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FREQUENT SERVICE AND GROSS RECEIPTS

According to Commissioner Frank Irvine, Public Service Commission of New York, Second District, the steam railroad train, composed of locomotive, baggage and express car and two or three coaches, is in a state of obsolescence. This statement was made as part of a decision on a demand for greater local service on the Lehigh Valley Railroad in and out of Auburn, N. Y., and the commission points out that the gasoline-motor car or some other system with small units and low operating expenses must be used unless the steam roads want to see their local traffic go to the interurbans or to the autobus or private automobiles. The stimulating effect of frequent service on gross receipts is a lesson which the steam railroads learn slowly. They have been brought up on the doctrine of the importance of long trains in through freight service and have difficulty in understanding that any other principle is advisable in passenger service. In this particular case, the commission declined to order the railroad to provide more transportation because it showed that the operating cost of the train described above was 54 cents per train-mile, whereas the receipts from the trains now in use were only 57 cents, leaving not enough margin for overhead charges. The situation described by Commissioner Irvine prevails on many other steam railroads. The track is there. All that is needed is some system of small units. Receipts of 57 cents per train-mile seem good to the average interurban electric railway manager, and if any one of a number whom we know were placed under similar circumstances we believe that we could tell what he would do.

THE HUMAN SIDE OF THE CORPORATION

The annual banquet of the Washington (D. C.) Traffic Club is an interesting event in steam and electric traction circles in that city. At the banquet held recently one of the addresses was delivered by W. F. Ham, vice-president of the Washington Railway & Electric Company. One of his main pleas was for an appreciation by the public of the fact that the corporation is not a soul-less affair, because it is made up of individuals from one end to the other. The stockholders who form the corporation are certainly human, as are the directors who attend to affairs for them. The directors select human officers who, in turn, appoint human experts to supervise the details of operation. Finally there is the rank and file of human employees who do the every-day work in all branches of the service. From stockholder to laborer there is nothing but humanity. While Mr. Ham's purpose in calling attention to the above fundamental fact was to impress it upon the public to the end that the corporation might be considered as something more than a mechanism for extracting money from the public, there is a suggestion in it for the corporation also. Involving as it does the welfare and happiness of so many human units, it is highly important that the corporation should furnish each of these units with the maximum opportunity for development. Corporations differ radically along this line. Some are almost like educational institutions in that the workers are developing mentally, and in their respect for themselves and for their work. In others only a few receive credit for achievement and are stimulated to manifest individuality and initiative. The one gets heart service from the employee, the other time and lip service only.

SECURITY HOLDINGS OF BANKS

The extent to which the banks of this country invest their funds in various classes of securities is good evidence of relative investment values, but in this matter one must be careful to observe trends rather than short-time changes. For instance, the careless analyst will loudly declare that steam railroad bonds are in disfavor because the report of the Comptroller of the Currency for the year ended June 30, 1915, shows railroad bond holdings to have increased only 1.74 per cent during the year, while public utility bond holdings rose 13.7 per cent. Yet in the preceding year the same critic undoubtedly condemned public utility bonds because the banks decreased their holdings of such issues by 19 per cent but added 9.4 per cent to their railroad bond holdings. We mention these facts simply to demonstrate how unwise it is to be either over-enthusiastic or depressed because of simply one year's showing. As a matter of fact, since 1912 public utility bond holdings have shown a net increase of 10 per cent, while railroad bond holdings have risen only 4.4 per cent. Undoubtedly steam railroad bonds have in late years been tending to lose their primacy as investments, while utility issues have enjoyed an increasing popularity. Whether this trend is to be maintained, however, and whether electric railways are to share proportionately in general utility prosperity are questions that are not yet definitely answerable. The same factors that have made for a decline in railroad bond holdings are present in the electric railway situation, and if the securities in the latter field are not to decline in popularity the public must more fully realize the unfairness and injustice of attacks on electric railway investments. Certainly it is in the interest of the

public that electric railway issues be just as sound and attractive investment propositions as those of any other class of utilities.

NEW YORK TRACTION AFFAIRS

New York traction affairs have been considerably in the limelight during the past few months, and particularly during the past few weeks. Commencing with the investigation of the Public Service Commission, First District, which was followed by beneficial results, the committee has been turning its attention to traction affairs, especially as to the ways in which the subways now under construction have been financed. It has secured various data in regard to the expenditures before and after the contracts for the new subways were signed as well as the salaries paid to various Interborough executive officials, and is now devoting itself to an investigation of the conditions surrounding the third-tracking contracts of the elevated railway. Much of the information elicited up to date is old and a great deal is inconclusive, as the testimony is not all in, so that it would be unwise for anyone yet to say that a scandal will develop. Those who know the care with which the able representatives of the city who had charge of its interests during the negotiations preliminary to the present subway contracts discharged their duty, will be very skeptical that any loophole was left for excessive charges to the city until such a condition is definitely proved. Undoubtedly, the city is committed to a large expenditure as its part of the subway improvements, but the acclaim which greeted the conclusion of these contracts showed that the public at large believed then and undoubtedly believes now that no other municipal improvement is so important to the city's welfare, and that the expense will be far more than counterbalanced by the increase in taxable real estate values. It might have been better to have undertaken this work gradually, that is to say, by building certain sections at a time, but there were obvious objections to such a piecemeal method of construction at the time the contracts were under consideration, and the city is assured now of a well-balanced system of subways which should be of inestimable benefit to it in its development.

Comptroller Prendergast, who had a great deal to do with the original contracts, has issued a statement showing in detail that the city's interests are fully conserved as regards excessive "construction expenses" under the present contracts, and that the "one notorious matter" which has been brought out by the committee is the seemingly large percentage of profit allowed to the contractor for the third tracking of the elevated railway. This expense, according to a former director of the railroad company, the president of the company said was necessary in order to take care of certain commitments and obligations. No further explanation has been made of this expenditure, but light will undoubtedly be thrown upon it through the testimony of Mr. Shonts, who, it is understood, will go on the stand within the next few days.

The legislative committee is particularly concerned with the aspect of the city's interest in the subway contracts, but we trust that in view of the broad nature of the inquiry the directors of the various companies engaged in the work will make a full statement to their stockholders of all extraordinary expenses incurred in connection with the contracts. It is only natural to expect that in an undertaking of this kind there would be many large disbursements for legal and other expert opinion as well as for financing the undertaking, but the stockholders should have asurance that these have not exceeded in amount what was reasonable under the circumstances.

GROSS RECEIPTS ARE NOT PROFITS

A number of the New York daily papers have been finding the current legislative committee investigation of the methods of financing the new subways in New York excellent "copy," and have had a good deal to say about the "profits" which the bankers have made in handling the bonds of the Interborough Rapid Transit Company and in guaranteeing the financing. An analysis of the figures thus quoted would indicate, however, that the newspapers in question deduced their figures of "profits" by taking the figure at which the bonds were purchased and the figure at which they were sold and multiplying the difference by the entire issue of bonds, then adding such additional allowances as were made to the bankers for commissions, readiness to finance, etc. We are not considering here whether the entire amount of profit received by the bankers was too much or too little under the circumstances, although it might be well to point out that the financing of an issue of $100,000,000 is rather a large undertaking even for Wall Street, and that as the number of banking firms which could handle an issue of this kind is limited, it is natural to assume that the profits demanded would be larger than where the number of bidders was greater.

But even omitting this phase of the question, it must be remembered that bankers, like others engaged in commercial undertakings, have operating expenses, interest, etc., which have to be paid before "profits" are realized, and a confusing of the difference between gross receipts and profits in banking would be just as absurd as in the railway or newspaper business. Even where a payment of $500,000 was made to a firm of bankers for readiness to finance the subway during the early negotiations which came to naught, it is improper to say that the payment was equivalent to profit. It is true no money was actually advanced to the operating company by the bankers under the contract, but every operating man knows that "readiness to serve" in the lighting and railway business costs money and is a legitimate charge to the consumer, and it is easy to understand that in a fluctuating money market the "readiness to serve" by the banker to the extent of being prepared at any time to take $100,000,000 of 5½ per cent bonds undoubtedly involves considerable actual expenditure as well as the sacrifice of profits which could have been earned by the use in other ways of the idle capital.

ELECTRIFICATION OF STEAM RAILROADS FOR PROFIT

In the early electrifications of short sections of steam roads, direct financial returns were not the primary objects in view. The long tunnel was the *bête noire* of the steam railroad, and the B. & O. in Baltimore, the Great Northern in the Cascade Range, the Grand Trunk between Sarnia, Ont., and Port Huron, Mich., and the New York Central, New Haven and Pennsylvania in New York, were all forced to electrification as the solution of the tunnel ventilation problem. While advocates of judicious electrification welcomed the rapid development in the art which was necessary under these circumstances, they deplored the fact that the economics of the situation had to take second place. In later, and more voluntary, electrifications financial considerations have predominated.

These remarks are prompted by the discussion at the heavy electric traction session of the mid-winter convention of the American Institute of Electrical Engineers last week. One speaker remarked that instead of criticising details of an achievement like the Norfolk & Western installation, which was under discussion at the time, its over-all significance should be appreciated. Here is a case where electric locomotives are doing what steam locomotives had never done and could not do, hoisting coal better than it had ever been hoisted before. Another speaker thought that this was not enough, implying that the criterion of success is not "does it work?" but "does it pay?"

Evidence is accumulating to show that electrification not only "works" but pays as well, under conditions conducive to profit. The Butte, Anaconda & Pacific has demonstrated this to the satisfaction of all concerned, as is shown not only by financial statements but by the action of the Chicago, Milwaukee & St. Paul. While no direct figures have as yet been given out by the Norfolk & Western, the excellent operating record reported for the road for the latter six months of 1915 undoubtedly reflects the effect of electrification in increasing the capacity of the track in the Bluefield region.

There are many other opportunities for large profits in applying electricity to hoisting problems, as Charles F. Scott called them in the discussion referred to, to say nothing of suburban installations, like that in Philadelphia, in which the multiple-unit train has the opportunity to demonstrate its superiority to any type of locomotive. In the Philadelphia case the profit resulted from the possibility of postponing large expenditures for enlarging the "neck of the bottle" over the Schuylkill River.

We look for a tremendous development in steam railroad electrification during the next few years. Between 1890 and 1900 there was a wholesale electrification of the horse railways of the country because large profits were seen to be within reach. This followed a period of preparation or scientific development. The past fifteen years have been the corresponding preparatory period for the application of electricity to the steam road, because there electricity is going to pay also. As soon as capital loosens up a bit in this field there is bound to be some interesting progress.

BY-PRODUCTS OF THE SAFETY MEDAL COMPETITION

The recent award of the Anthony N. Brady medal, the second which has been made, suggests a query as to the benefits to be derived from such competitions. The electric railways have not as yet manifested a lively interest in the competition for the the Brady medal, partly because the plan is new and probably also on account of lack of interest in competitions in general. We understand, also, that some of the competitors do not make particularly forceful presentation of their claims. It is possible that the managements of some roads do not consider it dignified to enter a competition of this kind and, as it were, plead their cases before the court of award. It is necessary, however, that something of this sort be done, as it is a physical impossibility for any committee to be omniscient in regard to the safety records of electric railways. Moreover, a number of the competitors have been among the leading roads in the country, a fact which establishes a precedent in this line.

Now, entirely aside from the possibility of securing the medal or "honorable mention" in the competition, there are certain by-products which make the effort worth while. The preparation of the statistics in the standard form prescribed by the committee of the American Electric Railway Association is valuable in that it permits at least a crude comparison of the results of safety work on a numerical basis. Of still more importance is the "account of stock" which must be taken in making an adequate presentation of the efforts made to reduce accidents. To "see oursels as ithers see us" occasionally is beneficial. The old fable of the pot of gold hid in the field is not inappropriate in this connection. It will be remembered that a father, dying, left to his son a field in which he said a pot of gold was buried. In diligently plowing for the gold the son so increased the fertility of the field that, although the coveted prize never materialized, the indirect reward was equally profitable.

So in this safety competition thorough preparation for the competition should prove its own reward, as one competitor this year testified it had done. More evidence in the same direction was furnished by another company which, although barred from the competition, nevertheless put in a comprehensive report which was prepared because last year's experience demonstrated the value of the study necessary in preparing the brief. It is not to be expected that a majority of the roads in the country will compete for the medal every year. But there is no reason why every road should not make an annual study of its accident situation and, when the record seems sufficiently creditable, why it should not "go in" for the medal. If then the Brady medal foundation does no more than stimulate the electric railways to the making of periodical and thorough safety inventories it will have proved to be a benefit to the industry.

CLEVELAND REBUILT CAR—VIEW OF CAR BEFORE REMODELING

Cleveland Modernizes Fifty Cars

Double-End, Composite-Underframe Cars Were Rebuilt into the Front-Entrance, Center-Exit Type in Response to a Popular Demand—The Alterations Made and the Shop Procedure Are Described

POPULAR demand and a desire on the part of the Cleveland Railway to accede to it, resulted in the recent purchase of fifty front-entrance, center-exit cars and the remodeling of fifty double-end cars into this type. Never in Cleveland's experience with the various types of cars, has any one type attained such immediate popularity as the front-entrance, center-exit car which was placed in experimental service early in 1915. This car was described on page 364 of the ELECTRIC RAILWAY JOURNAL of Feb. 20, 1915. In but a very short time after the first car of this type was put in service, its advantages from every standpoint became so apparent that the public requested more of them, they were popular with the trainmen and the transportation department experienced greater ease in making schedules. In the March following, a contract for fifty new cars was placed with the Kuhlman Car Company of Cleveland, and plans were completed for remodeling fifty old double-end cars. In connection with the front-entrance, center-exit type of car, it is of interest to note that the arrangement was conceived by Peter Witt, former street railway commissioner for Cleveland, after consulting with a number of motormen and conductors.

The peculiar advantages of the Cleveland front-entrance, center-exit type of car were brought out in the article in the issue of Feb. 20, already mentioned. The present article concerns itself principally with the methods employed in rebuilding the double-end cars into the new type. Soon after getting settled in the new repair shops, the mechanical department began to convert fifty double-end wooden cars into the front-entrance, center-exit type. The old cars selected for remodeling included twenty-five that were put in service in 1908 and twenty-five others that were put in service in 1898. The latter were originally fourteen-bench open cars, which were later rebuilt into the closed type shown in an accompanying illustration. Both types of cars had wooden outside sheathing below the belt rail, and the twenty-five cars built in 1898 were framed for a concave side sheathing. The over-all length of the original cars of both types was 52 ft., but in rebuilding this was reduced to 49 ft. 3⅜ in. through the elimination of the rear vestibule. The other principal dimensions are as given in the above table.

DIMENSIONS AND OTHER DATA OF REBUILT CLEVELAND CARS

Length over corner posts, 38 ft. 2½ in.	Height of entrance doors..6 ft.
Truck centers.....24 ft.	Step height front vestibule, 15 in., 14 in., 9 in.
Wheelbase .....4 ft. 6 in.	Step height center exit, 13¼ in., 12¼ in.,12½ in.
Floor to rail.....38 in.	Passengers seated in summer 54
Width over side plates, 8 ft. 2 in.	Passengers seated in winter.53
Width over belt rail, 8 ft. 4¾ in.	Passengers standing.....78
Height inside .....7 ft. 9 in.	Total passenger load.....132
Height of exit doors..7 ft. 3 in.	Wheel diameter.....33 in.

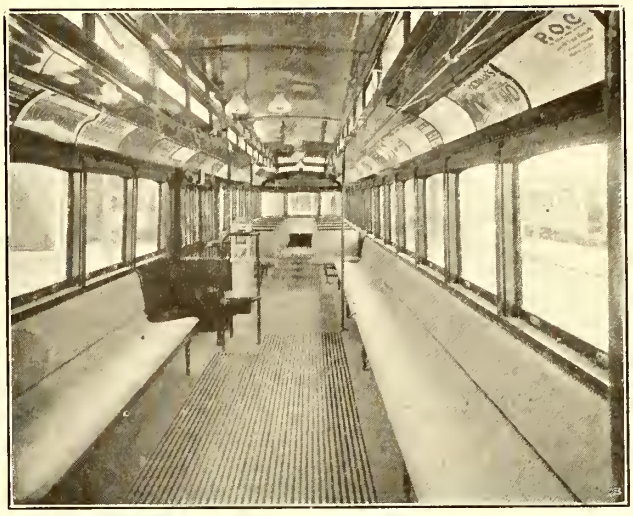
Essentially, the remodeling of these double-end car

CLEVELAND REBUILT CAR—VIEW OF REMODELED CAR COMPLETED

bodies included a change in the location and size of the entrance doors in the front vestibule, the provision for the center exits, the reconstruction of the rear vestibule to make them form part of the main car body and a rearrangement of the seating plan in the front half of the car. The door in the front vestibule was originally 2 ft. 2 in. wide, and it was installed beside the vestibule corner post. The changes in this entrance included an increase in the width of the opening to 4 ft. and its shift from the front vestibule corner post to a position beside the body corner post. No changes were made in the platform arrangement or dimensions, but at the line of the bulkhead between the front vestibule and the main car body, pipe rails and stanchions were provided to form a 36-in. aisle.

In place of the cross-seats in the front half of the body, two longitudinal seats were installed, one for seven passengers on the exit-door side, and the other for fourteen passengers on the side opposite the exit and extending from the front bulkhead to a point beyond the center-exit well. About 3½ ft. of the available seating space beside the exit door was utilized for the conductor's fare box and stand. The center of the exit-door well is 13 ft. 3 in. from the center of the rear body bolster, and the well is 25 in. wide by 5 ft. 5 in. long. Only such changes were made in the underframe at this point as were necessary to provide the exit well and reinforce the underframe around the opening. These changes included two new wooden floor beams, 2½ in. x 6¾ in., and 3½ in. x 6¾ in. in size respectively, bolted together and placed at each side of the well. A ⅝-in. x 3-in. rectangular, strap-iron frame was also installed on the car underframe beside the exit well to support the air-compressor equipment. The longitudinal floor member along the well was formed of a 4¾-in. x 6¾-in. wooden sill framed between the beams at each side of the well. The transverse floor members which had to be cut to provide for the well, were in turn framed into this longitudinal member.

