased. The practical limitation for energy saving at this point depends upon the facilities for boarding and alighting, the alertness of the conductor as to signals and the alacrity of the motorman in obeying or in even anticipating such signals.

Relation of Energy Input to Coasting Time

A most important conclusion from the studies up to this point, deduced from the data shown in Fig. 5, is that as the time-element factors of acceleration, braking and duration of stop are varied, the corresponding energy consumption is in inverse proportion to the coasting time. These time-element factors solely and only can affect the energy input required to operate a given car and its equipment for given conditions of schedule speed, with an average number of stops per mile, etc.

Up to this point the number of stops per mile has been taken as constant. The next step is to consider the practical conditions arising from a change in this quantity. Figs. 7 and 8 of both Company A and Company B diagrams, have been prepared to show these effects. The no-coasting conditions have been changed so as to permit the original schedule speeds to be maintained with somewhat more than eight stops per mile in each case. In the Company A case this proved to be 2 m.p.h.p.s. and in the Company B case 1½ m.p.h.p.s.. for acceleration and braking rates. The results are shown in Fig. 8, in the two sets of diagrams.

Analysis of these results shows that by utilizing the time-element factors of acceleration, braking and duration of stop on any selected basis, the maximum number of stops per mile is obtained with the condition of no coasting time, with corresponding maximum power input and maximum speed attained. The energy input and maximum speed attained both decrease, and the coasting time increases, as the number of stops per mile is decreased. Another important deduction is that the increased percentage of coasting is practically proportional to the decrease in energy consumed.

Relation of Schedule Speed to Power and Platform Expense

The next step for consideration is the problem paramount in the minds of executives and transportation managers, namely, that of determining the most efficient schedule speeds. The solution of this problem can be found by the methods previously used. Figs. 9 to 12, in the two series of diagrams, have been prepared to indicate the solution of the problem for the typical cases selected for illustration.

Taking the same no-coasting conditions as in the preceding case but varying the duration of stops so as to give greater values with fewer stops per mile, diagrams have been worked out for typical numbers of stops per mile. The results show that with the time-element factors of acceleration, braking and duration of stop utilized on any selected basis, and a given average number of stops per mile, the maximum schedule speed is obtained with no coasting time, and with corresponding maximum energy input.

The diagrams show further that energy input decreases and coasting time increases as the schedule speed decreases, and that the per cent decrease in energy input is in proportion to the increase in per cent coasting. It should be noted, however, that the curves plotted for per cent decrease in energy input referred to per cent decrease in schedule speeds rise very rapidly, particularly at low values of these quantities. In considering an increase in schedule speeds, therefore, we must balance the increased cost of energy with the decreased cost of platform labor.

Figs. 13 to 15 in Company A and Company B diagrams have been prepared to show the relation of energy consumption in kilowatt-hours per car-mile to per cent coasting and to schedule speeds; the relation of total energy and platform expense to schedule speeds and the relation of total energy and platform expense to the per cent coasting.

The curves shown in these figures were plotted from data tabulated in the accompanying tables III, IV, V, VI, VII and VIII.

Coasting as a Necessary Factor in Economy

Figs. 13 to 15 summarize all that has gone before on a cost basis. It is obvious that a certain amount of coasting is necessary in any schedule. For any existing or adopted schedule speed, additional coasting can only mean increased efficiency under such schedule. It is apparent, however, that for given car equipment, dependent upon traffic conditions, there is a most economical schedule speed with its corresponding per cent coasting resulting. The method for the solution of this problem is shown clearly in the curves.

Company A

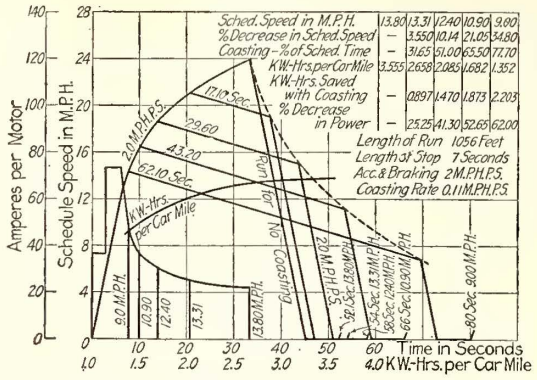


Fig. 9—Diagrams Showing Operating Conditions For Several Schedule Speeds, with Five Stops Per Mile

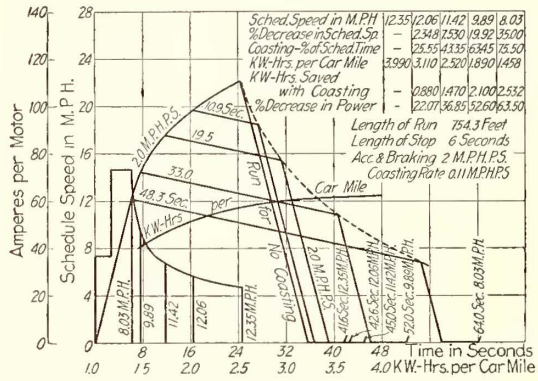


Fig. 10—Diagrams Showing Operating Conditions for Several Schedule Speeds, with Seven Stops Per Mile

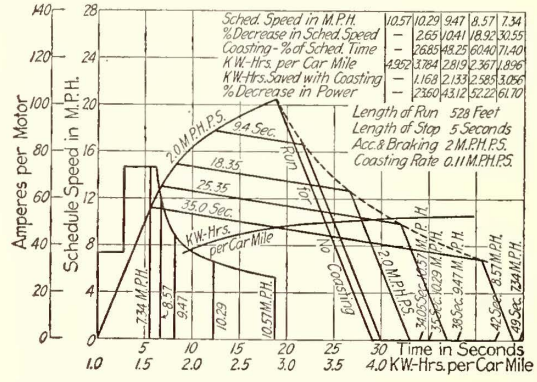


Fig. 11—Diagrams Showing Operating Conditions for Several Schedule Speeds, with Ten Stops Per Mile

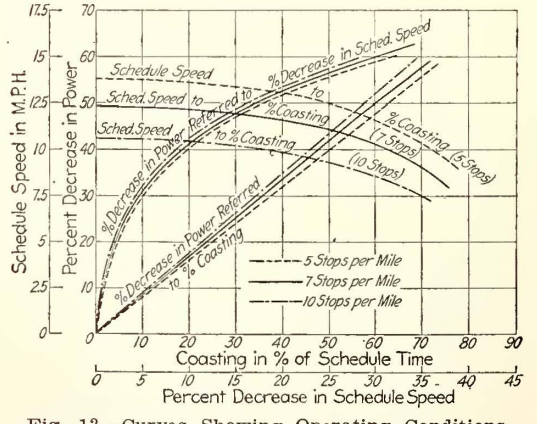


Fig. 12—Curves Showing Operating Conditions Compared with No-Coasting Conditions with Five, Seven and Ten Stops Per Mile

Company B

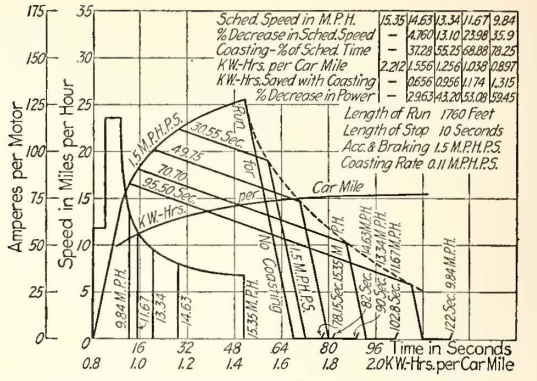


Fig. 9—Diagrams Showing Operating Conditions for Several Schedule Speeds, with Three Stops Per Mile

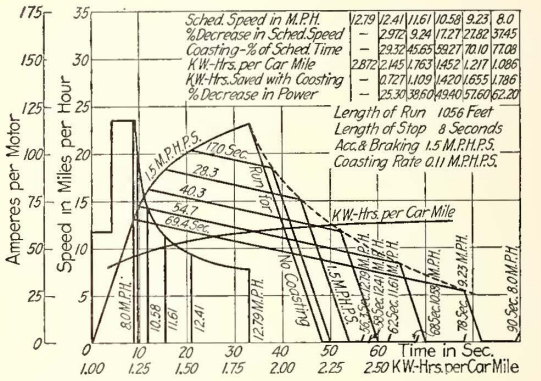


Fig. 10—Diagrams Showing Operating Conditions For Several Schedule Speeds, with Five Stops Per Mile

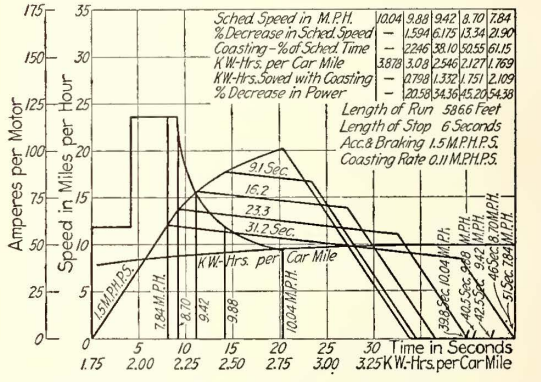


Fig. 11—Diagrams Showing Operating Conditions for Several Schedule Speeds, with Nine Stops Per Mile

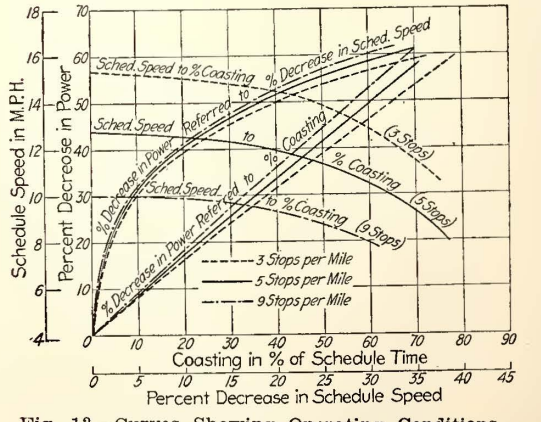


Fig. 12—Curves Showing Operating Conditions Compared with No-Coasting Conditions with Three, Five and Nine Stops Per Mile

Fig. 13 contains curves which form a summary of the data in the preceding four figures in each set of diagrams, and they show definitely the relation of energy consumption to per cent coasting and schedule speed respectively for three numbers of stops per mile. By combining with this information the cost of energy and platform labor for the case in hand it is possible to put the study upon a cost basis.

In Fig. 14 two sets of operating cost curves are plotted, one with costs plotted against schedule speeds and the other with costs plotted against per cent coasting. These are shown on the basis of 0.75 cent per kilowatt-hour energy cost, and 54 cents per hour platform labor cost in one case and 0.7 cent and 60 cents, respectively, in the other. In each curve there is a minimum value which is obviously the best one for the given number of stops per mile. In order to emphasize these minimum cost values, curves are drawn through the minimum values of the two sets of curves respectively.

In Fig. 15 the same data are plotted so that the most economical schedule speed can be read directly for any desired number of stops per mile and the corresponding per cent of coasting, combined power and platform labor cost and energy consumption are shown by curves plotted against number of stops per mile.

Both Fig. 14 and 15 show that when the schedule speeds are determined with relation to economical results, coasting must result and that the amount of coasting which corresponds to the most economical schedule speed is approximately the same in per cent over a wide range in the number of stops per mile.

Energy Input a Misleading Measure of Efficiency

Referring to Fig. 13 of Company A diagrams we note that for 40 per cent coasting with five stops per mile the energy input is 2.4 kw.-hr. per car-mile, with a schedule speed of 13 m.p.h. For 40 per cent coasting with seven stops per mile the energy input is 2.65 kw.-hr. per car-mile with a schedule speed of 11.64 m.p.h. For 40 per cent coasting with ten stops per mile, the energy input is 3.21 kw.-hr. per car-mile with a schedule speed of 9.94 m.p.h. Now the number of stops per mile selected for illustration, with the corresponding schedule speeds, are representative of the range in these quantities actually encountered for varying densities of non-rush-hour and rush-hour conditions. For the above enumerated stops per mile and corresponding schedule speeds, motormen showing coasting records of 40 per cent on that equipment are all operating at equal actual efficiency, even though the conditions of operation vary widely, as enumerated. The coasting record of the motorman, therefore, is the correct relative measure of his actual efficiency for variations in the number of stops per mile or in the schedule speed that must necessarily arise in practical operation.

On the other hand, the measurement of only the energy input of the car is an incorrect and misleading measure of the motorman's actual efficiency where the number and duration of stops or schedule speeds are variable. Efficiency in this connection means nothing unless analyzed in reference to the component time-element factors controlling the energy input, for as we have noted in the above illustrations, this may vary from 2.4 kw.-hr. to 3.21 kw.-hr. per car-mile, although the true efficiency of the motorman is exactly the same.

The incorrectness of conclusions based upon energy measurements where the number and duration of stops are variable is further illustrated by reference to Figs. 4 and 8 of Company B diagrams. In Fig. 4, with 10 m.p.h. schedule speed, five stops per mile of eight seconds' duration each, and acceleration and braking respectively ¾ m.p.h.p.s., the per cent coasting is seen to be 21½ and the energy input 2.1 kw.-hr. per car-mile. In Fig. 8 with the same schedule speed, 7.18 stops per mile of the same duration and twice the rate of acceleration and braking, the per cent coasting is seen to be 42 and the energy input 2.1 kw.-hr. per car-mile.

Based on power input measurement the performance of the motormen is exactly the same in the two cases, yet everyone knows that the additional stops in the second case require additional energy. By the efficient utilization of the time-element factors of acceleration and braking the motorman in the second case used the same energy input as did the one in the first case, but the percentage of coasting resulting was approximately double, even with additional stops. Had the motorman in the first case used 1½ m.p.h.p.s. acceleration and braking, as was done in the second case, the percentage of coasting would have been 64.3 and the energy input 1.4 kw.-hr. per car-mile.

Coasting the Correct Relative Measure of Actual Efficiency

The actual efficiency, based upon the inherent principles involved in operating any given car under given conditions, is dependent upon the effective utilization of the controlling time-element factors.

For further better understanding of the factors affecting the motorman's actual efficiency Fig. 17 has

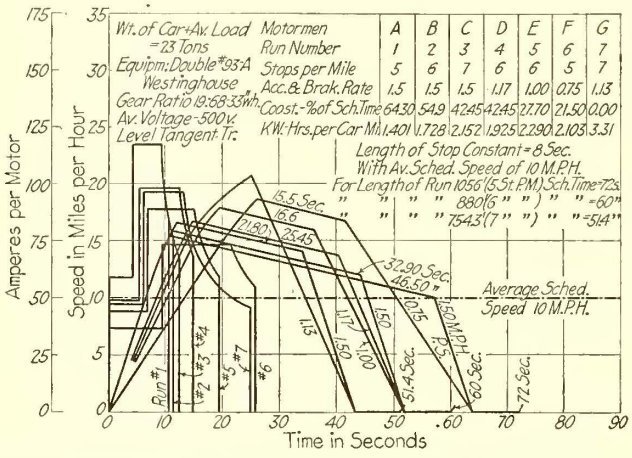


Fig. 17—Speed-Time and Power Graphs for Five, Six and Seven Stops per Mile for Several Rates of Acceleration and Braking at Constant Schedule Speed

been prepared, showing speed-time and power diagrams, for common variations encountered under the simplest conditions of operations, i.e., a constant schedule speed, with assumed equal duration of stops for the average number of stops per mile. In Fig. 17, seven typical runs, numbered 1 to 7, are shown, the number of stops per mile being either five, six or seven and, as indicated, each stop being of eight seconds' duration.

It is to be noted from Fig. 17 that, for like number of stops per mile, the per cent coasting increases and the power input decreases, dependent upon the increase in acceleration and braking rates. Now, assume these Runs 1 to 7 are made respectively by motormen A to G. Assume further that, as in the case in practice, nothing is known as to the number of stops per mile, the only known quantity being the schedule speed. Under such conditions suppose the performance of these motormen on their respective runs to be checked, on the one hand, by coasting measurements and, on the other hand, by measurement of the power input. Which method of checking would indicate the correct relative measure of the respective motormen's actual efficiency?

Company A

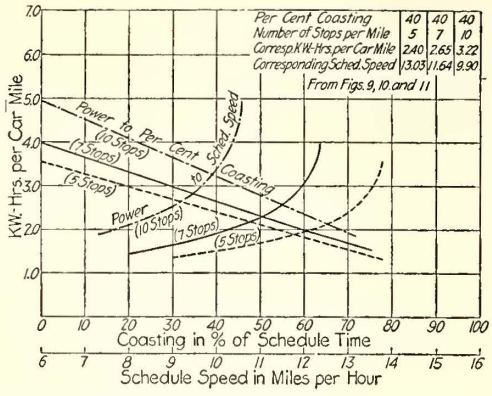


Fig. 13—Curves Showing the Relation of Power to Schedule Speed and Per Cent Coasting for Five, Seven and Ten Stops Per Mile

Company B

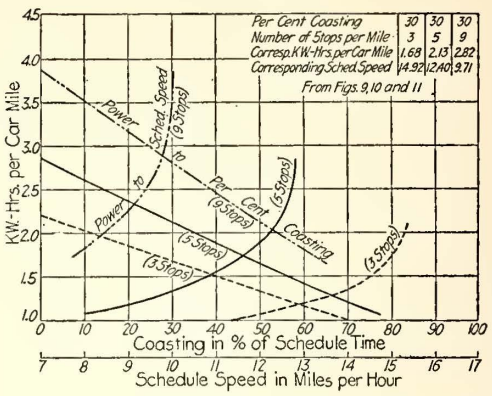


Fig. 13—Curves Showing the Relation of Power to Schedule Speed and Per Cent Coasting for Three, Five and Nine Stops Per Mile

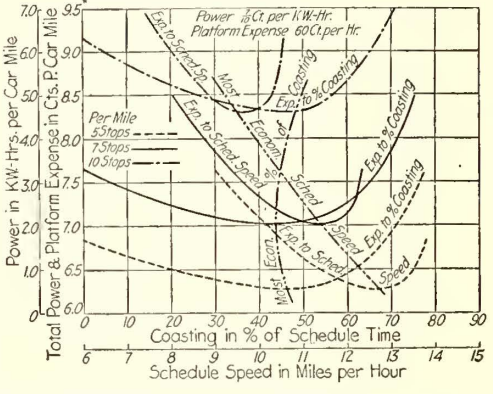


Fig. 14—Curves Showing the Relation of Power and Platform Expense to Per Cent Coasting and Schedule Speed, for Five, Seven and Ten Stops Per Mile

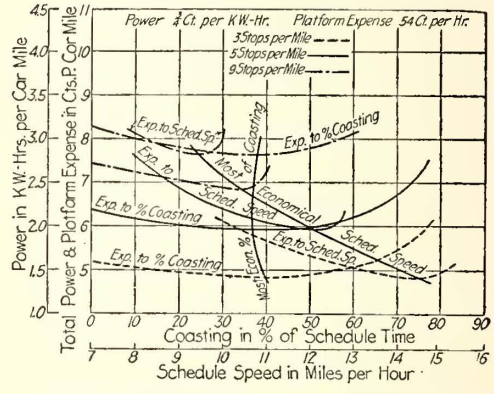
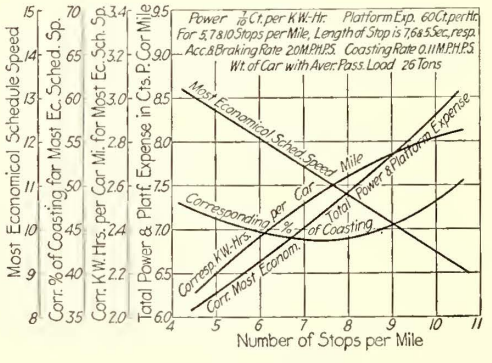


Fig. 14—Curves Showing the Relation of Power and Platform Expense to Per Cent Coasting and Schedule Speed, for Three, Five and Nine Stops Per Mile



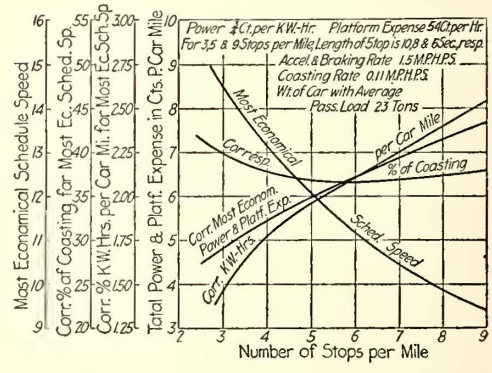
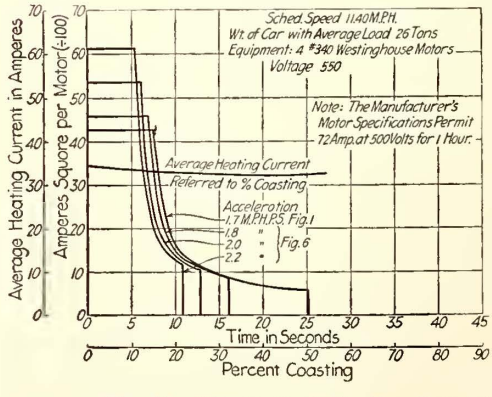


Fig. 15—Curves Showing the Most Economical Schedule Speed and Corresponding Cost and Energy Consumption for Different Numbers of Stops Per Mile



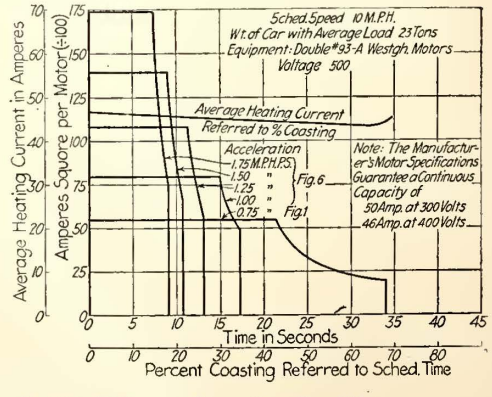


Fig. 16—Diagrams of Heating Currents Corresponding to Different Operating Conditions Shown in Fig. 6

The standing rating of the respective motormen can be stated as follows:

1. Basis of actual efficiency. Since the best efficiency for each respective number of stops per mile occurs with the highest rates of acceleration and braking, all motormen operating with such highest rates can be rated as "Par" and the remaining motormen rated the "Per cent below par," which the power actually used exceeds in per cent the power which would have been used had the highest, or "Par," rates of acceleration and braking been utilized.

2. Basis of per cent coasting determined from the measurement of the coasting time.

3. Basis of power input measured by meter, the motorman using the minimum power input (kw.-hr. per c.m.) being rated as "Par" and the remaining motormen being rated the "Per cent below par" which their respective values of kw.-hr. per c.m. actually used exceeds the minimum or "Par" value of kw.-hr. per c.m.

4. Basis of motorman's index number determined from metered measurements of the power input; each motorman's index number being the ratio of the kw.-hr. per c.m. used by such motorman to the average of the kw.-hr. per c.m. of all the motormen.

Table I shows a tabulation of the rated standings of the several motormen on the respective foregoing basis for ratings.

From Table I it is to be noted the rated standing of the respective motormen, based on the per cent coasting, is relatively correct, compared with the rated standing on the basis of actual efficiency; the discrepancies being that though the actual efficiency of motormen A, B and C is the same, the rated standing on the basis of per cent coasting differentiates as shown.

TABLE I—TABULATION OF RATED STANDING OF MOTORMEN, A TO G, WHOSE OPERATIONS ARE SHOWN BY THE DIARGAMS OF FIG. 17

1. Basis Actual Efficiency	2. Basis Per Cent Coasting	3. Basis Power Input	4. Basis Index Number
A—Par	A—64.3	A—Par	A—1.520
B—Par	B—54.9	B—23.3 per cent below par	B—1.232
C—Par	C—42.45	D—37.4 per cent below par	D—1.106
D—11.4 per cent below par	D—42.45	F—50.1 per cent below par	F—1.012
E—43.5 per cent below par	E—27.7	C—53.6 per cent below par	C—0.989
F—50.1 per cent below par	F—21.5	E—63.4 per cent below par	E—0.930
G—53.8 per cent below par	G—0	G—136.2 per cent below par	G—0.640

This differentiation is desirable, for results in practical operation show that the motorman tends to accelerate and brake at rates proportioned to the traffic requirements, instead of the efficient rates, unless his operations are effectively checked. From Fig. 17 it is to be noted that the stops per mile for A were less than for B, whose stops in turn were less than those of C. The tendency in practice would have been for B to operate less efficiently than C, and A even less than B in reference to the controlling time-element factors. Therefore, the psychological and practical effect is good if A and B are given credit, in their rated standing, as is done by the per cent coasting rating, for their efficient operation under the easier traffic conditions.

ECONOMIC ADVANTAGES OF THE SKIP-STOP PLAN

The enormous advantages to the public and the railway from the utilization of the skip-stop plan are illustrated by data taken from Figs. 13 to 15 of Company A diagrams for seven and ten stops per mile. The following table shows the results of eliminating three stops per mile.

Table II shows that the reduction from ten to seven stops per mile results in making available for the public 20.2 per cent more service, with 20.2 per cent saving in time due to increased rapid transit, at an approximate additional cost of only 1.6 per cent to the railways, on the basis of 4000 car-hours operation per car per year.

A similar study of Company B curves shows that, based on 4000 hours of operation per car per year, a reduction from seven to five stops per mile results in 15.7 per cent more available service for the public with 15.7 per cent saving in time, at only 0.7 per cent additional cost.

In concluding this part of the subject, it should be noted that while the curves in Fig. 15 show the most economical schedule speeds for given numbers of stops per mile, together with the corresponding most economical energy and platform expense, based on given energy and platform labor costs and for a given equipment, similar curves can be determined and constructed for any combination of expense rates. The important, dominating principle demonstrated by the curves is that the determination of conditions yielding best economy carry with them such utilization of the time-element factors that coasting time must result.

TABLE II—SHOWING GAINS BY REDUCTION IN NUMBER OF STOPS

	Ten Stops Per Mile	Seven Stops Per Mile	Per Cent Increase
Most economical schedule speed in. m.p.h.	9.48	11.4	20.2
Corresponding total energy and platform cost per car-mile, cents	8.32	7.03	15.5*
Total car-miles per car per year, based on 4000-hr. operation	37,920	45,600	20.2
Energy and platform labor cost per car per year, basis 4000 hr.	$3,154.92	$3,205.68	1.6

*Decrease.

It would not be right to leave this phase of the subject without considering the effect of variation in the time-element factors upon the heating of the motor equipment. Fig. 16, for Company A and Company B conditions, shows the results of studies made to determine this heating effect. In each case the square of the current, to which the heating is proportional, is plotted against time, and the average heating current is plotted against per cent coasting. The curve between the average heating current and per cent coasting shows that the results already described can be secured without exceeding the equipment limitations.

Questions may also be raised as to the effect of the rheostatic losses on the results and as to the effect of short-period, high-rate acceleration on the power plant. The construction and analysis of speed-time and power diagrams based on the maximum deviation of series operation with maintenance of schedule speeds for any average condition, will dispel any illusion that rheostatic losses may more than offset efficient utilization of the time-element factors hereinbefore discussed.

REDUCTION IN DEMAND ON GENERATING STATION AND DISTRIBUTION SYSTEM

That the adoption of a high rate of acceleration will not increase the demand on the power plant, substation equipment, etc., follows from the fact that the duration of the acceleration current and the required average current both decrease as the rate of acceleration increases. As the current peaks produced by the different cars occur at different times, when the diversity factor of the usual number of cars operated is considered it is apparent that only the sum of the reduced average currents is drawn from the power plant.

As generating and substation equipment ratings are usually based on hourly output, the average current drawn from, or the "demand" upon such equipment, for the usual rating periods of time, will be reduced approximately by the same percentage as the efficiency is increased by the efficient utilization of the controlling time-element factors, herein discussed. It is further

Tables III to VIII—Analysis of Relation of Energy and Platform Expense

Based on variable schedule speed with efficient coasting, determined from time-speed and energy diagrams. Track level and tangent

COMPANY A—MOTOR CAR WITHOUT TRAILER

Weight with average load, tons	26
Gear ratio	15:57
Line voltage	550
Wheel diameter, inches	26
Rate of acceleration and braking, m.p.h.p.s	2
Energy cost, cent per kilowatt-hour	0.7
Platform labor cost, cents per hour	60

TABLE III

Stops per mile	5
Duration of stop, seconds	7

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
9.00	77.70	1.35	0.95	6.67	7.62
10.90	65.60	1.68	1.18	5.50	6.68
12.40	51.00	2.08	1.46	4.84	6.30
13.31	31.65	2.66	1.86	4.51	6.37
13.80	None	3.53	2.47	4.35	6.82

With 13.80 m.p.h. schedule speed, total energy per car-hour is...48.71 kw.-hr.
With 12.40 m.p.h. schedule speed, total energy per car-hour is...25.79 kw.-hr.
Excess power per car-hour for 13.80 m.p.h. over 12.40 m.p.h. is...22.92 kw.-hr.
Or excess power for 13.80 m.p.h. over energy for 12.40 m.p.h. is...88.8 per cent
But 13.80 m.p.h. schedule speed in excess of 12.40 m.p.h. is.....11.3 per cent
Nine cars at 13.80 m.p.h. make 124.20 car-miles, using..438.39 kw.-hr. per hour
Ten cars at 12.40 m.p.h. make 124.00 car-miles, using...257.90 kw.-hr. per hour
Saving in kilowatt-hour output per hour for ten cars at 12.40 m.p.h. over nine cars at 13.80 m.p.h. schedule speed, both making approximately the same car-miles and hence running on the same headway, is.....180.49 kw.-hr. per hour
Or as offset to investment for one additional car there is required an investment for 180 kw. in power plant and distribution system.

TABLE IV

Stops per mile	7
Duration of stop, seconds	6

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
8.03	75.50	1.46	1.02	7.47	8.49
9.89	63.45	1.89	1.32	6.07	7.39
11.42	43.35	2.52	1.76	5.25	7.01
12.06	25.55	3.11	2.18	4.97	7.15
12.35	None	3.99	2.79	4.86	7.65

With 12.35 m.p.h. schedule speed, total power per car-hour is....49.27 kw.-hr.
With 11.42 m.p.h. schedule speed, total power per car-hour is....28.78 kw.-hr.
Excess power per car-hour for 12.35 m.p.h. over 11.42 m.p.h. is...20.49 kw.-hr.
Or excess power for 12.35 m.p.h. over power for 11.42 m.p.h. is...71.2 per cent
But 12.35 m.p.h. schedule speed in excess of 11.42 m.p.h. is..... 8.1 per cent
Ten cars at 12.35 m.p.h. gives 123.5 car-miles using....492.76 kw.-hr. per hour
Eleven cars at 11.42 m.p.h. gives 125.6 car-miles using.316.56 kw.-hr. per hour
Saving in kilowatt-hour output per hour for eleven cars at 11.42 m.p.h. over ten cars at 12.35 m.p.h., schedule speed, both making approximately the same car-miles and hence running on the same headway is....176.20 kw.-hr. per hour
Or as offset to investment for one additional car there is required an investment for 176 kw. in power plant and distribution system.

TABLE V

Stops per mile	10
Duration of stop, seconds	5

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
7.34	71.40	1.90	1.33	8.17	9.50
8.57	60.40	2.37	1.66	7.00	8.66
9.47	48.25	2.82	1.97	6.34	8.31
10.29	26.85	3.78	2.65	5.83	8.48
10.57	None	4.95	3.47	5.68	9.15

With 10.57 m.p.h. schedule speed, total power per car-hour is...52.39 kw.-hr.
With 9.47 m.p.h. schedule speed, total power per car-hour is...26.70 kw.-hr.
Excess power per car-hour for 10.57 m.p.h. over 9.47 m.p.h. is..25.62 kw.-hr.
Or excess power for 10.57 m.p.h. over power for 9.47 m.p.h. is..95.9 per cent
But 10.57 m.p.h. schedule speed in excess of 9.47 m.p.h. is.....11.6 per cent
Nine cars at 10.57 m.p.h. gives 95.13 car-miles using.....470.88 kw.-hr. per hour
Ten cars at 9.47 m.p.h. gives 94.70 car-miles using.....267.10 kw.-hr. per hour
Saving in kilowatt-hours output per hour for ten cars at 9.47 m.p.h. over nine cars at 10.57 m.p.h. schedule speed, both making approximately the same car-miles, and hence running on the same headway is.....203.88 kw.-hr. per hour
Or as offset to investment for one additional car there is required an investment for 203 kw. in power plant and distribution system.

COMPANY B—MOTOR CAR WITHOUT TRAILER

Weight with average load, tons	23
Gear ratio	19:68
Line voltage	500
Wheel diameter, inches	33
Rate of acceleration and braking, m.p.h.p.s	1.5
Energy cost, cent per kilowatt-hour	0.75
Platform labor cost, cents per hour	54

TABLE VI

Stops per mile	3
Duration of stop, seconds	10

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
9.84	78.25	0.90	0.67	5.49	6.16
11.67	68.88	1.04	0.78	4.63	5.41
13.34	55.25	1.26	0.94	4.05	4.99
14.50	39.88	1.46	1.09	3.72	4.81
14.63	37.28	1.56	1.17	3.69	4.86
15.35	None	2.21	1.66	3.52	5.18

With 15.35 m.p.h. schedule speed, total power per car-hour is...33.92 kw.-hr.
With 14.50 m.p.h. schedule speed, total power per car-hour is...21.17 kw.-hr.
Excess power per car-hour for 15.35 m.p.h. over 14.50 m.p.h. is..12.75 kw.-hr.
Or excess power for 15.35 m.p.h. over power for 14.50 m.p.h. is..60.2 per cent
But 15.35 m.p.h. schedule speed in excess of 14.50 m.p.h. is..... 5.9 per cent
Seventeen cars at 15.35 m.p.h. gives 260.95 car-miles using.....576.64 kw.-hr. per hour
Eighteen cars at 14.50 m.p.h. gives 261.00 car-miles using.....381.06 kw.-hr. per hour
Saving in kilowatt-hour output per hour for eighteen cars at 14.50 m.p.h. over seventeen cars at 15.35 m.p.h. schedule speed; both making approximately the same car-miles, and hence running on the same headway, is.....195.58 kw.-hr. per hour
Or as offset to investment for one additional car there is required an investment for 195 kw. in power plant and distribution system.

TABLE VII

Stops per mile	5
Duration of stop, seconds	8

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
8.00	77.08	1.09	0.82	6.75	7.57
9.23	70.10	1.22	0.91	5.85	6.76
10.58	59.27	1.45	1.09	5.10	6.19
11.61	45.65	1.76	1.32	4.65	5.97
12.05	36.80	1.96	1.47	4.48	5.95
12.41	28.32	2.14	1.60	4.35	5.95
12.79	None	2.87	2.15	4.22	6.37

With 12.79 m.p.h. schedule speed, total power per car-hour is...36.71 kw.-hr.
With 12.05 m.p.h. schedule speed, total power per car-hour is...23.62 kw.-hr.
Excess power per car-hour for 12.79 m.p.h. over 12.05 m.p.h. is..13.09 kw.-hr.
Or excess power for 12.79 m.p.h. over power for 12.05 m.p.h. is..55.4 per cent
But 12.79 m.p.h. schedule speed in excess of 12.05 m.p.h. is..... 6.1 per cent
Seventeen cars at 12.79 m.p.h. gives 217.43 car-miles using.....624.07 kw.-hr. per hour
Eighteen cars at 12.05 m.p.h. gives 216.90 car-miles using.....425.16 kw.-hr. per hour
Saving in kilowatt-hour output per hour for eighteen cars at 12.05 m.p.h. over seventeen cars at 12.79 m.p.h. schedule speed; both making approximately the same car-miles, and hence running on the same headway, is.....198.91 kw.-hr. per hour
Or as offset to investment for one additional car there is required an investment for 198 kw. in power plant and distribution system.

TABLE VIII

Stops per mile	9
Duration of stop, seconds	6

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
7.84	61.15	1.77	1.33	6.89	8.22
8.70	50.55	2.13	1.60	6.21	7.81
9.42	37.90	2.55	1.91	5.73	7.64
9.88	22.46	3.08	2.31	5.46	7.77
10.04	None	3.88	2.91	5.38	8.29

With 10.04 m.p.h. schedule speed, total power per car-hour is...38.96 kw.-hr.
With 9.42 m.p.h. schedule speed, total power per car-hour is...24.02 kw.-hr.
Excess power per car-hour for 10.04 m.p.h. over 9.42 m.p.h. is...14.94 kw.-hr.
Or excess power for 10.04 m.p.h. over power for 9.42 m.p.h. is...62.2 per cent
But 10.04 m.p.h. schedule speed in excess of 9.42 m.p.h. is..... 6.6 per cent
Fifteen cars at 10.04 m.p.h. gives 150.60 car-miles using.....584.40 kw.-hr. per hour
Sixteen cars at 9.42 m.p.h. gives 150.72 car-miles using.384.32 kw.-hr. per hour
Saving in kilowatt-hour output per hour for sixteen cars at 9.42 m.p.h over fifteen cars at 10.04 m.p.h. schedule speed; both making approximately the same car-miles, and hence running on the same headway, is..200.08 kw.-hr. per hour
Or as offset to investment for one additional car there is required an investment for 200 kw. in power plant and distribution system.

apparent from a study of the several speed-time and power diagrams that the investment for an efficiency checking system will be offset many fold by the value of the generating station, distribution system, and substation capacity, unrequired or available for other purposes, due to the reduction of the demand thereon.

SUMMARY AND CONCLUSIONS

By way of summarizing and emphasizing the results of the foregoing analysis of efficiency of car operation the following may be of interest:

1. The power input necessary to operate a given car and equipment at a given average schedule speed and with a given number of stops per mile is solely dependent upon the efficient utilization of the time-element factors; acceleration braking and duration of stop.

2. The effect on the power input of variation in these time-element factors is in proportion to the coasting time, and the increase in per cent coasting is in proportion to decrease in per cent energy consumption.

3. Since efficient utilization of power for given conditions is solely determined by these time-element factors, the correct method of checking the motorman's efficiency in the use of power is by a system giving him a positive, authentic record of his efficient utilization of these factors, which as explained above, is measured by the coasting time and the per cent coasting.

4. Equipped with such a correct method of checking efficiency, the motorman has only to handle his equipment and to take advantage of physical conditions encountered in operation so as to obtain the greatest possible coasting time, with maintenance of schedule time, on each trip of his run. The coasting time can be increased only by the motorman's efficient utilization of the time-element factors of acceleration, braking and duration of stop, these being the only factors under his control that can affect power input.

5. The economical schedule speed for given conditions is also dependent upon the efficient utilization of the time-element factors, and to be economical the schedule must be such as to permit of coasting.

6. The average number of stops per mile, considered in connection with the efficient utilization of the time-element factors, determines the limitations of possible schedule speeds with a given equipment. It is therefore necessary in determining the economical schedule speed to secure definite data in practical operation of the average number of stops per mile and the average duration thereof.

7. The per cent coasting is the measure of the correctness of the relation of the controlling time-element factors for any given number of stops per mile and schedule speed, and of the motorman's efficiency without regard to the variation in number of stops per mile and schedule speed encountered in practice.

As was stated earlier in this paper, there is no question as to the necessity for efficiency in operating an electric railway property. Gross earnings can hardly be increased under existing conditions, and, therefore, net earnings can be increased only by the reduction of operating expenses, which is a condition and not a theory that confronts us. In the solution of the problem of securing greater efficiency, practical and technical analysis must be applied to the only factors that control and determine results. As demonstrated hereinbefore, the laws governing these factors are based on known principles, and deductions based on the applications of these principles are correct to the certainty of the proverbial "death and taxes."

No railway executive or engineering staff questions the reasonable certainty of obtaining calculated efficiencies and results from the large investment involved in a new power generating station, yet the factors affecting the results obtained from that power station contain many more variables than the time-element factors which control car operation efficiency, and the correct method for checking such efficiency.

Doubtless many operating companies have already secured, or are securing, large economies from increased schedule speeds, from adopting the skip-stop and fixed-stop plans, from the use of coasting signboards, and from education of employees, as a group and by personal instruction, along the line of economies obtainable by proper handling of equipment. All of these activities tend to more efficient utilization of the controlling time-element factors of operation.

The writer realizes the possibilities of such methods, but when the enormous effect of variations of the controlling time-element factors encountered in practical operation is considered, the impossibility of approaching obtainable efficiency without a constant, individual checking record must be apparent.

A check made by means of stop watch readings of running schedule time, coasting time, average duration of stop and number of stops per mile, will demonstrate the variability in the way in which various motormen utilize the controlling time-element factors under the same conditions, to say nothing of the variations from obtainable possible results, and will prove convincing as to the need for a correct efficiency checking system.

To expect the best obtainable results without such a system is as inconsistent, when the facts involved are considered, as would be the checking of conductors in matters of fares, etc., by the average results per car on the system, instead of using some fare-registering checking system.

The fact that increased economies are accomplished by means of the more or less indirect methods mentioned points unmistakably to the economies which may be obtained when the efficiency problem is approached with the correct tool and accurate yard stick for measuring the efficient utilization of the controlling time-element factors.

It is well recognized that changing the gear ratio or utilizing the principle of field control for motors, will affect material economies under conditions that may be encountered in practical operation. However, it is apparent that such changes will not eliminate the importance the efficient utilization of the controlling time-element factors herein considered.

It should always be borne in mind that the coasting which has been referred to in this article is that coasting which forms an inherent part of the cycle of operations involved in moving the car efficiently under the practical conditions of traffic operation. Coasting is a function of such a cycle just as is acceleration, braking or duration and number of stops, but, as demonstrated, it is also the measure of the efficient utilization of these factors.

The efficiency checking system based on measurement of coasting comprehends the attainment and measurement of only such coasting as exists as a function of this cycle. It does not involve, as some seem to think, the slowing of schedules, the running by of stopping points, the operation on down grade, etc.

In conclusion the writer believes that executives and transportation managers will agree that the application of practical and technical principles to ordinary, every-day operation is the means for accomplishing efficiency in car operation. When the time-element factors are considered there will be no difference of opinion as to the correct method of checking efficiency, or as to the justification of the necessary investment in the checking system.

COMMUNICATIONS

Causes of Rail Corrugation

New York, Jan. 13, 1915.

To the Editors:

In Mr. Cram's article on curved rail heads in your issue of Dec. 25, 1915, we seem to be at least approaching the cause of rail corrugation, and the cause once found, the remedy will undoubtedly be found also. In an article in your columns several years ago the reasonableness of excessive wheel pressures being a contributing cause was set forth, but it does not seem to me that this is the sole cause. If it had been we would have found it out long ago. More probably, like tender derailments on steam railways, corrugation is the result of a combination of conditions rather than of any one condition alone, and this it is that constitutes the difficulty of solution.

Corrugated rails appear under such widely different conditions and the experience of different roads varies so greatly that it is quite impossible if not absurd to attribute the phenomenon to any one cause or possibly to any one set of causes. We find it on curves and tangents where brakes are applied and where never applied; on grades and levels, on girder and T rails, and under all manner of congruous and incongruous conditions, all of which tend to complicate the problem and add to the difficulties of its solution.

Reverting to Mr. Cram's investigations they seem to have come nearer the solution than any that have preceded, but he would probably be the first to acknowledge that he has not yet arrived, in spite of the fact that the curved headed rail has relieved some of his troubles. But rails with curved heads do corrugate, as witness those in the New York subway. Excessive wheel pressures alone cannot be responsible, else corrugation would be rampant on steam railways where individual wheel loads are far in excess of anything known in street railway work. Mr. Cram gives no figures as to the actual concentrated pressures under his wheels, but my own investigations would lead me to place it at about 70,000 lb. per square inch under eight-wheeled cars weighing 70,000 lb. when fully loaded, but this would probably be well below the load actually imposed on the rail when the car is in motion.

Some years ago I found that the vertical load between the truck and body bolsters of a car was increased by about 30 per cent with the car running at a speed of 25 m.p.h. on a smooth track. What the increase is between the wheel and the rail I do not know, but it is probably quite as much.

Again, I have found evidence that track conditions are probably responsible for much that occurs. In some investigations as to the lateral thrust of the wheel on the rail, on a tangent track, I found that if a heavy blow were delivered at a certain point, that point always received a heavy blow regardless of the type of locomotive or the speed at which it was running, and this was so although the speeds ranged from 30 m.p.h. to 60 m.p.h.

If this holds true for the lateral thrust, is it not reasonable to assume that it will be true for the vertical thrusts also? And if it is, then it is the combination of track and truck that makes for the determination of the actual instantaneous wheel loads. Incidentally it may be added that probably the more flexible the track the higher will be the gross wheel loads, while the loads imposed per square inch of area of contact will probably increase with the rigidity of the track.

I am not aware that any investigations have been made as to the microstructure of the steel at corrugations for the purpose of determining its condition and the difference between the cold rolling effect at the crests and hollows of the corrugations. As far as I could determine on a corrugated rail that was sent me for examination a few years ago, there was no difference in the hardness, but the investigation was not carried far enough to make this as a positive assertion.

Whether or not excessive wheel pressure is solely responsible it is evidently a contributing cause, and Mr. Cram has started along a line of investigation that, if followed, cannot fail to produce results of even greater value than those already obtained by him. His conclusion that the plain head is wrong and that the curved head is proper is based upon such definite data as to be incontrovertible.

It is therefore suggested that, as we know so little of the instantaneous effect of wheel and rail interactions, it would be a profitable line of investigation for an electric railway company to determine the actual vertical loads imposed by cars running on the rails, the movement of the head of the rail under traffic and the structure of the steel of the rail at the crests and hollows of the corrugations. With these data in hand, we would be better able to assign to truck and track each its own measure of responsibility for that expensive development of street railways, the corrugated rail.

George L. Fowler.

Curved Heads for Girder Rails

Atlantic Welding Corporation
30 Church Street
New York, Jan. 10, 1916.

To the Editors:

The article appearing in the issue of the Electric Railway Journal for Dec. 25, entitled "Curved Heads for Girder Rails in Brooklyn," written by R. C. Cram, assistant engineer of ways and structure, Brooklyn Rapid Transit System, and your editorial on page 1245 of the same issue, are of particular interest to way engineers, and should receive very careful consideration by all interested in this matter.

The ideas brought forward are further proof that such a step in the design of girder rail needs is unquestionably along proper lines and bear out my own personal observations. Rail corrugation is of such importance in my estimation that I am prompted to write these lines in further confirmation of the theory advanced by Mr. Cram. My own experience in the case is that the conclusions drawn are undoubtedly a predominant factor in the elimination of corrugation.

This particular subject was very forcibly brought to my attention several years ago, while connected with the Connecticut Company at Hartford, Conn., due to the fact that corrugations were developing in new rail much faster than usual. As no changes in the wheel treads had been made, the result indicated that some change in the rail necessarily caused the rapid development of corrugation.

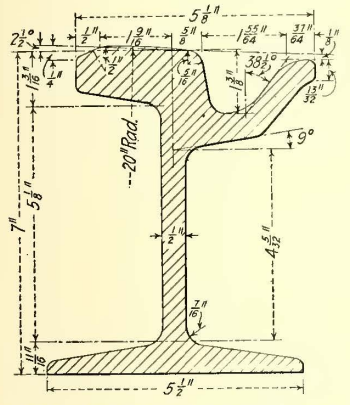
Several observations showed that the contact between the wheel tread and the head of the rail was very unusual and undoubtedly the cause of the corrugations, and in order to confirm this theory a practical test was instituted by constructing a stretch of track in which the rails were set in a position that would bring the head surface of the rails in contact with the wheel tread throughout its entire width.

After several months of close observation the trial showed that no corrugations had developed. That the demonstration was entirely successful was further

proved by the fact that after five years of service no signs of corrugation, or similar effects, were to be observed; while on identically the same general type of construction, where the rails were set in the usual manner, it was found that corrugations appeared within a few days after the rail had been put into service.

The foregoing example of corrugation elimination is further confirmed by my recent experience in Baltimore. During the time I was connected with the United Railways & Electric Company of that city a large portion of its track system was reconstructed. For some time previous to 1915 a flat-headed 7-in. girder section was used exclusively, and this always developed corrugation within a very short period after being subjected to traffic. In many cases the effects were noticeable even after but twenty-four hours of service.

A study of the situation again quickly developed the fact that the amount of rail head under action was exceedingly small and was being subjected to such an overload that the metal was being cold-rolled or peened. In a few days some well-developed corrugations were noticeable.



BALTIMORE RAIL WITH CURVED HEAD

In order to overcome this action a new section of rail was designed with a sloping head to meet as nearly as practicable the average wheel-tread contour, and the company had a large order of rail rolled as quickly as possible. This new section of rail was laid during the early part of 1915. It was P. S.-405, which is a modification of P. S.-287. Up to the time I left Baltimore no signs of corrugation were noticeable on any of these new rail, except in such instances where its presence could be attributed to some ulterior condition. In many cases we discovered that the contact between the wheel treads and the head of the rail was taking place only at the gage line and back of the head, but not for a small width on the center of the head. The new rail section eliminated the corrugation, but showed that a curved head rail was necessary in order to meet the true contour of the wheel tread.

In order to produce a complete and uniform contact between the wheel tread and the head of the rail another slight change in the design of the rail section was made. Rails of this type will shortly be laid. In my opinion this new section will be an ideal one, and besides materially helping to reduce corrugation troubles to a minimum will give the desired contact between wheel and rail.

Practical illustrations were obtained from several streets where both tracks were reconstructed in the same manner and subjected to practically the same service except that the rails used on one track were of the new design and those of the other of the flat-head type. After a few hours' time it was found that corrugation had developed in the track with flat-head rails, while no noticeable action of this nature had developed in the track with the new section.

My experiences, as set forth in the foregoing lines, has proved to me beyond doubt that the conclusions drawn in Mr. Cram's article and the statement made in the first sentence of your editorial are correct, and that the installation of curved-head girder rail will, to a great extent, eliminate corrugation and prolong life of rail and wheels.

I believe the matter to be of such importance that the subject should be given attention by the committee on way matters of the American Electric Railway Engineering Association and brought up for discussion at an early meeting.

C. F. GAILOR, Engineer.

General Business Conditions

The Entire Country Is Responding to a Feeling of Optimism for 1916—Forecast for Ensuing Year as Compared with 1915

THE outlook for business for the first four months of 1916, as determined by the standing committee on statistics and standards of the Chamber of Commerce of the United States, is in striking contrast to that prevailing at this time last year. A chart published in the ELECTRIC RAILWAY JOURNAL of Jan. 9, 1915, showed poor conditions in the New England section, the Southern States (except Florida), and parts of Tennessee, Kentucky, Illinois, Missouri, Kansas, Colorado, Wyoming, the Dakotas and Michigan. The only "good" section was in the contiguous corners of Iowa, Minnesota and South Dakota. The accompanying chart, of a similar character, tells its own story for this year. It will be seen that there are spots where much caution and conservatism still remain, and the influence of high

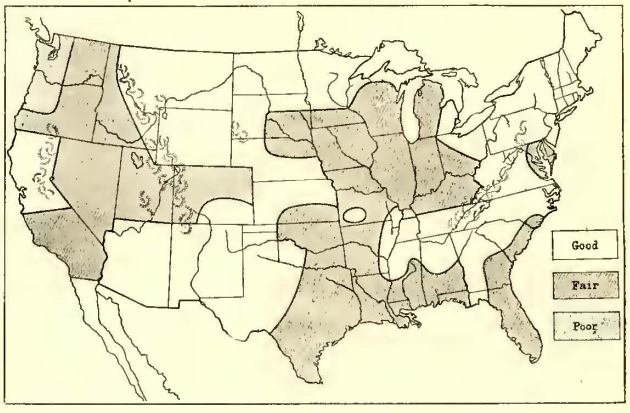


CHART SHOWING BUSINESS CONDITIONS IN THE UNITED STATES FOR FIRST FOUR MONTHS OF 1916

prices for the future accentuates this caution because dealers feel that high prices will curtail buying by the consumer. In a general way, however, it may be said that the spirit of optimism and hopefulness prevails to a degree that has not been apparent for nearly a decade, and the general belief and expectation is said to be for such prosperity during 1916 as will recompense the people for all past misfortunes.

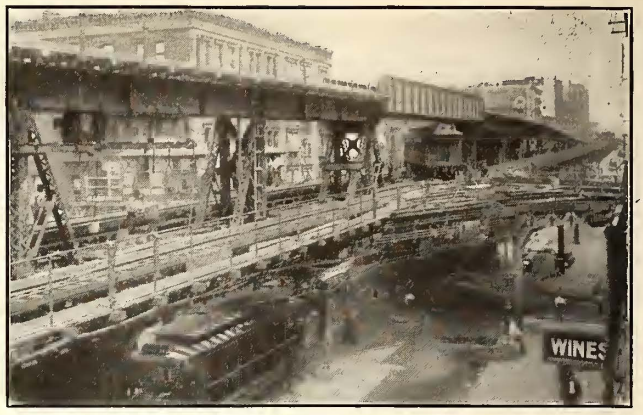
The adverse effect of the conflict in Europe still prevails in some sections, though to much less extent than at this time last year. There are still scattered fears of the possibility of this country being involved, but the large portion of the people are paying less attention to the war and concentrating on domestic matters. Beyond this is the striking fact that the influence of the war at present as a whole is more favorable than adverse, because of the tremendous impetus it has given to certain lines of manufacturing, especially east of the Alleghenies, and likewise to many agricultural products. This influence is a material factor in the present high prices of sheep, cattle, wool, grain, and of the products of leather, steel, iron, copper, brass, lead and zinc or spelter.