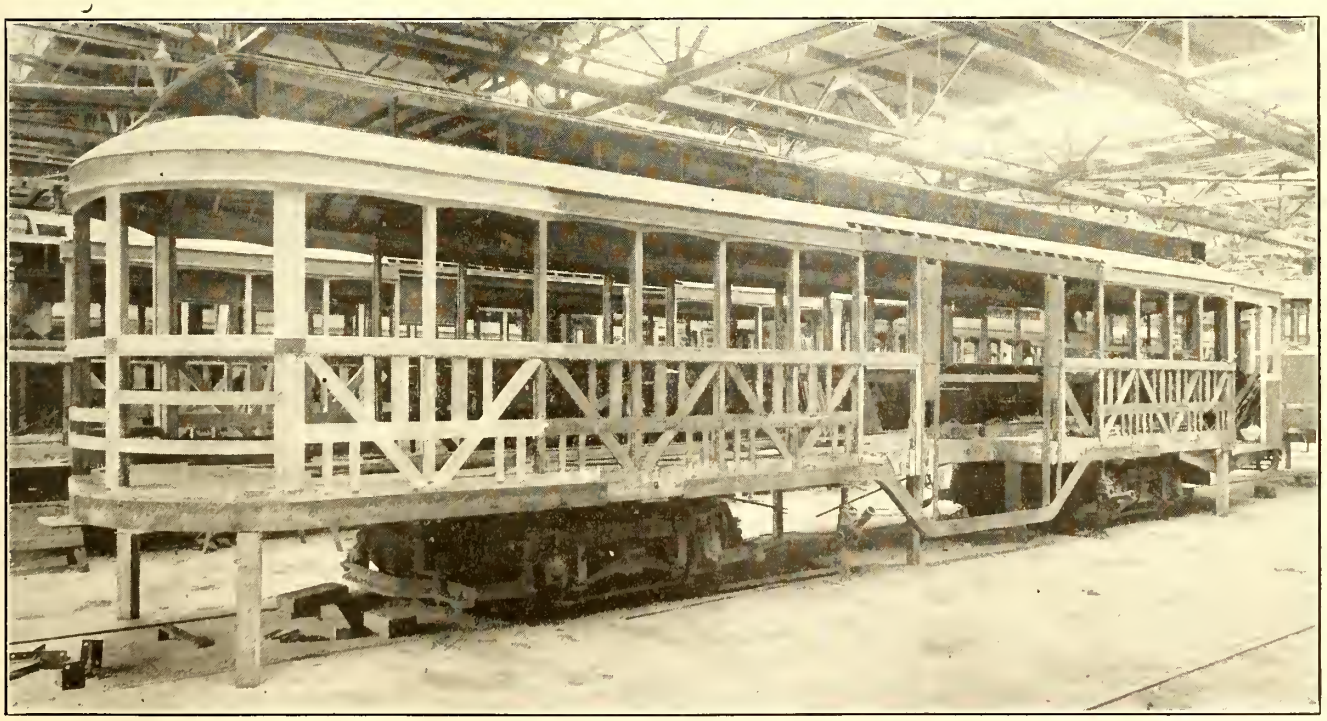
A steel frame, the details of which are shown in one of the accompanying illustrations, was provided to carry the stresses around the center exit. The longitudinal members included the offset angle side sill and



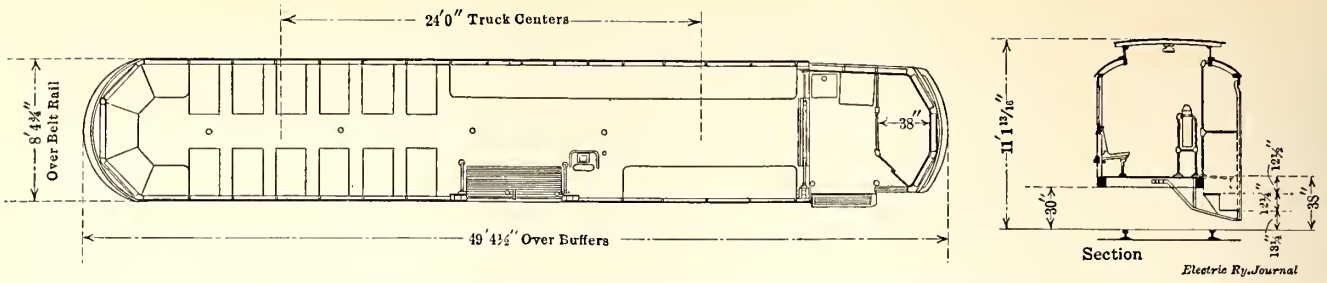
CLEVELAND REBUILT CAR—INTERIOR VIEW OF REMODELED CAR

the side plate. Both extend on each side of the exit to the first window post. The vertical members included two built-up, steel panel posts flanking the the exit and steel side sheathing in the first panels at each side of the opening. With this plan of reinforcement only two window posts had to be removed to provide for the exit, and for these the two steel panel posts flanking the opening were substituted. These panel posts were riveted to the 5/16-in. x 3½-in. x 5-in. angle side sill and the side plate. The steel angle side sill is continuous across the exit opening and extends 4 ft. 4 in. toward the front of the car and 6 ft. 6¾ in. toward the rear, along the 5-in. x 8-in. wooden side sill, to which it is bolted both horizontally and vertically by ¾-in. bolts spaced at 12-in. centers.

A ⅛-in. side plate, extending from the sill to the belt rail and from the panel post to the first window post each side of the exit opening, also reinforces the car side at this point. At the window posts these plates are stiffened with ⅛-in. x 1¼-in. x 1¼-in. angles which bolt to the old wooden posts and rivet to the side sheets. The panel posts are formed of two 2-in. x 2-in. x 3/16-in.



CLEVELAND REBUILT CAR—VIEW OF CAR DURING REMODELING



CLEVELAND REBUILT CAR—GENERAL FLOOR PLAN AND CROSS-SECTION

angles, spaced 10 in. back to back. Below the belt rail the web connecting these two angles is the steel side sheathing plate, and above the belt rail a separate web of the same thickness and 10 in. wide extends to the underside of the letterboard. At the belt rail this web is spliced with a ¼-in. x 9-in. x 12-in. plate, and at the letterboard it is spliced with a 3/16-in. x 9-in. x 10⅝-in. plate. The two steps in the exit well are supported on 3/16-in. x 1½-in. x 1½-in. angles. These frame into two 3/16-in. carrier plates which extend 25 in. into the car body and form the panels each side of the exit well. The steps are built with 1⅛-in. wooden treads and 16-gage steel risers.

The letterboard is formed of 5/16-in. x 6-in. sheet steel, and it extends on each side of the exit door opening along the wooden side plate, to which it is bolted, to the first window post. The letterboard is heavily reinforced with a 5/16-in. x 2-in. x 2½-in. angle extending full length. The 3/16-in. x 2-in. x 2-in. inside angles in the panel posts are also bent continuous over the exit and also riveted to the letterboard, thus reinforcing sufficiently to carry the side plate stresses. Four double-leaf folding doors close the 5-ft. x 6⅝-in. exit, and they are operated from the conductor's stand. On each side of the exit well are pipe rails and stanchions which extend from the floor to the deck sill. A curved pipe-rail stand was also provided on which to mount the fare box.

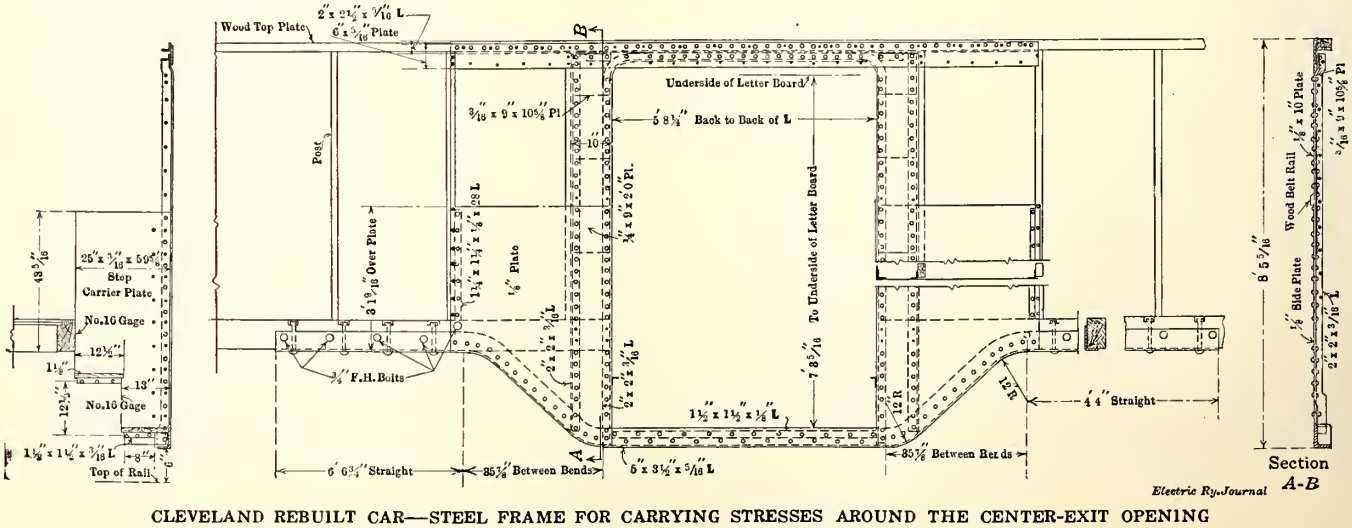
Practically the same steel sections around the center-exit opening were employed in the remodeled cars as were designed for the new front-entrance center-exit cars which were built by the Kuhlman Car Company. The design of these sections was based on mathematical calculations modified by experience and by the exigencies encountered in applying them to the two types of remodeled cars. The design of the panel posts on each side of the door opening was maintained practically the same as that used in the new cars. In connection with the cars with the concave sides, however, it was necessary to place the steel sheathing on each side of the opening, inside of the outside sheathing line. This permitted the installation to be made without distorting the plates to conform to the side of the car. The concave side was then constructed outside of this plate, the general appearance of the old car being thus retained.

The location of the exit door opening was also selected to conform, in the best practical way, to the sizes of the windows. These were balanced against the width of the door opening, and the door posts were also made of a width to correspond. The width of the door opening was determined by the number of folding doors which it was practical to use without their projecting too far beyond the car body line when they were in the open position. It was also desirable, of course, to obtain a maximum door opening at this point, and this, too, was a factor borne in mind in arriving at the 5-ft. 6⅝-in. exit opening.

As mentioned earlier in the article, the rear vestibule was cut away and the body underframing extended to give the remodeled car an over-all length of 49 ft. 4½ in. The change added space to the main car body sufficient for seven built-in seats around the rear end. In rebuilding this end of the car, the body corner posts were shifted 3 ft. from their original positions in the old car, and new window posts were substituted for them. The extension of the underframe was reinforced along the side sills and the buffer with a ⅜-in. x 3½-in. x 6-in. angle, and the ½-in. x 3½-in. x 5-in. angle center sills were spliced and extended to frame into this buffer. Wooden cross-bearers 3½-in. x 6¾-in. in size, in turn, frame into these center and side sills to complete the floor framing. The changes at this end of the car body also necessitated rebuilding the roof and extending the monitor deck. In one of the accompanying illustrations the new work on the old car-body framing is shown.

REMODELING PROCEDURE

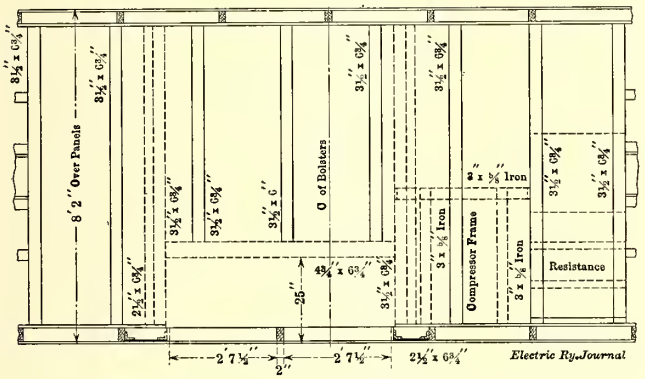
The reconstruction of fifty double-end cars into the front-entrance, center-exit type was no small task to be undertaken by a mechanical department that was already busily engaged in maintaining and repairing more than 1500 cars in the regular service. In order to



CLEVELAND REBUILT CAR—STEEL FRAME FOR CARRYING STRESSES AROUND THE CENTER-EXIT OPENING

do this work and at the same time not disorganize the forces handling the regular repair work, the remodeling of this equipment was "sandwiched in," so to speak, and no fixed schedule of reconstruction was adopted. Cars were taken from regular service and brought into the shop two at a time, so that a small force of men could be employed continuously in the rebuilding operations. Upon the arrival of the car at the shop two laborers removed the rear vestibule, the rear bulkhead, the seats, the fare-box stand, etc. While this was being done, carpenters were cutting out the side wall of the car preparatory to the insertion of the steel center section which supports and incloses the center-exit steps and doors. These carpenters also reconstructed the heavy car framing and relaid the floors, following which the change in the front-door opening, which includes the installation of new doors and steps, was undertaken.

After the completion of the wood framing around the center-exit opening and well, the steel center section, which was partially assembled in the machine shop, was fitted and bolted in place. The variation in dimensions, which is certain to be present in old cars, made it more practical to set up the large ⅛-in. panels on each side of the doorway and mark them in place, after which they were cut and drilled to suit the steel frame. The steel bumper channels and angles were also assembled on the car and bolted to the wooden underframing. This latter operation was carried on simul-



CLEVELAND REBUILT CAR—FLOOR FRAMING AT CENTER OF CAR—DOTTED LINES SHOW THE NEW FLOOR MEMBERS

taneously with the construction of the rear-end framing. When these operations were completed, the work of remodeling was brought up to the point where the car-wiring force could proceed with the installation of the Cleveland Railway's standard large unit lighting system. Nichols-Lintern signals were also installed on the rear dash of the car, and the push-button wiring system was repaired and extended.

After the wiring and carpenter work were completed the interior finishers installed the center-exit doors, the interior finish and panels, repaired the headlining and did all the general interior work. The old heater ducts were removed and the Cleveland Railway's standard type of duct installed. The car was then thoroughly repainted outside and revarnished inside to conform with the general color scheme used by the Cleveland Railway.

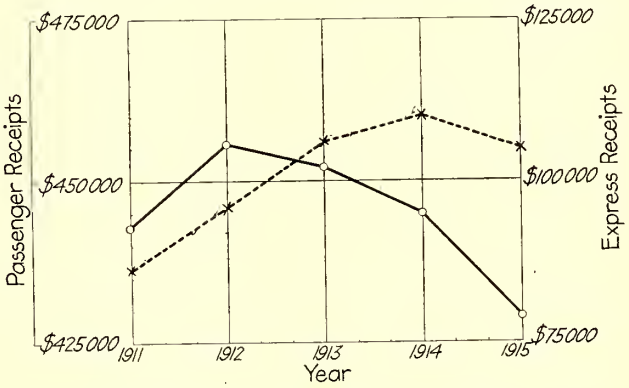
Hunter illuminated signs were also applied to the front vestibule, and a special type of side sign was installed at the belt rail on the step side and at both ends of the car body. The final stages of the reconstruction included the reinstallation of the air compressor and air piping, the application of the grid resistances and the adjustment of the brake pull-rods and levers. While the body was undergoing the various remodeling stages, the trucks also were overhauled so that when the car was restored to service it was practically as good as new.

The time required for the various reconstruction operations outlined in the foregoing was about six weeks. As indicated on the schedule showing the number of men employed on the various stages of remodeling and the sequence of their operations, the complete force at any one time was relatively small.

Two laborers on tearing down, one inside, one outside.
Two men to build rear end.
Two men to tear center and lay floor.
One man to build front.
Three men on iron work.
One man on wiring for lights.
Four men to finish inside.
Two men on door connections.
Two men on roof and general outside.
Two men to place frame and set doors.
Two men on painting.
Two men on equipment, motors, etc.
Two men on brakes.
Two men on pipe fitting.
Two men on truck work.

Five Years' Growth of Freight and Passenger Receipts

THE relative earnings from freight and passenger business on a 100-mile interurban system operating branch lines out of a large city into contiguous territory are shown on the accompanying chart. Considering the year 1915 as abnormal, the relative merits of the two classes of traffic are clearly indicated. While the freight earnings are from a strictly interurban express and milk business, they show a uniform increase from 1911 until 1914, whereas the passenger business showed a marked increase up to 1912, but since that time has



Solid line, passengers; dotted line, express and milk

CHART SHOWING GROWTH OF FREIGHT AND PASSENGER RECEIPTS

been gradually falling off. During the abnormal business conditions existing in 1915, both the earnings from freight and passenger traffic showed a decrease of approximately 6 per cent from the maximum gross earnings for any one year to the minimum. On the other hand, for the entire five-year period, earnings from passenger traffic decreased 3 per cent and earnings from freight traffic increased 19 per cent. The total increase in freight traffic from 1911 until the close of 1914 was 25 per cent. In other words, this chart brings out quite clearly the stability of freight traffic and, at the same time, the possibility of increasing earnings by stimulating this class of traffic. In the instance cited it is believed that if the company had been handling a general freight business instead of a strictly express business, a greater increase would have resulted, and the per cent of decrease, even during the abnormal conditions existing in 1915, would not have been as great.

According to estimates which have been prepared since the new year, the San Francisco-Oakland Terminal Railways suffered a loss during the calendar year of 1915 of $350,000, attributed to the competition of jitney buses. During December the loss on this account amounted to $1,200 a day.

Railway Military Preparedness*

Dependence of Military Operations on Facilities Afforded by Steam and Electric Roads—Proposed Military Transportation Commission and Its Duties—Assistance Required of Railway Officials

By LIEUT.-COL. CHAUNCEY B. BAKER, Q. C. U. S. A.

IN any plan looking to the employment of the resources of our country in the general scheme of national defence, the transportation facilities take first place. Upon the prompt and methodical transfer of men, munitions and supplies depends the first principle of military success—to be first on the ground to be contested with superior forces and armament. It is needless to point out the part which railways have played in all wars from the Crimean to the present titanic struggle in Europe. During the early part of the civil war, the railway service, though promptly performed, suffered from the complaints and rivalry of different corporations and from the want of a uniform basis of compensation. A tariff was arranged in 1862 for military transportation which was sufficient to pay the expenses of the roads and some profit besides, though the rates were below those received for ordinary business. In almost all cases the service was performed with promptness and efficiency.