Third Tracking Complete on the New York Elevated

Express Service Will Be Inaugurated on Jan. 17 During the Morning and Evening Rush Hours, Increasing the Passenger-Carrying Capacity 20 Per Cent

THE third tracking of the Manhattan Elevated Railway in New York City has now been completed and express service on these lines will be begun on Jan. 17, the express trains running south during the morning rush and north during the evening rush over the center track. It is estimated by officials of the Interborough Rapid Transit Company, which operates the elevated roads, that the introduction of this service will increase their capacity by about 20 per cent, the limiting feature being the ability of the local track that is opposed to the prevailing direction of traffic to supply cars at the terminal from which the express trains start. Practically no storage can be provided at the downtown end of the lines. However, traffic will be diverted to some extent from the overcrowded subways, as the third tracking of the Second Avenue elevated line, which has heretofore been used for a comparatively small local traffic, has now been arranged to give express service to the upper part of the city and the borough of the Bronx. In fact, the Second Avenue line is to be the fastest route uptown, as it is planned that the run from the City Hall to 125th Street, a distance of about 7 miles, is to be made in twenty minutes, including only four intermediate stops, as opposed to twenty-three minutes required by the subway express trains and saving about ten minutes over the local schedule on the elevated lines. The Second Avenue trains will be run across a new double-deck bridge over the Harlem River to serve the elevated lines in the Bronx which heretofore were utilized only for Third Avenue trains.

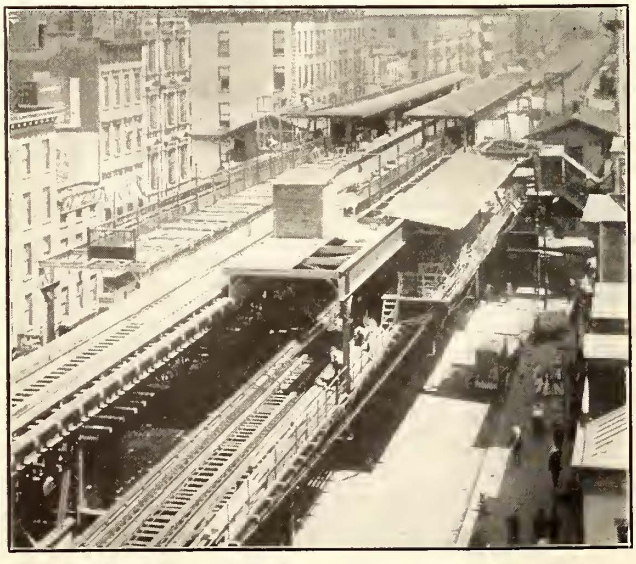
The work, which was undertaken just two years ago, has added about 15 miles of new track to the elevated railway system, and about 9 miles of the old track have been rebuilt. A number of engineering problems of unusual difficulty have been solved in the construction, a double-deck terminal station with four tracks having been provided at the City Hall, and a two-level station with seven tracks having been constructed at Chatham Square, the point where the City Hall and South Ferry trains separate for the southbound traffic and where northbound Second Avenue and Third Avenue trains diverge.



MANHATTAN ELEVATED THIRD TRACKING—HUMP IN EXPRESS TRACK TO CLEAR CROSS-OVER AT JUNCTION OF LOCAL TRACKS

In general, the third track has been inserted between the two original tracks, and an unusual feature of this arrangement has been the use of double-deck stations for the express tracks, which have made possible the establishment of express stations without widening the original elevated structure. At these express stations the express platforms are located at a higher level than the rest of the line, and as the third track approaches one of them it begins to ascend until the platforms that serve it are high enough above the local tracks to clear the cars which run upon them. The platforms for the express stations are thus built directly over the local tracks and stairways to the new platforms are provided from the original station platforms. In this manner the obstruction of light and air to the street has been reduced to a minimum.

These "humps" in the third-track construction have been introduced also to avoid grade crossings, such, for instance, as occurs where the Sixth Avenue line at Fifty-third Street joins the Ninth Avenue line. In consequence, the Ninth Avenue express trains will have a clear run without risk of running into Sixth Avenue trains which turn onto the Ninth Avenue line and without chance of being held up while one of these local trains is slowly passing. An especially interesting feature of the work of construction was the raising of the Second Avenue tracks for four blocks at 125th Street without interfering with traffic. This was done by jacking up the whole structure from false-work erected below it. Also on the double-track Third Avenue line in the Bronx, room for the express station at 133d Street was made by sliding one of the existing local tracks complete with ties and stringers sidewise upon the new supporting structure built below it.



MANHATTAN ELEVATED THIRD TRACKING—TYPICAL EXPRESS STATION ON HUMP, LOCAL STATION BELOW

MANHATTAN ELEVATED THIRD TRACKING—RAISED THIRD TRACK PRIOR TO ERECTION OF EXPRESS STATION

MIDYEAR MEETING CHICAGO FEBRUARY 4, 1916

ASSOCIATION NEWS

MIDYEAR MEETING CHICAGO FEBRUARY 4, 1916

Committee Lists of the Various Affiliated Associations Are Practically Completed and Are Published Below—New England Delegation Is Making Arrangements to Attend Mid-Year Meeting—A Conference on the Electrical Safety Code Was Held in New York City

Committee Appointments for 1915-1916

With a few exceptions, the following is a complete list of committees for the year 1915-1916 of the various associations except the Accountants.

AMERICAN ASSOCIATION

Aera advisory—H. C. Donecker, chairman, Newark, N. J.; T. P. Kilfoyle, Cleveland, Ohio; John Lindall, Boston, Mass.; George Carson, Seattle, Wash.; H. A. Nicholl, Anderson, Ind.; Thomas Finigan, San Francisco, Cal.; C. C. Peirce, Boston, Mass.

Anthony N. Brady medal—Arthur W. Brady, chairman, Anderson, Ind.; W. C. Fisk, New York City; C. S. Sergeant, Boston, Mass.

Award of bronze medal for best paper presented before a company section—H. R. Fehr, chairman, Allentown, Pa.; P. S. Arkwright, Atlanta, Ga.; J. H. McGraw, New York City.

Company membership—George W. Knox, chairman, Oklahoma City, Okla.; A. M. Patten, Topeka, Kan.; J. H. DeGrange, New Orleans, La.; W. J. Jones, Austin, Tex.; W. B. Rockwell, Pottsville, Pa.; E. C. Foster, Manchester, N. H.; B. M. Warner, San Diego, Cal.

Company sections and individual membership—Martin Schreiber, chairman, Newark, N. J.; F. W. Bacon, Lexington, Ky.; J. E. Gibson, Kansas City, Mo.; George G. Whitney, Washington, D. C.; E. J. Blair, Chicago, Ill.; Prof. H. H. Norris, New York City.

Compensation for carrying United States mail—George H. Harries, chairman, Omaha, Neb.; Henry S. Lyons, Boston, Mass.; A. R. Piper, Brooklyn, N. Y.; R. S. Goff, Boston, Mass.; S. W. Ladd, Detroit, Mich.

Constitution and by-laws—George H. Harries, chairman, Omaha, Neb.; R. I. Todd, Indianapolis, Ind.; E. B. Burritt, New York City.

Education—Prof. H. H. Norris, chairman, New York City; H. A. Bullock, Brooklyn, N. Y.; Martin Schreiber, Newark, N. J.; Prof. W. L. Robb, Troy, N. Y.; Prof. A. M. Buck, Urbana, Ill.; Prof. V. Karapetoff, Ithaca, N. Y.

Electrolysis—Calvert Townley, chairman, New York City; R. P. Stevens, Youngstown, Ohio; L. D. H. Gilmour, Newark, N. J.; J. E. Woodbridge, San Francisco, Cal.

Federal relations—Arthur W. Brady, chairman, Anderson, Ind.; E. G. Connette, Buffalo, N. Y.; George H. Harries, Omaha, Neb.; E. C. Foster, Manchester, N. H.; L. S. Storrs, New Haven, Conn.; F. W. Brooks, Detroit, Mich.; H. H. Crowell, Grand Rapids, Mich.; Frank R. Ford, New York City; L. S. Cass, Waterloo, Iowa; F. T. Griffith, Portland, Ore.; H. E. Chubbuck, Peoria, Ill.

Insurance—A. H. Ford, chairman, Portland, Me.; H. J. Davies, Cleveland, Ohio.; F. J. Spaulding, Brooklyn, N. Y.; F. A. Healy, Cincinnati, Ohio.

Mid-year dinner—B. I. Budd, chairman, Chicago, Ill.; Henry A Blair, Chicago, Ill.; Leonard A. Busby, Chicago, Ill.; Charles C. Peirce, Boston, Mass.; L. E. Gould, Chicago, Ill.; E. F. Wickwire, Mansfield, Ohio; M. B. Lambert, Pittsburgh, Pa.

Public relations—C. Loomis Allen, chairman, Syracuse, N. Y.; T. S. Williams, Brooklyn, N. Y.; J. D. Mortimer, New York City; J. H. McGraw, New York City; Guy E. Tripp, New York City; S. M. Curwen, Philadelphia, Pa.; E. W. Rice, Jr., Schenectady, N. Y.; J. K. Choate, New York City; Frank Hedley, New York City; Charles N. Black, San Francisco, Cal.; T. S. Wheelwright, Richmond, Va.; Henry A. Blair, Chicago, Ill.; Arthur W. Brady, Anderson, Ind.; E. G. Connette, Buffalo, N. Y.; George E. Hamilton, Washington, D. C.; H. G. Bradlee, Boston, Mass.; H. H. Vreeland, New York City; C. C. Peirce, Boston, Mass.; P. F. Sullivan, Boston, Mass.

Recommendations in president's address—Arthur W. Brady, chairman, Anderson, Ind.; Thomas N. McCarter, Newark, N. J.; George H. Harries, Omaha, Neb.; Guy E. Tripp, New York City; E. W. Rice, Jr., Schenectady, N. Y.

Representing association at good roads congress—Gordon Campbell, chairman, York, Pa.; W. B. Rockwell, Pottsville, Pa.

Standards for car loading—S. W. Huff, chairman, Brooklyn, N. Y.; E. J. Dickson, Buffalo, N. Y.; E. J. Cook, Rochester, N. Y.; W. F. Ham, Washington, D. C.

Subjects—L. S. Storrs, chairman, New Haven, Conn.; Jesse W. Lilienthal, San Francisco, Cal.; Harlow C. Clark, New York City; John Lindall, Boston, Mass.; T. P. Kilfoyle, Cleveland, Ohio; George Carson, Seattle, Wash.; H. A. Nicholl, Anderson, Ind.

Valuation—J. N. Shannahan, chairman, Hampton, Va.; P. J. Kealy, Kansas City, Mo.; H. H. Crowell, Grand Rapids, Mich.; B. E. Tilton, Syracuse, N. Y.; C. S. Sergeant, Boston, Mass.; W. H. Sawyer, Columbus, Ohio; C. G. Young, New York City; Martin Schreiber, Newark, N. J.

Operation of motor vehicles—Britton I. Budd, chairman, Chicago, Ill.; William A. House, Baltimore, Md.; Henry G. Bradlee, Boston, Mass.; C. L. S. Tingley, Philadelphia, Pa.; Frank Silliman, Philadelphia, Pa.

1916 *transportation committee*—W. O. Wood, master of transportation, Long Island City, N. Y.; H. G. McConnaughy, master of transportation, New York City; *New England*—R. M. Sparks, chairman, Boston, Mass.; C. V. Wood, Springfield, Mass.; A. H. Ford, Portland, Me.; J. K. Punderford, New Haven, Conn.; A. E. Potter, Providence, R. I.; *New York State (exclusive of New York City)*—W. H. Collins, chairman, Gloversville, N. Y.; B. E. Tilton, Syracuse, N. Y.; J. F. Hamilton, Schenectady, N. Y.; F. H. Hill, Elmira, N. Y.; R. M. Searle, Rochester, N. Y.; *New York City*—J. P. Kineon, chairman, Far Rockaway, N. Y.; J. S. Doyle, New York City; George Keegan, New York City; J. J. Dempsey, Brooklyn, N. Y.; H. A. Bullock, Brooklyn, N. Y.; *New Jersey, Pennsylvania, Delaware and Maryland*—W. B. Rockwell, chairman, Pottsville, Pa.; J. W. Brown, Newark, N. J.; T. W. Wilson, Wilmington, Del.; William H. Hitchcock, Keyport, N. J.; Rankin Johnson, Trenton, N. J.; T. C. Cherry, Annapolis, Md.; S. S. Crane, Altoona, Pa.; *District of Columbia, Kentucky, Virginia and West Virginia*—J. N. Shannahan, chairman, Hampton, Va.; C. B. Buchanan, Richmond, Va.; J. H. Hanna, Washington, D. C.; F. W. Bacon, Lexington, Ky.; W. A. McCorkle, Charleston, W. Va.; *Indiana, Ohio and Michigan*—R. P. Stevens, chairman, Youngstown, Ohio; A. D. B. Van Zandt, Detroit, Mich.; J. F. Collins, Jackson, Mich.; G. K. Jeffries, Indianapolis, Ind.; F. W. Coen, Sandusky, Ohio; R. A. Crume, Dayton, Ohio;

North and South Carolina, Georgia and Florida—W. H. Glenn, chairman, Atlanta, Ga.; R. W. Spofford, Augusta, Ga.; Hardy Croom, Jacksonville, Fla.; J. H. Sottile, Charleston, S. C.; H. W. Plummer, Asheville, N. C.; *Tennessee, Mississippi and Alabama*—F. W. Hoover, chairman, Chattanooga, Tenn.; R. H. Smith, Jackson, Miss.; C. J. Zell, Gadsden, Ala.; *Texas, Oklahoma Arkansas and Louisiana*—L. C. Bradley, chairman, Houston, Tex.; C. J. Griffith, Little Rock, Ark.; M. S Sloan, New Orleans, La.; R. D. Long, Muskogee, Okla; *Colorado, Utah, Arizona and New Mexico*—F. W. Hild, chairman, Denver, Col.; H. L. Beach, Salt Lake City, Utah; F. E. Russell, Tucson, Ariz.; W. S. Townsend, Las Vegas, N. M.; *Illinois and Wisconsin*—G. T. Seeley, chairman, Chicago, Ill.; J. V. Sullivan, Chicago, Ill.; E. E. Soules, Peoria, Ill.; R. B. Stearns, Milwaukee, Wis.; C. R. Phenicie, Green Bay, Wis.; *Minnesota, North and South Dakota, Iowa, and Manitoba, Canada*—J. J. Caufield, chairman, Minneapolis, Minn.; F. M. Mills, Sioux Falls, S. D.; E. L. Kirk, Sioux City, Ia.; Thomas Roycroft, Grand Forks, N. D.; L. S. Cass, Waterloo, Ia.; Wilford Phillips, Winnipeg, Man.; *Missouri, Kansas and Nebraska*—J. R. Harrigan, chairman, Kansas City, Mo.; Bruce Cameron, St. Louis, Mo.; R. A. Leussler, Omaha, Neb.; A. M. Patten, Topeka, Kan.; *Montana, Idaho, Oregon and Washington, and British Columbia, Canada*—F. I. Fuller, chairman, Portland, Ore.; W. C. Callaghan, Helena, Mont.; H. F. Dicke, Boise, Idaho; George Carson, Seattle, Wash.; W. G. Murrin, Vancouver, B. C.; *California*—G. H. Harris, Oakland, Cal.; H. T. Jones, San Francisco, Cal.; B. M. Warner, San Diego, Cal.; *Eastern Canada (Ontario, Quebec and Nova Scotia)*—Patrick Dubee, chairman, Montreal, Que.; H. G. Mathews, Quebec; E. L. Milliken, Sydney, N. S.; J. D. Fraser, Ottawa, Ont.

Street traffic—J. K. Punderford, chairman, New Haven, Conn.; John Lindall, Boston, Mass.; George Carson, Seattle, Wash.; H. A. Nicholl, Anderson, Ind.

ENGINEERING ASSOCIATION

Buildings and structures—C. F. Bedwell, chairman, Newark, N. J.; R. C. Bird, New York City; C. S. Kimball, Washington, D. C.; H. G. Throop, Syracuse, N. Y.; William Roberts, Akron, Ohio; H. G. Salisbury, Toronto, Ont.; James Link, Knoxville, Tenn.; H. E. Funk, Brooklyn, N. Y.; F. F. Low, Boston, Mass.

Electrolysis—A. S. Richey, chairman, Worcester, Mass.; G. W. Palmer, Jr., Boston, Mass.; E. B. Katte, New York City; E. J. Blair, Chicago, Ill.

Equipment—W. G. Gove, chairman, Brooklyn, N. Y.; H. A. Johnson, Chicago, Ill.; W. E. Johnson, Brooklyn, N. Y.; H. C. Prather, Syracuse, N. Y.; W. W. Brown, Brooklyn, N. Y.; R. H. Dalgleish, Washington, D. C.; L. M. Clark, Indianapolis, Ind.; J. S. McWhirter, New York City; E. W. Holst, Boston, Mass.

Heavy electric traction—E. R. Hill, chairman, New York City; E. B. Katte, New York City; W. S. Murray, New Haven, Conn.; Hugh Hazelton, New York City; C. H. Quinn, Roanoke, Va.; J. H. Davis, Baltimore, Md.

Nominations—Paul Winsor, chairman, Boston, Mass.; E. O. Ackerman, Columbus, Ohio; W. S. Twining, New York City; A. T. Clark, Baltimore, Md.; S. L. Foster, San Francisco, Cal.

Power distribution—C. L. Cadle, chairman, Rochester, N. Y.; Ralph H. Rice, Chicago, Ill.; E. J. Blair, Chicago, Ill.; M. J. Kehoe, Springfield, Ohio; C. F. Woods, Boston, Mass.; E. J. Burdick, Detroit, Mich.; C. R. Phenicie, Green Bay, Wis.; E. S. Gillette, Wheaton, Ill.; C. R. Harte, New Haven, Conn.

Power generation—J. W. Welsh, chairman, Pittsburgh, Pa.; H. G. Stott, New York City; G. H. Kelsay, Anderson, Ind.; F. S. Freeman, Boston, Mass.; A. B. Stitzer, New York City; G. T. Bromley, Allentown, Pa.; W. E. Rolston, Michigan City, Ind.; L. E. Sinclair, Washington, D. C.; J. G. Swain, Akron, Ohio.

Representing association at good roads congress—J. M. Larned, Pittsburgh, Pa.

Standards—H. H. Adams, chairman, Chicago, Ill.; E. R. Hill, New York City; E. B. Katte, New York City; W. G. Gove, Brooklyn, N. Y.; J. S. McWhirter, New York City; C. F. Bedwell, Newark, N. J.; Martin Schreiber, Newark, N. J.; J. W. Welsh, Pittsburgh, Pa.; J. H. Hanna, Washington, D. C.; C. H. Clark, Cleveland, Ohio; R. C. Cram, Brooklyn, N. Y.; C. L. Cadle, Rochester, N. Y.; C. R. Harte, New Haven, Conn.

Subjects—F. R. Phillips, chairman, Pittsburgh, Pa.; J. H. Hanna, Washington, D. C.; Martin Schreiber, Newark, N. J.

Use of association standards—H. H. Adams, chairman, Chicago, Ill.; W. G. Gove, Brooklyn, N. Y.; J. H. Hanna, Washington, D. C.

Way matters—C. H. Clark, chairman, Cleveland, Ohio; R. C. Cram, Brooklyn, N. Y.; L. A. Mitchell, Anderson, Ind.; E. M. T. Ryder, New York City; W. F. Graves, Montreal, Que.; A. E. Harvey, Kansas City, Mo.; B. J. Fallon, Chicago, Ill.; E. M. Haas, Chicago, Ill.; H. M. Steward, Boston, Mass.

CLAIMS ASSOCIATION

Employment—B. B. Davis, chairman, Columbus, Ohio; A. D. Brown, Syracuse, N. Y.; C. J. McAleer, Schenectady, N. Y.

Subjects—H. G. Windsor, chairman, Tacoma, Wash.; W. F. Weh, Cleveland, Ohio; H. V. Drown, Newark, N. J.; James R. Pratt, Baltimore, Md.

Ways and means—J. S. Kubu, chairman, Utica, N. Y.; J. S. Harrison, Jacksonville, Fla.; W. H. Renaud, Jr., New Orleans, La.

TRANSPORTATION & TRAFFIC ASSOCIATION

Construction of schedules and time-tables—Edward Dana, chairman, Boston, Mass.; Howard F. Fritch, Boston, Mass.; Fred Cooper, Portland, Ore.; J. P. Kineon, Far Rockaway, N. Y.; Herman E. Hicks, Rochester, N. Y.

Express and freight traffic—F. D. Norviel, chairman, Anderson, Ind.; H. J. Clark, Syracuse, N. Y.; W. S. Whitney, Springfield, Ohio; A. R. Piper, Brooklyn, N. Y.; C. J. Munton, Kendallville, Ind.; W. J. Whiteside, Buffalo, N. Y.

Fares and transfers—C. S. Ching, Boston, Mass.; B. C. Edgar, Nashville, Tenn.; George L. Radcliffe, Cleveland, Ohio; Bruce Cameron, St. Louis, Mo.; J. T. Moffett, Washington, D. C.; G. S. Brush, Portland, Me.

Passenger traffic—J. K. Punderford, chairman, New Haven, Conn.; P. P. Crafts, Parkersburg, W. Va.; B. E. Wilson, Rochester, N. Y.; Charles Currie, Akron, Ohio; E. M. Walker, Dubuque, Iowa; J. F. Keys, Detroit, Mich.

Rules—C. E. Morgan, chairman, Jackson, Mich.; S. W. Greenland, Fort Wayne, Ind.; F. H. Hill, Elmira, N. Y.; U. W. Berry, Fort Worth, Tex.; M. S. Sloan, New Orleans, La.; J. E. Duffy, Rochester, N. Y.; Samuel Riddle, Louisville, Ky.

Special committee on cost of rush-hour service—J. V. Sullivan, chairman, Chicago, Ill.; H. B. Potter, Boston, Mass.; A. T. Warner, Newark, N. J.

Standards—L. H. Palmer, chairman, Baltimore, Md.; J. N. Shannahan, Hampton, Va.; A. H. Ford, Portland, Me.; C. H. Harvey, Knoxville, Tenn.; C. V. Wood, Springfield, Mass.; H. C. Donecker, Newark, N. J.; C. E. Morgan, Jackson, Mich.; F. D. Norviel, Anderson, Ind.; Edward Dana, Boston, Mass.; N. W. Bolen, Newark, N. J.; J. K. Punderford, New Haven, Conn.

Subjects—M. C. Brush, chairman, Boston, Mass.; L. H. Palmer, Baltimore, Md.; J. K. Choate, New York City; H. C. Donecker, Newark, N. J.

Training of transportation employees—N. W. Bolen, chairman, Newark, N. J.; C. B. Buchanan, Richmond, Va.; M. J. Feron, Chicago, Ill.; J. T. Conway, Boston, Mass.; W. C. Sparks, Rockford, Ill.

Uniform definitions—J. V. Sullivan, chairman, Chicago, Ill.; Frederic Nicholas, New York City; William C. Greenough, Worcester, Mass.

JOINT COMMITTEES ACCOUNTANTS AND ENGINEERING ASSOCIATIONS

Engineering-Accounting—Accountants, not yet appointed; Engineering, L. P. Crecelius, co-chairman, Cleveland, Ohio; J. P. Ripley, New York City; Harold Bates, New Haven, Conn.; Norman Litchfield, New York City; E. P. Roundey, Syracuse, N. Y.

Life of railway physical property—Accountants, not yet appointed; Engineering, Martin Schreiber, co-chairman, Newark, N. J.; J. H. Hanna, Washington, D. C.; C. F. Bancroft, Boston, Mass.

ACCOUNTANTS AND TRANSPORTATION & TRAFFIC ASSOCIATIONS

Transportation-Accounting—Accountants, not yet appointed; Transportation and Traffic, E. B. Peck, co-chairman, Indianapolis, Ind.; A. Swartz, Sylvania, Ohio; E. C. Faber, Aurora, Ill.

ENGINEERING AND TRANSPORTATION & TRAFFIC ASSOCIATIONS

Block signals for electric railways—Engineers, J. M. Waldron, chairman, New York City; J. Leisenring, Peoria, Ill.; G. N. Brown, Syracuse, N. Y.; J. B. Stewart, Jr., Youngstown, Ohio; Transportation & Traffic, J. W. Brown, vice-chairman, Newark, N. J.; J. J. Doyle, Baltimore, Md.; F. W. Coen, Sandusky, Ohio; G. K. Jeffries, Indianapolis, Ind.

Transportation-Engineering—Engineers, Paul Winsor, co-chairman, Boston, Mass.; F. R. Phillips, Pittsburgh, Pa.; W. J. Harvie, Syracuse, N. Y.; Transportation & Traffic, W. A. Carson, co-chairman, Evansville, Ind.; P. N. Jones, Pittsburgh, Pa.; C. F. Hewitt, Albany, N. Y.

New England Delegation to Mid-Year Meeting

Transportation arrangements are being made for the New England delegation to the mid-year meeting of the Railway and Manufacturers' associations in Chicago on Feb. 4. The trains are as follows: "Wolverine," leaving Boston on Feb. 2 at 2 p. m.; the "B. & A. 41," leaving on Feb. 3 at 10 a. m., and the "Twentieth Century," leaving Feb. 3 at 12.30 p. m. The railroad fare each way between Boston and Chicago, exclusive of Pullman charges, is $23.10, with $8 excess fare on the "Twentieth Century." The committee in charge is: C. V. Wood, Springfield, Mass.; A. E. Potter, Providence, R. I.; J. K. Punderford, New Haven, Conn.; A. H. Ford, Portland, Me., and Ralph M. Sparks, chairman, 15 Milk Street, Boston.

Electrical Safety Code Conference in New York

On Jan. 6 and 7 at the association's headquarters, a conference of railway men was held for the purpose of considering suggestions regarding the proposed Bureau of Standards' national electrical safety code in response to a letter recently sent out by President C. L. Henry. Those in attendance included the following: Representing the American Electric Railway Association, W. J. Harvie, Syracuse, N. Y.; A. S. Richey, Worcester, Mass., and T. L. Cadle, Rochester, N. Y.; representing the power distribution committee of the Engineering Association, E. J. Blair, Chicago, Ill., and R. H. Rice, Chicago, Ill.; representing the Central Electric Railway Association, Adolph Schlesinger, Indianapolis, Ind., and G. H. Kelsay, Anderson, Ind.; representing the Pennsylvania Street Railway Association, A. P. Way, Philadelphia, Pa. Representatives of the Illinois Electric Railways Association and the New York Electric Railway Association were also invited but were unable to appear.

The conference took up point by point a number of detailed suggestions which had come in from member companies, and where practicable, these were put into form for suggestion to the Bureau of Standards.

Slight Increase in Mail Pay

Report of Second Assistant Postmaster-General Shows Slight Increase for Year Ending June 30, 1915, but Smaller Estimate of Cost for This Year

THE report of the second assistant postmaster-general for the year ended June 30, 1915, has just been made public. The portion of the report relating to electric and cable-car service follows:

TABLE SHOWING ELECTRIC AND CABLE MAIL ROUTES, YEAR ENDED JUNE 30, 1915

		Increase	
		Amount	Per Cent
Number of routes	569	10	1.788
Length of routes, miles	8,182.68	250.40	3.156
Annual travel, miles	13,947,850.96	795,907.40	6.051
Annual rate of expenditure	$819,452.41	$57,247.02	7.517
Average rate of cost per mile of length	$100.14	$4.06	4.225
Average rate of cost per mile traveled, cents	5.87	0.09	1.554
Average number of trips per week	16.39	0.45	2.823

The appropriation for the fiscal year 1915 provided by the act of March 9, 1914, was $784,000. The deficiency appropriation provided by the act of March 4, 1915, was $15,888, making the total appropriation for the fiscal year $799,888.