The railways of Great Britain correspond more nearly in methods of ownership and operation to those of the United States than those of any other countries involved in the present war. These are and will continue to be operated by their own officials and employees. On Aug. 4, 1914, the War Office published a declaration which provided for taking in charge the management of all railways in Great Britain. Its powers are exercised by an extensive committee composed of managing directors. This committee was selected from the officials of the railroads. Such restrictions as were necessary were placed upon commercial traffic, and these were removed as rapidly as practicable. In reality, there is no military organization of the railways in Great Britain. The roads are placed at the disposal of the government, but are left in the hands of those most familiar with administration and operation. The central committee of managers serves as an intermediary between the War Department and the railway systems. It assures unity of direction and controls the execution of the service.

To arrange for the settlement of accounts, a basis was agreed upon between the government and the railroads to the effect that the latter should receive in compensation the difference between their net income during the period of the year preceding the war and the same period during the operations of the war. Lately this plan has been slightly modified by using the average of the three-year period before the war as a basis of comparison.

In France, between Aug. 2 and Aug. 5, 1914, more than 3000 trains ran over the Paris, Lyons and Mediterranean lines and nearly 1500 over the Orleans company's lines. On Aug. 5, though the mobilization was not completed, the process of concentration was begun to convey the troops from their mobilization depots to the front. From this date to Aug. 19, more than 4000 trains were run on the Eastern Railway alone, the maximum number per day being 395. The concentration necessitated the running of nearly 2000 military trains composed of 57,000 cars over the Orleans company's lines. These trains carried 600,000 officers and men, 144,000 horses and 40,000 carriages and guns. From more than one regulating station 200 trains per day were dispatched, an average of more than one every eight minutes. Army corps, active and reserve, were thus sent to the front in twenty days. In addition, the railway lines had to effect the transportation of the territorial troops, which in infantry alone, amounted to 145 regiments. All this transportation was carried out in great order and without any particular difficulty.

TRANSPORTATION REQUIREMENTS OF UNITED STATES FIELD ARMY

Table I shows the equipment required to move the various units in our service. For the movement of a field army (about 82,000 men) consisting of three infantry divisions, one cavalry division and a brigade of field army troops would require 6229 cars, made up into 366 trains. To move our field army would require 0.7 per cent of the locomotives in operation on American lines, 4.2 per cent of the passenger equipment, and 0.2 per cent of the freight equipment.

TABLE I—RAILROAD EQUIPMENT REQUIRED TO MOVE VARIOUS ORGANIZATIONS OF THE ARMY AT WAR STRENGTH

	Personnel					Railroad Equipment Required						
	Officers	Men	Animals	Vehicles	Guns (Complete)	Pullman	Coaches	Baggage	Box	Stock	Flat or Gondola	Total Cars
Infantry regiment	55	1,890	177	22	..	5	43	5	15	9	8	85
Cavalry regiment	54	1,284	1,438	26	..	8	28	8	25	72	9	150
Artillery regiment, light	45	1,170	1,157	32	24	9	23	9	25	58	46	170
Artillery regiment, heavy	45	1,173	1,571	35	24	10	24	10	25	78	47	194
Artillery regiment, mountain	45	1,150	1,229	..	24	7	23	7	30	61	..	124
Engineers, pioneer batt.	16	502	165	12	..	2	12	2	10	8	4	38
Signal corps field	9	171	206	15	..	2	4	2	5	10	5	28
[1]Infantry division	736	22,285	7,660	775	48	76	487	76	245	383	301	1,568
[2]Cavalry division	458	10,259	12,231	414	24	63	218	63	210	611	137	1,302

[1]Comprising three brigades infantry, one regiment cavalry, one brigade of light artillery, one pioneer engineer and one field battery signal corps and wagon trains.
[2]Comprising three brigades cavalry, one regiment horse artillery, one pioneer engineer and one battery signal troop and necessary wagon train.

To move a field army would require 2115 passenger, 385 baggage, 1055 box, 1899 stock and 775 flat cars, a total of 6229 cars.

Table II on page 349 shows the gross weights of supplies required for one infantry division and one field army for thirty days.

PROPOSED MILITARY TRANSPORTATION COMMISSION

It is believed that the organization of a military transportation commission composed principally of officials of the various steam and electric railway associations would be of great value to the office of the Quartermaster General in reaching conclusions in regard to rail transportation. This bureau should include in its membership not only representatives of the operating departments of the railroads, steam and electric, but at least one representative each of the freight traffic department, accounting and construction departments. Nominations for members of the committee representing the operating department and the construction de-

*Abstract of address at meeting of Massachusetts Street Railway Association, Boston, Feb. 9, 1916.

TABLE II—SHOWING GROSS WEIGHTS OF SUPPLIES REQUIRED FOR ONE DIVISION (INFANTRY) AND ONE FIELD ARMY FOR THIRTY DAYS.

One Division		Pounds
Clothing and equipage		300,960
General quartermasters' supplies		448,440
Candy and tobacco		4,242
Rations		3,292,800
Forage:		
Hay		3,222,240
Oats		2,472,210
Ordnance supplies:		
Other than ammunition	21,666	
Ammunition	93,500	
		115,166
Medical supplies		7,924
Signal supplies		120,000
Engineers' supplies		162,000
Total		10,145,982
One Field Army		
Clothing and equipage		1,134,017
General quartermaster's supplies		1,689,722
Candy and tobacco		15,984
Rations		12,531,523
Forage:		
Hay		17,516,100
Oats		13,641,730
Ordnance supplies:		
Other than ammunition	$1,637	
Ammunition	352,308	
		433,945
Medical supplies		29,858
Signal supplies		452,160
Engineers' supplies		610,416
Total		48,055,455

partment should be made by one of the general associations; of the freight traffic department, by the American Association of Freight Traffic Officers; of the passengers department, by the American Association of General Passenger and Ticket Agents, and of the accounting department by the Association of American Railway Accounting Officers. These nominations, it is thought, should be subject to the approval of the Secretary of War. Whatever new legislation may be necessary for co-ordination should apply equally to the steam and electric roads.

The quartermaster corps, under the law, deals with all features of the military service in connection with rail transportation, with the exception of military railways in the field of operations, which are assigned to the corps of engineers. It is believed that the commission proposed could operate effectively and intelligently and accomplish satisfactory results by co-ordination with the transportation division of the Quartermaster General's office.

SCOPE OF THE COMMISSION'S WORK

Many difficulties that obtain in connection with the transportation of troops and supplies generally have occurred through the lack of co-ordination of the functions of the railways themselves in military movements. Solicitors of the railways, passenger and freight, by every means possible try to procure business over their particular roads, often to the detriment of the efficiency of the movement of troops and supplies. General, freight and passenger agents often fail to co-ordinate their labors, and all of them at times fail to co-operate with the operating branch of the roads.

It frequently happens that the facilities for loading and unloading at points of entraining or detraining are wholly insufficient. Even when the physical features are satisfactorily accomplished, the matter of preparing and accomplishing bills of lading and settlement of accounts is burdensome. It is believed that a railway commission would effectively find a solution for many of these difficulties. With that object in view the Quartermaster General's office has endeavored to come in touch with the various railway associations, with a view to outlining some effective plan.

When war was threatened between Mexico and the United States, the American Railway Association agreed to appoint a committee that would assist the department in the movement of troops and supplies, and it is believed that such an arrangement would have been in a measure effective.

Sec. 6 of the act to regulate commerce (34 Stat. 587) provides that in time of war or threatened war, preference shall, upon demand of the President of the United States, be given over all other traffic, to the transportation of troops and munitions. Primarily the military operation of railways will be confined to the lines of communication, which, under the field service regulations, will be built, repaired and operated by the engineer corps. In addition to the construction and operation of military railroads, strictly speaking, there are many features in the operation of railroads back of the base that can be and should be definitely provided for in time of peace.

1. A distinct understanding between the War Department and all the carriers should be reached concerning the tariffs for military traffic, including freight, passenger, baggage and animals. This should be so established as to render the invitation of bids unnecessary and should have the approval of the government and the roads in advance of the outbreak of war. Separate tariffs should be provided for time of peace and time of war. These tariffs should cover every class of trains, including hospital trains, service and armored trains, and should have the simplest possible basis for their building. Preferably a mileage basis should be used.

The proper officers of the War Department have been in conference with the principal passenger associations in the country, and the department feels that so far as steam railroad passenger traffic is concerned, it is on the point of effecting an agreement that will include all the United States except New England. It is believed, however, that with the appointment of a board as proposed progress would be much more rapid. A commission acting for the electric lines in any community should have authority to provide rates of compensation and to enter into negotiations fixing tariffs for military business of every character.

2. As a result of any agreement as above outlined the simplification of the settlement of railway accounts will naturally follow. Much of the difficulty now experienced is due to disagreements as to the interpretation of tariffs and classifications, and a clear and specific basis, simplified as proposed, would obviate all controversy.

3. The physical operation of the railroads in carrying troops and supplies to mobilization, concentration and embarkation points. The necessity of co-ordinating departments is too apparent for argument, as is a complete understanding between the military and railway authorities.

The proposed commission should have a representation from the operating branch of the railroads who would have authority to represent the roads in all features pertaining to operation; in effecting rules and preparing plans for movements of troops and supplies to any point, the desirability of withdrawing empties over neighboring lines so as to avoid congestion, all features of the operation of roads, and providing the rolling stock in advance so far as possible.

The quartermaster corps has effected an arrangement agreeable to the American Railway Master Car Builders' Association which provides for certain placard markings on the cars which will indicate the character of the stores, the bureau to which they belong and particular class of stores of the various bureaus. These marks give practically the full information of the bill of lading. The value of this is readily understood by those who had experience in this class of work in 1898.

4. A definite arrangement should be made with the proper railway officials in regard to the provision of facilities at entraining points, with spurs, switches, side tracks, extra lines, loops, platforms and all facilities for handling troops and supplies on reaching such points.

5. Collection and preservation of all information of military value concerning railroads, street railways, buildings, telegraph lines, equipment, docks, yards and appurtenances of the railway systems of the United States. The quartermaster corps has gathered a quantity of information along these lines, including data on terminal facilities, various classes of sleeping cars, kitchen cars, baggage cars, freight equipment, engines, etc., and has prepared schedules from military stations to points of mobilization, concentration and embarkation.

6. It is considered desirable to provide a reserve corps for the quartermaster corps to establish the relations outlined between the railroads and the army. This corps should include a large number of railroad officials and employees in all branches of railway service, including construction and operating branches, traffic departments and the accounting branch. Such a reserve corps could be commissioned into the service and called immediately at the time of mobilization, and would be engaged in directing the movement of bodies of troops and war supplies and all the functions pertaining to the movement of troops and supplies by rail. It would thus form a link between the army and the railroads and electric lines. If the suggestion of such a reserve is favorably received, it is believed that the nominations for positions in such corps should be made by the various railway associations and organizations, after filling such requirements as the Secretary of War may consider necessary.

General. The plan proposed requires no new or radical legislation. The object can be attained through the methods outlined with the assistance of the railway authorities and with practically no new legislation except that providing a reserve corps. The other features of this plan could be carried out without introducing the feature of the reserve corps.

The operation of military and commercial trains is not essentially different. The main difference consists in the provisions of entraining and detraining. The details of instructions, so far as military requirements are concerned, should be generally along the lines required of the officers and employees of the quartermaster corps handling the details of transportation. In matters of construction and operation the same general methods would be effective as in commercial work.

As the result of personal experience it can be said that the chief difficulties are due to a lack of understanding and in no instance to an unwillingness to respond promptly to the requirements of the military service. It is believed that the reserve here suggested, to be utilized in the capacity of auxiliary officers, would effectively co-ordinate the operations of the railways and the military establishment.

Utilization of Sea Coast Trolleys

The author referred appreciatively to the article in the Electric Railway Journal of Nov. 20, 1915, in which the main ways in which the trolley systems of the country can be utilized were concisely covered. It was pointed out that these lines can be utilized in handling men, supplies and munitions, in mobilization, in concentration and in strategic manoeuver. These lines from Maine to Virginia touch the coast at intervals every few miles. Their strategic advantages should be carefully studied and the practicability of utilizing armored cars, carrying guns, howitzers and machine guns should be carefully examined by those familiar with the problems of ordnance, engineering and coast defence. It is believed that were the American Electric Railway Association or some other general association, as suggested by General Bancroft, to propose to the War Department the willingness of the roads to assist in co-ordinating their work for defence, the way would open toward a complete understanding which would result in the full use of all the facilities afforded by the electric lines.

Chicago Surface Lines Safety Calendar

Distribution of the Calendar in the Public School Expected to Reduce Street Accidents

EVERY school room in the city of Chicago is to be presented with one of the attractive safety calendars just issued by the Chicago Surface Lines. This arrangement has been made by the railway company with the superintendent of the public schools, and it is hoped that the illustration in colors and the verse contained on the calendar will prove of educational value to the school children. In some of the schools the verse has already been set to music and other verses added so that they may be sung. The object of the jingle was to appeal particularly to the children, and it is believed that, together with the picture, it will prove of value in reducing accidents. The picture is a special painting prepared and published by the Manz Engraving Company, Chicago, and copyrighted by the Chicago Surface Lines. Arrangements may be made for reprints of the illustration and the verse upon application to the railway company and by payment of a nominal royalty. The calendar is reproduced in halftone in the accompanying illustration.

CHICAGO SURFACE LINES SAFETY CALENDAR

The London (England) Electric Railway is equipping many of the passenger lifts at its stations with a semi-automatic control. From the beginning of their installation all these lifts had limit switches actuated by the movement of the cars to bring them automatically to rest at the landing. Furthermore, the attendants in the elevator could throw the gate-controlling lever to the open position while the car was moving and the gates would then open of themselves by pneumatic power when the landing was reached. The elaboration of this system that is now being used consists of the control of the elevator and gate from the landings, no attendants traveling with the lift.

Traffic Circulars

The Author Describes the Art of Planning a Trolley Folder That Will Attract Travel—Suggestions Are Made on Methods of Securing Efficiency in Distribution—Some Data on Cost Are Given

By FINLEY H. GREENE
Secretary the Matthews-Northrup Works, Buffalo, N. Y.

SOMETIMES it seems as though an operating official is too close to the details of managing a trolley road successfully to plan and produce a folder. In manufacturing lines they say the best way to compile a catalog is to take all the inquiries the customers have sent in for a year and make the new book answer them. Probably the traveling public could suggest the best kind of folder for the electric road. Let us see how they can be got to work on the proposition.

We shall assume, to start, that the road goes to a place of some importance and that it is well equipped and the cars are run at frequent intervals. The problem now is how to say in the most effective and efficient way: "Come on, people, and ride on our nice cars; we are running them, anyway, and may as well have them filled."

The commercial traveler steps up to the folder rack in a hotel to look the folders over. He wants to go to Auburn or Sidney or Kokomo, and make a stop or two en route. He knows where he wants to go, but he doesn't know the name of your road, so (Rule One), display the names of the important towns at top of front cover and put the name of the road at the bottom. The roads on the Pacific Coast seem to do this more than their Eastern brothers, but this may be occasioned by the heavy tourist travel out there, and also because the Peck-Juda people usually have about three full-size racks in each hotel, where we have only one in the Eastern section of the country.

The page size should be 4 in. x 9 in. (Rule Two), so the folder will stick up above the crossbars of the folder racks and fit the pocket at the same time. If the plan of distribution includes folder racks in the cars, they can just as well be made to accommodate a 4-in. x 9-in. size of folder as any other.

Folders of this kind are issued primarily to furnish the time of all cars to and from all stations, but it is using space to fine advantage, if available, to devote a page or two to cuts and write-ups of the prosperous cities reached and the attractive resorts and scenery en route. A plan successfully followed for years by the Cleveland, Painesville & Eastern Railway was to have the two-page title in colors taken from the company's general descriptive folder, and run on the time-table forms by the color printer who handled the big folder as well. Then the local printer later ran in the time-table changes, using one color only. There was no space for type talk about the scenery along the road, but the pictures incorporated into the title pages in color gave the traveler a good hint at what to expect. Handled in this way, an attractive time-table folder in colors on the two outside pages cost the company practically no more than smaller lots of plain black time folders, because the forms had to be run in large lots, and, of

TRAFFIC CIRCULARS—TYPICAL MAP FROM TRAFFIC CIRCULAR

TRAFFIC CIRCLARS—THREE EFFECTIVE FOLDERS

course, the color plates had already been made for the general pictorial folder.

The road mentioned operates along Lake Erie from Cleveland to Ashtabula and reaches many fine resorts, so the two-page title was designed and engraved to carry the company's station at Willoughby, the Lake County Court House at Painesville and the ore docks at Ashtabula. Then a bird's-eye map, in colors, of the whole operating territory was printed to cover eight pages, sheet size 32 in. x 9 in. The remaining six pages were taken up with black halftones and type matter. This folder was used in selling property and locating cottages along the shore, securing pictures, etc.

As colors on a folder are always more effective than plain black and white, their use becomes simply a question of expense. In general, it might be said that one color usually is employed for time-table editions but that colors are required in pictorial folders to make them so attractive that they will force themselves onto the attention of people who don't know they want to go where you want them to go. The difference is that a time-table is a utilitarian thing, that tells a man when he can go. He's more than half sold on the proposition to start with. But here's this beautiful countryside and the babbling brook, and the cool lake nestling in the woods. The railway manager knows about them, and his problem is to describe them as befits their beauty so the people in town will come off their porches and ride out along the line to see and enjoy.

The size and general form of the folder can be gaged by the shape of the territory covered. If the line is straightaway, like the C., P. & E. from Cleveland to Ashtabula, that's a long, narrow folder, 32 in. x 9 in. Or if the field squares up pretty well, make it a square sheet 16 in. wide and 18 in. deep, so it will fold to 4 in. x 9 in.

Without exception, there should be a map. People want to know where they're going, and their ignorance of locations, even near home, may be appalling to the average railway man. But he should remember that locations are a part of his business, and the traveler may have arrived from Russia two years ago and spent the interim sewing in a New York loft. How many people can sketch the relative locations of Albany, Troy, Schenectady, or Washington, Baltimore, Philadelphia?