The amount expended, as reported by the auditor, to Sept. 30, 1915, was $797,800.82, leaving an unexpended balance of $2,087.18, out of which unsettled accounts must be paid.

The amount available for the fiscal year 1916 is $784,000. The post-office appropriation bill for 1916 carried $845,000 for this purpose but failed of passage, and the joint resolution hereinbefore mentioned made the amount of appropriation for the fiscal year 1915 available for the fiscal year 1916.

The annual rate of expenditure was:

July 1, 1915	$818,857.57
Sept. 30, 1915	788,944.95

The sum estimated as necessary for the fiscal year ending June 30, 1917, is $660,000, being $124,000, or 15.81 per cent, less than the appropriation for 1916.

The annual rate of expenditure for electric and cable-car service authorized at the various rates provided by law was, on June 30, 1915, as follows:

At 3 cents a mile	$196,991.85
At 4 cents a mile	75,504.89
Under special provision	6,707.20
At railroad rates	81,137.79
At schedule rates other than 3 and 4 cents a mile	38,750.34
At department and independent car regular rates	45,126.02
At apartment and independent car maximum rates	370,219.93
At special agreement rates less than regular rates	5,014.38
	$819,452.41

The estimates for the next fiscal year include the existing provisions regarding rates that may be paid.

Demands were made upon the department during the fiscal year by a number of electric car companies for increased compensation, and increases were allowed within the limitations prescribed by law where conditions warranted. In certain cases, notably Boston, Mass., it was found to be to the department's advantage to discontinue the electric car service and provide a substitute service.

EQUIPMENT AND ITS MAINTENANCE

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

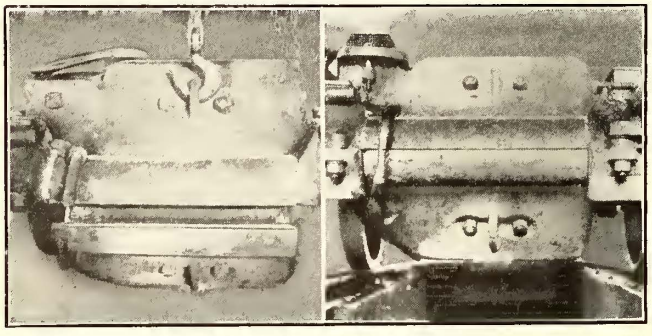
Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Reclaiming GE-57 Motors

BY R. W. PALMER
Manager Cleveland & Erie Railway, Girard, Pa.

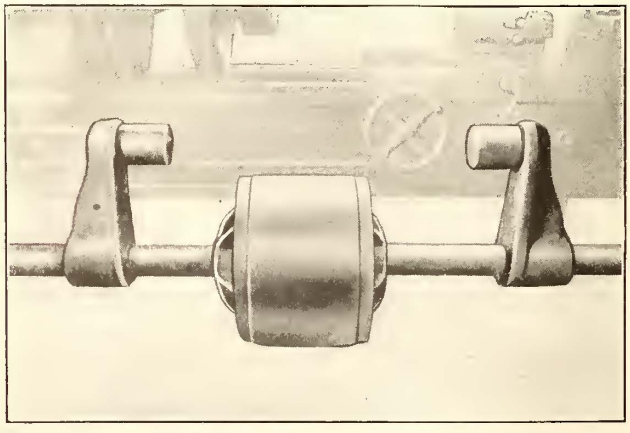
The armature and axle bearings on GE-57 railway motors, like those of most split-frame railway motors, are held in position by clamping the bearing shells in place by means of the lower bearing or other housing cap. The regular service wear causes these bearing seats to wear to such an extent as to interfere with proper alignment of the armature, pinion, gear and axle, causing undue wear of gear and pinion, as well as inequality in the air gap between armature and pole pieces. These faults not only interfere with the efficiency of the motor but increase the cost of maintenance.

To correct the defects and re-establish the centers it is necessary to rebore the motor frames, which work is



RECLAIMING GE-57'S—CAST-STEEL SHIELD OVER AXLE

done in the shops of the Cleveland & Erie Railway on a standard 36-in. lathe. In boring the frames for the armature bearings the field coils and pole pieces are removed and a cast-iron spool 20⅜-in. in diameter, shown in the illustration immediately following, is placed between the upper and lower frames, resting on the four finished surfaces where the pole pieces are attached. The frame bolts are then replaced and the upper and lower halves are bolted together, clamping the spool, which acts as a guide for the boring bar, firmly in place.



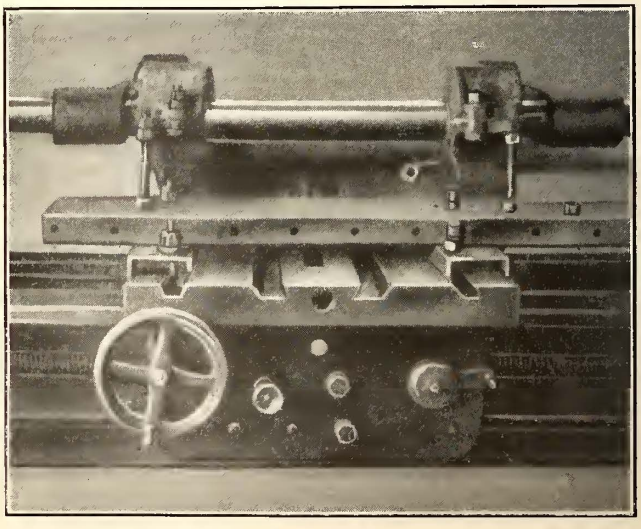
RECLAIMING GE-57'S—SPOOL GUIDE FOR BORING BAR

After removing the cross-feed carriage the frame is placed in the lathe, with the boring bar between the centers. It is then lined up and clamped to the carriage and the armature bearing seats are bored to a standard diameter of 5 in.

After the boring of the armature seats, and while the spool is still clamped in position, a ⅞-in. hole is drilled parallel to, and 7 5/16 in. from, the axis of the armature bearings on both commutator and pinion ends, on the side opposite the axle. These ⅞-in. holes are drilled so that one-half of each is in the upper and the other half in the lower frame. When the motors are finally reassembled, a ⅞-in. pin, made from cold-rolled steel with cotters at each end, is placed in the holes. This pin acts as a dowel and prevents the lower frame from shifting when it strikes any obstruction in the track, such as high bricks in pavement or hard, frozen snow.

In reboring the axle-bearing seats the spool and boring bar are removed, and the finished ends of the arms shown in the previous halftone are clamped in the armature-bearing seats. After the frame has been properly centered and clamped to the carriage, the axle-bearing seats are rebored to a uniform standard of 5 in., new armature and axle bearings being made to fit the rebored frames. The following illustration shows this operation.

On the GE-57, and other older types of motors, the axle bearings as well as the axles were subjected to unnecessary wear on account of dust and grit. In connection with the reclaiming of GE-57's, the axles have been inclosed with a cast-steel shield made in two halves, one section being electrically welded to the top and the other to the bottom half of the motor frame, the joint between the two halves being machined with an offset so as to make it dust tight. This arrangement as well as the practice of reboring the frames has given very satisfactory results and has been the means of considerably reducing the cost of maintenance. The shield is shown in the two small illustrations in the first column.



RECLAIMING GE-57'S—REBORING THE AXLE BEARINGS

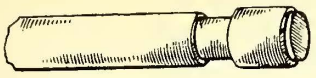


Fig. 1a—Tip of the round-tip fixture

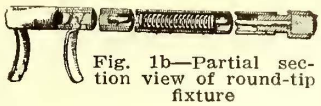


Fig. 1b—Partial section view of round-tip fixture

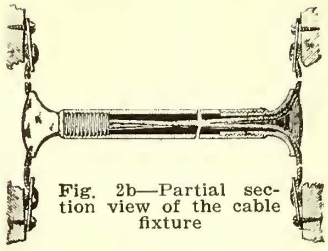


Fig. 2b—Partial section view of the cable fixture

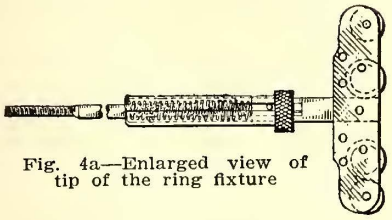


Fig. 4a—Enlarged view of tip of the ring fixture

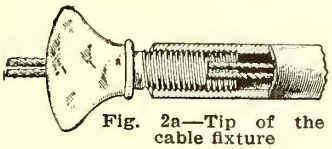


Fig. 2a—Tip of the cable fixture

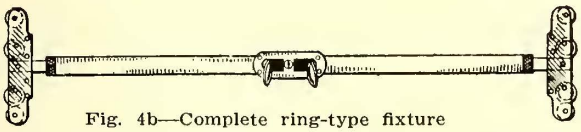


Fig. 4b—Complete ring-type fixture

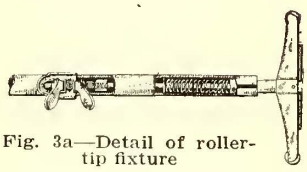


Fig. 3a—Detail of roller-tip fixture

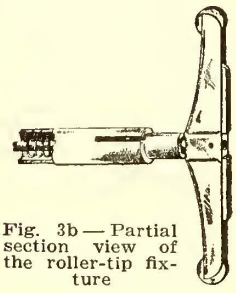


Fig. 3b — Partial section view of the roller-tip fixture

DETAIL SKETCHES SHOWING FOUR STAGES IN THE DEVELOPMENT OF THE MODERN CURTAIN FIXTURE

The Development of the Automatic Car Curtain

BY W. H. FORSYTH
Second Vice-President Curtain Supply Company, Chicago, Ill.

The first concern to offer to the trade a practical and suitable curtain device was the E. T. Burrowes Company of Portland, Me., which, about the year 1892, purchased from the inventors and owners the original pinch-handle curtain fixture. This consisted of a tube at the bottom of the curtain containing two reciprocating rods, to the inner ends of which pendants or handles were attached. The rods carried at their outer ends pieces of rubber which were thrust against the bottoms of the grooves in the window frame by springs.

Prior to the introduction of this style of curtain, wooden blinds had been generally used, but had proved costly to the railroad and inconvenient to the passengers. In order to keep the wooden blinds in proper condition, they had to be removed from the car, scraped and revarnished at intervals. One or two of such treatments loosened the wooden slats in their sockets, requiring early replacement of the blinds. The hardware attached to the wooden blind was also a source of expense. As a result of the high first cost and maintenance cost of the wooden blind the railroads welcomed the curtain. The passengers also, who found the wooden blinds difficult to move due to swelling, appreciated the change.

The use of the pinch-handle curtain with the rubber tip grew rapidly, but as it grew certain defects became apparent. Many passengers, through ignorance, failed to pinch the handles but instead grasped the bottom of the curtain, often drawing them into oblique or canted positions. Sometimes the curtains would be pulled entirely out of the curtain grooves.

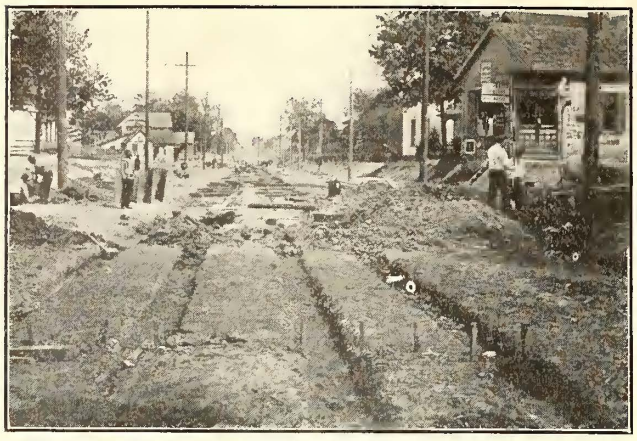
About this time the Adams & Westlake Company put on the market the "Acme" cable fixture, which was so constructed that the fixture could not get into a canted position, nor could it be pushed out of the grooves, through the application of the "squaring band" principle used on large drawing boards. Two cables which crossed each other inside the tube at the bottom of the curtain were used. This device held the curtain rod in the grooves, but another difficulty was encountered, namely, the wearing of the cables due to the constant friction. Furthermore, the cable fixtures could not be removed from the groove at the top of the window openings to permit the car cleaners to clean the windows without soiling the curtains. The curtains thus became soiled during the cleaning operation.

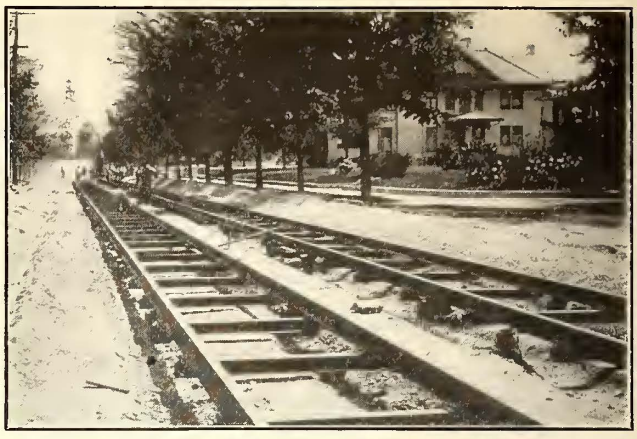
About 1892, Forsyth Brothers Company put on the market the roller-tip type of fixture. In this the tips were elongated and in the tip ends were placed anti-friction rollers. A friction pad was placed between the rollers, extending out beyond a line tangent to their surfaces. Thus when the curtain was tilted the friction pads were withdrawn or rocked away from the bottom of the grooves, and the anti-friction wheels on the ends of the tips came in contact with the bottom of the grooves. As these had no holding power, the upward pull of the spring roller immediately drew the curtain into a level position, and the curtain righted itself without leaving the grooves. This type of fixture almost immediately became popular.

In 1899 the Curtain Supply Company was formed, having come into possession of all the patents owned by the other companies mentioned. The new company immediately began to develop the art still further. It was seen that, in order to work efficiently, a curtain fixture should hold the curtain at any point in the window without creeping, and it should be capable of operation either by using the pinch handles or by grasping the curtain anywhere along the bottom, remaining at the same time level and in the grooves.

While the roller-tip device held the curtain without allowing creeping, it lacked the ability automatically to release its hold upon the window frame when the attempt was made to draw the curtain down. This latter operation was the immediate cause of the canting of the curtain or of its being pulled entirely out of the grooves. When the passenger pulled the curtain down at one end, he drew the holding means on one side away from the bottom of the groove, but he did not release the holding means which was still holding the curtain on the other side. Therefore, the curtain was readily drawn from a horizontal position out of the window opening.

To obviate the above difficulty the ring fixture was designed. This not only holds the curtain without





TRACK REHABILITATION IN SPRINGFIELD—PREPARATION OF FOUNDATION TRENCHES, AND TRACK READY FOR GROUTING

creeping, resisting the upward pull on the roller, but in addition automatically releases its hold of the window frame when the curtain is drawn down.

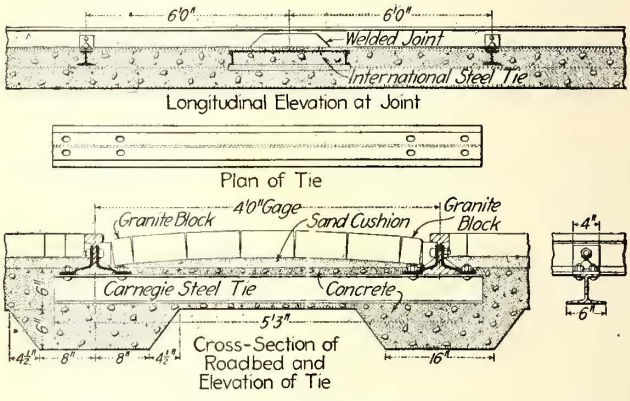
Experience developed that for some cases a special construction of the tip was desirable in order that the fixtures could not be removed from the grooves. For this purpose flanges were provided on the tips of the ring fixture and a confining strip of metal was mounted to project part way over the groove, the inside of the flange coming in contact with the inside of the confining strip. This is called the closed type of fixture, which is much more generally used on electric cars in the country than on steam cars.

Track Rehabilitation in Springfield, Ohio

BY C. G. KEEN
Engineer of Way and Structures American Railways, Philadelphia, Pa.

The Springfield (Ohio) Railway, a subsidiary of The American Railways, Philadelphia, Pa., has recently completed about 12 miles of track construction and reconstruction which presents many interesting features. With the exception of about 2½ miles of open track the entire construction is of 100-lb. A. R. A. Series A rail on steel ties and concrete ballast. The paving is of brick with granite stretcher blocks, except in the central portion of the city, where wood block was laid to conform with the paving program of the city. Paving was done by the same contractor who had the city contracts for paving the balance of street, and the contracts included the entire concrete substructure. The granite stretchers were furnished by the company.

The company was fortunate in being able entirely to suspend operation on the streets on which work was being done and thus was enabled to give the concrete substructure and the paving grout ample time to set. The old tracks were generally in dirt ballast and were removed to the original sub-grade at a cost of from 13 cents to 16 cents per foot. The additional excavation to conform with the cross-section shown in the accompanying illustration averaged 5 cents per foot. The concrete was mixed in a batch mixer and was spouted into the trench by the paving contractor and was included in the square-yard price for paving.



TRACK REHABILITATION IN SPRINGFIELD—DETAILS OF STANDARD TRACK CONSTRUCTION

Carnegie rolled steel ties section 25-M were used with 5-ft. spacing. A special clip was bolted through the web of the rail as shown on the drawing, except at joints where the International twin-steel tie was used.

In paved construction the track was electrically welded

TRACK REHABILITATION IN SPRINGFIELD—PAVING TRACK IN WEST PLEASANT STREET, SPECIAL-WORK LAYOUT WITH STEEL TIES

at the joints, and the base of the rail was welded to the plates of the twin-steel ties. Joints were placed opposite, making but one twin tie every 60 ft. Both resistance-type and motor-generator machines were used in the welding. The electrical resistance of 3 ft. of rail at the joints was equivalent to an average of less than 3 ft. of unbroken rail, owing to the use of the cross-section of the joint plates and the International steel tie plate for conductivity. Flat joint plates, furnished by the Indianapolis Switch & Frog Company, and plain angle bars with the lower leg planed to give welding space were used on different parts of the work. No cross-bonding was necessary as the rails are welded to the steel ties at joints.

From a summary of a few jobs on which costs are completed the following statement of the average cost per foot has been prepared:

Engineering and superintendence	$0.05
Grading (extra depth below original sub-grade)	.05
Ballast (concrete 1:3:5)	.54
Ties (one twin steel tie at joints, Carnegie ties on 5-ft. centers between)	.31
Rail and rail fastenings (including clips for Carnegie ties)	1.16
Special work:	
Track labor (including welding costs)	.30
Paving (brick with granite stretchers, cement grout)	1.50
Removing old track to original sub-grade	.15
Total	$4.06

Special work was also built of 100-lb. A. R. A. Series A rail with bolted, rolled guard. Iron-bound construction comprised frogs and mates and solid manganese tadpole-type switches. Cast-iron heel blocks were placed at all acute angles and drain boxes in the switch pieces.

The track work described above is the remaining part of the rehabilitation scheme, of which the carhouse and shop buildings were described in the issue of the ELECTRIC RAILWAY JOURNAL for March 20, 1915, page 556, and the power house in the issue of Oct. 30, 1915.

The rehabilitation work has been in charge of George C. Towle, general manager, Andrew Schmittauer, superintendent of construction Springfield Railway, H. J. Crowley, general manager American Railways, and the writer.

Converter Trouble Cured by Brush Treatment

At the Virden substation of the Illinois Traction System, a 300-kw. rotary converter operating at 500 r.p.m. on 25-cycle current with 600 volts on the d.c. side, originally gave considerable trouble partly because of the extreme irregularity of the loads placed upon it. A standard make of carbon brush having sufficient hardness to keep down the mica between commutator bars was used at the time, but by undercutting the commutator and substituting softer brushes for the hard ones, all of the original difficulties were overcome.

The rotary has six poles with seven brushes to the pole, the size of brush being 1¼ in. x ⅝ in. The full load is 500 amp., giving about 30 amp. per square inch of brush contact, a pressure of ½ lb. per brush being maintained. The accompanying chart, taken with a graphic meter during the time when the excessive trouble with the converter was being experienced, indicates the variable character of the load. However, the average output of the substation is only about 1800 kw.-hr. per day, making it evident that the trouble was not due to constant overloading of the converter. The d.c. circuit breaker, it may be said, is set to open between 800 amp. and 850 amp. of load.

The following record shows the frequency of the trouble that was experienced up to the time that the change was made.

Jan. 16, 1913, armature burned out. Replaced thirteen coils.

Jan. 21, 1913, armature burned out. Replaced twenty-one coils.

March 22, 1913, flash across a.c. collector rings. Rings burned badly. Collector brushes annealed.

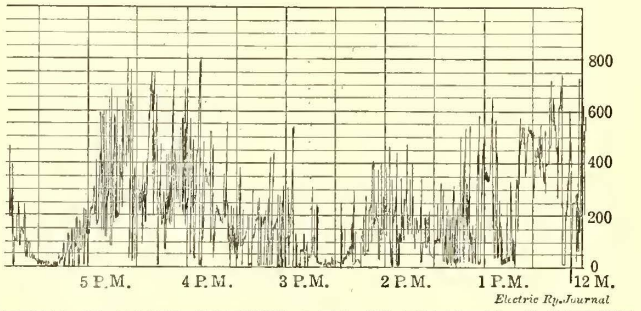
July 21, 1913, shunt field winding punctured.

Aug. 4, 1913, armature burned out. New armature installed because commutator was badly burned.

Aug. 19, 1913, shunt field punctured.

Aug. 28, 1913, commutator badly burned. New set of brushes installed after commutator had been ground down.

Sept. 30, 1913, armature burned out. New armature installed because commutator was badly burned.



SECTION OF CHART SHOWING LOAD ON FRACTIOUS CONVERTER

Feb. 7, 1914, armature changed because commutator was badly burned. Grinding gave only temporary relief.

March 13, 1914, shunt field punctured.

March 30, 1914, commutator ground down because it was burned.

May 14, 1914, commutator turned down, ground smooth, undercut, and a set of Le Carbone grade G carbon brushes installed.

Since the date of the last entry in the above record no lubricant whatsoever has been used. The brush wear, up to the present time, is about 3/16 in., and the change has eliminated all of the previous trouble with the rotary. The brush that is installed at present is of a much less abrasive grade than the one previously used, this being made possible by the undercutting of the commutator, which has now acquired the desired finish. It may be said that the present peak load on the machine is higher than it was when the chart that is reproduced in the accompanying illustration was taken.

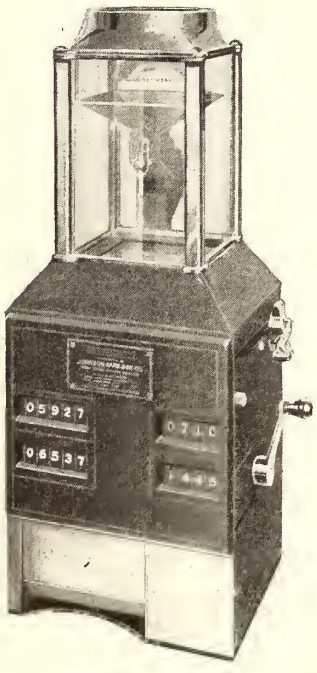
Electric Locomotives Ordered and Track Electrified by the St. Paul

The Chicago, Milwaukee & St. Paul Railway was noted in the regular annual rolling-stock statistical tables of the ELECTRIC RAILWAY JOURNAL of Jan. 1, 1916, as having ordered during 1915 nine 260-ton electric locomotives. This figure should have been thirty, which includes nine locomotives for the Three Forks-Deer Lodge division, and twenty-one locomotives for the Deer Lodge-Avery division, all of which are under construction at the present time. While these machines were originally designed for 260 tons, certain modifications made by the manufacturer and the customer increased the weight to 282 tons.

In the statistical tables on new electric railway track built, published in the same issue, the new mileage of approximately 7 miles electrified and placed in operation at 1500 volts by the Great Falls, Mont., terminal of the Chicago, Milwaukee & St. Paul Railway should have been included in the list.

Counts Five Kinds of Fares

Another development in the refining of the registering fare box to meet the various demands of street railway service has just been put on the market by the Johnson Fare Box Company, Chicago and New York. To the standard registering fare box has been added a registering mechanism which automatically counts two different denominations of metal tickets, as well as nickels, dimes and pennies on separate cyclometers. The metal tickets, which are made in two sizes to serve for lines where two classes of ticket fares are in use, are counted and indicated on two different dials, while the cash fares, including nickels, dimes and pennies are totalized and shown on another indicator. The fourth indicator totalizes all fares collected and the three other indicators show the total passenger load divided into the three classes of fares collected. The counting mechanism for the four dials is so interlocked that it is impossible for any class of fare to be registered on the wrong dial. The addition of the new features has involved no change in the size of the regular Johnson fare box nor in the design of the hopper. All fares are deposited into one hopper and the counting mechanisms select the different classes of fares and indicate them on the dials.



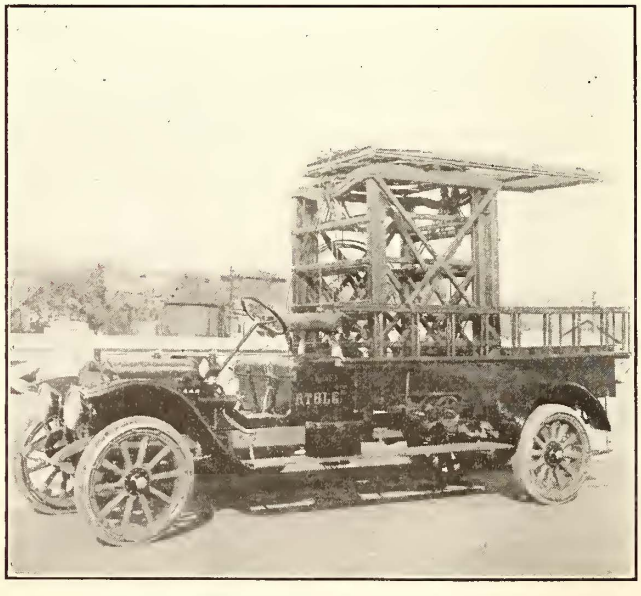
FOUR-DIAL FARE BOX

Distinctive tokens, which may be furnished by the fare box company or purchased in the open market, have been designed especially for use with this box. They consist of coins, one between the penny and the nickel in size and the other between the American dime and the Canadian 5-cent piece. Both of these metal tokens are made with a bronze rim and a German silver center swedged securely in place. This combination, together with the printed matter impressed on this coin with the dies, making it very difficult to counterfeit, and the hardness of the metal employed insures a long wear life. Considerable attention was given to the design of the coin and the selection of the metal to overcome the usual objections to a metal ticket. This fact and the provision of four cyclometer dials and the transfer register mechanism on the fare box, are distinctive features which make possible the use of the registering machine in cities where complicated fare classifications have limited their use heretofore.

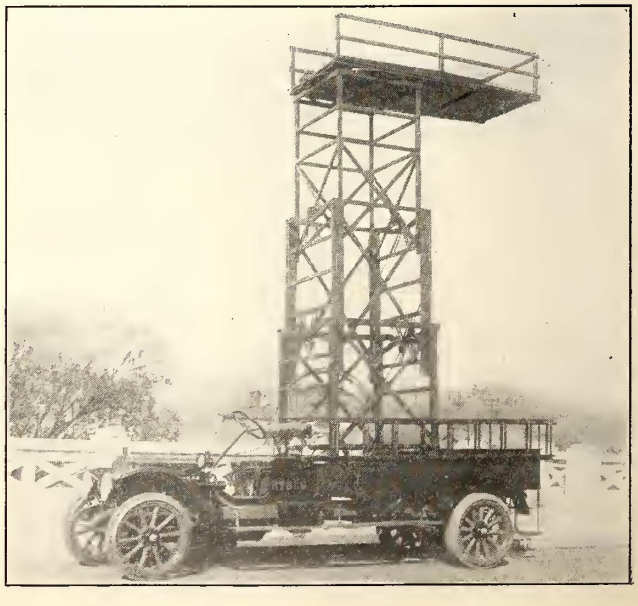
Three-Section Tower Wagon

Since the adoption of the automobile type of tower wagon by many electric railway companies, the need has been felt for a tower in which the weight is placed lower when the tower is closed than on the commonly-used two-section tower, thus eliminating top-heaviness as far as possible. To meet this demand, J. R. McCardell & Company, Trenton, N. J., have recently brought out the three-section design which is shown in the accompanying illustrations, these cuts being made from photographs of a machine in use by the Reading Transit & Light Company, Reading, Pa. This type of tower, when lowered, has between 20 per cent and 25 per cent less height than a two-section tower designed to attain a height equal to that attained by the three-section design. It can be operated easily by one man, the same type of revolving platform and hoisting engine being used in both the three-section and two-section designs. In fact, only such parts have been introduced in the three-section tower as were necessary to adapt the company's well-known two-section tower to the new conditions involved by the growing use of the automobile.

The three-section design measures, horizontally, 4 ft. 7 in. long by 4 ft. 3½ in. wide, and it can be used on any vehicle or car on which a two-section section tower can be used. The body measures 4 ft. 5 in. wide outside of panels, and the length of the body is governed by the length of the chassis frame in back of the driver's seat. Two large lockers, one on each side with a passage way between, extend from the rear of the tower to the rear end of the body, these being provided with lids, hasps and staples, and a complete equipment of hand rails, back rails, steps, etc., is provided. The height of the tower when lowered, measured from the bottom of sill to the



THREE-SECTION TOWER IN LOWERED POSITION



THREE-SECTION TOWER IN RAISED POSITION

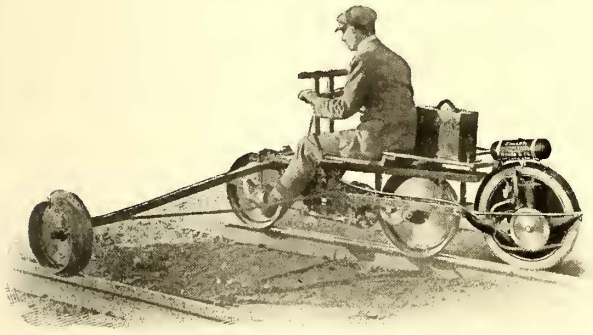
floor of platform, is 7 ft. 1 in. When the platform is elevated the height between the same points is 16 ft. 5 in., but these dimensions can be varied within certain limits, every inch added to the height when lowered adding 3 in. to the height when raised. The net weight of the three-section tower, complete, is approximately 1750 lb.

Motor Wheel for Railway Hand Speeders

A convenient application of the motor wheel to the railroad hand speeder or velocipede, shown in the accompanying illustration, has been worked out by Mudge & Company, Chicago, Ill., together with the A. O. Smith Manufacturing Company of Milwaukee, who have for the past two years been manufacturing a motor wheel for application to bicycles.

The motor wheel is attached behind the velocipede and employed as a pusher. Special appliances for attaching may be furnished. The engine is of the four-cycle, air-cooled type, 2⅜-in. bore by 2½-in. stroke, and develops 1½ hp. It is magneto equipped and is throttle governed by means of a flexible tubing control fastened to handlebars or conveniently on seatboard. Any speed from 4 to 25 m.p.h. can be set and maintained.

Some idea of the capacity of this motor wheel can be gained from the fact that for a test two of them ap-



MOTOR WHEELS FOR RAILWAY HAND SPEEDERS

plied to the rear of a seven-passenger Franklin automobile easily propelled it on a run of several miles. The wheel complete weighs but 50 lb. and with its heavy rubber tire gives ample tractive power to carry one and, under favorable conditions, two men on a speeder. It is quickly attached and detached and can be taken off at night and locked up if it is desired to leave the speeder out of doors. When not in operation it is hooked up to the frame of the speeder about an inch over the rail so that the handlebars can be used.

Italian State Railway Electrification Projects

Representations have been made to the Italian State Railway Administration urging the completion and extension of electrification of the Piedmontese Railway network, and in particular the early completion of the electrification and double-tracking of the line from Turin to Bussoleno; also for the supply of electric current for the operation of the completed section to Modane of the Mount Cenis Railway, and the discontinuance of steam operation on the Bardonecchia-Modane section. The absence of the engineers of the Paris, Lyons & Mediterranean Railway is recognized, but it is urged that the Italian Railway Administration should proceed with or without their co-operation, in the interest of the future trade prospects of these regions. The association also urges action with regard to the electrification of the Turin-Pinerolo-Torre Pellioe line, which is of a mountainous character.

Clear Vision Shield

An independent adjustable glass panel or shield for preserving a clear line of vision through the motorman's window during bad weather has been developed by the Clear Vision Shield Company, Pittsburgh, Pa. The shield, shown in the accompanying illustration, is hinged at its upper edge and mounted independently in front of the motorman's window. When in an inclined position it prevents the driving of snow and rain against the motorman's window and may be so adjusted so that the line of vision of the motorman, while below its lower edge, is within the zone protected by the inclined shield from both snow and rain. If ventilation is

STORM SHIELD FOR MOTORMAN'S WINDOW

desired the motorman's window may be dropped slightly without any exposure. When the shield is in a vertical position there is created a "dead air space" between the rain panel and the motorman's window which tends to prevent the formation of frost on the front window and thus in very cold weather gives the motorman a clear view ahead.

The shield is a handsomely-finished black enameled steel channel frame; the glass is ¼-in. plate, set in rubber or steel liner. All parts are made extra strong to withstand hard service. The adjustments are furnished in either rod or friction hinge styles.

The Colwyn Bay (England) Council is vigorously opposing a change proposed by the officials of the tramways running between Colwyn Bay and Llandudno, to increase the service by putting on a number of double-deck cars. The opponents of the change object to the double-deck cars on account of the steep hills, and also contend that such cars would not be in keeping with the character of the district.

NEWS OF ELECTRIC RAILWAYS

NEW YORK COMMISSION REPORTS TO LEGISLATURE

Commission for the Second District Reduces Its Operating Cost Despite Increase in Activities

The ninth annual report of the Public Service Commission for the Second District of New York, submitted to the Legislature on Jan. 10, shows one of the most important years in the commission's existence. In addition to handling large current business, the commission has disposed of all of the old cases which have been pending for a long time, has released nearly $500,000 tied up in a dispute with the New York Central over the payments for the elimination of the Yonkers grade crossings and has entered upon the administration of the so-called Thompson jitney bus law which brought all the vehicles of this character under the jurisdiction of the commission as common carriers.

In taking up the work of the jitney bus, two cases were brought to the courts, one of which was carried to the Appellate Division. These cases, recently decided, have laid down clearly the classes of vehicles which come under the law, embracing practically all vehicle lines, operating wholly or partly within a city, and in competition with other common carriers. The district attorneys and city officials throughout the State were notified of the scope of these decisions, and so far as the commission has learned all operation of jitneys in contravention to the statute has been stopped. Many applications are now pending before the commission for certificates of convenience and necessity under the law.

The total number of applications and complaints to the commission for the year has been 1997; 2184 cases of all sorts have been disposed of, showing a reduction of the commission's calendars for the year by 187 cases. To accomplish this result the commission held 578 hearings on 352 days, 256 hearings in Albany, eighty-four in New York City, fifteen in Buffalo, and eighty-six in various other places in the State.

The expenses of the commission during the first year were $438,000. For the current fiscal year (ended Sept. 30, 1916), the appropriation is $394,000, and for the next fiscal year the commission has requested only $392,000, showing a consistent decrease in cost despite enlarging duties.

There are now 928 public utility enterprises under the jurisdiction of the commission, including steam and street railway corporations, express, sleeping car, baggage and baggage transfer, stage coach and stock yard companies, electrical, gas, and steam corporations, including municipalities and unincorporated individuals, and telephone and telegraph companies.

RECOMMENDATIONS CONTAINED IN NEW JERSEY COMMISSION'S REPORT

The Board of Public Utility Commissioners of New Jersey is still of the opinion that the legislation suggested by it to the Legislature but not adopted last year would add desirably to the laws providing for regulation of public utilities. The commission now suggests in its annual report to the Governor further consideration of the following:

1. An act specifically empowering the commission to require proof when its approval of proposed security issues is asked that there has been an adequate attempt on the part of the petitioners to ascertain and to obtain the highest price at which such securites may be sold, and in default of satisfactory proof thereof to impose as a condition of granting such approval the advertising for sealed competitive bids for such securities accompanied by certified checks guaranteeing the responsibility of the bidders.

2. An act making void all security issued by public utilities, whether put out by way of sale or by way of pledge or hypothecation, and making such unauthorized issue a misdemeanor, unless the prior approval of the board thereof has been granted.

3. An amendment of the general railroad act, and in particular Sec. 70 thereof, whereby the limitations to be imposed upon the bonded debt that may be incurred by a railroad company incorporated in New Jersey by a foreign corporation as regards its property situate in this State may be made uniform, whether said company is operated independently or under lease, or by virtue of merger or consolidation with another railroad company.

4. Legislation prescribing more precisely the terms under which railroad companies or other public utilities may lease or be leased to railroads or other public utilities, such legislation to fix the maximum term of the lease and to make mandatory the requirement that the property of the lessor company shall be at all times capable of identification either physically or by fixing the value thereof upon the books of said lessor company and lessee company respectively.

MASSACHUSETTS COMMISSION STUDYING BAY STATE VALUATION

Following an appropriation of $10,000 from the executive council for expert services in the pending fare case of the Bay State Street Railway, the Massachusetts Public Service Commission has begun an investigation of the valuation submitted by the company at the recent hearings and prepared by Sloan, Huddle, Feustel & Freeman, Madison, Wis. At present the board is utilizing the services of seven members of its engineering and inspection departments in the analysis of investment cost on about 40 miles of road between Medford and Lowell, Boston and Lynn. The checking is being done independently of the Feustel report and takes into account the cost of track, conduit and overhead lines. Various records of the company are being examined by the accounting department of the commission under J. W. Lester, chief accountant, and the engineering studies are being made under H. W. Hayes. The checking at present being carried out by the board is in the nature of a cross-section of the company's valuation. The extent of later work has not yet been determined. Hearings will be resumed at Boston on Feb. 1 by the commission. At that time Mr. Feustel will be cross-examined relative to the valuation submitted by the company. This valuation is stated to have cost about $60,000.

FURTHER APPROVAL OF HYDRO-RADIALS

The construction of a public-owned radial system in western Ontario was approved on Jan. 3 by eighteen municipalities. Only four went against it—the Townships of Waterloo, Blanchard, North Easthope and East Zorra. Of the four defeats for the by-law, two at least, those in Blanchard and Waterloo, were due to the fact that the by-laws were submitted for the whole township instead of for the section immediately interested. The result was that the portions of the townships which would not derive a direct benefit from the radial line voted down the other part. These are contiguous to the line, and under a clause in the act their consent is not necessary for the construction of the radials. New petitions will be circulated asking for a by-law covering only the sections of the townships benefited.

Counting the six municipalities that voted on Jan. 1 for the scheme, twenty-four places have not voted. In five municipalities by-laws will be voted upon later. Regarding the negotiations with Sir William Mackenzie in connection with the purchase of Mackenzie and Mann radials, Sir Adam Beck said that the offer of cost plus 10 per cent only referred to two lines now in the conception stage, and possibly one or two under construction. This offer had nothing to do with the Metropolitan or other radials now running out of Toronto. He thought a fixed price

would have to be agreed to before title to the radials could be acquired, but the conferences have not reached that stage.

It is not unlikely that another attempt will be made in the courts to upset the by-law in Toronto. This was intimated when the application to restrain the Council from submitting it was thrown out by the High Court. If this is attempted it will probably be on similar grounds, viz., including in the by-law the clause relating to townships setting forth the district to be assessed for the line.

MASSACHUSETTS COMMISSION PRESENTS REPORT

The third annual report of the Massachusetts Public Service Commission was submitted to the Legislature on Jan. 10. It covers the year ended June 30, 1915.

An appropriation of $10,000 has been received to enable the board to call upon outside experts in studying the pending Bay State Street Railway fare case, which the commission considers in many respects the most important fare case of the kind ever tried in the State. The report states that in the pending cases depreciation will demand close attention leading to the establishment of a single standard of figuring this expense. A special report will be submitted relative to conditions at the Dudley Street station, Boston.

During the year 3613 car inspections were made and no serious defects were found. The number of cars found defective with reference to wheels, brakes, lighting, car-seat frames or through untidy conditions was 732. The number of accidents due to broken or loose wheels, broken journals and axles reported was sixty-seven; miscellaneous accidents investigated, such as collisions, personal injuries, and faulty operation, 455; accidents caused by defective track, 447. The number of fatal accidents to individuals investigated was ninety-six. Accidents caused by persons coming in contact with either fenders or wheel guards, or both, were: fatal, fifteen; serious, sixteen; not fatal or serious, 252. Lifting jacks were used eight times to extricate persons from underneath cars. In five instances the time consumed was five minutes each, in one instance twelve minutes and in two others nine and eight minutes. The total number of persons injured was 8488, of which eighty-five were fatal. The number of passengers injured was 6229. Of these twenty-two were fatal. Last year 8282 persons were injured and 117 were killed.

THE TRUTH ABOUT CALGARY

F. G. R. Gordon, writing in *Concerning Municipal Ownership* for January, 1916, under "The Truth About Calgary," referred to the municipal street railway there as follows:

"A further claim has been made by public ownership advocates that the operation of the street railway system has resulted in a big profit, and one writer adds that this miracle has been accomplished on a fare of 2½ cents. This is far from the truth. The fare of 2½ cents is only for school children, that is to say, ten tickets are sold for 25 cents. Workingmen's tickets are sold during certain hours of the day at a rate of eight for 25 cents. Ordinary tickets are sold at twenty-five for $1 in book form. Civic employees receive thirty tickets for $1. In 1914 the actual revenue was $702,531. The expenses amounted to $698,698, leaving a surplus of $3,831.

"The funded debt of the Calgary street railway is $2,280,210, upon which there is an annual interest charge of $106,359. The operating expenses for last year totalled $428,797, of which $277,894 went for wages and salaries. The ratio of operating expenses to gross earnings approximated 70.08 per cent. The system cost $31,331 per mile. The depreciation charges for 1914 were $29,299, or less than 1½ per cent. Here we find the 'nigger in the (municipalized) wood-pile.' Five per cent for depreciation is a sufficiently low figure in the United States and it is doubtful if 6 per cent would be too high for Calgary, when the climate is considered. If Calgary had allowed even 4 per cent for depreciation in 1914, the city would have lost $58,000 net on her street railway system.

"The taxes paid by the system amount to a total of $3,373, of which $863 was on land. As the tax rate in Calgary is $20.75 per $1,000 of valuation, we see that the city discriminates in favor of its street railway system."

ANOTHER 200 CARS ORDERED BY NEW YORK MUNICIPAL RAILWAY

The New York Municipal Railway Corporation, Brooklyn, N. Y., has just placed an order with the American Car & Foundry Company for 200 all-steel side-door car bodies and trucks for same. This order supplements earlier orders for 300 car-body and truck equipments previously placed with the same builder. The bodies and trucks will differ only in a few minor details from the original designs which were described in the ELECTRIC RAILWAY JOURNAL for June 6, June 13 and Dec. 26, 1914; March 13, March 27 and May 8, 1915. This order is subject to the approval of the Public Service Commission, First District of New York, in accordance with regular procedure. News of this order was received too late to be included in the department headed "Rolling Stock," which had already gone to press.

DUTY TO KEEP STREETS IN REPAIR IN NEW JERSEY A CONTINUOUS ONE

The Board of Public Utility Commissioners of New Jersey has disposed of the complaint of the Borough of Red Bank against the Monmouth County Electric Company by ordering the company to make certain improvements to its roadbed, tracks and ties requisite to furnishing safe, adequate and proper service. Complaint was made by the borough that the company did not furnish proper service and it was particularly charged that it did not properly maintain its property in Monmouth Street, Front Street, Broad Street, West Street, Wharf Avenue and Shrewsbury Avenue. The company denied the streets were in bad condition due to its negligence, and alleged the borough required the company to permit the Jersey Central Traction Company to operate cars over its rails in certain streets. It was charged that any impairment of the rails and streets was due to the size and weight of the cars of the Central Traction Company. The company also set up that the jitney service between Red Bank and Long Branch had greatly diminished the revenues of the company and that the service, facilities and appliances furnished by the company were all that could fairly and justly be required under the circumstances. After reviewing the testimony, the board concluded the company did not keep certain portions of its property in proper condition and stated that repairs could be made for $847. Continuing, the board said:

"No matter if this unsafe condition of the company's property is partly due to the operation of the cars of the Jersey Central Traction Company over said tracks by the terms of the original franchise ordinance, under which the respondent is operating its system in the borough, it is in no wise relieved thereby from its duty to the public. It is well to note, however, that the Jersey Central Traction Company pays to the Monmouth County Electric Company a regular rental mutually agreed upon between them, for the operation over its tracks."

The statutes of New Jersey, the board says, impose on every street railway company the duty to keep in repair, to the satisfaction of local authorities, the paving or surface material of the portions of the streets occupied by its tracks. The board said:

"This statutory obligation cannot be waived or modified by any ordinance of the borough. The supplemental ordinance known by the number 68 is improvident and disadvantageous to the borough of Red Bank. The paltry consideration of the payment of $200 per annum only aggravates the injustice perpetrated on the public if we accepted the company's view of its intent. We conclude that the statutory duty was not and could not be changed by any action of the Borough Council. The duty of the company to keep portions of the streets in proper repair is a continuing one, and if these repairs were satisfactory to the local authorities in the year 1910, they certainly have not been for the two years last past. They have continually complained of their unsatisfactory condition."

Toledo Appraisal by July 1.—The Ohio Public Utilities Commission has extended until July 1, 1916, the time of the Toledo Railways & Light Company, Toledo, Ohio, for filing its inventory and appraisal. The city officials desire the data from the appraisal for use in negotiating with the

company for a new franchise. The city will probably appoint engineers to check the inventory and report in its behalf.

President Wilson to Address Railway Business Association.—President Woodrow Wilson has authorized announcement that he will speak at the dinner of the Railway Business Association on Jan. 27 at the Waldorf-Astoria Hotel, New York. His subject has not yet been given out. In his annual message in December the President recommended an inquiry into the whole question of railway regulation. The suggestion is embodied in a resolution, now pending, introduced by Senator Newlands, chairman of the committee on interstate commerce, and calling for a joint committee of five Senators and five Representatives to report next December.

San Francisco Purchase Offer Referred Back.—The ordinance authorizing the submission of an offer by the city to the United Railroads, San Francisco, Cal., for its lines on Junipero, Serra and Sloat boulevards and Twentieth Avenue has been referred back to the public utilities committee by the Board of Supervisors. Supervisor Vogelsang said the decision on this proposition should be left to the new board. City Engineer O'Shaughnessy stated from $3,000,000 to $4,000,000 would be required for the Municipal Railway extensions which should be constructed now, and he regarded a bond issue as desirable.

Six Ex-Directors of New Haven Acquitted.—Six of the eleven ex-directors of the New York, New Haven & Hartford Railroad were acquitted on Jan. 9, in the Federal District Court, of having conspired to break the Sherman law. Concerning the other five, the jury, after having been out fifty hours, disagreed. The five whose innocence was not established were: William Rockefeller, Lewis Cass Ledyard, Charles F. Brooker, Charles M. Pratt, Edward D. Robbins. The six who were acquitted were: Frederick F. Brewster, D. Newton Barney, Robert W. Taft, James S. Hemingway, A. Heaton Robertson, Henry K. McHarg.

Small Gathering Greets Milroy Committee at Toledo.—Only thirty persons were present at the first meeting for the year of the Milroy street railway committee at Toledo, Ohio, held on Jan. 4, and only two members of the committee appeared. Out of the total number, nineteen voted in favor of municipal ownership regardless of how it is to be attained. Most of those present favored the transportation of freight over the local line at hours to be designated by the city. Frank Hillenkamp made the principal address. He argued that the present indebtedness of the city was not so serious as to preclude municipal ownership.

Tenders Wanted for Spanish Railway.—Tenders will be received at the Direccion General de Obras Publicas, Ministerio de Fomento, Madrid, Spain, until Jan. 28, 1916, for the construction and working, for a period of sixty years, of an electric tramway in Madrid (Monte del Pardo district). The minimum rolling stock required to commence the working of the line is three motor cars and three trailers. Construction work must be commenced within three months and completed within a year from the date of the award of the concession. The Bureau of Foreign and Domestic Commerce, Department of Commerce, reports that it has no further information relative to this opportunity.

Ordinances Before Pittsburgh Council. — Councilman Robert Garland has introduced into the Council a resolution authorizing that body, as the committee on public service and surveys, to enter at once upon a study of all phases of the underground system which, it is believed, will afford the only permanent relief from traffic congestion in the downtown section. Mr. Garland has also presented the ordinance granting a franchise to the Pittsburgh District Railroad, a proposed underground system to extend across the city. This measure was considered by the Council before, but never acted upon definitely. A. E. Anderson is president of this company. The proposed ordinances of the Pittsburgh Railways looking toward the relief of traffic did not come before Council on Jan. 10.

Columbus Purchasing Agents Organize.—The Columbus Purchasing Agents' Association was organized at the Virginia Hotel, Columbus, Ohio, on Dec. 13, 1915. The following officers were elected for the coming year: N. O. Abey, president; W. T. Sheldon, vice-president; H. J. Kaufman, secretary; W. V. C. Bulkeley, treasurer. The board of directors will consist of these four officers and C. H. Rogers, H. C. Hoeflich and J. D. Pinney. The charter members include the following purchasing agents in Columbus: N. O. Abey and J. W. Davidson, Jeffrey Manufacturing Company; W. V. C. Bulkeley and E. C. Johnston, Columbus Railway, Power & Light Company; J. E. Finneran, Buckeye Steel Castings Company; H. C. Hoeflich, Case Crane & Engineering Company; C. H. Rogers, Scioto Valley Supply Company; R. M. Royer, Ohio State Telephone Company; W. T. Sheldon and W. A. Tully, Ralston Steel Car Company. The association will become a branch of the National Association of Purchasing Agents.

East Boston Tunnel Tolls Agitation.—Since the beginning of the year the Boston (Mass.) Elevated Railway has met with considerable difficulty in the collection of 1-cent tolls in the East Boston tunnel, in addition to the regular 5-cent fare. The Legislature of 1915 passed a law opening a way for the elimination of the 1-cent toll charge collected from each passenger through the tunnel. The law provided that the taking of tolls might cease on Jan. 1, 1916, if the Mayor and the City Council of Boston should appropriate a sum from the tax levy sufficient to make up the difference between the sinking fund requirements and the amount of rentals paid by the company for the use of the tunnel, such suspension of tolls to last for one year. Owing to the failure of the city authorities to take proper action, the company found itself obliged by law to continue the collection of tolls after Dec. 31, 1915, and scenes of disorder accompanied the refusal of passengers to pay the toll charge. In a statement issued on Jan. 6, William A. Bancroft, president of the company, explained the terms of the company's lease of the tunnel and showed that it has no alternative to toll collection pending suitable action by the city. The company is now collecting substantially all the tolls with police co-operation. It is expected that appropriate action will soon be taken by the city to enable the tolls to be abolished for the current year.

Brooklyn Elevated Third-Tracking Controversy.—The Public Service Commission for the First District of New York took action on the third tracking of the Fulton Street elevated railroad in Brooklyn, on Jan. 6, by adopting a resolution authorizing the New York Municipal Railway Corporation, upon filing a certain stipulation, to close a contract for the supply of steel required for the third tracking from Nostrand Avenue to Adams Street on condition "that the plans or drawings for the portion of such work between Cumberland Street and Adams Street, if constructed, shall be so modified as to provide for lattice instead of plate girders, and as so modified shall be subject to the approval of the chief engineer of the commission and of the commission." The stipulation referred to is a statement made at the last public hearing in regard to the third tracking by Timothy S. Williams, president of the Municipal Corporation, to the effect that if the city will provide as a substitute for the three tracks in Fulton Street between Cumberland Street and Brooklyn Bridge equal facilities in a subway running generally parallel to Fulton Street, to be held by the company during the same tenure as the surrendered facilities and to be furnished free of cost, the company will accept such substitute facilities and surrender the elevated structure in the business district of Fulton Street between Cumberland Street and the Brooklyn Bridge.

PROGRAMS OF ASSOCIATION MEETINGS

New York Electric Railway Association

The twenty-first quarterly meeting of the New York Electric Railway Association will be held at the Ten Eyck Hotel, Albany, N. Y., on Feb. 24 and 25.

Illinois Electric Railways Association

The annual meeting of the Illinois Electric Railways Association will be held at the Hotel LaSalle, Chicago, Ill., on Jan. 21. The business program will include the reports of various committees and election of officers. A sub-committee of the engineering committee will report on trolley and transmission lines and their supports. A. J. Bates of the Bates Expanded Steel Truss Company, Chicago, will deliver an address on expended steel poles for overhead lines .

Financial and Corporate

ANNUAL REPORT

Boston & Worcester Street Railway

The statement of income, profit and loss of the Boston & Worcester Street Railway, Boston, Mass., for the years ended June 30, 1914 and 1915, follows:

	1915	1914
Revenue from transportation	$724,429	*$686,025
Miscellaneous revenue	14,366	6,451
Total revenue	$738,796	*$692,477
Conducting transportation	$228,846	$233,821
Maintenance	120,425	128,458
General expenses	81,854	78,338
Total expenses of operation	$431,126	*$440,618
Operating income	$307,670	$251,859
Interest on funded and floating debt	$120,723	$120,693
Taxes	49,301	46,668
Net income for year	$137,645	$84,496
Dividends on preferred stock	$23,832	$23,832
Dividends on common stock	55,687	55,687
Surplus for year after dividends	$58,126	$4,977

*As adjusted by reason of revised method of accounting in freight department, which excludes freight earnings and expenses on tracks of other companies.