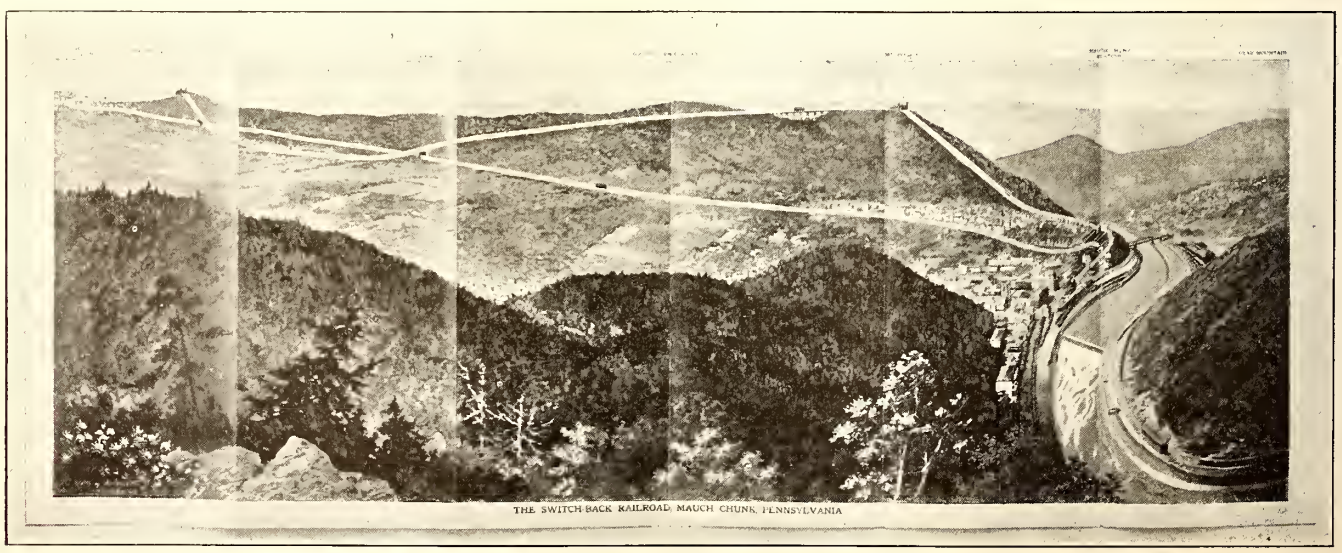
And while a patron can see where he is going with a black map on a time-table, it is advisable to picture the country in colors on the map and in the general folder. A clever artist will make a bird's-eye view of the territory that will bring out all the natural beauties in four colors. Usually, on a map, we find black used for the foundation plate, which carries all names of places and connecting lines; blue for water, buff or olive for a tint over the whole surface of the land, then using red for the line of the road issuing the edition. Beautiful examples of color maps of this kind are those of the Duluth Street Railway, Spokane & Inland Empire, New York State Railways, Schenectady Railway Company and Ohio Electric Railway.

It is a serious mistake (Rule Three) to print time on the pages of a general folder if it is issued in large quantities. In case the time changes, the beautiful folder is wasted. Some years ago, an official in Illinois led me into the stationery storage room and showed a boy at work trucking folders to the furnace. "Never again for me," he said; "the folders were doing good work, and I want more of them at once, but I shall put pictures into the time pages and issue a time-table separately."

When a color map is engraved, the black plate should be made so it can be run without the colors in the time-table editions.

Efficiency in Distribution

We know how time-tables are displayed in folder racks at all points along the line and especially at junction



TRAFFIC CIRCULARS—BIRD'S-EYE VIEW OF MAUCH CHUNK RAILWAY FROM TRAFFIC CIRCULAR

points and terminals, but the suggestion is made that this distribution should not stop at that. Time-tables should be displayed along the connections and at points beyond terminals. For instance, a road operating out of Buffalo should have time-tables in the racks at Erie, Dunkirk, Westfield, Jamestown, Niagara Falls, Hamilton, Tonawanda and Lockport.

It is somewhat more difficult to distribute pictorial editions so that each copy will count. Every Sunday school, business house and fraternal society likely to go on a picnic should receive a copy by mail. One day a week, Friday usually, it is advisable to run a reading notice in the newspapers calling attention to the trip and offering the folder. Display of expensive pictorial editions in the cars has usually been found too expensive, because it does not get the copies into the homes where the trips can be planned, and it often is pointed out as waste circulation to give a man a folder when he is already taking the trip. One trolley official has analyzed his distribution of folders to a fine point. He mails new time-tables to the sales managers of all large concerns in his cities and to all their traveling men whose names he has, while the pictorial folder goes out each spring to another officer of the same concerns, but it has been learned by personal calls that this official has charge of the company picnic. This same trolley official has found that it pays him, just before the Fourth of July each year, to distribute his pictorial folder in the best residential section of the city. He takes care to reduce waste by having his own men do this work. He instructs them to ring the bell, and when it is answered say just ten words as they hand in a folder: "Lake ——— (naming the resort) is a fine place to spend the Fourth." Of course, he gets an enormous traffic on the holiday. He might get most of it anyway, but he figures he has the public started, going to his resort, and his experience and records prove that they keep going all summer. Folders are mailed out of town on receipt of 4 cents in stamps.

Something on Cost

Now, this article would not be complete without a few words about the cost of a suitable folder. First comes the map. It is advisable to have a good one stamped in wax, with all names clean and clear. People's eyes are trained to read newspaper type, and maps are always better when all names are set up in type and punched into a wax pattern. It is true that this process is more expensive to start with than a copy drawn by hand on tracing cloth and photoengraved onto zinc, but the names drawn by hand often vary in size and style and become hard to read when reduced into the printing plate. The cost of a map should be considered separately from the printing price of the folder—say $150 for a black map and $350 if in four colors. Another advantage of the wax map is that no drawing is required. The engraver prepares his own rough copy and then cuts lines with a graving tool and stamps the names with type.

The next cost to consider in issuing a time-table is setting the type. This usually is expense to be incurred but once, for most printers are willing to keep it standing in the forms ready to print, so the type may be used again for subsequent editions simply by correction of the items affected by time changes. For the pictorial folder there is no time to set, but we have instead the halftones to engrave for illustrations and the descriptive text to compose, but this usually is straight reading matter than can be set by machine. After the map is made and type set, the time-table usually can be run in a 10,000 lot for $50 to $100, depending on the number of pages. The color folder is, of course, more expensive.

The question often is asked whether it is better for a road operating to points of historic interest to name them right in the map or run reference numbers there and index the names in the margin. Our experience shows that historic points mean as much traffic as some cities and should have as prominent a showing on the map.

"Saturday Evening Post" Answered*

A Criticism of One of Its Recent Editorials Telling What "Good Service" Really Is

BY JOHN A. BEELER, DENVER, COL.

CITY TRAVEL

Seems to us we have not dropped into any American city any time the last ten years without finding it in more or less of a throe over local transportation. Occasionally it is jitneys, but usually it is the street cars. It might help some if a few basic facts were generally understood.

In the first place, there is no such thing as a good city street car service. There never has been and probably there never will be. Perhaps the nearest approach to it is in Washington; but in Washington there are really no rush hours. The only rush that occurs in Washington is the rush for the pie counter when a new administration comes in, every four or eight years.

Elsewhere the typical situation is that a majority of those who ride at all want to ride in certain limited periods, morning and evening. If facilities were provided to carry them all comfortably, with a seat for every passenger, those facilities would lie idle the greater part of the day and bond interest would be in default. Obviously, there is no good street car service unless there is always a seat for every passenger.

That is like looking for a dodo or any other unobtainable object. The practicable goal is, not a good service but one that is least bad. For a good service there must be other means of transit than the standardized 5-cent surface, elevated or subway scheme, because if those schemes provide equipment to carry the rush-hour crowds in comfort they will not earn a return on their investment. If they do earn a return on their investment they will not carry the rush-hour crowds in comfort.

The 10-cent motor buses do not take very extensively, but the time is almost at hand when everybody with 10 cents will have an automobile. That may prove the solution.—*From "Saturday Evening Post," Jan. 8, 1916.*

THE above editorial appeared in the *Saturday Evening Post* of Jan. 8 this year. Now the *Post* is a real paper and I, being a traction manager for the best part of my life, became deeply interested when I read the sweeping statement that "In the first place there is no such thing as good street car service."

I rubbed my eyes and reread the article, noting especially the definition which in the writer's opinion constituted good service, viz.: "Obviously, there is no good street car service unless there is always a seat for every passenger."

The article then goes on to show the practical impossibility of complying with this requirement, at the same time leaving the thought, probably unintentionally, that there is very little if anything worthy of commendation in traction companies.

Now, even though contrary to the belief of editorial writers generally, traction men have some feeling. True, they may not be the most sensitive people in the world, but to be summarily dismissed, once and for all, bag and baggage, in a single sentence to ignoble condemnation seems like a trial without judge or jury with only the executioner present.

Why not just say "weighed and found wanting"? That would be shorter and more concise. But that would not do, for the subject has not been weighed. If it had, the condemnation would, at least, not have been so sweeping.

In the first place, I want to mention some "basic facts" that should, I believe, underlie good city street car service.

The frequency of the headway, the scope of the system in the territory served, the routeing of the lines, the transfer privileges, the smoothness of the tracks, the character of the rolling stock, the courtesy of the employees, the price charged for the service, etc. Any

*Text (slightly modified) of a letter sent by the author to the *Saturday Evening Post*.

one of the above might rank equally important with the seat requirement if it were not for the fact that they are taken as a matter of course.

Suppose the rule was a seat at all times for every passenger. During certain hours of the day and night probably two-thirds of the present street car service in the United States could be discontinued and yet provide the required seat. True, the present rush-hour service would have to be increased. Possibly a sufficient saving could be effected in the non-rush hours to do this. However, would this really be an improvement? Isn't the frequency and the regularity of the service during eighteen or twenty hours a day a more important factor than "always" a seat for everyone during the rush-hour period?

Nearly every business has its rush period. When a man steps into a popular café he may have to wait for an unoccupied table. At the barber shop he waits for his turn as "next"; in a big store it is sometimes necessary to wait for a clerk. We stand in line at the teller's cage at the bank, at the post-office, at the ticket window, etc.

Now, Mr. Editor, you probably say in answer to this: "Yes, but even after I wait for the car I cannot get a seat." That may be true during the rush hours. But on the other hand, neither do we always get the particular table at the café desired, or the barber preferred, or our favorite salesman, or the best seat in the house. At the best we take our chances after waiting. Why condemn only the street car company and not these things generally.

To maintain a good service during the non-rush hours and also to provide seats for everyone during the rush hours is indeed a very difficult and expensive task, but Denver has practically solved this question, and the great majority of her citizens, if asked, will state emphatically that she enjoys good city street car service in this and in every other respect. As every street railway man knows, seats during the rush hours means not only extra cars, but extra power plants, extra equipment, more substations, more transmission and feed lines, more carhouses, more men—all involving heavier operating expenses and greater overhead charges, including interest, insurance, taxes and depreciation on additional plant and equipment.

By far the greatest problem with most companies is the securing of men to man the cars for the rush hours only. If a company has to pay a whole day's wage for one or two trips, it would, with a 5-cent fare and a free transfer, soon be bankrupt, as the *Post* shows. But great advancement is being made throughout the country, even in this matter of more seats during rush hours, and it may yet be solved without raising the fare during the rush hour in order to encourage travel at other hours, which plan would be unpopular. To-day, in Denver, an average of more than 90 per cent of all passengers carried during rush hours secure seats, except for an average distance of about six blocks. During rush hours we double the seating capacity by attaching large, commodious, light-weight trail cars to the regular motor cars, and on certain lines we more than double it by adding additional trains of this character.

These trail cars are manned with conductors recruited from the Denver University and the various high schools. The hours do not interfere with the studies of the young men, who are thankful for a few hours' work for which they receive the regular wage rate. It makes better men of them, besides assisting many a worthy young man through school and college, and their duties are performed in a manner entirely satisfactory to the company and to its patrons.

About ten years ago I inaugurated this service, gradually increasing it from time to time, until it now covers practically the entire system. It has proved beneficial not only to the young men, but to the regular men by reducing the extra list. It is approved by parents, teachers and the public, and it has enabled the company to solve the rush-hour problem without encountering the minimum wage proposition.

Of course there are badly-managed traction companies, giving poor and inadequate service, but should all traction service be condemned on this account? After all, what industry has made greater strides in advancing health, happiness and prosperity than the trolley by making it possible for those of moderate circumstances to live in the fresh air and sunshine and yet retain their city employment? Philadelphia is an example of marvelous traction development and improvement, which should be a matter of special pride to the *Post*.

Where is there any one thing for which a person can secure as much for his money as from a traction company? I anticipate your answer here. You will say the *Saturday Evening Post*, and it is truly marvelous what you do furnish the reader for 5 cents. You are only enabled to do this, however, by the large revenue received from your valuable advertising pages. Thus, after all, it is advertising which makes it possible for you to furnish your remarkable service. Were the traction companies able to secure a like proportionate gross revenue from advertising they could almost afford to carry patrons free.

The conclusion reached by the editor, that the solution may lie in the fact that when everyone with 10 cents will have an automobile, is not likely to be realized, especially in cities of any importance. Denver, with its broad, smooth streets, has considerable congestion now with only 7000 autos on the streets. If every family owned its own auto some 50,000 machines for the 225,000 people would be required, and the congestion during the rush hour would be intolerable. But how much more so would it be in the larger and more densely populated cities of the East? Every avenue and thoroughfare would be choked for hours. One day's trial would demonstrate the futility of this. The dear old traction car with all of its faults would be welcomed back with outstretched and eager arms, as in Chicago after a day or two cessation of operation on account of the recent strike, or as it was in Denver after the great deluge of snow in December, 1913.

The regrettable thing is that one rarely if ever sees a word of commendation for traction companies, men, or service in any of our great periodicals, when there is so much that could in all fairness be said in their behalf.

Endowment for Fellowship in Electrical Engineering

Under the terms of an endowment made by Clarence Mackay, of New York City, jointly with his mother, Mrs. John W. Mackay, the University of California has established two John W. Mackay, Jr., fellowships in electrical engineering, of an annual value of $600 each. The fellowships are open to all properly qualified university graduates. The object is not to facilitate ordinary engineering or scientific study, but to enable students who have completed a college course to do advanced research work in electrical engineering, with a view to aiding the advance of the application of electricity to scientific and industrial purposes. A form for use in applying for a John W. Mackay, Jr., fellowship in electrical engineering may be obtained from the recorder of the faculties, University of California, Berkeley, Cal.

Traffic Studies in Lafayette, Ind.*

The Author Describes the Results of Recent Street Railway, Private Automobile, Jitney and Pedestrian Traffic Counts on a Loop Line Connecting Two Distinct Districts of a City of 20,000 Inhabitants

By D. D. EWING
Assistant Professor of Electrical Engineering, Purdue University

IN view of the present general interest in transportation and highway engineering problems, it is thought that a brief summary of the data thus far obtained in a traffic study recently made at Lafayette, Ind., may be interesting to electric railway, highway and municipal engineers.

The objects of the study are the determination, in so far as is possible, of (1) the sufficiency of the present street car service; (2) the magnitude of the jitney-bus operations and their effect on the street car service; (3) the character, the volume and the hourly, daily and seasonal variations of the traffic passing over the levee which joins Lafayette and West Lafayette.

This levee carries most of the traffic between the two places. It is new, as the disastrous flood of 1913 destroyed the old one. The paving is wooden block.

According to the 1910 census the population of Lafayette was about 20,000 and that of West Lafayette, 3800. These figures do not include the 2000 students of Purdue University, most of whom reside in West Lafayette during the time the University is in session.

The car traffic observations were made on the Purdue Line of the Lafayette street railway system. This line runs west from the courthouse square in Lafayette, across the Main Street bridge over the Wabash River and the levee above mentioned, along State Street, West Lafayette, to Waldron Street, north on Waldron Street to Seventh Street, east on Seventh and Thornell Streets to Salisbury Street, thence south to State Street again, thus forming a loop which incloses the main campus of Purdue University and a portion of the residence and business sections of West Lafayette. The route, with the main stops properly located as far as scale of distance is concerned, is used as the abscissas of the graphs in Figs. 1 and 2. The route length is 3.04 miles.

Some data on the headway of cars and weather conditions which existed during the time of the autumn observations are given in Table I. The so-called "regular" cars are operated around the loop in both directions, that is, when they arrive at the State Street end of Salisbury Street, instead of going on into Lafayette, the passengers are transferred and the cars turned back around the loop in the opposite direction. As operated the Purdue line is really part of what the street railway company calls its "Purdue-Oakland line." The outbound traffic over the Purdue line, therefore, does not all originate at the courthouse square but some comes from points farther east of the Oakland line. Also as the courthouse square is a transfer point, some passengers are transferred to the Purdue line from other lines. Likewise, the in-bound passengers do not all stop at the courthouse square. The tripper cars start at the courthouse square. They do not run around the loop, however, but are turned back at the Ladies' Hall entrances to the University campus because the traffic beyond this point is light. The tripper car route length is 1.22 miles.

The jitneys usually operate between the courthouse square and Southworth's (see Fig. 1), although occasionally some of them go as far west as do the tripper cars. The jitneys are, therefore, operating in direct competition with the tripper cars, except that some of the tripper car passengers are carried on transfers from other lines, or are transferred to other lines at the courthouse square. Jitney operation is not regulated, although special licenses are required. Most of the jitney cars are Fords. The jitney operators may be divided into three classes: (1) Those who make a regular business out of the work; (2) workmen or others who hang out a "taxi" sign while on their way to or from their regular work, or who operate only during the evening rush-hour periods; (3) farmers who come into town and run their automobiles in jitney service during Saturday afternoons and evenings. By reason of the good paving and the large amount of short-haul traffic, conditions are very favorable for jitney service between Lafayette and West Lafayette.

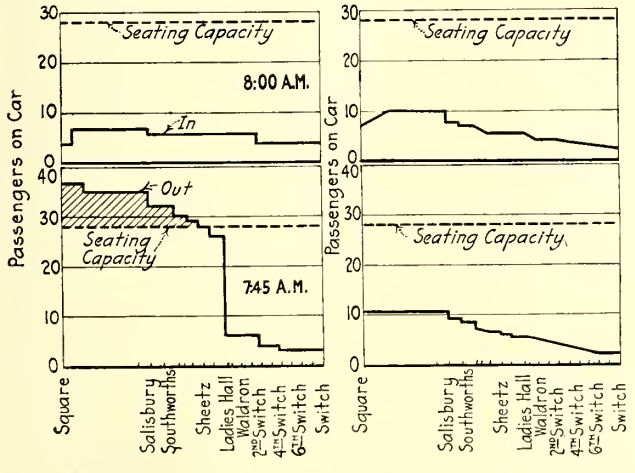
TABLE I—GENERAL DATA

Headway between cars:	
Regular cars	15 min.
Tripper cars	5 min. (7 a. m., 1 p. m., 4 p. m., 10 p. m.)
	7½ min. (remainder operating day)
Seating capacity of cars	28
Seating capacity of jitneys	4
Length of car route	3.04 miles
Length of jitney route	0.85 miles
Time and weather conditions:	
Saturday, Oct. 30, 1915, warm and clear.	
Sunday, Oct. 31, 1915, cool, clear and windy.	
Wednesday, Nov. 10, 1915, cool and clear.	