Both the passenger and the freight earnings of the company are said to have showed a substantial increase during the year in spite of the unfavorable business conditions in the early part. The total revenue showed an increase of $38,404 or 5.6 per cent, while the operating expenses decreased $9,492 or 2.1 per cent. This decrease resulted from a decrease of $4,975 in conducting transportation, a decrease of $8,033 in maintenance and an increase of $3,516 in general expenses. The operating income increased $55,811 or 22.1 per cent. Fixed charges showed a slight increase, so that the net income for the year increased $53,149 or more than 60 per cent. It is said that a reserve for depreciation of equipment and for damages was set aside during the year, which will be increased from time to time for the upkeep and protection of the property.

DIVIDEND REDUCTION IN CHICAGO

Chicago City & Connecting Railways Collateral Trust Finds Earnings Insufficient to Pay Full Preferred Dividend

The owners of participation shares of the Chicago City & Connecting Railways, which was formed in 1910 to hold securities of the Chicago City Railway and connecting railways serving outlying districts in the southern part of Chicago and extending into Indiana, have suffered a dividend reduction. The committee of nine has advised the shareholders that the earnings of the various street railway lines, the stock and the bonds of which are held in trust, have been insufficient to pay in full the cumulative annual dividend of $4.50 per share on the 250,000 preferred participation shares.

The following facts are said to have considerable bearing upon the situation: (1) A large reduction in gross receipts owing to the general depression of business, which condition is improving very decidedly with the oncoming of better times. (2) The heavy increase in operating expenses due largely to the unprecedented increase in wages as the result of an arbitration presided over by Mayor Thompson. (3) Compulsory extensions of street railway lines into unsettled territory, where the operating income is only a small fraction of operating expense and yields no return on capital invested. (4) The operations of various regulatory boards and commissions whose activities have added heavy additional expenses with no corresponding benefit either to the public or to the company.

Harrison B. Riley, chairman of the committee, states that the problems which are continually confronting the officers and directors of the various companies are indicated in some measure by these facts. It is hoped that an increase in gross receipts, which may be fairly anticipated for the coming year, will ameliorate conditions for the stockholders. At the annual meeting the common shares will have no voting power in view of the default on the preferred.

A semi-annual dividend of 75 cents was declared on the preferred participation certificates, payable on Jan. 1. The total payment was $2.50 for 1915, previous to which $4.50 was the yearly rate. No distribution has been made on the common certificates since July, 1912.

LATEST RETURNS FOR MASSACHUSETTS LINES

Public Service Commission Reports Summary of Financial and Operating Statistics for Year Ended June 30, 1915—Effects of Jitney Competition

The report of the Massachusetts Public Service Commission for the year ended June 30, 1915, just submitted to the Legislature, covers the returns of fifty-three electric railways in the State. The total main track operated was 2952.5 miles, a gain of 24.9 miles over 1914. The gross assets as of June 30, 1915, were $221,543,802; the gross liabilities, $221,418,356, and the surplus (with change in classification of accounts), $125,446, or an amount representing 0.12 per cent of the capitalization. The aggregate capital stock was $99,031,275, an increase of $836,500. The total amount of dividends declared was $4,612,019, or 4.66 per cent of the capital stock, as compared to 5.2 per cent in 1914. The net divisible income was less than the dividends declared by nearly $50,000. The net debt was $104,375,077, as compared to $100,590,688 in 1914. The total cost per mile of main track was $70,904, as compared to $70,646 in 1914, and the capital investment per mile was $66,980 and $64,534 in the two years, respectively. Of the present investment per mile, $39,895 represents construction cost, $13,370 equipment, and $17,639 other permanent property, mainly lands, buildings, parks and power plants.

The total operating revenue for the year ended June 30, 1915, was $39,537,442 and the total income $42,230,884, the latter representing an increase of $604,980 over 1914. The total expenditures were $42,278,562, an increase of $751,697 over last year. Operating expenses, $27,194,899, gained $529,678, while taxes increased $2,467,773. The companies carried 760,464,372 passengers, a decrease of 6,164,163, and the total car mileage was 132,187,596, a decrease of 168,229. The average number of passengers carried per mile of main track was 257,558, as compared to 261,853 a year ago. The percentage of operating expenses to gross earnings increased during the year from 67.16 to 68.78. A brief summary of various unit figures follows:

	1915	1914
Gross earnings per mile of main track	$13,839.00	$14,017.00
Operating expenses per mile of main track	9,519.00	9,414.00
Net earnings per mile of main track	4,320.00	4,603.00
Gross earnings per car-mile (in cents)	29.91	29.99
Operating expenses per car-mile (in cents)	20.57	20.14
Net earnings per car-mile (in cents)	9.34	9.85
Gross earnings per passenger (in cents)	5.20	5.18
Operating expenses per passenger (in cents)	3.58	3.48
Net earnings per passenger (in cents)	1.62	1.70

The operating revenue per car-hour for 1915 was $2.97 and the operating expenses per car-hour were $2.04, leaving a net of $0.93 per car-hour. The companies had 23,842 employees in 1915, as compared to 23,412 in 1914, and they owned 8296 passenger cars, as compared to 8364 last year, and 20,688 electric motors, as compared to 20,636 last year.

Two comprehensive appendices accompany the other data submitted by the commission in its report, one being a study of the cost of power by Prof. L. E. Moore of the engineering department on the twenty-five principal electric railways of the State, and the other a report on the jitney bus, by Charles E. Mann, executive secretary of the commission. The latter includes brief histories of the growth of the jitney movement in the various Massachusetts counties, an account of its effect on earnings of the local railway companies, and notes on a number of ordi-

nances regulating jitney traffic in various parts of the country.

In regard to the effect on electric railway earnings, it is said that according to company statements the jitney competition in Massachusetts has been felt severely in some cases, and in others very slightly. The Rhode Island Company estimated its total loss on account of jitneys at $362,000 from March to August, inclusive. Early last December 160 jitneys were operating in the Providence section. The Bay State Street Railway early in December estimated its daily loss on the entire system at $700, and said that the loss had been on about this ratio since early in the summer. For the three months ended Sept. 30, 1915, the estimated loss of the Massachusetts Northeastern Street Railway was at the rate of $100 a day. Upon the Middlesex & Boston Street Railway the June, July, August and September receipts were cut at least $10,000 by the jitneys. The Union Street Railway estimated its loss during the summer months at about $200 per day, but early in December the loss was roughly set at about $100 a day, with the number of jitneys gradually decreasing. The loss of the Springfield Street Railway from April 1 to Dec. 15, 1915, was approximately $67,402. Other losses from jitney competition for the same period were approximately $28,309 for the Worcester Consolidated Street Railway, $1,924 for the Milford, Attleboro & Woonsocket Street Railway, and $14,026 for the Interstate Consolidated Street Railway.

NEW YORK COMMISSIONS REPORT

Traffic Decrease in New York City Said to Be Almost Negligible—Up-State Lines Show Declining Tendency, But Maintenance Is Kept Up

For the first time in the eight years' life of the Public Service Commission for the First District of New York, according to the report just submitted to the Legislature, the total of street railway traffic and the total revenue from passenger fares in New York City showed a decrease instead of an increase. The report states that this condition was also recorded in most other parts of the country, and was generally attributed to the effect of the European war. The decrease was so small in New York City, however, as to be almost negligible. The total number of passenger fares for the fiscal year ended June 30, 1915, was 1,807,632,726, as compared to 1,813,204,356 for 1914, a decrease of 5,571,630. Yet the real decrease was about 3,000,000 in excess of this figure, owing to the traffic over the Manhattan Bridge, which was not included in the 1914 report. The total loss of about 8,500,000 was less than the traffic of two normal days. The companies' receipts from passenger fares amounted to $88,783,012 for 1915, as compared to $89,361,262 for 1914. The thirty-six operating companies showed at the end of the year an accumulated surplus of $18,700,591.

In spite of the traffic decrease, there was an increase in track mileage from 1706 miles in 1914 to 1730 miles in 1915, and also a substantial increase in the passenger car miles operated, indicating that the service was better as compared with the traffic than in the preceding year. The decrease in traffic was confined to the elevated and surface car lines, the traffic in the subway showing a slight increase. The figures for the subway were 345,585,749 passengers, an increase of more than 5,000,000 for the year. The per capita railway rides for the year were about 360. Before the days of the elevated and underground railroads, the per capita rides were between forty and fifty. With the population of the city estimated at 5,400,000, the fare payments for local transportation during the year averaged about $16.49 per capita.

The Public Service Commission for the Second District in its report states that the net income available for dividends in the case of street railways has been and is falling off because of decreased revenues and increased taxes. Dividends for the last few years have been maintained only by drawing on accumulated surplus. In spite of the decreased earnings, however, nearly all lines are said to have kept up their maintenance of way and rolling stock. Electric corporations showed a slight reduction of prosperity and gas corporations a decided falling off, while corporations doing business in both fields showed a gain. There was a slight falling off in the net revenues of telephone corporations on account of increased taxes and expenses.

STATISTICS OF NEW JERSEY COMMISSION

The report of the Board of Public Utility Commissioners of New Jersey for 1915, just submitted to the Governor, contains the following preliminary summary of revenues, operating expenses, etc., for the year ended Dec. 31, 1914:

No.	Class	Operating Revenues	Operating Expenses and Taxes	Per Cent of Operating Revenues	Net Revenues
23	Street railways	$19,041,299	$12,621,522	66.2	$6,419,777
35	Gas companies	13,065,924	7,683,673	58.8	5,382,251
55	Electric light and power companies	11,404,044	6,002,555	52.6	5,401,489
119	Water companies	4,844,096	2,364,378	48.8	2,479,718
15	Sewer companies	267,525	179,515	67.1	88,010
40	Telephone companies	9,001,801	6,488,021	72.1	2,513,779
287		$57,624,689	$35,339,664	61.3	$22,285,024

Steam railroad companies are not included in the above. This is due to the fact that the revenues of these companies are derived from both State and interstate business, much the greater part coming from the latter. Divisions have not been made in reporting returns to an extent sufficient to show the total sums paid for transportation of freight and passengers wholly within the State. Complete statistics from this commission for electric railways for the calendar year 1913 were published in the ELECTRIC RAILWAY JOURNAL of Nov. 20, 1915.

As in the past, the largest issues of securities approved by the board during 1915 were for the railroad companies. The law provides that all such issues shall be approved, and this requires at times action by the board on proposed issues of securities supported by property outside the State, or the proceeds of which are to be used by companies whose New Jersey business is but a part of the whole. The following is a general summary of the security applications granted in 1915:

No.	Class	Bonds	Stock	Notes
8	Railroads	$136,182,500	$454,400	.....
7	Street railways	7,224,000	1,811,300	.....
11	Electric lighting companies	651,000	3,453,600	.....
6	Gas companies	911,562	860,800	.....
14	Water companies	1,535,500	1,029,100	$20,000
1	Sewer company	70,000	.....	.....
47		$146,574,562	$7,609,200	$20,000

NEW SECURITIES FOR ELMIRA LINE

Elmira Water, Light & Railroad Company Plans to Issue $425,000 to Cover Outstanding Obligations and Meet Requirements for Next Five Months

Three meetings of stockholders of the Elmira Water, Light & Railroad Company, Elmira, N. Y., have been called for Jan. 18. One meeting is to be held to increase the capital stock $200,000; the second meeting is to classify the increased stock as second preferred stock, and the third meeting is to increase the board of directors, amend the by-laws and authorize the issuance of securities and certain acts necessary to permit the company to acquire the property and franchise of the Elmira & Seneca Lake Traction Company, the entire capital stock and bonds of which are already owned.

It is said that for several months the officers, directors and some of the largest stockholders of the Elmira Water, Light & Railroad Company have been considering the financial condition of the property, the financing of its capital expenditures and its estimated requirements for the coming five months. It has been determined that obligations of this company and the Elmira Transmission Company (which is to be merged with the approval of the Public Service Commission) outstanding on Oct. 31, 1915, and incurred for improvements, betterments and extensions, and the acquisition of property, should not be capitalized or refunded wholly in bonds. Hence it has been deemed best to sell $125,000 of 7 per cent cumulative first preferred stock, $200,000 of 5 per cent cumulative second

preferred stock and $100,000 of first consolidated mortgage 5 per cent fifty-year gold bonds. The proceeds derived from the sale of about $60,000 of these bonds will be applied toward future improvements, betterments and extensions to the plant and property of the company, estimated as required during the coming five months, while the proceeds of approximately $40,000 of the bonds and the proceeds of the stocks will be applied, to the extent that they are sufficient, to the payment of obligations outstanding on Oct. 31, 1915.

It is proposed that any balance of expenditures made for capital account, or obligations incurred therefor, prior to Oct. 31, 1915, and not refunded or paid out of the proceeds of the sale of these stocks and bonds, shall not be capitalized by the issuance of any additional securities, and that the accumulated surplus earnings as of Dec. 31, 1915, shall not be used for the declaration of any dividends on the common stock subsequent to this date. With the approval of the commission, it is also proposed that the physical property and the franchises of the Elmira & Seneca Lake Traction Company shall be acquired so that the company will own these directly instead of controlling the company through stock ownership.

Application has been made to the Public Service Commission for the Second District of New York for leave to issue the above-stated securities. Stockholders will have an opportunity to subscribe to the additional $125 000 of first preferred stock and $200 000 of second preferred stock at par. During the year ended Nov. 30, 1915, the gross earnings showed an increase of $66,987 over the gross earnings for the corresponding period of the preceding year.

Belvidere (Ill.) City Railway.—A report circulated some months ago that W. C. Foster had purchased at auction the Belvidere City Railway was misleading, for the property of this company has never been foreclosed upon or sold and a receiver has never been appointed. All that Mr. Foster purchased at auction was a 1914 paving assessment for $275. It seems that the Belvidere City Railway, which is controlled by the Elgin & Belvidere Electric Company, has been operated at a loss for more than eight years, and the controlling company asked for complete release from the operation of local cars on the ground that there was no hope of such operation ever paying. The Mayor and City Council were disposed to give the release asked, but when a town meeting laid the case upon the table, the owners took the matter before the Illinois Public Utilities Commission and received authority to discontinue the operation of local cars and to operate interurban cars into the city without interference from city officials. Then the City Council last September passed an ordinance repealing the original ordinances granted to the Belvidere City Railway and the Elgin & Belvidere Electric Company, and authorized the former company to sell or lease such portions of its tracks as it desired to the latter company, and the latter company to operate its cars over such portions of the city tracks as it wished to and to take up such portions as it did not desire to use. Inasmuch as Mr. Foster's purchased assessment was for paving the tracks which the company proposes to take up, he is said to have a claim against only that portion of the track in front of the property assessed on the particular street in question, and the salvage value of such material is not worth the cost of its removal.

Birmingham, Ensley & Bessemer Railroad, Birmingham, Ala.—Counsel for the reorganization committee of the Birmingham, Ensley & Bessemer Railroad state that the sale of this property, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 13, has been confirmed, but title has not yet passed. The approved reorganization plan, which was described in the issue of Oct. 2, is in alternative form, but it has not yet been decided which alternative will be carried out and no decision will be reached for some time.

Boston Suburban Electric Companies, Newtonville, Mass.—The directors of the Boston Suburban Electric Companies have declared a quarterly dividend of $1 on the preferred stock, payable on Jan 15 to holders of record on Jan. 4. This dividend is the same as that paid during the first two quarters of 1915, the payments for the last two quarters being 50 cents each. It is said that the arrears of dividends on this cumulative stock to date amount to $11.50.

Camaguey (Cuba) Company, Ltd.—A dividend of 1 per cent has been declared on the common stock of the Camaguey Company, payable on Feb. 1 to holders of record on Jan. 15. This is the first dividend since March, 1913.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—The Ohio Electric Railway did not pay its rental on Dec. 24 to the Cincinnati, Dayton & Toledo Traction Company, whose lines it operates under lease, and as a result the lessor failed to pay interest on its bonded indebtedness on Jan. 1. The lessee had twenty days' grace, but it was said that no payment of rental would be made within this time on account of losses under the lease. Plans are being considered in regard to changing the rental and adjusting the bonded indebtedness of the lessor. One proposition was described in the ELECTRIC RAILWAY JOURNAL of Jan. 1. The outstanding bonds on which interest is unpaid consist of $2,700 000 of Cincinnati, Dayton & Toledo Traction Company bonds, $250 000 of Dayton Traction Company first mortgage bonds and $400 000 of Cincinnati & Hamilton Electric Traction Company 6 per cent bonds. Bondholders' protective committees have been formed for the first and last of these issues.

Dayton & Troy Electric Railway, Dayton, Ohio.—The dividend of 1¼ per cent on the common stock of the Dayton & Troy Electric Railway, paid on Dec. 31, 1915, was the first payment on this stock since June 30, 1914. The declaration of this dividend was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 8.

Holyoke (Mass.) Street Railway.—Directors of the Holyoke Street Railway have declared a semi-annual dividend of 3 per cent on the company's stock. From 1892 to 1915, inclusive, 8 per cent per annum was paid.

Iowa & Illinois Railway, Clinton, Iowa.—The Iowa & Illinois Railway, with terminals at Davenport and Clinton, has been sold to the Davenport & Muscatine Railway, operating between Davenport and Muscatine. These two properties are controlled by the United Light & Railways Company. The principal office will be at Davenport. John G. Huntoon will serve as general manager of the consolidated lines and Clark Anderson as assistant general manager.

Kansas City Railway & Light Company, Kansas City, Mo.—Judge Hook on Jan. 11 signed the decree for the sale of the properties of the Kansas City Railway & Light Company under the reorganization plan. Many questions as to procedure and conditions came up during the two days prior to the issuance of the decree, but Judge Hook made it plain that, while preserving everybody's rights, he would control the situation until the new company, the Kansas City Railways, actually had charge. J. A. Guthrie was named commissioner to sell the street railway properties, and W. A. Nickels to sell the light company properties. The sale of the personal property of each group will be held on Feb. 4, and the sale of the real estate on Feb. 11. The approval of the franchise for the Kansas City Railways and the reorganization plan by the State commission was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 8.

Miami (Fla.) Traction Company.—The stockholders of the Miami Traction Company have authorized an issue of $1,000,000 of bonds, of which $200 000 are to be sold now, the proceeds to be used for the construction of an extension to Miami Beach, West Palm Beach, Florida City and other points. Plans are also being considered to construct extensions to Cape Sable, Lake Okeechobee and Tampa. The company recently placed 3.5 miles of line in operation in Miami.

Northern Electric Railway, Chico, Cal.—Holders of more than 66 per cent of the several outstanding issues of bonds of the Northern Electric Railway and its subsidiary corporations have signed the reorganization agreement and placed their securities at the disposal of the committee. The signatures of 80 per cent of holders of the securities must be obtained before the plan can become operative. This reorganization plan was described in the ELECTRIC RAILWAY JOURNAL of Oct. 23. The earnings of the road are said to have been very satisfactory of late.

Public Service Railway, Newark, N. J.—With the approval of the Board of Public Utility Commissioners of New Jersey, a merger of the Public Service Railway and the Public Service Newark Terminal Railway has been arranged. The latter corporation was formed for the purpose of constructing the large terminal building nearing completion in Newark. Under the terms of the merger, the street railway's authorized capital has been increased from $38 000,000 to $50,000,000, the additional amount representing $9,000,000 of the terminal company's authorized capitalization and $3,000,000 of new stock. As both the railway and the terminal company are owned absolutely by the Public Service Corporation of New Jersey, none of the securities of the underlying company will be put upon the market.

Southeastern Ohio Railway, Zanesville, Ohio.—The Ohio Public Utilities Commission on Jan. 5 authorized the Southeastern Ohio Railway to issue $800,000 of common stock and to sell $50,000 for the highest price obtainable but not less than par. A total of $750,000 in stock and the proceeds of $8,000 of stock are to be delivered in full payment of the purchase price for the property of the Southeastern Ohio Railway, Light & Power Company, recently purchased at receiver's sale. A preliminary notice regarding the incorporation of the successor company was published in the ELECTRIC RAILWAY JOURNAL of Jan. 1. The proceeds of $42 000 of stock are to be used for the construction of additions, extensions and improvements to the company's property. The extension of the line from Crooksville to New Lexington is planned.

United Light & Railways Company, Grand Rapids, Mich.—It is reported that the United Light & Railways Company has decided to issue only limited amounts of first and refunding 5 per cent bonds in future financing, the major part to be accomplished through the issuance of 7 per cent preferred stock.

United Railroads of San Francisco, San Francisco, Cal.—The United Railroads of San Francisco has filed with the California Railroad Commission an application for an order confirming the issue of coupons on 400 bonds of the Ferries & Cliff House Railway remaining unpaid on Dec. 31, 1914. The bonds have a par value of $1,000 each. The Ferries & Cliff House Railway, organized in 1887, issued in 1889 first mortgage 6 per cent bonds of $650,000, maturing on March 1, 1914. In 1893 the company was consolidated into the Market Street Railway and in 1902 was taken over by the United Railroads of San Francisco. Before the bonds became due on Jan. 21, 1914, this company arranged a postponement until Dec. 31, 1914, when 200 of the bonds were cancelled and a further postponement of the 400 remaining bonds were secured until Dec. 31, 1916. As part consideration for the postponement, the company gave four coupons for interest at 6 per cent on each of the 400 unpaid, due semi-annually on June 30 and Dec. 31, 1915 and 1916. For this action it now asks the approval of the commission.

Wausau (Wis.) Street Railroad.—The Wausau Street Railroad has changed its name to the Wisconsin Valley Electric Company, and it has purchased the property of the Merrill Railway & Lighting Company, Merrill, Wis., consisting of a hydraulic and steam power plant, street railway, and electric lighting and power business. The company has also purchased in Merrill all the water power of the Lindauer Pulp & Paper Company, and proposes combining into one hydraulic electric plant the power formerly owned by the above-named companies. Merrill is located 18 miles north of Wausau. The company is now constructing a high-tension line, 23,000 volts, connecting these two cities. It is said that the stockholders have authorized an increase in stock from $400,000 to $800,000, and of the new amount $200,000 will be issued immediately.

Winnipeg (Man.) Electric Railway.—William P. Bonbright & Company, New York, announce that their recent offering of $750,000 of Winnipeg Electric Railway two-year 6 per cent gold notes, mentioned in the ELECTRIC RAILWAY JOURNAL of Jan. 8, has been largely over-subscribed. It is reported that the directors of this company have declared a dividend of 2 per cent for the last quarter of 1915, making the total for the year 9½ per cent as compared to 12 per cent for 1914 and the years immediately preceding. The rate was reduced from 3 per cent quarterly to 2½ per cent during the first quarter of 1915.

York (Pa.) Railways.—At the annual meeting of stockholders of the York Railways Charles H. Bean and John E. Zimmerman were added to the board of directors. Mr. Bean is a prominent banker of Philadelphia, while Mr. Zimmerman is a member of the firm of Day & Zimmerman, contractors, of the same city.

DIVIDENDS DECLARED

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 75 cents, preferred.

United Railways & Electric Company, Baltimore, Md., quarterly, 50 cents, common.

Winnipeg (Man.) Electric Railway, quarterly, 2 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov.,	'15	$156,442	$102,201	$54,241	$39,512	$14,729
1 " "	'14	160,928	104,688	56,240	39,950	16,290
5 " "	'15	869,759	549,246	320,513	202,251	118,262
5 " "	'14	944,717	581,813	362,904	199,017	163,887

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

1m., Nov.,	'15	$72,856	*$62,253	$10,603	$16,786	††$5,956
1 " "	'14	72,066	*64,896	7,170	17,315	††10,055
5 " "	'15	425,641	*321,886	103,755	84,526	‡20,059
5 " "	'14	447,386	*339,892	47,494	85,921	††37,607

CITIES SERVICE COMPANY, NEW YORK, N. Y.

1m., Nov.,	'15	$490,623	$15,537	$475,086	$40,833	$434,253
1 " "	'14	371,124	11,927	359,197	40,833	318,364
12 " "	'15	4,352,413	167,112	4,185,301	490,000	3,695,301
12 " "	'14	3,943,507	108,761	3,834,746	408,333	3,426,413

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m., Nov.	'15	$679,900	*$487,961	$191,939	$100,575	‡$114,720
1 " "	'14	601,801	*474,675	127,126	98,386	‡50,530
5 " "	'15	3,747,870	*2,496,831	1,251,039	493,014	‡874,178
5 " "	'14	3,561,744	*2,650,636	911,108	492,245	‡527,158

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

1m., Nov.,	'15	$477,688	*$197,256	$280,432	$212,253	$68,179
1 " "	'14	458,574	*180,146	278,428	209,663	68,765
5 " "	'15	2,246,310	*956,674	1,289,636	1,059,288	230,348
5 " "	'14	2,225,920	*922,989	1,302,931	1,058,220	244,711

NEW YORK (N. Y.) RAILWAYS

1m., Nov.,	'15	$1,134,595	$698,369	$436,226	$370,534	‡$114,500
1 " "	'14	1,061,863	683,988	377,875	366,451	‡47,347
5 " "	'15	5,795,652	3,555,097	2,240,555	1,853,978	‡613,871
5 " "	'14	5,680,232	3,560,362	2,119,870	1,840,274	‡472,082

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1m., Nov.,	'15	$25,093	*$24,302	$791	$7,998	††$7,158
1 " "	'14	23,967	*22,692	1,275	7,876	††6,563
5 " "	'15	186,660	*135,331	51,329	40,003	‡11,639
5 " "	'14	190,342	*138,334	52,008	39,379	‡12,883

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m., Nov.,	'15	$44,265	*$41,804	$2,461	§$5,422	††§1,628
1 " "	'14	37,849	*44,602	†6,753	§6,827	††12,046
5 " "	'15	214,341	*208,158	6,183	§30,460	††16,041
5 " "	'14	187,073	*215,734	†28,661	§30,521	††51,194

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO.

1m., Nov.,	'15	$341,974	$200,063	$141,911	$54,241	$87,670
1 " "	'14	286,732	186,008	100,724	50,261	50,463
11 " "	'15	3,510,934	2,155,045	1,355,889	575,269	780,620
11 " "	'14	3,319,704	2,040,013	1,279,691	556,365	723,326

REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.

1m., Nov.,	'15	$289,151	*$167,266	$121,885	$58,838	‡$63,547
1 " "	'14	241,625	*153,065	88,560	56,005	‡34,126
11 " "	'15	2,800,428	*1,706,192	1,094,236	635,884	‡460,142
11 " "	'14	2,741,626	*1,703,810	1,037,816	620,510	‡420,855

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m., Nov.,	'15	$417,449	*$332,972	$84,477	$120.461	††$34,388
1 " "	'14	397,016	*343,126	53,890	117,300	††61,721
5 " "	'15	2,315,599	*1,696,816	618,783	602,136	‡49,925
5 " "	'14	2,376,507	*1,724,294	652,213	591,800	‡96,777

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m., Nov.,	'15	$793,618	$484,236	$309,382	$166,265	‡$144,773
1 " "	'14	750,592	475,033	275,559	133,415	‡144,024
11 " "	'15	8,596,586	5,504,360	3,092,226	1,520,340	‡1,593,015
11 " "	'14	8,486,162	5,264,675	3,221,487	1,442,725	‡1,791,828

WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.