Various data regarding the street car traffic are given in Tables II and III. The average number of passengers per trip was low, varying between 19.6 and 25.4 per cent of the seating capacity of the cars. The tripper car traffic was much lighter than that carried by the regular cars. On Saturday, the day of heaviest street car traffic, the average number of in-bound passengers per tripper car was only 3.5. The corresponding number for the regular cars was 10.5. It appears, therefore, that the greater part of the street car traffic is long-haul traffic.

As shown in Table III, the percentage of overloads

*Abstract of a paper presented at the annual convention of the Indiana Engineering Society, held in Indianapolis, Feb. 3 to 5.



LAFAYETTE TRAFFIC—FIG. 1—MAXIMUM LOAD "OUT" AND "IN," SATURDAY, OCT. 30, 1915; FIG. 2—DISTRIBUTION GRAPH, AVERAGE FOR SATURDAY, OCT. 30, 1915

Table II—Street Car Traffic Data

Day	Saturday	Sunday	Wednesday
Number of trips, regular car, out	71	64	68
Number of trips, regular car, in	70	62	67
Number of trips, tripper car, out	124	98	99
Number of trips, tripper car, in	126	98	101
Total trips, all cars, out	195	162	167
Total trips, all cars, in	196	160	168
Total trips, all cars, both ways	391	322	335
Total passengers, regular cars, out	968	905	695
Total passengers, regular cars, in	734	769	538
Total passengers, tripper cars, out	371	255	239
Total passengers, tripper cars, in	439	361	349
Total passengers, all cars, out	1,339	1,160	934
Total passengers, all cars, in	1,173	1,130	887
Total passengers, all cars, both ways	2,512	2,290	1,821
Average load per car, both ways	6.4	7.1	5.5
Average load, per cent seating capacity	22.8	25.4	19.6

Table III—Street Car Overload Traffic Data

Day	Saturday	Sunday	Wednesday
No. of overloads, regular cars, out.	5	6	1
No. of overloads, regular cars, in.	3	4	1
No. of overloads, tripper cars, out.	1	1	0
No. of overloads, tripper cars, in.	0	0	0
Number of overloads, both ways.	9	11	2
Overloads, per cent total trips	2.3	3.4	0.56
Time, maximum load, out	7.45 a. m.	5.00 p. m.	7.45 a. m
Time, maximum load, in	2.45 p. m.	9.15 a. m.	7.15 p. m.

was extremely low, for the different days varying between 0.56 and 3.4 per cent. As here used an overload is defined as a load in excess of the seating capacity of the car, no account being taken of the passengers "standing by preference." On days when the University is in session the maximum load "out" is usually carried by the car which leaves the courthouse square at 7.45 a. m. and is due to students living in Lafayette who are on their way to 8 o'clock classes. This overload is not usually excessive and, as shown in Fig. 1, the next "in" trip is light.

The lower graph, Fig. 1, is plotted with passengers in the car as ordinates, and main stopping points, spaced to scale, as abscissas. The number of passengers leaving the car at a given point is indicated by the height of the offset in the graph at that point. The shaded area indicates load in excess of seating capacity. Beyond the point marked "switch" the traffic is very light and the observer changed at this point to an in-bound car. The upper graph shows the load conditions for this "in" trip.

Graphs representing the averages of all "in" and "out" trips for Saturday are shown in Fig. 2. Sloping lines indicate a change of load between main stopping points. In connection with these graphs the various areas are of interest. The area between the seating capacity line and the axis of abscissas is a measure of the total seat mileage per trip. Similarly, the shaded and unshaded areas are, respectively, measures of the empty seat mileage and passenger mileage. The ratio of passenger-miles to total seat-miles for the average "in" trip is only 0.173 and for the average "out" trip, 0.186. The passenger-miles per trip divided by the number of passengers per trip gives the average length of ride, which in this case for the in-bound trip is about 1.6 miles, transfer passengers neglected.

The graphs of Fig. 3 indicate the number of passengers carried by the cars for the various hour periods of the operating day. It will be noted that the "in" peaks and "out" peaks do not come simultaneously.

A careful study of the car traffic data leads to the conclusion that from the standpoint of car seating capacity and schedule, the service is better than the traffic demands justify.

In Table IV are summarized the jitney traffic data. It will be noted that, while the number of passengers per trip only averaged 1.5, the total number of passengers carried by the jitneys is comparable with the number carried by the street cars. In fact, the data show that the jitneys carried about two and one-half times as many passengers as the tripper cars. Apparently the short-haul passengers preferred the jitney as a conveyance. Bad weather conditions would undoubtedly affect this preference. In the present case the preference seemed to be at least partly due to the fact that the

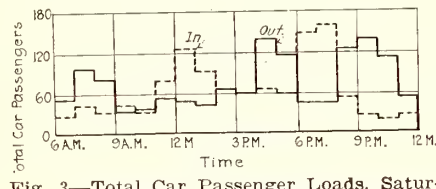


Fig. 3—Total Car Passenger Loads, Saturday, Oct. 30, 1915

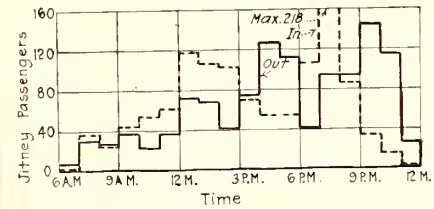


Fig. 4—Jitney Passenger Loads, Saturday, Oct. 30, 1915

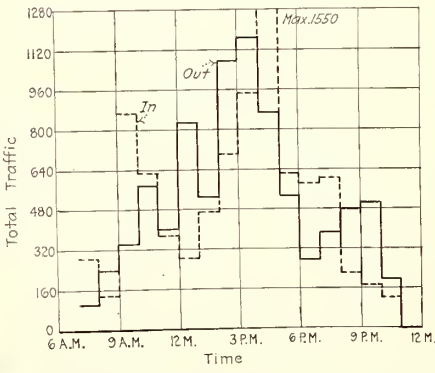


Fig. 7—Total Traffic, Sunday, Oct. 31, 1915

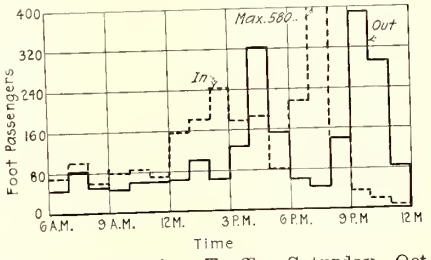


Fig. 5—Pedestrian Traffic, Saturday, Oct. 30, 1915

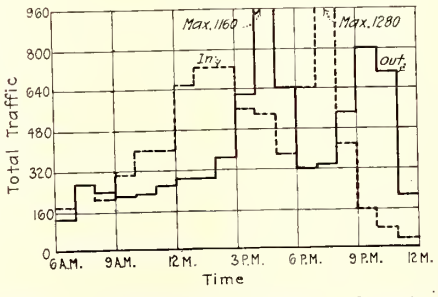


Fig. 6—Total Traffic, Saturday, Oct. 30, 1915

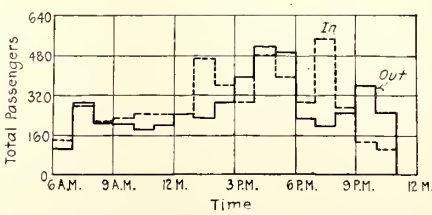


Fig. 8—Total Traffic, Wednesday, Nov. 10, 1915

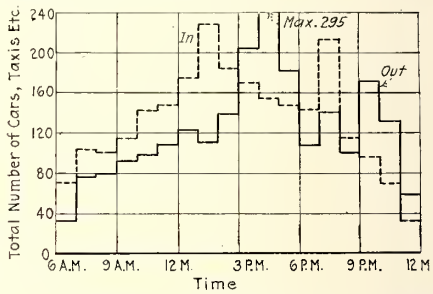


Fig. 9—Cars, Autos, Jitneys and Other Vehicles, In and Out, Saturday, Oct. 30, 1915

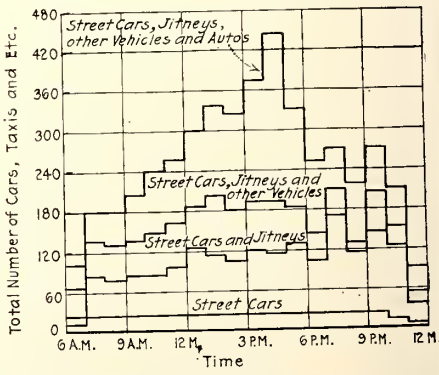


Fig. 10—Cars, Autos, Jitneys and Other Vehicles, Both Ways, Saturday, Oct. 30, 1915

Diagrams Accompanying Traffic Studies in Lafayette, Ind.

TABLE IV—JITNEY TRAFFIC DATA

Day	Saturday	Sunday	Wednesday
No. of jitneys operating (approximate)	23	12	19
Total jitney trips, out	709	380	446
Total jitney trips, in	772	371	453
Total jitney trips, both ways	1,481	751	899
Total jitney passengers, out	1,194	632	697
Total jitney passengers, in	1,180	506	623
Total jitney passengers, both ways	2,374	1,138	1,320
Ave. passengers per jitney, both ways.	1.60	1.52	1.47

TABLE V—JITNEY EARNINGS

Day	Saturday	Sunday	Wednesday
Total jitney earnings	$118.70	$56.90	$66.00
Average earnings per jitney per day	$5.15	$4.83	$3.47
Average number trips per jitney.	64.4	62.6	47.3
Average earnings per trip, cents..	8.0	7.6	7.3
Ave. earnings per jitney-mile, cents	9.4	8.9	8.8

TABLE VI—OTHER TRAFFIC DATA

Day	Sat.	Sun.	Wed.
Number of private autos, out	901	1,165	661
Number of private autos, in	940	1,123	708
Number of private autos, both ways	1,841	2,288	1,369
Number of passengers, private autos, out	2,268	3,801	1,453
Number of passengers, private autos, in	2,433	3,614	1,564
Number of passengers, private autos, both ways	4,701	7,415	3,017
Number of other vehicles, out	451	312	324
Number of other vehicles, in	618	329	376
Number of other vehicles, both ways	1,069	641	700
Number of passengers in other vehicles, out	758	556	621
Number of passengers in other vehicles, in	812	599	489
Number of passengers in other vehicles, both ways	1,570	1,155	1,110
Number of pedestrians, out	2,094	2,474	1,177
Number of pedestrians, in	2,489	2,641	1,370
Number of pedestrians, both ways	4,583	5,115	2,547

time necessary to make the trip was far less with the jitney than with the street cars. This difference of time in favor of the jitney would partly disappear if the speed limit ordinances were rigidly enforced, although by reason of its fewer stops, the jitney, if operated at the same maximum speed as the cars, could be expected to maintain a higher schedule speed.

The financial data of Table V have been computed from data given in Tables I and IV. On account of the fact that the number of jitneys operating varied throughout the day, too much stress should not be placed on the average earnings per jitney per day. The jitney owner working from twelve hours to eighteen hours per day would be likely to earn considerable more than the average. The short-haul makes the jitney earnings per mile rather high even if the average load is small.

The graphs in Fig. 4 show the number of passengers hauled by the jitneys on Saturday during the various hour periods between 6 a. m. and midnight. The graphs in Figs. 5 and 6 give similar data for the foot traffic and total traffic respectively. It will be noted that these graphs are similar in general shape.

In Table VI is given a summary of all traffic other than that previously discussed. "Other vehicles" include all those not specifically classified.

Total traffic graphs giving the number of people passing "in" and "out" during the various hour periods of the other two days are given in Figs. 7 and 8.

Figs. 6, 7 and 8 may be compared for the purpose of studying daily total traffic variations. The graphs show clearly the special traffic conditions encountered on Saturdays and Sundays as compared with those encountered on week days. It may be noted here that the days on which observations were made were average autumn days and the graphs do not contain abnormal peaks. The peaks indicated were, depending on the hour and day, caused by shoppers, amusement seekers, clerks, workmen, churchgoers or other similar waves of traffic.

In Table VII is summarized the total passenger traffic for the three days and for a week, the latter being estimated on the basis that the Wednesday traffic was a fair average for the five week days. The crews of the street cars and jitneys are not included in these figures. Considering the population from which the traffic is derived the magnitude of the grand totals is surprising. A study of the data indicates that on the week basis, about 30 per cent of the traffic was "fare" traffic, and that the street cars carried about 60 per cent of it. One-third of the total passenger traffic was carried by private automobiles.

TABLE VII—PASSENGER TRAFFIC SUMMARY (BOTH WAYS)

Time	Saturday	Sunday	Wednesday	One Week
Street car passengers	2,512	2,290	1,821	13,900
Jitney passengers	2,374	1,138	1,320	10,100
Private auto passengers	4,701	7,415	3,017	27,200
Other vehicle pasengers	1,570	1,155	1,110	8,275
Pedestrians	4,583	5,115	2,547	22,425
Grand total	15,740	17,113	9,815	81,900
Per cent total:				
Carried by street cars	15.9	13.4	18.6	17.0
Carried by jitneys	15.1	6.7	13.5	12.3
Carried by private auto	29.9	43.3	30.6	33.2
Carried by other vehicles	10.0	6.7	11.3	10.1
Pedestrians	29.1	29.9	26.0	27.4

TABLE VIII—VEHICLE TRAFFIC SUMMARY

Time	Saturday	Sunday	Wednesday	Week
Total trips, cars	391	322	335	2,390
Total trips, jitneys	1,481	751	899	6,730
Total trips, private auto	1,841	2,288	1,369	10,970
Total trips, other vehicles	1,069	641	700	5,210
Grand total	4,782	4,002	3,303	25,300
Per cent total:				
Cars	8.2	8.0	10.1	9.4
Jitneys	31.0	18.7	27.2	26.6
Private auto	38.5	57.3	41.5	43.4
Other vehicles	22.3	16.0	21.2	20.6

Studies have been made of the car traffic in previous years, but not for the same time of year. While data from these studies are not directly comparable with the data here presented, the indications are that with the advent of the jitneys and numerous private automobiles the street car traffic decreased about 25 per cent. It is probable that the major part of this loss is due to the loss in the short-haul traffic which the jitneys now carry, but since the jitneys at the time of the observations carried 40 per cent of the "fare" traffic, it is evident that they are traffic makers themselves. By increasing the riding habit of the people they may actually be of some assistance to the street railways in the matter of long-haul traffic.

A study of Figs. 3, 4 and 6 leads to the suggestion that the jitneys may be of still further service to the street railways by acting as "peak absorbers." The lure of possible fares "automatically" increases the number of jitneys operating during the rush-hour periods and thus lowers the demands on the street railway, provided that the increase in jitneys does not too seriously affect car operation by increasing the street traffic congestion. This "automatic peak absorbing" action is of value to the street railways if the peak is of such a nature as to demand the use of extra equipment for a short time, otherwise, instead of being of assistance to the railways the jitneys are the cause of a direct loss in net income. The fact that unregulated jitneys do act as peak absorbers may well be made the basis of objection by the street railway company against increasing rush-hour service, is an important point.

The total Saturday vehicle traffic, "in" and "out," during the various hour periods is plotted against the corresponding periods in Fig. 9. Fig. 10 is a summation of the graphs of Fig. 9, the summation being divided in such a manner as to indicate the distribution of traffic among the various classes. For example, the intercept between the "Street Cars" graph and the "Street Cars + Taxis" graph for a given hour is the number of jitneys passing the observation point during the hour. The total vehicle traffic is summarized in Table VIII.

The percentages are interesting. On the week basis, approximately 70 per cent of the traffic is automobile, 10 per cent street car and 20 per cent horse-drawn vehicles. By comparing the average loads in Tables II and IV it will be seen that for the same passenger traffic handled

four jitneys were required to carry the traffic carried by one car. On the week basis, a little more than one-fourth of the vehicle traffic was due to jitney operation. From the standpoint of paving wear, these figures might well interest the taxpayer, since the street railway pays directly for a strip of the paving, and in proportion to the assessed value of its property helps to pay for the remainder, while jitney owners in communities where there is no jitney regulation pay little or no tax on their equipment and only nominal license fees. As traffic congestion affects the safety and welfare of the public the figures should be of interest to municipal authorities as well as the public at large.

A brief summary follows of some of the more important points brought out by the study, the figures given being approximate:

1. From the standpoints of seating capacity and schedule the street car service was better than the autumn traffic demands justified.
2. The jitneys carried more of the short-haul traffic than did the street cars.
3. The average earnings per jitney-mile were 8.9 cents.
4. One-third of the people going from one town to the other rode in private automobiles and 30 per cent paid fares.
5. Seventy per cent of the vehicle traffic was due to automobiles, 10 per cent to street cars and 20 per cent to horse-drawn vehicles.
6. On the basis of the same number of people carried the jitney vehicle traffic was four times the car vehicle traffic.

The writer desires to express his indebtedness to M. Q. Allen, L. A. Hurley, H. H. Fisher, K. Kline and C. G. Bach, seniors in the School of Electrical Engineering, Purdue University, who collected the original data and plotted the traffic graphs, and to Jack Abbott, superintendent Fort Wayne & Northern Indiana Traction Company.

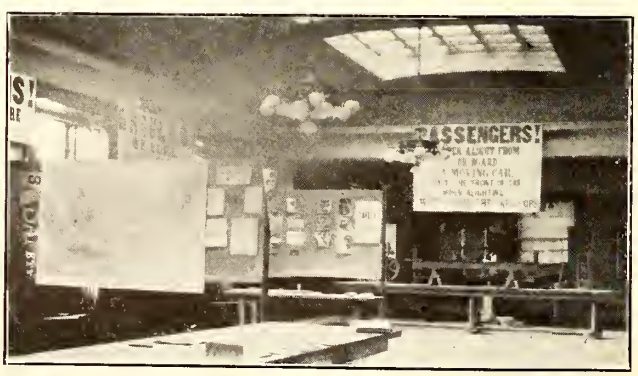
Safety-First Exhibit in New Haven

The New Haven Public Library Arranges Material Donated or Loaned by Manufacturers and Railways Into an Attractive Safety Exhibit

BY KENNETH C. WALKER

Head of the Department of Technology, New Haven Public Library

EARLY in the month of November the New Haven Public Library had an offer from the industrial department of the New Haven Y. M. C. A. of the loan of the United States Steel Corporation's safety exhibit. From this offer plans were laid at once, with the cooperation of A. B. Dickson, industrial secretary of the Y. M. C. A., for an enlarged exhibit. Inasmuch as the safety-first movement largely relates to industries the planning and general direction of the enlarged exhibit



GENERAL VIEW OF NEW HAVEN LIBRARY SAFETY EXHIBIT

SAFETY-FIRST POSTERS AND PHOTOGRAPHS SHOWN IN EXHIBIT

was logically undertaken by the technology department of the library.

As a result of a careful survey of the field and well-directed inquiries, more than forty firms sent material, either as gifts or loans. Among the railway operating and manufacturing companies which exhibited were the following: American Mason Safety Tread Company; Boston Elevated Railway; Brooklyn Rapid Transit Company; Connecticut Company; General Electric Company; Nachod Signal Company; National Safety Council, Chicago, Ill.; New York, New Haven & Hartford Railroad, and Public Service Corporation of New Jersey.

The accompanying illustrations give a general idea of the exhibit. Although much of the material was in the form of photographs and posters, there were many pieces of apparatus. A special demonstration of the pulmotor was one of the features. Already requests for this exhibit have come from different sources, one request suggesting that we make a suitable exhibit to send around to other cities in this State. It is quite likely that such an exhibit will be sent to libraries interested.

To obtain the necessary publicity, the industrial department of the Y. M. C. A. had several hundred invitations printed and mailed to people of importance and distributed freely among the shops and carhouses. The vice-president of the street railway company very kindly consented to our request to have signs placed in vestibule windows worded, "Be Careful, Safety Always, Wait Until This Car Stops," and dashboards bearing the notice, "Look Both Ways Before Crossing the Street, Safety Always."

New Gasoline Line to Operate in the Southwest

A new 43-mile line, known as the California Southern Railroad, is now under construction in the Palo Verde Valley of California from Blythe Junction on the Santa Fé Railroad to Blythe. The line is standard gage and at first will be operated by gasoline, but later will probably be operated by steam. Eighteen miles of the line have already been completed and the company expects to complete 25 miles within the next thirty days and the 43 miles to Blythe by this spring. The line will traverse a rich mining district. The officers of the company are: President, J. M. Neeland, who built the Pan-American Railroad in Mexico and various other lines; vice-president and general manager, C. H. Beggs, formerly vice-president and manager of the Frisco System; secretary and treasurer, J. R. Grant; vice-president, J. H. Borders; general freight and passenger agent and auditor, W. F. Burnett. The general offices of the company are in the Investment Building, Los Angeles, Cal.

Railway Operation in Cleveland*

Efforts Made in Cleveland to Reduce Cost of Operation in Order to Permit Low Fares Under Tayler Ordinance—Details of the Service Rendered and the Actual Cost of Operation Under This Ordinance

By F. W. DOOLITTLE

Consulting Engineer, New York City, and Formerly Director Bureau of Fare Research, American Electric Railway Association

IN 1903 Tom L. Johnson was re-elected Mayor of Cleveland upon a platform pledging the establishment of competing 3-cent fare railways, together with possible municipal ownership, etc. For several years after this date the street railway situation at Cleveland was in a very unsettled condition. Various proposals were made by the company but rejected by the city; others were made by the city and rejected by the company. Franchises were given to newly-organized companies to operate in limited districts at a 3-cent fare; but no real progress was made.

TAYLER ORDINANCE

Finally, however, a settlement was reached through the referendum approval on Feb. 17, 1910, of the Tayler ordinance, granting a renewal of the street railway franchises to the Cleveland Railway and fixing the rates experimentally at 3 cents cash fare and 1 cent for transfer with no rebate.

The features of the plan, as later amended, were briefly these:

1. The city of Cleveland, through its Council and its street railroad commissioner, was to prescribe the service.

2. The revenues were to be credited to an "interest fund" established at $500,000 by an initial payment of that amount by the company.

3. To cover costs of operation, the company was to be allowed: (a) For maintenance, depreciation and renewals 4 cents per car-mile during January, February, March, April, May and December; 5 cents per car-mile during November, and 6 cents per car-mile during June, July, August, September and October; (b) for operation 11.5 cents per car-mile, these allowances being computed on the basis of total car mileage less all yard and house mileages, all mileages made by service equipment and 40 per cent of the trailer car mileage.

4. Interest at 6 per cent was to be calculated on the agreed valuation at the date of the taking effect of the ordinance, plus the value of such additions and betterments as should be agreed upon by the city and the company, less the bonded indebtedness of the company. On the funded debt interest was to be allowed as disbursed. This is and has been 5 per cent.

5. If at any time after a trial period of eight months the interest fund should amount to more than $700,000, the company was forthwith to put into effect the next lower rate of fare, and if the fund should fall below $300,000, the next higher rate of fare. Ten rates were provided for, varying from 4 cents plus 1 cent for transfer to 2 cents with free transfers.

EXPERIENCE UNDER ORDINANCE

The trial period of eight months provided by the ordinance for the operation of a 3-cent fare plus 1 cent for a transfer was completed on Nov. 30, 1910. As the interest fund was approximately $550,000, this rate of fare was continued. In May, 1911, the city asserted that the interest fund exceeded $700,000, and on June 1, 1911, the charge for transfer was discontinued. The straight 3-cent fare continued in effect until Sept. 1, 1914.

During all this period there was a gradual accumulation of deficits in the operating and maintenance funds. At a conference of city and railway officials on Feb. 5, 1913, President Stanley advocated an increase in fare, while the city officials demanded the transfer of the injuries and damage fund and the insurance fund accumulations to the interest fund, thus obviating the necessity for any increase in fare. Subsequent requests for increased allowances for maintenance and operation were refused and a decrease in fare ordered, beginning with May 1, 1913, to 3 cents cash, two tickets for 5 cents and 1-cent charge for transfer. The company thereupon demanded arbitration in accordance with the terms of the ordinance.

ARBITRATION OF 1913

As a result of their investigations the arbitrators found that the allowances for maintenance, depreciation and renewals were inadequate. The overdraft of $323,597 in the fund they decreed should be liquidated in such amounts from time to time as could be transferred from the interest fund without reducing the interest fund below $400,000. They were unable from the evidence, however, to determine satisfactorily whether the prevailing allowances should be increased, and decided that the company should again start with the presumption that the average allowance would provide an adequate maintenance, renewal and depreciation fund, because officers of the company, having long experience, accepted this appropriation in the framing of the measure. The allowances for operation were deemed insufficient. The over-expenditure on Feb. 28, 1913, of $259,592 was taken care of by the transfer on July 31, 1913, of the whole amount from the interest fund, and the board unanimously determined that there should be an increase of 0.6 of a cent per car-mile, making an operating allowance of 12.1 cents per car-mile, effective March 1, 1913.

The accumulated amount of $216,002 in the reserves for injuries and damages and for insurance was credited to interest fund on July 1, 1913, under the finding of the arbitrators, that the practice of the company of maintaining an accident fund, to which was credited currently 0.8 of 1 cent per car-mile and to which were charged all expenditures under this account, could not be justified under the ordinance. A similar finding was made with regard to the insurance fund, so that since that date, March 1, 1913, the company has not maintained any reserve for insurance or accidents.

At the time of the arbitration there had been retired from service certain physical property which it was no longer possible to operate. The value of this property had been credited to the proper account and charged to the maintenance, renewal and depreciation reserve. Subsequently, when an arrangement was made with the

*Abstract of address delivered before Engineers' Club of St. Louis, Mo., on Feb. 9, 1916. The data upon which this address was based were gathered in connection with the studies of the Bureau of Fare Research of the American Electric Railway Association.

city to spread the value over a period of years, a suspense account was opened at the suggestion and request of the street railroad commissioner. The amount finally agreed upon between the commissioner and the company for the value of the equipment retired was $705,347.

From a practical standpoint, the operating results disclosed at the time of the arbitration indicated that while the plan of regulation had many admirable features, it was nevertheless economically unsound, inasmuch as it did not permit revenues sufficient to cover the costs of operation, to maintain the property and to permit such a return upon the investment as would enable the company to compete in an open market for additional funds.

Efforts to Reduce Cost of Operation

The partial recognition by the board of arbitration of actual costs of operation in lieu of "allowances" as set forth in the ordinance, brought the Cleveland city officials face to face with the problem of continuing low fares by unusual economies in operation. There has resulted, largely during the administration of Commissioner Peter Witt, a degree of co-operation between the City Council, the public and the railway which is unique in American cities and goes far to explain the unusually low costs in the conduct of the traction business in Cleveland.

Termination of Lines in Center of City: The principal avenues of travel in Cleveland radiate from the business center of the city, which is located on the lake front. There are eleven radial lines leading in a general easterly direction and five leading to the west. Under the present arrangement each of these lines terminates in the center of the city. A large percentage of all the cars pass around one of the five loops installed in the Public Square under the direction of Mayor Johnson. A very large proportion of all the traffic in and out of town originates or terminates in this square. The effect that this plan of stopping all cars in the center of town has on the revenues is probably not as great as the effect upon operating cost, although it is now necessary in some cases for the rider to pay 7 cents to get across town. The total amount of revenue from such fares, however, is not great, and the inconvenience of transfer at the center of the city is the chief disadvantage with which the public is willing to contend in order to promote the economies of operation incident to the short routeing of all cars in the downtown district.

Designated Stops and Effects Thereof: Altogether about 45 per cent of the stops in the city have been eliminated, but there has been pressure brought by various interests affected resulting in the restoring of certain of the eliminated stops until the percentage of designated stops at present has increased from 53 to 64. One very important effect of the elimination of stops is shown in the increased speed of cars, which has risen from 9.5 m.p.h. in 1913 to an average of 10.73 m.p.h. in 1915. Comparative figures for this and other properties are published in the accompanying Table I. The elimination of stops has tended to decrease injuries and damages arising out of boarding and alighting accidents. Moreover, it has not brought about an increase in the number of collisions, owing probably to closer attention on the part of motormen and a knowledge on the part of drivers and pedestrians that at many street intersections cars do not stop. Special attention has been given by the traffic police to the prevention of accidents, and this efficient effort has doubtless been reflected in the decreased accident hazard.

Trail-Car Operation: There has been a steady increase in the use of trail cars in Cleveland, the percentage of mileage made by trail cars increasing from less than 1 in 1911 to about 15 per cent at the present time. As a result there is a saving in time resulting from the decreased time of loading and an increase in the track capacity due to the fact that there is no headway between the motor and the trail car. There appears to be little objection on the part of the patrons to a schedule whereby two cars are operated together on a headway twice as great as would be the case in single-car operation. The acquiescence of the traveling public in this economy was a considerable factor in the continuance of the 3-cent fare until Sept. 1, 1914.

Table I—Showing Comparative Speeds for Cleveland and Other City Railways

Company			Miles Per Hr.
Cleveland Railway:			
Municipal Traction Company	—1908		9.45
Receivers	—1910		9.50
Cleveland Railway	—1912		9.50
Cleveland Railway	—1915	Base	10.76
		Rush	10.08
		Night	11.27
		All	10.73
Denver Tramway			9.74
United Railroads of San Francisco			8.57
Washington Railway & Electric Company			8.65
Chicago Surface Lines			9.04
Twin City Rapid Transit Company			9.55
Springfield (Mo.) Traction Company			7.57
United Railways Company of St. Louis			9.57
Bronx Surface Roads			8.36
Manhattan Surface Roads			6.75
Queens Surface Roads			9.60
Cincinnati Traction Company			8.70
Toledo Railways & Light Company			8.15
Milwaukee Electric Railway & Light Company			8.59

Extension of Lines: During the life of the ordinace there has been a relatively small amount of track constructed. Such track as has been built, however, has been so placed as to permit passengers to move from one point of the city to another without passing through the region of greatest traffic density. There is at the present time a well-defined need for certain extensions. Recently a delegation of property owners requested a 3-mile extension of one of the suburban lines. The street railroad commissioner agreed to the extension provided the property owners contributed to the cost of construction 75 cents per foot of abutting land, or $1.50 per foot of track. At the present time more than $22,500 has been pledged and construction will be begun in the near future. The fare from the city to the point where the extension will be begun will be 3 cents. For each 1½ miles of the extension an additional fare of 3 cents will be charged. It is particularly of interest that the building in Cleveland during the last two years has been with slight regard to the location of the single-fare district. Some localities within the 3-cent area, particularly those along the recently constructed crosstown lines, have shown a considerable activity, but no more so than other districts to which the fare is 5 cents. There are a number of lines extending beyond the old city limits and on these lines a fare of 5 cents or more is charged. It appears that in these districts a 5-cent fare is not regarded as a particular disadvantage.

Paving Obligations: It is a rather difficult matter to measure the expenditures of the Cleveland Railway for paving by a comparison with expenditures of other companies, owing to differences in practice in distribution of paving costs as between operating expenses and charges to capital account, and the variety of franchise requirements under which various companies operate. Moreover, paving costs show a very large fluctuation from year to year. A tabulation recently prepared, however, discloses that about 17 per cent of the charges to way and structures of the Cleveland Railway for the last three years went for paving, while the average for sixteen other companies was 23.5 per cent.

Co-operation of Traffic Police: The track "hog" does not exist in Cleveland. The traffic ordinances of

the city provide that vehicular traffic shall move as close to the right-hand curb of each street as possible, and the utmost vigilance is exercised to arrest and convict teamsters and autoists who appear to be encroaching upon the company's tracks. This matter is handled directly by the police prosecutor, and it is possible for teamsters to be arrested, convicted and fined for interference with street cars without the matter coming to the attention of the railway company. So careful apparently is the police department to co-operate with the street railroad commissioner in the promotion of high schedule speeds that during two weeks of rather frequent riding in Cleveland but one instance was observed in which the motorman rang his gong to warn a driver off the track.

SERVICE RENDERED UNDER TAYLER ORDINANCE

Rather extensive tests were made last summer in Cleveland with a view of determining as definitely as possible the quality of the service furnished. The general conclusion reached was that with an unusually favorable distribution of residence and business districts, with a type of equipment more quickly loaded than is the case generally, with unusual co-operation on the part of the patrons in the matter of the method of fare collection, in the matter of passing quickly into and out of cars, and in the matter of the use of trailers and of designed stops, there is still, during both rush and non-rush periods on many lines, a degree of crowding and a percentage of standing passengers which places the standard of service in Cleveland below that specified by the Wisconsin Railroad Commission in its widely quoted service order in connection with the Milwaukee Electric Railway & Light Company, and in certain instances below that recommended in Chicago by the Board of Supervising Engineers.

Density of Traffic: The passengers and car-miles on each of the several lines were examined and the data summarized. From an examination of figures covering the operation of electric railways in thirteen cities, ranging in population from 260,000 to 1,900,000, comparative data have been prepared, on which Table II is based. The relatively high density of traffic in Cleveland is due to the cumulative effect of conditions of operation later enumerated. This high density summarizes some of the prevailing reasons for low operating cost.

District Served: An examination was made of the traffic movement throughout the city by studying the receiving and discharging areas and the neutral zone for each line.

It is of interest to note that in many portions of the city the neutral zone is rather wide. This, no doubt, is one reason for the lack of jitney competition in Cleveland. Contributing causes are low minimum fares and the evident unfriendliness with which the city officials interested in the success of the ordinance view such competition.

Rolling Stock: The street railroad commissioner and the company have co-operated to produce several novel types of cars from the standpoint of carrying capacity. In the latter designs the area available for passengers constitutes a somewhat larger percentage of the total capacity of the car than that obtaining in former Cleveland cars and in the cars of many other cities. This tendency is best illustrated by the front-entrance, center-exit type described in the ELECTRIC RAILWAY JOURNAL of Feb. 20, 1915, page 364. The speed of loading is facilitated in very many of the cars by the use of wide doors, the absence of steps and the collection practice.

The company has maintained an equipment register

TABLE II—SHOWING RELATIVE TRAFFIC DENSITY AS DETERMINED FOR THIRTEEN CITIES

Item	Cash and Ticket Passengers (per Car-Mile)	Total Passengers Including Transfer (per Car-Mile)	Cash and Ticket Passengers (per Capita)	Total Passengers Including Transfer (per Capita)
Average	6.00	8.41	267	376
Maximum	6.83	10.58	337	541
Minimum	4.66	6.35	223	255
Cleveland	6.83	9.54	330	461
St. Louis	5.54	8.50	302	466

on a strictly comparable basis for many years, and this register indicates that on March 1, 1910, the average seating and standing capacity of all revenue cars owned was 113.5 passengers, and on March 1, 1915, 129.3 passengers. This is an increase of 14 per cent. The revenue car-miles during the year ended March 1, 1910, were 24,500,000, and during the year ended March 1, 1915, were 33,800,000, an increase of 37 per cent. The product of car-miles and car capacity was therefore 57 per cent greater in 1915 than in 1910. During this period the number of rides per year had increased from 195,000,000 to 324,000,000, or 66 per cent. On the basis of seating capacity only, there were furnished in 1910 accommodations for 1,100,000,000 passenger-miles and in 1915 for 1,700,000,000 passenger-miles, an increase of 52 per cent, as contrasted with an increase in passengers of 66 per cent and a probable greater increase in passenger-miles owing to the building up of outlying parts of the city, with a consequent increase in the average length of ride. It would appear from this comparison that the efforts made, which have been successful in increasing the speed of operation, have failed to keep the equipment as nearly that required by the traffic as was the case five years ago, service having increased 57 per cent while traffic increased 66 per cent.

Loading and Collection Practice: The present practices of loading and discharging passengers and collection of fares are designed to promote speed and reduce expense in the matter of economies in fare collection. A variety of methods are in use at the present time on different lines, the method used being apparently that best fitted to the type of traffic and car in use. The practice also varies on the same line at different times of the day and even between motor and trail car on the same trip. The various practices are best illustrated by the following examples:

1. The ordinary car with front and rear doors will be operated in-bound as a pay-as-you-enter car, the passenger entering by the rear door where the conductor is stationed and leaving by either door. On the out-bound trip this car will be operated as a pay-as-you-leave car, passengers entering at either door and leaving by the rear door.