1m., Nov.,	'15	$19,847	*$21,426	†$1,579	$1,548	††$3,271
1 " "	'14	19,752	*21,686	†1,934	1,917	††3,231
5 " "	'15	116,228	*109,218	7,010	7,161	††956
5 " "	'14	123,385	*116,640	6,745	6,812	‡587

*Includes taxes. †Deficit. ‡Includes non-operating income. §Excludes interest on bonds, charged income and paid by the N. Y., N. H. & H. R. R. under guarantee, also interest on notes held by the N. Y., N. H. & H. R. R. not credited to income of that company.

Traffic and Transportation

DETROIT UNITED CREATES NEW POSITIONS

Night Superintendent and Inspectors of Service Are Appointed to Effect Improvement in Service

On Jan. 1 the Detroit (Mich.) United Railway made many appointments with a view to the better supervision of the service within the one-fare zone. Among the appointments made are those to fill some newly-created positions, chief of which is one of night superintendent, while the other new positions are inspectors of service. The night superintendent will have charge of the night operation of all the city lines in the absence of the division superintendents of the several lines, while the inspectors of service will be located at the more important turn-outs and junction points for the purpose of regulating the service and re-establishing the schedules whenever, from any cause, there have been delays. The night superintendent is Richard Dawson and the inspectors of service are C. H. Wendt and Marvin Heidt, with jurisdiction over the Woodward, Hamilton and Victor lines; F. A. Vogel, with jurisdiction over the Baker, Sherman, Harper, Springwells and Chene extension lines; Arthur McKeown, with jurisdiction over the Fort, Grand Belt and Third-Larned lines; W. Cannon, with jurisdiction over the Michigan, Mack, Brush and South Chene lines; August Kornrumpf, with jurisdiction over the Jefferson, Myrtle and Trumbull lines; H. E. Baldwin and William Walsh, with jurisdiction over the Fourteenth, Crosstown and West Warren lines.

Other appointments by reason of vacancies caused by promotion, are as follows: C. E. Wilcox, assistant division superintendent of the Woodward, Hamilton and Victor lines; Charles Crowley, assistant division superintendent of the Fourteenth, Crosstown and West Warren lines; George Conkle, carhouse foreman Fourteenth carhouse; W. A. Jenkins, carhouse foreman Clark carhouse; William A. Murphy, carhouse foreman Jefferson carhouse; R. Pinkard, carhouse foreman Field Avenue sub-office.

HANNIBAL SERVICE CASE DECIDED

Summary of Findings of Missouri Commission With Respect to Service in Town of 19,000 Inhabitants

The Public Service Commission of Missouri has denied the motion for a rehearing made in the matter of the complaint of the city of Hannibal against the Hannibal Railway & Electric Company. The commission held in short as follows:

1. Street railway stops at the middle of the blocks in the business district of a city of 19,000 are not considered necessary and are ordered discontinued.

2. The installation of a small automatic signal system or the construction of longer passing tracks by a street railway, not clearly shown to improve the service, is not ordered.

3. The operation of street cars by one man in certain districts should not be condemned where the same tends toward economy without increasing the danger to the traveling public.

4. Delays in street railway service due to the blockading of cars by railroads in violation of municipal ordinances are to be avoided through the enforcement of the ordinance.

5. The names of streets should be called by conductors of street railway cars as the streets are approached.

6. The designation by a street railway of the rear door as an entrance and the front door as an exit is to be made.

7. Additional cars are to be operated by the street railway system to relieve congested traffic during morning and evening rush hours.

8. Where the evidence and an examination of a portion of a street railway show the same to be in bad condition, its reconstruction is ordered; the reconstruction to be effected by applying the annual surplus from the entire system thereto, from time to time, where the company is not financially able to proceed at once.

9. It is recommended that the city co-operate with the street railway in the granting of the necessary permission and the establishment of the grades of streets for the reconstruction of street railway tracks that elimination of objectionable curves might be had and the shifting of the tracks after reconstruction might be avoided.

10. The reconstruction of street railway tracks along a shorter route, serving better territory and eliminating dangerous grades, is suggested.

11. This commission has no power to grant the necessary franchises, or compel a municipality to do so, for an extension of the existing lines of a street railway. However, the commission may direct the street railway company to apply to the appropriate municipal authorities and take the necessary legal steps to secure the required franchise and rights-of-way for a necessary extension of its system.

12. Although slightly longer than other proposed extensions, a route having easy grades, serving the places having the greatest demand for street railway service and the most desirable and available territory for residences, is preferred.

13. Where, upon an analysis of the testimony, it appears that there would not be sufficient traffic on a proposed extension of street railway service to pay operating expenses, the construction of the new lines and the operation thereof at a loss is not ordered—the company being barely able to make operating expenses and not having the necessary funds for the extension or means of raising them.

CONFERENCE TO PROMOTE SAFETY AT GRADE CROSSINGS

Chairman Van Santvoord of the Public Service Commission for the Second District of New York called a meeting for Jan. 14 in the commission's Albany offices, of the executive committee of the conference to promote safety at the grade crossings of electric railways. This conference met in Syracuse last October and was attended by representatives of motorists' organizations and of electric railways, by the State highway officials, the Secretary of State and representatives of the Public Service Commission. A number of sub-committees were appointed to consider the many suggestions then and since offered for making the grade crossings of electric railways safer. The executive committee, which was appointed by the chairman, will consider the many suggestions that have been made and take steps for the further development of the campaign for making the electric railway crossings safe. In addition to Chairman Van Santvoord, and Charles R. Barnes, the electric railway inspector of the Public Service Commission, the members of this committee are: George C. Diehl, Buffalo; John B. McInerney, Rochester; B. E. Tilton, New York State Railways, Utica; Peter G. Ten Eyck, Albany; James P. Barnes, Buffalo, Lockport & Rochester Railway, Rochester; Edwin Duffey, State Commissioner of Highways, and Francis M. Hugo, Secretary of State.

MILWAUKEE LINES BEGIN PACKAGE EXPRESS SERVICE

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., on Dec. 20 inaugurated a package express service on its interurban lines between Milwaukee and East Troy and Burlington, Wis. Two trains daily each way on both lines leave and arrive at the Public Service Building in Milwaukee and make the 36-mile runs on the two lines in approximately four hours. In connection with this service a tariff provides for the addition of 20 per cent to the scheduled rates for all shipments where collection and delivery are made by the company. All shipments have been divided into two classes, one of which includes the collection and delivery service, but does not provide a time limit for collection, transportation and delivery by the company, and constitutes Class A shipments. All shipments forwarded which do not include collection and delivery nor a time limit for collection, transportation and delivery by the company make up Class B shipments. The railway collects and delivers all Class A shipments within the free mail delivery limits of eight cities and villages along its lines.

The lines selected to inaugurate this package express

service traverse a territory not served by steam roads, hence it was possible to calculate the rates on a 15-mile zone basis. For instance, shipment of a 1-lb. Class A package, without the 20 per cent added to the rate for collection and delivery service, is made within this first 15-mile zone for 21 cents. The charge for a Class B shipment for the same haul is 20 cents. A 100-lb. Class A shipment carries a rate of 40 cents for the first zone, and a Class B shipment is carried anywhere in the first zone for 25 cents. Shipments to the second zone are made for 21 cents and 20 cents respectively for a 1-lb. package of Class A and Class B, and 45 cents and 28 cents respectively for 100-lb. shipments of the two classes. In addition to the rate schedules on commodity shipments the company has issued a switching tariff on carload freight and a graduated scale of rates on milk and cream in 5, 8 and 10-gal. cans. The rate on milk shipments varies from 7 cents for a 5-gal. can for a 5-mile haul to 11 cents for a 5-gal. can for a 40-mile haul. The rate on a 10-gal. can of milk is 10 cents for the first 5 miles and 19 cents for 40 miles. The charge for cream in the three sizes of cans is slightly in excess of that for milk.

GRAND RAPIDS RAILWAY TO ITS PATRONS

The Grand Rapids (Mich.) Railway published a two-page advertisement in the Grand Rapids *Herald* of Jan. 2 over the signature of Benjamin S. Hanchett, president of the company. The ad was headed "A frank and friendly talk by a friendly company to a friendly people." Underneath this appeared the following statement: "The Grand Rapids Railway has no secrets; its records are open to every eye. An old year-new year review of what a year has brought forth." The ad was divided into paragraphs headed: "The company has no secrets," "Jitney competition and its results," "Economy's urgent demand," "Income and what was done with it," "Number of passengers carried," "Not a passenger killed," "The company's loyal employees," "Parks and pleasure places," "The record of extensions," "The old year and the new." The ad carried a portrait of Mr. Hanchett and a picture of a modern pay-as-you-enter car which the company hopes to adopt for general use. In the upper right hand corner of the ad appeared these thoughts for the new year:

"The good will of the people is the company's greatest and best asset.

"Good understanding is helpful to the maintenance of friendly relations.

"Impairment of the company's earnings impairs its ability to give good service.

"Thirty million passengers handled, not one killed.

"Look out for the aged, take care of the children, be gentle with the infirm, help the women, be courteous with everybody and be eternally and everlastingly vigilant for safety are the rules of conduct for employees.

"Training employees and the public in safety first and all the time.

"A million dollars of income and what was done with it.

"Promised extensions were made in spite of the demands for economy.

"The company's earnest purpose of not merely winning but of deserving the good will of the people, their friendship and their approbation."

Bristol & Norfolk Tariff Suspended.—The Massachusetts Public Service Commission has issued an order suspending the proposed fare increase on the Bristol & Norfolk Street Railway until May 1, 1916, unless otherwise ordered.

Crusade Against Spitting in Washington.—Both the Washington Railway & Electric Company and the Capital Traction Company, Washington, D. C., have anti-spitting notices displayed in all the cars operated by them and both have notified their conductors to direct the attention of passengers to the regulation.

Club for Atlanta Employees.—Announcement of plans for the formation of an association among the forces of the Georgia Railway & Power Company, Atlanta, Ga., has been made by P. S. Arkwright, president of the company. Mr. Arkwright stated that a library and meeting room will be equipped in the company's building, and will be kept open at all times to company workers, officers and men, and that the initial plans of the association will be developed as rapidly as possible.

Hearing on Massachusetts Northeastern Fares.—The Public Service Commission of New Hampshire held a hearing at Concord on Jan. 6 upon the proposed fare increases of the Massachusetts Northeastern Street Railway. Representatives of border towns in southern New Hampshire opposed the increase. The board informed those present that the case will be decided with the aid of joint sessions with the Massachusetts Public Service Commission at Boston, in view of the preponderance of interstate travel on the system.

Traffic Circular of Michigan Railway.—The Michigan Railway, Jackson, Mich., has issued an attractive calendar, 11 in. x 24 in. in size, containing a map of its lines and halftone illustrations showing the character of service, equipment and roadway. Particular emphasis is laid on the modern all-steel equipment of the company for both freight and passenger service, and attention is directed to the places of interest along its lines. The principal points touched by this 550-mile interurban system are indicated on the map and listed on the calendar.

Prize Composition on Electric Roads.—E. F. Schneider, general manager of the Cleveland, Southwestern & Columbus Railway, reports that a school composition on the benefits of electric railways, written by a girl fourteen years old in the Berea High School, first grade, was recently selected to be read before a teachers' institute which was held in Berea. The composition describes the advantages which children living in the country now have in the way of education because they can use the electric lines to go to the high schools in the nearest town.

Supervisors Consent to Car Rerouteing.—The subject of permitting the United Railroads, San Francisco, Cal., to reroute certain of its lines was discussed at the regular meeting of the Board of Supervisors recently. A majority of the committee reported in favor of the scheme proposed by the company being given a thirty days' trial, during which time a study of the traffic conditions as developed thereby would be made and new suggestions considered by the committee at a meeting to be held on Jan. 27. It was also stipulated that the service on the Mission-Richmond line be increased 25 per cent. A minority of the committee recommended a modified plan of rerouteing, which was adopted.

Only Six Jitneys in Fort Worth.—Jitneys in Fort Worth, Tex., have been reduced from about sixty to six on account of the bonding companies raising the cost of the $2,500 indemnity bond required by the ordinance, which, in the opinion of the jitney operators, makes the business unprofitable. The petition of the jitney union to eliminate the bond feature from the ordinance and instead maintain a pool of $5,000 in a bank out of which indemnity would be paid for any injury or damage to persons or property, was refused by the City Commissioners following a ruling from the city attorney to the effect that such a provision would be discrimination against the operators who were not members of the jitney union or group making the pool.

Interurban Edition of "Electric Railway Service."—The publicity department of the Detroit (Mich.) United Railway has inaugurated a new feature in connection with *Electric Railway Service*, the weekly publication of the company. An interurban edition, paying particular attention to matters of interest in the cities and towns served by the Detroit United interurban lines, is now being issued in addition to the regular edition for the consumption of Detroit riders. The interurban edition will be placed in all interurban cars and at many of the important suburban stations. The publicity department does not plan a complete change in the subject matter of the two editions, but proposes to devote two or three pages each week exclusively to interurban news. Many favorable comments upon the new departure have been made by newspapers in the cities and towns along the interurban lines.

Safety Calendars in 9000 Brooklyn Classrooms.—The Brooklyn Institution for Safety and the bureau of public safety of the Brooklyn (N. Y.) Rapid Transit System have issued their safety calendar for the year 1916. This is the

third year in which a special safety calendar has been produced for use primarily in the public schools of Brooklyn. An edition of 9000 copies was printed so as to provide one of the calendars for every school classroom in the borough. The safety calendar has proved one of the most effective features of the public safety campaign. This year's calendar consists of twelve sheets produced in poster form by Ernest Hamlin Baker. Each sheet presents a safety picture in colors, and most of the pictures have to do with the dangers to which children subject themselves while playing in the streets. With the pictures there is a safety text calling attention to the particular hazard which the picture presents.

New Cars for Springfield.—The Wason plant of The J. G. Brill Company, at Brightwood, Mass., has received an order for nine more semi-convertible cars from the Springfield (Mass.) Street Railway. The cars are a departure from previous rolling stock used by the road, being of a type recently developed under direction of Clark V. Wood, president of the Springfield company. The cars are rebuilt from nine-bench open equipment and are provided with two steps, the floors being on the same level in both platforms and inside the body. Increased aisle width is a feature and wooden slat seats are used. The doors are provided with glass panels extending to the floor, in order to facilitate safe alighting and boarding. Several of the cars are also being built by the Osgood Bradley Car Works, Worcester, Mass., for the Springfield company. The order for the cars has been referred to previously in the department headed Rolling Stock in the ELECTRIC RAILWAY JOURNAL.

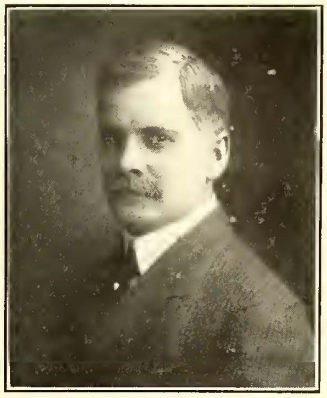
A Good Example to Follow.—*On the Cars*, the publication of the Sioux Falls (S. D.) Traction System, in an item in the issue of Jan. 1 said: "Seven years ago we began to print 'now and then' our little paper *On the Cars*. It had the honor of being the first in the field. We had many inquiries and requests for copies from the managements of street railway companies, which resulted in our example being followed by companies in many parts of the country—some of them like ours, only published occasionally, and some issued regularly every month. The one feature of ours which has not had the attention given to it by others is that we have devoted most of our space to boosting the city. We believe in working for the place we live in. We want it to be the biggest and best and busiest place in the country, knowing, of course, that if Sioux Falls grows we will grow too. Some of the other street railway publications are very elaborate but all devoted almost exclusively to the interest of the company. We believe in publicity so we unbosom ourselves to the public."

Oregon Supreme Court Upholds Jitney Bus Ordinance.—The Oregon State Supreme Court in a recent decision written by Justice Benson declares that the jitney bus ordinance passed last fall by the city of Portland is constitutional. This decision reverses the judgment of Circuit Judge Bagley, who decided in favor of the jitney bus representatives against Mayor Albee of Portland. Justice Benson holds that a municipality has power to enact an emergency ordinance and that "the ordinance in question goes quite fully into matters necessary to entitle an applicant to a license for the operation of a motor bus, and, among other things, requires the procuring of a certain certificate prescribing what it shall contain. This part of the ordinance is to be read in connection with other provisions of the act and an appeal is provided against unjust action upon the part of the commissioner." Among other provisions the ordinance requires that jitney bus drivers shall be more than eighteen years of age; that the route shall be specified in applying for a license and can be changed only with the consent of the commissioner of public utilities; that continuous service shall be furnished between 6 a. m. and 8 a. m. and 4.30 p. m. and 7 p. m.; that the fare shall be 5 cents unless a passenger agrees to a greater fare for diverting from route; that machines shall stop only on or near intersections and within 2 ft. of curb; that only one passenger shall ride in the seat with the driver and no passenger ride on the door or running board; and that all cars shall be lighted inside at night. It also requires the examination of drivers to determine their ability. Inspections are to be made once a month. The city license costs $2 a month for seven-passenger cars and 25 cents a month for each additional seat for larger cars.

CHICAGO BOARD OF ENGINEERS NOMINATED

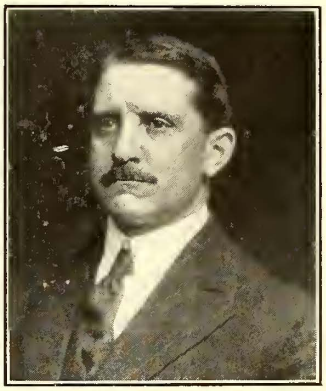
Messrs. Arnold, Ridgway and Parsons Selected to Pass on Chicago Transportation Problems

The board of three engineers which is to present a report to the city of Chicago providing for a unified and comprehensive system of transportation, including the present surface and elevated lines and the proposed subway, was completed on Jan. 7 by the selection of Robert Ridgway, New York, as the associate on the board of Bion J. Arnold, Chicago, and William Barclay Parsons, New York, previously selected. All three have accepted appointment. The decision to appoint one man from Chicago and two others familiar with the efforts made to solve the transportation problems of New York, Boston and Philadelphia, shows a broad view of the situation. The choice still has to be confirmed by the Council and the Mayor of the city of Chicago.

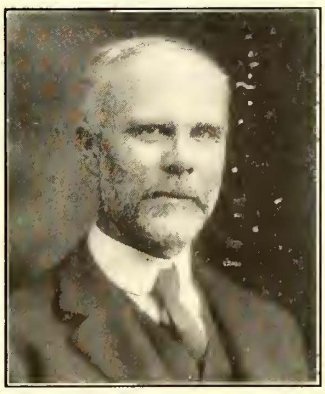


B. J. ARNOLD

The selection of Mr. Arnold as the member from Chicago was most logical. He is chairman of the Board of Supervising Engineers Chicago Traction and has been connected with the traction situation there for many years. Mr. Ridgway is not so well known to men engaged in the electric railway industry as is either Mr. Arnold or Mr. Parsons. After a short period spent on railroad construction work he entered the service of the city of New York and has been engaged on engineering work for the city ever since. In 1900 he was appointed senior assistant engineer of the New York Rapid Transit Commission and had charge of much difficult work connected with the rapid transit lines now in operation, including the Brooklyn division with the line under the East River. In 1911 he was appointed engineer of subway construction by the Public Service Commission of the First District of New York, in which capacity he has supervised the work under the $360,000,000 dual system of rapid transit now well along toward completion. Mr. Ridgway's work in Chicago will not affect his connection with the New York commission. Mr. Parsons has long been engaged in consulting engineering work, and is best known in traction matters, probably as the chief engineer of the New York Rapid Transit Commission under whose direction the present subway in New York was built. He remained as chief engineer of the Rapid Transit Commission until 1905. He was a member of the Isthmian Canal Commission in 1904; advisory engineer to the royal commission on London traffic in 1904, and member of the board of consulting engineers of the Panama Canal in 1905. He has inquired into and reported on street railway operating problems in San Francisco, Detroit and other cities.



ROBERT RIDGWAY



W. B. PARSONS

Personal Mention

Mr. L. W. Gent has been appointed traffic manager of the Arkansas Valley Interurban Railway, Hutchinson, Kan.

Mr. John Gribbel has been elected vice-president of the American Railways, Philadelphia, Pa., to succeed Mr. William H. Shelmerdine.

Mr. A. W. Wilkerson, vice-president of the City National Bank, Bryan, Tex., has been elected treasurer of the Bryan-College Interurban Railway, Bryan, Tex.

Mr. L. M. Levinson, acting manager of the Bryan-College Interurban Railway, Bryan, Tex., has been elected secretary and general manager of the company.

Mr. John H. Hanna, formerly chief engineer of the Capital Traction Company, Washington, D. C., has been elected vice-president in charge of operation of the company.

Mr. William F. Ham, vice-president of the Washington Railway & Electric Company, Washington, D. C., has been elected a director of the Federal National Bank of that city.

Mr. R. L. Cadwell has resigned as superintendent of the Warren-Bisbee Railway, Warren, Ariz., to accept a similar position with the Gila Bend & Ajo Railroad, now nearing completion.

Mr. A. M. Mocre, who has been master mechanic of the Georgia Railway & Power Company, Atlanta, Ga., has been appointed to the newly created office of superintendent of equipment of the company.

Mr. J. E. Eaves has been appointed master mechanic of the Georgia Railway & Power Company, Atlanta, Ga., to succeed Mr. A. M. Moore, who has been made superintendent of equipment of the company.

Mr. Arthur Blaser, for the last six years with Wilbur J. Watson & Company, engineers, has been appointed chief engineer in his department by Fielder Sanders, Street Railway Commissioner of Cleveland, Ohio.

Mr. David S. Carll has voluntarily retired from the office of general manager of the Capital Traction Company, Washington, D. C., but retains his position as vice-president and as a member of the board of directors.

Mr. Richard Dawson has been appointed night superintendent of the Detroit (Mich.) United Railway, a new position, in which he will have charge of the night operation of all the city lines in the absence of the division superintendents of the several lines.

Mr. Clarence P. King, president of the Washington Railway & Electric Company, Washington, D. C., and allied interests including the Potomac Electric Power Company, was elected a director of the Chamber of Commerce of Washington at the annual election held on Jan. 11.

Mr. Frank Irvine has resigned as a member of the Public Service Commission of the Second District of New York and will return to his post at Cornell University as dean of the college of law. Mr. Irvine was appointed to the commission in 1914 by Governor Martin H. Glynn.

Mr. A. D. Furlong has resigned as general manager of the Saginaw-Bay City Railway, Saginaw, Mich., with which he has been connected since January, 1914. Mr. Furlong was formerly third vice-president, general manager and purchasing agent of the Springfield (Ill.) Consolidated Railway.

Mr. Frank J. Sprague has sailed with the superdreadnought New York as the guest of Capt. Hugh Rodman. Mr. Sprague, who is a graduate of Annapolis, is a member of the new Naval Consulting Board. He will witness the maneuvers and target practice of the Atlantic fleet, and on his return will embody his observations in a report to the Naval Consulting Board.

Mr. Van Horn Ely, president of the National Properties Company and the Wilmington & Philadelphia Traction Company, has been elected president of the American Railways, Philadelphia, Pa., to succeed Mr. J. J. Sullivan, the National Properties Company and the American Railways having been amalgamated, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 6 and 27.

Mr. C. I. Beamer, special car agent of the Detroit (Mich.) United Lines for the last seven and a half years, has been granted leave of absence, and he plans to spend some time in the West and Southwest to improve his health. Before his departure he was presented with a purse of gold from company officials and fellow employees. Mr. Malcolm McIntyre will act as special car agent during Mr. Beamer's absence.

Mr. Peter Witt, until Jan. 1 Street Railway Commissioner at Cleveland, Ohio, has opened an office in that city, and will probably devote a portion of his time to certain features of electric railway operation, as an expert. He will also give his attention to a car, for which patents have been applied, a number of which are now in operation on the Cleveland Railway. Mr. Witt has been asked by the Massachusetts Commission to represent it in the Bay State Street Railway fare case.

Mr. H. E. Cleland, formerly advertising manager and manager of the copy-service department of the Hill Publishing Company, New York City, has joined the organization of the McGraw Publishing Company, Inc., publisher of the ELECTRIC RAILWAY JOURNAL, and, effective on Jan. 10, was appointed business manager of the *Electrical World*. Mr. Cleland has had an exceptionally broad experience in publicity and modern sales methods employed in the distribution of engineering products.

Mr. R. F. Carley, at present chief operating engineer of the Illinois Traction System, Peoria, Ill., has been appointed general superintendent of the Galesburg Railway, Lighting & Power Company, Galesburg, Ill. He succeeds Mr. Foster Hannaford, who has become connected with the Twin City Lines as superintendent of the St. Paul division, as announced in the ELECTRIC RAILWAY JOURNAL of Dec. 8. The duties of the office of chief operating engineer will be assumed by the present organization.

Mr. John A. Cleveland, who has been connected with Hodenpyl, Hardy & Company, New York, since December, 1913, has returned to Saginaw, Mich., as general manager of the Saginaw-Bay City Railway, which is controlled by the barking firm previously mentioned. Mr. Cleveland succeeds Mr. A. D. Furlong at Saginaw. Mr. Cleveland was formerly general manager of the Saginaw property. He is thirty-six years old and was graduated from Williams College in 1901 with the degree A.B. and from Cornell University in 1904 with the degree E.E. He was at one time connected with the Rochester Railway & Light Company. In May, 1903, he entered the employ of the Saginaw Power Company as superintendent in charge of new business.

Mr. Fielder Sanders, recently appointed Street Railway Commissioner by Mayor Harry L. Davis of Cleveland, was born in Washington, D. C., on Aug. 24, 1876. Mr. Sanders was graduated from Central High School, Cleveland, in 1893, and from Adelbert College in 1897, with the degree of bachelor of letters. In 1901 he was graduated from the law school of Western Reserve University and within a short time was admitted to the bar. He practised law in Cleveland from 1901 to 1909, when he was made assistant county solicitor, a position which he held until Jan. 1, 1912. He then took his seat as judge of the municipal court and was re-elected to that office in 1913 for a term of four years. He resigned from the municipal court on Dec. 20, 1915, to assume his present position.

Mr. Lewis F. Brown, who for a number of years has been claim agent for the South Covington & Cincinnati Street Railway, Covington, Ky., and the Union Light, Heat & Power Company, has been made chief counsel for both companies, and Mr. E. W. Fitzgerald has been appointed claim agent to succeed Mr. Brown. The legal departments of the companies have been in charge of Mr. R. C. Simmons, Covington, and Mr. Alfred A. Cassatt, Cincinnati. Mr. Brown has been connected with the South Covington & Cincinnati Street Railway for a number of years. He entered the employ of the company as a boy, studied law, and several years ago became a practising attorney at the Kentucky County bar. Both Mr. Brown and Mr. Fitzgerald were claim agents of the company previously.