2. The center-entrance cars are operated in-bound as pay-as-you-enter cars. The rear half of the car is regarded and treated as a platform and passengers may occupy that part of the car without paying fare until they leave. If, after entering the rear part of the car, a passenger desires to go forward, he is required to pay his fare when he passes the conductor. These cars are operated out-bound as pay-as-you-leave cars. The result is that the passengers who leave the car at the Public Square and those who get on at that place are enabled to move through the doors with no delay, those alighting having paid their fare upon entering the car and those boarding paying as they leave. At the Public Square observations taken with a stop watch indicate that 100 people frequently pass through the doors of a center-entrance car in three-quarters of a minute. The movement of passengers boarding other types of cars in Cleveland is less rapid than that for center-entrance

cars, and the rate of adoption of the latter type of car during the past few years is of interest. On Jan. 1, 1913, 1914 and 1915, the percentages of center-entrance cars in service were respectively 10, 29 and 39 per cent.

Car Movement: The average speed of cars in Cleveland as computed from the current schedules is about 11 m.p.h. The speed is at present a trifle less than it was a few months ago and it is probable that this has resulted partly from the resuming of certain stops which were originally eliminated and partly from the well-known tendency of individuals and machines to slow up. An examination of the reports of sixty-five urban companies operating in other American cities, shows that the average speed, as obtained by dividing revenue car-miles by revenue car-hours, is 8.59 m.p.h. Values for the various companies range from 6.85 to 9.60 m.p.h.

The effect of skip stops on car movement has already been pointed out and is again referred to as being one of the major factors contributing to rapid movement of cars. The use of trail cars, with the increased headway thus possible, is another factor which facilitates car movement. It is obvious that when cars are running within a few feet of each other, a delay to one will occasion a delay to a considerable number of cars, while if the cars are run on a greater headway, the delay to the first car is not transmitted to those following it and the first car alone suffers.

Short routeing of cars has been practised in Cleveland to an extent considerably greater than is general. The saving in car-miles thereby effected is large and while there is some inconvenience to those passengers who are obliged to take the car following to complete their journey, the plan is in the interest of economy. A provision of the franchise minimizes "car to car" transferring by requiring passengers to board a car running to destination wherever possible.

Near-side stops are employed in the downtown business district in Cleveland and elsewhere in the city at intersecting lines. Throughout the remainder of the city the stops are not determined by the position of the intersecting streets, but are so placed as to equalize the distance walked by patrons under the designated stop scheme.

As has been previously mentioned, the traffic detail of the Cleveland police force is particularly efficient in avoiding delays to the street cars. Traffic police are stationed at seventy-two points throughout the city, from 8 a. m. to 7 p. m. Owing to the peculiar conditions in Cleveland, the area of congestion is relatively small and this factor doubtless contributes to the possibility of the maintenance of high-speed operation.

Number of Transfer Points: The number of transfer points on the Cleveland lines is relatively small. On 295 miles of track they number but eighty-eight in addition to the general transfer points at the Public Square. Compared with a number of other American cities, the transfer points per mile of track indicate that the layout of lines and general movements of traffic in Cleveland permit the serving of the public with a minimum of special work and with a minimum of delay and confusion at transfer points. An examination of twenty-two companies operating approximately 5000 miles of track, available for comparison with Cleveland, disclosed a number of transfer points varying from 0.94 down to 0.18 per mile of track, as compared with 0.30 in Cleveland and with 0.715 in St. Louis.

Car Loading: To determine the car loading, a study was made of traffic conditions on lines carrying about 80 per cent of the total traffic in Cleveland for a continuous period of eighteen hours on a typical week day. This study involved the observing of all radial lines at the point of maximum loading and the determination by actual count of the number of seats and passengers in each direction, from 6 a. m. to midnight.

The results of this study of loading indicate that at the point of maximum loading during the maximum fifteen minutes, the ratio of seats to passengers varied from 55 to 96 with an average for all lines observed of 72.1. For the maximum hour, the ratio of seats to passengers varied from 52 to 99 with an average for all lines observed of 78.9. These conclusions are corroborated by a previous check made in October, 1914. It was then found that during one hour from 4.50 p. m. to 5.50 p. m. for three consecutive days, the standing passengers were 27.9 per cent during the maximum fifteen minutes and 21.1 per cent during the maximum hour.

The situation during non-rush hours, as is indicated by the eighteen-hour check, is not greatly different from that during rush hours. The operation of 3.7 times as many cars during the evening rush as during the middle of the day, shows a concentration of service probably greater than that of any other urban system in this country, except certain rapid transit lines in New York and Chicago. From two to two and a half times as many cars are ordinarily run during the evening rush as during the middle of the day, and when this ratio is increased to exceed three, it indicates either that exceptional service is furnished during the rush hours, or that service during the middle of the day is considerably less than would be furnished by the average company, the latter being the case in Cleveland.

An examination of the service on the individual lines shows that the uniformly heavy lines, such as St. Clair, Euclid, Broadway and Lorain, are generally deficient during the non-rush hours on the basis of the standard of car loading prescribed by the Wisconsin Railroad Commission, but that this standard is met during the rush hours. On such lines as Fulton, Dennison, Detroit, Clifton, West Twenty-fifth, Scranton, Woodland and West Fourteenth, the service is generally bad during the evening rush and shows a degree of overcrowding not permitted under the Wisconsin requirements, or by generally accepted good practice.

To sum up the situation, additional service for the entire system is required as follows: 598 additional car-hours per day by cars already in service, and fifty-one additional car-hours during the maximum period and requiring therefor additional facilities. Although a certain amount of excess service is being rendered, it is evident that this excess service could not, in general, be used to supplement the insufficient service elsewhere, both on account of the difficulty of running the same car on various lines at various times of the day and also because of the fact that excess service in one direction is usually necessary in order to provide the required service in the opposite direction on the return trip. It should also be borne in mind that more than one-third of the "excess" shown occurs after 8.30 p. m. when headway requirements rather than loading requirements govern.

In general for the twenty-two lines studied, it appears that the particular departure from the Wisconsin standard is during the transition period and during the middle of the day. In each of these places it is, of course, possible to furnish the required service with equipment which is at the present time available, inasmuch as the total number of cars in service during these periods is less than the number in service during the rush hour. With this in mind, it appears that in order to meet the Wisconsin standard, it would be necessary to increase the off-peak car-hours by 5.5 per cent. During the evening peak there would also be required about 4.3 per cent more cars than are now operated. These would presumably represent an increase in investment in cars, car-housing facilities, power plant and other parts of

the street railway plant which must be provided in proportion to the maximum car demand.

The cost of providing 5.5 per cent more car-hours has been computed on the basis of the average cost per car-hour, exclusive of those operating expenses which would presumably not be increased and exclusive of any and all charges for taxes and interest. The cost of furnishing 4.3 per cent additional service during the evening peak has been computed by including in addition to the costs enumerated above those costs which vary with traffic demand, including, of course, interest and taxes. The total costs thus obtained and necessary to meet the service standard promulgated by the Wisconsin Railroad Commission amount to more than $300,000. It may be possible, of course, in certain instances, to meet the Wisconsin standard by shifting of cars from one line to another throughout the day. The very great practical difficulties of schedule making which arise when such an attempt is made, appear to indicate, however, that no very great part of this $300,000 could be saved. Hence, it is evident that since the measure of the necessity of an increased rate is but $200,000, the present service standards in Cleveland are the means of economy equal to at least one step in the rates of fare.

Riding Habit: The growth of population and industrial activity in Cleveland has been accompanied by a steady increase in the number of rides per capita. This growth in social and industrial importance has been such as to increase materially the extent of the floating population, which is reflected in the apparent riding habit. In spite of the fact, however, that the extent of riding in Cleveland is above the average, it is not obvious that the various changes in fare are reflected to any considerable extent in the amount of riding. During the past years there have been various changes of rate of fare in Cleveland, and a study of these data does not indicate any marked degree of correlation between the rate of fare and the number of rides per capita.

Psychological Factors in Measuring Service: After examining all the physical factors, it is obvious that there is at work in Cleveland in addition to these a factor which is of considerable moment but which it is difficult to reduce to accurate measurement. The people of Cleveland have been told and generally believe that they have the best street railway system in the country, and, as the writer knows from experience, the most casual acquaintance both on the cars and in the streets in Cleveland is quick to boast of the excellence of the service and the satisfactory results of the Cleveland experiment.

There are no standards of service which the average person is able to estimate or define accurately because satisfaction is psychological and largely independent of those elements of service which can be measured in accurate terms. Inasmuch as a preconceived idea as to the quality of service frequently determines opinion, the general reputation of a company is of great importance. The people of Cleveland have had pointed out to them for five years that low fares can continue only if accompanied by economies in operation, and the political capital of the party in power has been based upon the belief of the people that "Cleveland service" is "good service."

How great a factor this is may best be appreciated by those who have experienced a situation in which efforts have been directed toward emphasizing the idea that whatever service the local street railway company rendered was poor service. A headway of six minutes in a community where the company is popular is satisfactory, but a headway of three minutes when the company is under attack is considered poor service. The same observation applies to standards of loading and other criteria of service. In a word, the co-operation of the patrons, fostered by the city government, is a material factor in the Cleveland situation, and much that may be complained of elsewhere is not there regarded as poor service.

Actual Cost of Service Under Tayler Ordinance

The interest fund and the true corporate surplus have not been at all similar during the operation of the Tayler ordinance. Indeed, the true corporate surplus was late in 1914 more than $1,000,000 less than the interest fund.

During the five years of operation of the ordinance, it has been possible to write off only $180,000 out of $700,000 of abandoned equipment, all of which went out of service during the first three years, and as the present value of that portion of the Cleveland Railway's plant in existence on March 1, 1910, is obviously less than it was five years ago by a very considerable amount, the discrepancy between the actual expenditures for maintenance, renewals and depreciation and the allowance for these expenses fails very materially to indicate the amount by which the ordinance allowance has proved to be insufficient.

Aside from the wasting of physical property, the operation of the Cleveland Railway has failed to yield 6 per cent on about 70 per cent of the investment, and while under the provisions of accounting necessitated by the ordinance there has been a decrease in the interest fund of $219,012 during the last two years, there has actually been a deficit of $379,778. Since Sept. 1, 1914, when under the terms of the ordinance it became necessary, due to the status of the interest fund, to increase rates, there has been an increase in the interest fund of $92,146, but with labor conditions unsettled (an increase of wages was granted to trainmen, effective May 1, 1915, of 2 cents an hour, amounting to about $140,000 per year), with financial and industrial conditions not of the best, and with constantly increasing costs of operation, it will probably be some time before it is possible to reduce fares in Cleveland again, if in fact such a time ever comes.

On March 1, 1915, the operating fund showed an overdraft for two years of $916; the maintenance, depreciation and renewal fund an overdraft for the same period of $478,109, and there was a deficit of $145,444 remaining from the total deficit converted into a suspense account at the time of the arbitration. The sum of the first two items, $479,025, indicates the amount by which the allowances during the last two years have been insufficient to meet the expenses which they were designed to meet, and this total, together with the amount now remaining in the maintenance suspense fund ($145,444), indicates the contribution of over $620,000 by the company to continuity and quality of service since March 1, 1910, in addition to the amount by which its property has depreciated and against which no adequate reserve has been built up. It is of particular interest to note that under the present system no reserves, such as those for injuries and damages, insurance and other provident funds, can be built up. It is obvious that this is in violation of well established principles of sound accounting and business prudence.

With respect to depreciation, it appears that the ordinance contemplates that the maintenance of all physical property, as well as its depreciation, shall be met from an allowance of approximately 5 cents per ordinance car-mile. During 1914, the allowance per actual car-mile—that is, per car-mile in which the mileage of trail cars is given full weight—was 4.75 cents.

Depreciation alone on a well-operated plant will not be less than 3.75 per cent of the cost new of the physical property. The 1909 valuation of the property operated by the Cleveland Railway was $27,596,366, and since that time there has been invested in additional property $6,747,555, making the cost new of the present plant $34,343,921. Of this amount 3.75 per cent is $1,287,900. This is 3.8 cents per actual car-mile for the year ended Dec. 31, 1914. This leaves of the allowance of 4.75 cents but 0.95 cents per car-mile for maintenance of all physical property. The average expenditure in 1912 of nearly 1000 electric railways in the United States for maintenance (not including depreciation) was 5.75 cents per car-mile.

While the allowance under the Cleveland ordinance might cover either depreciation or maintenance, it is obvious without a more extended analysis that any company attempting to meet both maintenance and depreciation charges out of this allowance of 4.75 cents per car-mile is attempting the impossible. It was to have been expected that the Cleveland company would necessarily over-expend this allowance for maintenance, depreciation and renewals. This over-expenditure has already amounted to $623,000, and it is certain that the item "deferred maintenance" will be one of increasing importance. Attention should again be called to the $700,000 of property which was retired about three years ago and which still appears in the balance sheet to the amount of $553,002, as "road and equipment suspense." The necessity of meeting the cost of property retired is inevitable, whether the loss is insured by a proper reserve or amortized after the property is retired. The difference is that car riders in the future will pay for losses incurred for the benefit of car riders in the past.

In the matter of taxes, the Cleveland Railway is in a unique position. It is to the evident interest of the city to keep expenditures of every kind at a minimum, and there is pending at the present time an action to have the assessment of the company reduced for the last two years. This action was brought following the adoption by the City Council of a resolution requesting the street railroad commissioner to direct the company to ask for a rehearing before the Tax Commission on the question of valuation and to refuse to pay taxes on an amount in excess of $19,000,000. In the meantime charges are made monthly on the basis of the assessment now under dispute, and the amounts thus accumulated are included in the interest fund. In case the city is successful in its fight to have the assessment lowered, there will be, after the payment of taxes for the last two years, a balance in this tax reserve fund which will be credited to the interest fund. It is impossible to state at this time how much this will amount to, but it will probably, even in the event of a particularly favorable decision, not be large enough to change materially the status of the interest fund.* The company is not required to pay any car license fee, and it is freed from certain obligations in connection with paving.

With regard to the charges made for interest, interest on funded debt and bills payable is charged to the interest fund as payments are made. When securities are sold at a premium, the amount of this premium is credited directly to the interest fund, and when securities are sold below par, the discount is amortized through monthly charges to the interest fund. Interest is allowed on outstanding stock at 6 per cent per annum, but since the outstanding stock is materially less in amount than the actual capital investment prior to the adoption of the present working agreement, the fixed rate of return guaranteed by the city is more nearly 4 per cent per annum on the cost of the property than 6 per cent, as would appear from a casual reading of the ordinance.

The balance sheet indicates that in addition to the depreciation of the physical plant for which no reserve has been maintained, and which has amounted to no inconsiderable figure during the last five years, there has been an operating loss of $1,465,026. Had interest been paid during this period on the $10,000,000 of stock which was surrendered in 1908, this operating deficit would at the present time have amounted to approximately $1,750,000.

*Since this was written the suits have been decided by Judge Vickery of the Common Pleas Court adversely to the company, but it is understood that an appeal will be taken.

Conclusions

From the study of costs in Cleveland and the survey of operating and traffic conditions peculiar to Cleveland, the following conclusions may be drawn:

1. While the regulating ordinance contemplates fixing the rates of fare to conform with costs, the actual costs of service have considerably exceeded those recognized by the ordinance, owing to the inadequacy of allowances for operation and maintenance, the failure to provide reserves for injuries and damages and insurance, and the failure to make due provision for depreciation.

2. The actual value of property used for the transportation business exceeded that recognized by the ordinance, owing to the arbitrary reduction of the cost new of physical property to approximately 70 per cent of such value. To reproduce identical facilities for rendering transportation service would require an investment in excess of that assumed in the ordinance.

3. The rate of return provided in the ordinance, or 6 per cent, is not comparable with the rate of return necessary to attract money into the urban transportation business under conditions where, unlike Cleveland, such return is not guaranteed.

4. The actual costs of operation per passenger are considerably less than those of urban transportation systems in other American cities, owing to the co-operation of the public and the City of Cleveland. The skip stop, headway as high as five minutes on heavy lines, the use of trailers and short routeing, the loading and collection practice and the regulation of vehicular traffic are evidences of this co-operation. These innovations have had a substantial effect on costs.

5. The scheme of ordinance regulation as provided in Cleveland retards the extensions of existing lines and will in time no doubt materially affect the distribution of population.

6. The service rendered is found to result in a degree of crowding and a proportion of standing passengers which discloses a standard of service below that prescribed as adequate in other American cities.

7. While the average rate of fare per revenue passenger is now generally 3 cents with 1 cent for transfers in conformity with ordinance costs, the increase of actual costs of operation reflected in the deficiencies of operating allowances leads to the conclusion that the car-riding public of Cleveland may expect to face the alternative of higher fares or poorer service.

8. In view of the property abandoned, which is only now partially written off, it would appear that the present generation of car riders is receiving transportation costing in excess of fares paid, leaving future generations to pay for equipment worn out from past service. In effect, such a process of paying for the depreciation of the property results in converting physical property values into service rendered, and if continued would affect the security of the property which the ordinance is pledged to safeguard.

American Association News

At a Meeting on Feb. 5 President Henry Addressed the Milwaukee Company Section, His Subject Being "The Relation Between the Public and the Electric Railway Companies—Meetings at Denver and Washington Were Also Addressed by Prominent Speakers

DENVER TRAMWAY SECTION

The thirty-second monthly meeting of the section was held on Jan. 27, with 100 persons in attendance.

The program was opened with a paper on "Efficiency Engineering," by Edward A. West, efficiency engineer of the Portland Railway, Light & Power Company. He was followed by H. N. Wheeler, the United States forest supervisor, with headquarters at Fort Collins, Col., who displayed a number of lantern slides and described the work of the forestry department. After the lectures the speakers were bombarded with questions by the members, and many interesting details of their subjects were thus brought out.

MILWAUKEE SECTION

At the meeting of the section held on Feb. 5, the guest of honor was Charles L. Henry, president of the association, who spoke on "The Relation Between the Public and the Electric Railway Companies." Five hundred persons attended.

Following President Henry's address brief reports were made as follows:

Results of the medical benefits and the reduction of illness due to the Employees' Mutual Benefit Association medical work, by Dr. C. H. Lemon, chief surgeon.