Mr. William W. Mason has been appointed senior electrical engineer for the Interstate Commerce Commission, Central District, with headquarters at Chicago, Ill., and has severed his connection with the Public Service Commission for the First District of New York, with which he has been associated since 1908. Mr. Mason took the student course with the Thomson-Houston Electric Company in Lynn in 1893. In 1896 he became connected with the Greenfield & Turner Falls Street Railway in charge of the power station and later of all electrical work of the system. In 1899 he entered the employ of the Boston (Mass.) Elevated Railway and took an active part in installing the multiple-unit system on that road. In 1903 Mr. Mason went to the Pacific Coast on construction work for the first third-rail interurban line west of the Mississippi River. After the earthquake in 1906 he returned to the East to enter Westinghouse, Church, Kerr & Company, New York. After the Erie electrification at Rochester Mr. Mason supervised for Westinghouse, Church, Kerr & Company all field parties in the appraisal of rolling stock of the electric properties of the New York, New Haven & Hartford Railroad. The Metropolitan Street Railway, Coney Island & Brooklyn Railroad, Brooklyn Rapid Transit Company, Second Avenue Railroad and the Third Avenue Railroad were all appraised by the Public Service Commission during Mr. Mason's connection with that body.

Mr. W. A. Carson has been elected vice-president of the Evansville (Ind.) Railways in addition to the position as general manager. Mr. Carson has been connected with the Evansville Railways since July, 1908. He was assistant to the general superintendent of the Indianapolis & Cincinnati Traction Company from 1903 to 1906, and was assistant general manager of the Indianapolis, Columbus & Southern Traction Company from 1906 to 1908. Since Mr. Carson's connection with the Evansville Railways the company constructed a line in 1908 from Evansville to Newburgh, and built an extension from Rockport to Grandview in 1910. That same year a syndicate composed of officials of the Evansville Railways, of which Mr. Carson was a member, purchased the city lines in Henderson and Owensboro, Ky., and Mr. Carson was appointed general manager of both companies, which were taken over by the Evansville Railways in 1913. In 1912 a lease was secured on the line of the Illinois Central Railroad between Evansville and Henderson. This property was electrified by the Evansville Railways and a gasoline car ferry was installed to transport the interurban cars across the river. In 1913 the Crescent Navigation Company was incorporated with Mr. Carson as president, to operate a line of fast passenger motor boats on the Ohio River to connect with the company's line at Grandview, operating up the river to Troy, Tell City and Cannelton, Ind., and Hawesville, Ky., also a line of boats connecting with the line of the Evansville Railways at Rockport, and operating down the river to Owensboro, Ky. During Mr. Carson's connection with the company the carload freight business on the eastern division from Evansville to Rockport and Grandview has shown a rapid growth, and exchange of carload business is made with the Illinois Central Railroad at Evansville and the Southern Railway at Rockport under the American Electric Railway Association's rules on per diem and car service.

OBITUARY

Clarence Howard Clark, Jr., president of the Centennial National Bank, Philadelphia, Pa., and a member of the firm of E. W. Clark & Company of that city, bankers, died near Garnett, S. C., on Jan. 9. Mr. Clark was fifty-four years old. He entered the employ of E. W. Clark & Company in 1879, who control many public utility properties, as a clerk and became partner in 1885. For ten years he had served as president of the Centennial National Bank.

Oliver C. Gayley, vice-president of the Pressed Steel Car Company, died on Jan. 8 at his home in New York in his fifty-sixth year. Mr. Gayley was born in West Nottingham, Cecil County, Md., and was formerly for eight years employed in the engineering department of the Pennsylvania Railroad, later becoming a division engineer of the Philadelphia & Reading Railroad. For many years he was connected with the Safety Car Heating & Lighting Company, and was a director at the time of his death.

Construction News

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

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

RECENT INCORPORATIONS

Tampa, Clearwater & Island City Railroad, Clearwater, Fla.—Incorporated in Florida to construct a railway from Clearwater to Clearwater Key, 2¾ miles. Capital stock, $100,000. Officers: E. W. Parker, Tampa, president; G. R. Smoyer, Clearwater, vice-president; E. T. Roux, Plant City, secretary; H. W. Bivins, Clearwater, treasurer, and M. G. Gibbons, Tampa, counsel. [Dec. 25, '15.]

***Intermountain Traction & Power Company, Tacoma, Wash.**—Incorporated in Washington with a capital stock of $500,000. The main office of the company will be at Tacoma, with branches at Seattle and Valdez, Alaska. Incorporators: I. M. Iles, F. B. Chandler and A. B. Iles.

FRANCHISES

Kingman, Ariz.—Application for a franchise to build and operate a steam and electric railroad from some point on the Santa Fé main line to Oatman has been filed with the Mohave County board of supervisors by Henry Lovin and Horace J. Pullen.

San Diego, Cal.—The San Diego Electric Railway has asked the Council for a franchise to construct an extension of its line on University Avenue from Fairmount Avenue to Euclid Avenue.

Kansas City, Mo.—The Kansas City & Tiffany Springs Railway has received franchises from Clay and Platte Counties for building and operating a line across the county highways. [Dec. 25, '15.]

Buffalo, N. Y.—The Public Service Commission for the Second District of New York has approved the franchise granted the International Railway by the Council in October of last year for a double-track extension of its line with the necessary switches, etc., in Skillen Street from the Military Road to O'Neil Street.

Dallas, Tex.—The Dallas Standard Traction Company has received a twenty-year franchise from the Council to construct an extension to its Mount Auburn line.

TRACK AND ROADWAY

Edmonton (Alta.) Radial Railway.—The City Commissioners have recommended the extension of the Edmonton Radial Railway along Brandon Avenue to connect with the Edmonton Interurban Railway, estimated cost $3,000.

Pacific Electric Railway, Los Angeles, Cal.—A contract has been let to the Union Switch & Signal Company for the installation of block signals on this company's line between Los Angeles and Riverside.

Martinez, Cal.—It is reported that preliminary surveys for the proposed line to connect Concord and Martinez have been completed. The line will follow the main road from Martinez to Pacheco, and from there will take a cut-off through the Oak Knoll property and into Martinez. In conjunction with the building of the line, the Santa Fé Railroad will move its station at Muir to a point about 1½ miles nearer Martinez. Judge Clifford McClellan, San Francisco, and Irving Peterson, Berkeley, are interested. [Jan. 8, '15.]

Municipal Railways, San Francisco, Cal.—The Board of Supervisors has received a petition from the North Beach Promotion Association to extend the Stockton Street line from Stockton and Market Streets along Fourth Street to the Third and Townsend Streets depot, and from Columbus Avenue to the bay.

New Britain, Kensington & Meriden Street Railway, New Britain, Conn.—At a conference recently held by the joint committee of the New Britain and Meriden Chambers of Commerce and representatives from Kensington interested in the proposed line between New Britain and Meriden and

Mr. Brown of the Railway Storage Battery Car Company, the committee went over the matter in detail with him and arranged to have him submit an agreement giving the proposal his company is willing to make in writing. With this as a working basis, the committee will then prepare a report to present to their directors.

Miami (Fla.) Traction Company.—This company has authorized an issue of $1,000,000 of bonds, of which $200,000 are to be sold now, the proceeds to be used for the construction of an extension to Miami Beach, West Palm Beach, Florida City and other points. Plans are also being considered to construct extensions to Cape Sable, Lake Okeechobee and Tampa. It is proposed to begin work on the extension this winter.

Chicago (Ill.) Surface Lines.—Operation has been extended by this company over North Western Avenue to Devon Avenue and over South Ashland Avenue to Eighty-seventh Street. The line which has heretofore been operated between California and Kedzie Avenues via Elston Avenue will be operated via the newly constructed tracks on Milwaukee Avenue. These lines, with those operated on the extensions of Division Street, North Avenue, the north and south ends of Kedzie Avenue and the north end of Crawford Avenue, added approximately 20 miles to the transportation facilities during 1915.

Northwestern Elevated Railroad, Chicago, Ill.—Operation has been begun over the new elevated structure of the Northwestern Elevated Railroad in Chicago between Wilson and Howard Avenues. Permanent platforms have not been laid at the stations, as the men who have been working on the elevation have been needed for structural work. It is the intention of the company to replace these temporary platforms with concrete next spring.

***Mishawaka, Ind.**—Plans are being considered to build an electric line to connect Mishawaka with Indianapolis. The line would form a connecting link with the Grand Trunk System at Mishawaka and extend south through Bremen, Bourbon, Argos, Logansport and other towns and connecting with a steam line into Indianapolis. Among those interested are D. C. Dunlap, Wilmett, Ill.; Degroot Van Backerman, Chicago, Ill., and A. G. Barone, Wellington, Ill.

Iowa City-Muscatine Interurban Railway, Iowa City, Iowa.—According to an announcement made by President A. D. Bowen, the Iowa City-Muscatine Interurban Railway will be in actual operation not later than March 1. Contracts have been signed with the Rock Island Company for the leasing of its 104-mile line from Muscatine to Iowa City, What Cheer and Montezuma. Stock of the railway has been sold to the amount of $110,000 in Muscatine and Iowa City. [Nov. 6, '15.]

Morganfield, Ky.—Construction of an electric, standard gage, trunk railroad between Morganfield and Uniontown is proposed in a petition which has been presented to the Fiscal Court of Union County by S. B. Anderson of Memphis, Tenn., and G. L. Drury of Morganfield. The proposition is conditioned on the granting to the company by the court of a right-of-way along the main thoroughfare which now connects the two towns. They propose to begin construction immediately and state that the line will be in operation within twelve months after the concessions asked for are granted. In return the promoters propose to do what hauling the county requires at special rates. The towns are approximately 12 miles apart.

Worcester (Mass.) Consolidated Street Railway.—Residents of Greenwood Street below Upland Street have petitioned the Worcester Consolidated Street Railway for the extension of the Greenwood Street line from its present terminus on Greenwood Street to the Millbury line.

Kansas City & Tiffany Springs Railway, Kansas City, Mo.—This company will soon go before the utilities commission with a request for permission to issue bonds, probably asking for $35,000 a mile, and for issuance of stock. The company is planning now to build only in Clay and Platte Counties, the main line northward from Kansas City detouring to reach Parkville on the route to Tiffany Springs, a spur extending to Campbellton. The purposes of the spur are to touch the main line of the Quincy, Omaha & Kansas City Railroad at Campbellton. [Dec. 25, '15.]

United Railways, St. Louis, Mo.—Alderman Koenig on Jan. 7 introduced in the Board of Aldermen a resolution that the United Railways be required to extend either the Lee or Natural Bridge car lines to reach the northwestern residence section. On Mr. Koenig's motion, the resolution was referred to the committee on public utilities. The measure asks the United Railways to extend one of the lines from the present terminus to Union and Bernays Avenue, west on Lillian Avenue to Jennings Avenue, and to the western city limits.

International Railway, Buffalo, N. Y.—A report from this company states that it contemplates the construction of 33 miles of new track for its 1916 requirements.

Interborough Rapid Transit Company, New York, N. Y.—Bids were opened on Jan. 10 by the Interborough Rapid Transit Company for new extensions, as follows: For the Webster Avenue extension the two lowest bidders were M. J. Leahy, $331,110.90, and A. L. Guidone & Son, $838,765; for the West Farms extension the two lowest bidders were A. L. Guidone & Son, $105,915, and Conners Brothers, $108,000, and for the Eighth Avenue extension the lowest bidder was Battery Engineering & Contracting Company, $336,000.

Cleveland (Ohio) Railway.—An application will be made by this company to Traction Commissioner Sanders for an appropriation of $934,370 for track renewals and repairs. The request will include applications for funds to relay the Broadway line between Miles Avenue and East Thirty-fourth Street, 6.3 miles, and the East 105th Street line on East Ninety-third Street, between Kinsman and Miles Avenue, 3.5 miles. The application for 1916 is $10,000 higher than the amount Commissioner Witte was asked for in 1915.

***Wilmington, Ohio.**—A committee of four Dayton business men, Messrs. Cooper, Kimmel, Ratcliff and Eichelberger, has arranged for a special meeting with the local Chamber of Commerce, at which time a proposition to construct a line from Wilmington to Xenia, to connect with the Dayton, Springfield & Xenia Southern Railway, will be made. The route has already been surveyed. It is reported that the Dayton Power & Light Company is back of the proposition.

Youngstown & Niles Railway, Youngstown, Ohio.—It is reported that the directors of the Youngstown & Niles Railway, a subsidiary of the Mahoning & Shenango Railway & Light Company, and recently incorporated with a capital stock of $10,000, have filed an application for an extension of its charter. The original charter provided for a line between Youngstown and Niles. The extension now asked for provides for the line extending through Niles to Warren, furnishing a route for a high-speed line almost entirely on private right-of-way. J. P. Wilson, Youngstown, president. [Dec. 11, '15.]

Kansas-Oklahoma Electric Company, Caney, Okla.—It is reported that steps are being taken to finance this company's proposed line from Independence, Kan., to Caney and Dewey, Okla. Plans for the line from Independence to Caney are said to be already perfected. S. M. Porter, Caney, is interested. [Dec. 25, '15.]

London & Port Stanley Railway, London, Ont.—A by-law was carried by the ratepayers of London to spend $101 000 on terminal connections for the newly electrified London & Port Stanley Railway.

Toronto, Ont.—By a vote of nearly four to one the taxpayers of Toronto on Jan. 1 indorsed the agreement under which the city guarantees about $14 000,000 of the bonds of the proposed Toronto-London radial railway, to be constructed and operated by Ontario's Hydro-Electric Power Commission. The line will eventually be extended to Sarnia. A line will also be built northward from Toronto, extending to Collingwood, Barrie and Orillia, and possibly to Owen Sound. An easterly radial will extend along the shore of Lake Ontario through to Montreal.

Southern Oregon Traction Company, Medford, Ore.—Operation has been begun on this company's extension from Medford to Jacksonville.

Willamette Valley Southern Electric Railway, Oregon City, Ore.—Plans are being considered by this company to extend its line from Mount Angel to Salem via Silverton, Macleay and Aumsville.

Perkiomen Traction Company, Collegeville, Pa.—It is reported that contracts have been let by this company for the construction of its line from Collegeville to Schwenkville, and preparations are being made to begin grading and track-laying. James L. Wolcott, Dover, Del., president. [March 6, '15.]

Pottstown & Phœnixville Railway, Pottstown, Pa.—A report from this company states that during 1915 it constructed 3½ miles of new line between Sanatoga Park and Linfield. During the coming year the company expects to construct 2½ miles of line between Linfield and Spring City.

Dallas, Tex.—At a meeting of officials of the city of Dallas, the Union Terminal Company and Dallas Consolidated Electric Street Railway, it was decided that there would be no car tracks laid on Houston Street in front of the Union Terminal, now in course of construction, owing to the narrowness of the street and consequent possibility of congestion. Passengers entering Dallas via steam roads will have to walk a block to Jefferson Street to get a street car.

Houston, Richmond & Western Traction Company, Houston, Tex.—It is reported that bonuses and donations amounting to nearly $600,000 have been secured by this company, which proposes to build a line from Houston to San Antonio. E. Kennedy, president. [Dec. 18, '15.]

Green Bay & Eastern Railway, Manitowoc, Wis.—Surveys have been begun by this company for its proposed line from Green Bay to Sheboygan via Manitowoc. [Dec. 25, '15.]

SHOPS AND BUILDINGS

Bay State Street Railway, Boston, Mass.—The old carhouse of the Bay State Street Railway on Bass Avenue, Gloucester, was totally destroyed by fire on Jan. 4, together with thirteen open cars, other equipment and three horses. The carhouse was a wooden structure and has been used as an auxiliary station to the brick building at the corner of Sayward Street and Bass Avenue. The loss is estimated at $40,000.

Long Island City, N. Y.—The transit committee of the Queens Chamber of Commerce has urged the Public Service Commission for the First District of New York to hasten the station finish work in the Hunters Point Avenue station on the Queensboro subway in Long Island City, in order to provide connections for passengers wishing to transfer from the Long Island Railroad trains at that point. This would enable residents in all parts of the Borough of Queens to transfer to the subway system at this station. Public Service Commissioner George V. S. Williams promised to take up at once the question of having a separate contract prepared for the station finish of the Hunters Point Avenue station.

Texas Traction Company, Dallas, Tex.—It is reported that this company will rebuild its substation near Sherman which was recently destroyed by fire.

POWER HOUSES AND SUBSTATIONS

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—Work is progressing rapidly on the addition to the Lowellville power house of this company. The Stone & Webster Engineering Corporation is now engaged on the structural iron work. The reinforced concrete stack has been completed and one boiler has been installed. The addition will increase the horsepower capacity of the plant from 20,000 to 40,000.

Northampton Traction Company, Easton, Pa.—This company, which has taken over the property of the Bangor & Portland Traction Company, contemplates some changes in its power supply and lines. One or more substations, probably of the automatic type, may be erected. Plans are now being prepared by James T. Rood, consulting engineer, Easton, Pa.

Potomac Electric Power Company, Washington, D. C.—The capacity of the Benning steam power plant of the Potomac Electric Power Company, which supplies energy to the Washington, Baltimore & Annapolis Railroad, is to be increased by the installation of an additional 15,000-kw. generator. The building will be enlarged by the construction of necessary extensions to accommodate the new machinery, and a contract for the engineering and construction work has been awarded The J. G. White Engineering Corporation of New York.

Manufactures and Supplies

ROLLING STOCK

Bristol & Plainville Tramways, Bristol, Conn., expects to buy three convertible cars during 1916.

Chicago & Joliet Electric Railway, Joliet, Ill., on Jan. 3 had one of its street cars partially destroyed by fire.

Manhattan & Queens Traction Corporation, New York, N. Y., is considering the purchase of additional passenger cars.

Vicksburg Light & Traction Company, Vicksburg, Miss., may purchase during 1916 two closed city motor passenger cars.

Manhattan City & Interurban Railway, Manhattan City, Kan., expects to purchase during 1916 two single-truck motor cars.

Lehigh Valley Transit Company, Allentown, Pa., has issued specifications for twelve side-entrance cars for city and interurban service.

Union Traction Company of Indiana, Anderson, Ind., has purchased a modern double-track snow sweeper from the McGuire-Cummings Manufacturing Company, at a cost of $3,000.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has just completed at its Huntington shop a single-truck, double-end, broom snow sweeper to replace one destroyed by fire at LaFayette, Ind.

Metropolitan Street Railway, Kansas City, Mo., advises that the report that it was in the market for fifty cars and trucks is in error, but that it was in the market for fifty four-motor electrical and air-brake equipments.

Toronto (Ont.) Civic Railway will shortly purchase thirteen new cars at a cost of about $100,000. These will be used on the new Lansdowne line, the St. Clair Avenue line, and the Danforth line. The money was provided for in the estimates for this year. The Toronto Works Department is now advertising for bids on this equipment, which will be received up to Feb. 1.

East Liverpool Traction & Light Company, East Liverpool, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of Dec. 18, 1915, as having received delivery of fifteen low-level center-entrance Pittsburgh type cars from the G. C. Kuhlman Car Company, specified the following details for these cars:

Seating capacity 51
Weight of car body, incl. elec. eq. attached to body and seats .....18,910 lb.
Bolster centers, length, 21 ft. 8 in.
Length of body.....31 ft.
Length over all.....45 ft.
Width over sills...7 ft. 9½ in.
Height, rail to sills, at bolsters...2 ft. 4 5/16 in.
Height, sill to trolley base, 8 ft. 3 7/16 in.
Body .....metal
Interior trim .....cherry
Headlining .....Agasote
Roof .....Monitor Deck
Air brakes .....G.E. CP-27
Axles, spec. heat treated carbon
Bumpers .....Ry. Std.
Control .....G.E.
Couplers, Ry. std. shackle bar with drawhead castings
Curtain fixtures.Cur. Sup. Co.
Curtain material ..Pantasote
Destination signs...Keystone
Gongs, New Departure rotary
Handbrakes .....Peacock
Heaters .....Peter Smith
Headlights ....Crouse-Hinds
Journal boxes, Symington torsion lid
Motors, 4 G.E.-247-A, inside hung
Paint .....Sherwin-Williams
Registers, Int. Reg. Co.'s C-21 combined coin and transfer register
Sash fixtures.O. M. Edwards
Seats .....Brill rattan
Step treads .....Feralun
Trolley catchers, Knutson No. 5
Trolley base .....G.E.
Trucks ..Brill arch-bar type
Varnish, Sherwin-Williams & Valspar Peerless for platform roof
Ventilators, Perry for monitor deck
Wheels .....rolled steel

TRADE NOTES

Kay & Ess Company, Dayton, Ohio, has appointed H. N. Turner, formerly Eastern representative of this company, as sales manager with headquarters at Dayton. J. W. Wilson has been appointed Eastern railway representative succeeding Mr. Turner.

Curtain Supply Company, Chicago, Ill., has received orders to equip with Ring No. 88 fixtures and Rex rollers the fifteen cars recently ordered by the United Traction Company, Albany, N. Y., and the three cars ordered by the Bristol & Plainville Tramway, Bristol, Conn.

Harrison Safety Boiler Works, Philadelphia, Pa., have received a gold medal award for the exhibit of their combined open-feed water heater and hot water meter, known as the Cochrane Metering Heater, which was exhibited at the Panama-Pacific Exposition.

Bailey Meter Company, Boston, Mass., has been incorporated under the laws of Massachusetts to manufacture and sell a line of recording meters and instruments for power plants and other similar uses. These meters have been developed during the past six years in the mechanical engineering department of the Fuel Testing Company of Boston. E. G. Bailey will devote his entire time to the new company, but the Fuel Testing Company will continue its regular line of work under the personal direction of W. B. Calkins, who has been a partner with Mr. Bailey since its organization in 1909.

ADVERTISING LITERATURE

Berger Manufacturing Company, Canton, Ohio, has issued a folder describing its various types of steel lockers suitable for employees' use in carhouses and shops.

Wright Manufacturing Company, Lisbon, Ohio, has issued a catalog describing and illustrating its various types of chain hoists, steel trolleys and hand cranes.

Ohio Brass Company, Mansfield, Ohio, has issued a folder illustrating the elimination of the danger factor at steam and electric railway crossings through the use of its National trolley guard.

Bowman, Cost & Company, St. Louis, Mo., have begun to issue *Investment Factors*, a new free periodical for investors. The January number contains articles on the bond market outlook for 1916, talks with investors, "What the Public Wants," the time to make purchases of securities, a list of profitable income-producing issues, and it touches on almost every phase of the investment market.

T. J. Cope, Philadephia, Pa., has issued a folder on his underground construction tools and equipment. This material includes cable racks, porcelain insulating saddles, cable tags, conduit-cleaning tools, cable-pulling wire ropes, steel manhole ladders, winches for pulling cables, cable-pulling rigging, cable reel jacks, shoring or trench jacks, bond plates, high-tension terminals, duct protectors, manhole guard rails and turnbuckles.

Western Electric Company, New York, N. Y., has issued the second edition of its year book, known as the "Electrical Supply Year Book for 1916." The current book continues the practice of a simple series of list prices, upon which a basis discount applies, such a discount indicating to the holder of the catalog his approximate price for all the articles listed. The 1916 book is even more complete and comprehensive than the 1915 issue, the number of pages being 1504 as compared with 1296 last year.

Richardson Scale Company, Passaic, N. J., has issued an artistically designed and completely compiled catalog describing its hopper scales for the automatic weighing of coal and water in power plants. The value of these appliances is emphasized in the catalog from the fact that since coal is the largest single element in the cost of power it is important to insure that the quality and quantity of coal paid for is received, and that proper economy in the use of coal bought is obtained. These automatic hopper scales are made on the principle of the equal-arm, single weighing beam, provided with standard Government weights. The hoppers are so arranged that no coal can pass through them unweighed and unrecorded. Three types of these scales find application in power plants: the scale for receiving coal, the scale for weighing fuel to boilers, and the water scale. In essential principles they are alike and differ only in details of construction. With the aid of clearly prepared illustratoins the catalog describes the construction and operation of these scales and gives special attention to the method of their installation. The catalog is designed and written by Ray D. Lillibridge, Inc., New York.

NEW PUBLICATIONS

Maintenance of Way and Structures. By William C. Willard, C.E., M.S. McGraw-Hill Book Company, Inc., New York. 451 pages. Cloth, $4.

This book sets forth the accepted practice in the maintenance of way and structures of steam railroads. The author has arranged the matter and treated it in such a way that it will be of interest both to maintenance of way engineers and to university students pursuing a course in engineering. Fundamental principles and theory are stated and are emphasized in each instance by representative examples of the practice of individual railways. The standard methods and practices recommended by the American Railway Engineering Association serve as a guide and, aside from these, way engineers of electric railways will find much information of value in the matter of way department organization and rules, records and accounts. A large amount of fundamental information concerning roadway, ballast, wooden ties, economics of ties, the preservation of timber and rails has been included. The latest data regarding stresses in the track are treated in one chapter, which is followed by a discussion of railway track design. Accepted standards for signs, fences, highway crossings, bridges, trestles and culverts are also described in detail. In each chapter the practical construction features, as well as theoretical calculations, are given. As a compendium of information concerning modern track and roadway construction this volume will prove invaluable for reference purposes.

Tramway Track Construction and Maintenance. By R. Bickerstaffe Holt. D. Van Nostrand Company, New York. 450 pages. Cloth $4.50.

This book contains a wealth of information concerning construction and maintenance methods employed by English tramway engineers. While English track construction differs materially from the American standards from a design standpoint, the care exercised by English tramway engineers during the construction and maintenance periods will be a revelation to American way engineers. The author is the permanent way engineer of the Leeds Corporation and is responsible for the construction and maintenance of one of the largest tramway systems in England. The exceptional opportunities afforded the author in this capacity have eminently fitted him to present conclusions concerning track materials and processes that will also serve as a guide to American way engineers. The book does not pretend to survey all the methods that have ever been employed on English tramways, but is concerned principally with the materials and methods that have been tested and have given the author confidence in them. In reality this work is a book of instructions on track construction and maintenance, being basicly practical and, doubtless, is the most authoritative contribution on the subject of English tramway tracks that has yet been published. In a foreword the author states that "all is not well with the permanent way" and then proceeds to furnish suggestions to tramway engineers, managers, students and municipal authorities concerning what he deems to be the best practices. In scope the volume treats of concrete foundations and materials and their repairs. The different track designs employed are described and the best practice to follow in rail packing, laying and fastening is presented. The problems incident to joints and joint welding are discussed at length. Rail wear, the composition and manufacture of rails and the effect of the section on rail wear are given thorough consideration. Drainage, rail maintenance, special work, track paving and reconstruction are also treated at length and in a way that they will serve as a guide to English way engineers. An appendix presents the principal methods required in special track work calculations, and the value of the volume is enhanced by over 150 illustrations carefully selected to illustrate the methods and practices described by the author.