Results to date of the operation of the bonus plan in the transportation department, by G. Kuemmerlein, superintendent of transportation.

Results of the operation of the premium system in the rolling stock department, by W. C. Bolt, shop accountant.

Brief description of the profit-sharing plan installed in the rolling-stock department, effective Jan. 1, 1916, by H. A. Mullett, superintendent of rolling stock.

The social philosophy of the company in developing its various profit-sharing plans, by S. B. Way, vice-president.

After the more serious part of the exercises had been concluded an original one-act musical comedy, entitled "Brewster's Hennery," was presented by the educational and social auxiliary of the Benefit Association, all of those participating being employees of the company.

The accompanying halftone shows the gathering, with Mr. Henry on the platform.

CAPITAL TRACTION SECTION

This section, which was organized a month ago with eighty-nine charter members, has now 117 enrolled, and is growing rapidly. At the meeting held on Feb. 10, the speakers were Frank J. Hogan, attorney of the company, and R. G. Simms, treasurer. During the evening Division Superintendent E. L. Grayson, on behalf of the motormen and conductors, presented former Manager D. S. Carll with a gold watch as a token of esteem.

Mr. Simms outlined the history of the Capital Traction Company and its predecessors, and explained in detail the handling of fares. He stated that the present company came into existence in 1895, its predecessors being the Rock Creek Railway, incorporated in 1888, and the Washington & Georgetown Railroad, incorporated in 1862. The latter operated the first car line in the city, the fare being 5 cents. This company was the successor of the Vanderwerken Bus Company, which had two lines, on each of which 6 cents was the fare. A bus ride from Thirty-second and M Streets to the Navy Yard, 4¾ miles, cost 12 cents. To-day it is possible to ride more than 10 miles for 4 1/6 cents.

Mr. Hogan spoke of the great opportunities in the railway field for the young men to-day, and cited as an example the life of the late Henry Hurt. Mr. Hurt started his career in the lowly position of water-carrier in the Washington & Georgetown Railroad stables, and advanced step by step until he became president. Mr. Hogan claimed that similar achievements are

MEMBERS AND GUESTS IN ATTENDANCE AT THE FEBRUARY MEETING OF MILWAUKEE COMPANY SECTION; PRESIDENT HENRY IS SHOWN ON THE PLATFORM

possible to-day as "the golden age of opportunity is not behind but ahead of us."

Musical numbers by local talent formed part of the program, as did the announcement by the membership committee of the reception of twenty-eight new members, the majority of whom were motormen and conductors.

WASHINGTON RAILWAY AND ELECTRIC SECTION

The February meeting of the section was held on Wednesday of this week, with the members of the commercial section of the Potomac Electric Power Company as the guests of the railway section. After opening the meeting, C. S. Kimball, president of the section, turned the meeting over to John C. McLaughlin, of the power corporation, who called upon Colonel Truesdell, former commissioner of the District. The colonel described what engineers have done to make the city beautiful. Then Col. W. W. Harts, U. S. A. engineering corps, officer in charge of public buildings and grounds in Washington, gave an illustrated lecture on the development of the city, and outlined plans which will soon be submitted to Congress for the further improvement of the city.

In taking the chair to introduce Colonel Harts, Colonel Truesdell stated that he personally had asked for the first charter for an electric railway in Washington, the Eckington & Soldiers' Home line, later the City & Suburban Railway, and now a part of the Washington Railway & Electric Company.

COMMUNICATIONS

The Amendments to the Constitution

Washington Railway & Electric Company

Washington, D. C., Feb. 15, 1916.

To the Editors:

I am in receipt of your invitation to express my views concerning the amendments adopted at the recent conference of the association at Chicago. Under ordinary circumstances I would not care to discuss the matter further, for the reason that my views, as expressed at the conference, were so distinctly at variance with those of others in attendance. Yet, I would rather like to say a word in order that my position may not be misunderstood.

I am keenly interested in the welfare and success of the association, and believe that the maximum amount of co-operation and assistance should be extended by the manufacturers both as individual companies and as an organization. There appeared, however, to be a lack of understanding as to what would be accomplished by the adoption of these amendments and, furthermore, as to what the final effect would be upon the status of the Manufacturers' Association. For these reasons it seemed to me the matter might be left in abeyance until the manufacturers themselves could have a clearer knowledge of the purposes sought to be attained, and I urged that the matter go over until the fall convention.

It developed that in holding this view I was in a hopeless minority, but being a good soldier and willing to abide by the judgment of the majority, I sincerely hope that the amendments adopted will bring about all the good results hoped for, and believe that the manufacturers should generally accept the invitation which has been extended to them to join the American Association, in the belief that in so doing they will strengthen the electric railway industry as a whole and in that way work for their own interests. It is apparent that we all have a common purpose, and no mere matter of administrative detail should be allowed to interfere with the accomplishment of what we are all working for.

W. F. Ham.

President Henry's Letter

Drew Electric & Manufacturing Company

Indianapolis, Ind., Feb. 15, 1916.

To the Editors:

I have noted in your issue of the 12th inst. President Henry's open letter respecting the recent amendments to the constitution and by-laws of the American Association, permitting manufacturers, dealers and the technical publishers to become members of the association. Past-President Allen, President Henry, Mr. Brady and the others who conceived and presented this measure have to some extent "pioneered" but have undoubtedly established a wise precedent that will be followed by other associations. I am informed that some associations extend the privilege of the floor to its allied appliance manufacturers, and in some few cases the right of vote is extended. It is certainly a mark of confidence and a compliment to the manufacturers that they should be called into the councils of the parent association.

That the move is not wholly unselfish is suggested by President Henry's letter. He believes that the association needs the manufacturers. If we can be of service we should answer the call, as it is impossible to conceive a constructive act of the American Electric Railway Association that will not bring its proportionate return to the manufacturer. No manufacturer should overlook the fact that the electric railway is the medium through which he extracts his little share of the fractional "nickel" from the public's spending money. If we are then, as manufacturers, only once removed from the source of our revenues, it seems logical that we should move up to the front with our associates and give them our heartiest assistance and best advice when requested. We must stand ready to shoulder any duty that will tend to improve, stabilize or increase their business, because on their success the manufacturer stands or falls.

In his reference to the work of the future, Mr. Henry refers to the attitude of our opponents. Personally I am not disposed to consider the general public, or any considerable portion thereof, as extremely hostile to the electric railway industry at this time. Whatever small unfairness may exist is due to lack of understanding. The public generally is coming to regard the electric railway now as a business, fundamentally the same as any other business. It permits its state, municipal and civic representatives to come with words of assurance and to take part in our meetings frequently. The people do not antagonize factories, stores, shops, newspapers and other commercial servants. It encourages and patronizes them. It would seem that the street railways and interurbans should soon enjoy this same treatment.

I believe it should be emphasized, publicly and otherwise, that the electric railway business is basically the same as any other legitimate business. Its patrons, both present and prospective, should be courted and considered as its friends and not its opponents. We as manufacturers have a golden opportunity to increase good-will and light in our respective communities. As members of the American Electric Railway Associa-

tion we can present our own ideas for consideration at its meetings, and at the same time learn of the ways in which we can be of use to the association.

I believe the manufacturers can do valuable service in every department and in every activity of the association if permitted to become an integral part, and our efforts be better directed and of greater effect. It is obvious that there is a community of interests which calls for unity of action. J. H. DREW, President.

Energy-Input Method of Determining Motormen's Efficiencies

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILL., Feb. 14, 1916.

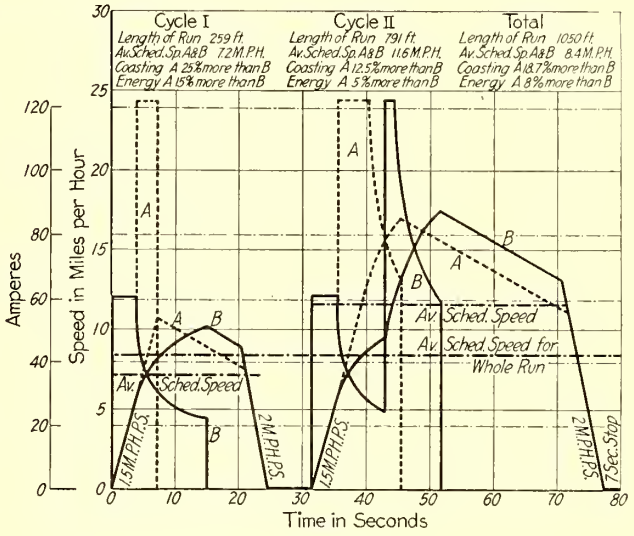
To the Editors:

Believing that in Mr. Chappelle's article entitled "Fundamental Principles of Car Operation Efficiency" in the Jan. 15 issue of the ELECTRIC RAILWAY JOURNAL there are several misleading comparisons made of the two devices now on the market for determining motormen's efficiencies, comparisons that might easily be wrongly construed and give rise to prejudice in favor of the coasting method of determining efficiency, the writer takes occasion to defend the energy-input method on the points on which it is assailed, and to question the soundness of some of Mr. Chappelle's deductions.

Mr. Chappelle, at great length, and by the aid of a series of speed-time curves dealing exhaustively with the subject, arrives at the apparently logical conclusions that the "best efficiency occurs with the highest rates of acceleration and braking," and that the "increased coasting percentage is practically proportional to the decrease in energy." Based on the premises which Mr. Chappelle has chosen to assume, these conclusions are no doubt correct, but it is the writer's opinion that there are many more factors affecting efficient car operation than the ones the author considered in attempting to solve this very complex problem. "The proof of the pudding is in the eating," and if Mr. Chappelle's conclusions will not hold in examples other than those used to prove his case, then the conclusions must have been based on unsound premises. Had Mr. Chappelle qualified his conclusions, and limited them within the bounds of the conditions he cited, there could be no disputing his contentions, but his sweeping statements must be challenged.

One important factor of operation that vitally affects energy input and coasting is the relative locations of different stops and the effectiveness of their anticipation by the motorman. In actual city operation, the average motorman has no idea whatsoever of the particular blocks at which he will be compelled to make his average number of stops per mile. These stops may be "bunched" considerably at certain parts of the run, and may be spread out considerably over other sections of the run. Under such conditions it is possible for a good motorman to effect great economies in energy consumption if he anticipates probable stops. The accompanying graph illustrates a typical run of four city blocks made by two motormen equally proficient in rapid acceleration and braking. It also shows an instance where the "best efficiency does [*not*] occur with the highest rates of acceleration and braking," and where the increased coasting percentage does *not* vary even "practically with the decrease in energy." For this diagram, there has been assumed a 23-ton car, 93-A Westinghouse motors, a low gear ratio of 3.58, all of which are data that Mr. Chappelle has used in preparing his diagrams. A normal acceleration of 1.5 m.p.h.p.s. and a braking rate of 2 m.p.h.p.s. have been assumed. It is also to be noted that a retarding force 20 lb. per ton for coasting has been used, it being believed that this figure more nearly represents actual operating conditions than Mr. Chappelle's figure of 10 lb. The mean schedule speed for the whole run, including stops, is 8.4 m.p.h., and there are assumed ten stops per mile of seven seconds' duration each. This graph differs from any of Mr. Chappelle's diagrams, in that the stops are not spaced at regular intervals over the distance, and in that the probability of a stop at any block is given consideration.

The sequence of operations of Motormen A and B, through the two cycles shown in the diagram, is as follows: Both motormen start with the same acceleration rate of 1.5 m.p.h.p.s. At the end of 7.2 seconds they both "get the bell" to stop at the next short block. A immediately cuts off power and uses all of his available time in coasting. B, however, has anticipated a stop at this block and has accelerated with his motors in series. When he gets the signal to stop, he does not cut off power immediately, as he has not yet used sufficient energy to carry him at approximate schedule speed to the next stop. Instead, he still runs in series



EXAMPLE OF INCREASED ENERGY CONSUMPTION ACCOMPANYING INCREASED COASTING

until he reaches a speed of about 10 m.p.h., when he cuts off power and coasts five seconds, then brakes down to the stop. At the end of this cycle of operations A has used 15 per cent more energy than B even though he has coasted 25 per cent more, and both have made the run in the same time. Each now has a seven second stop. On starting again both use the same accelerating rate. A is after a coasting record, so he again accelerates through series into the full parallel position. B is again not sure whether or not he will have to stop at the next short block, so he accelerates again with the motors in series until he finds that he will "get no bell," then feeds through the parallel resistance points into full parallel. Both motormen now run three blocks, then get the signal to stop. Both stop at the same time. At the end of this second cycle of operations, A has used 5 per cent more energy than B, even though he has coasted 12.5 per cent more, and both have made the run in the same time. At the end of the whole four-block run A has used 8 per cent more energy than B, though he has coasted 18.7 per cent more than B. Both have made the run in exactly the same time.

In this approximately 0.2-mile run by both men, two stops of seven seconds duration each, were made, or an average of ten stops per mile. A and B have both made the same schedule speed for the run, including stops. A solely utilized the time-element factors in this operation, and made the better coasting record. B used these same time-element factors within reasonable limits, and by taking cognizance of probable stops, made a lower coasting record than A, but used approximately 8 per cent less energy than A. This diagram, representing as it does actual practical conditions of every-day operation, refutes pretty effectively the assertion that the duration of the time elements of acceleration, braking and stop period are the sole factors involved in the solution of this complex problem.

Law of Averages Always Applies

It might be well to consider here the assumption in Mr. Chappelle's article that the law of averages does not apply to the operating conditions experienced by different motormen on a given route, although he has actually invoked this same law indirectly in support of his own contentions.

In the paragraph headed "Energy Input a Misleading Measure of Efficiency," Mr. Chappelle states that in his Fig. 13, with three different schedule speeds and stops per mile, the energy per car-mile is respectively 2.4, 2.65, and 3.21 kw.-hr., though the coasting in the three instances remains the same, or 40 per cent. Therefore, he argues that since the men are operating their cars in the best and most efficient manner in the three different service conditions, the coasting method, by its resultant similar figures of 40 per cent, shows that they have all operated at "equal efficiencies even though the conditions of operation vary widely, as enumerated." Mr. Chappelle indirectly hints that a comparison of the three energy-input figures tells nothing whatsoever of the relative efficiencies of the three motormen, but he probably does not know that energy-input figures are compared in a far different and more ingenious manner. First, it is to be premised that more than one man will work on each of the three schedules, and actual practice has proved that over a period of one or two weeks quite a number of men will have encountered an equal amount of the same conditions, and therefore they can be fairly compared with the men who have worked in the same class of service. In other words, a regular motorman who does a whole day's work will have periods of light traffic that will counterbalance his periods of rush-hour traffic, and over a period of time the average severity of the conditions he has encountered will be about the same as those of his fellow workers in that class of service. It is on this basis that the efficiencies of motormen are obtained by the energy input method. It is true that this necessitates the classifying of cars into sub-classes, depending on weight, horsepower rating, etc., and the classifying of the service conditions on the basis of their average severity. Such subdivisions, however, are neither difficult nor laborious, and are essential for the success of either system. It is possible to combine the results of any man, no matter in how many classes he has worked, and represent his system average efficiency in car operation by one number.

Very evidently it was Mr. Chappelle's intention to convey the idea that since the three motormen in his example worked under varying conditions but at equal actual efficiencies, and all made 40 per cent coasting, that in all cases the coasting percentage was the true measure of the men's actual operating efficiency. In other words, he endeavors to show that the coasting time recorder automatically handicaps the men for the more or less severe conditions under which they work. Suppose one would try Mr. Chappelle's formula in the case of Motormen A and B in his Fig. 16. He would discover that although A and B operated at equal actual efficiencies with the three men who made the 40 per cent coasting, yet A made 64.3 per cent and B made 54.9 per cent coasting. "The coasting record of the motorman, therefore, is [*not*] 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," at least not in this case, nor in many others that anyone interested may care to work out.

On the same page, in endeavoring to prove the fallacy of depending upon meters, Mr. Chappelle shows that a good man uses 2.1 kw.-hr. per car-mile, and coasts 42 per cent against only 21.5 per cent coasting and the same power, 2.1 kw.-hr. per car-mile, used by a poor operator under far easier conditions. Therefore, a good motorman, according to Mr. Chappelle's theory, if his record was taken with meters, would become discouraged at failing to see that he had used less power even though he had done better work. Suppose, however, that each man had a period of heavy traffic and a period of light traffic every day, and suppose that over a period of a week or more they both had encountered an equal number of the same kinds of conditions. Then the relation of their average energy per car-mile over this period would be indicative of their actual operating efficiencies, because all unequal conditions would have been eliminated by the law of averages.

It is gratifying to note an occurrence very similar to the one just mentioned to the coasting percentage figures in one of Mr. Chappelle's own diagrams. In Fig. 17 Motorman C used a more efficient accelerating rate, and made more stops than did Motorman D, and undoubtedly was disgusted on finding that his 100-per-cent-efficient work gave him only the same coasting as his inefficient fellow-worker. It would be interesting to know if Mr. Chappelle considers this "differentiation" desirable in the case of the coasting time recorder! And what would the psychological effect be on Motorman C when he discovers that it is an impossibility and a miscarriage of "automatic handicapping" for him ever to top D in the records?

In the end, however, the gist of the whole matter is that, because of the innumerable variables that are ever present, comparisons of individual records of individual runs are unreliable unless these variables are eliminated, or unless all factors affecting operation are considered. In the past, both the coasting time recorder and the meter have produced successful results, but these results are due to the fact that both devices rate the men on the basis of the average of all the conditions encountered over a period of time. Of course, coasting is an important indication of efficient car operation. But to hold that it is therefor the "time element" factor solely affecting such efficiency, under any and all conditions of car operations, is unfair to say the least.

C. H. Koehler.

The New Zealand Government Railway Department has recently had built by the Thomas Transmission Company, England, a 200-hp. locomotive-coach of gasoline mechanical drive, which has been designed to meet operating conditions of exceptional severity varying from a speed of 40 m.p.h. on the level with a gross load of 85 tons to a speed of 10 m.p.h. up a grade of 1 in 40 with the same load, the coach alone to be capable of taking the specified grades at a speed of 28 m.p.h. Tests conducted in England before shipment to New Zealand showed excellent evidence of its hauling power and quick acceleration under exceptionally heavy loads.

EQUIPMENT AND ITS MAINTENANCE

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

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

Twin Jacks for Removing Wood Poles

BY S. L. FOSTER
Chief Electrician United Railroads of San Francisco

In taking out wood poles the work and time spent can be much reduced and the appearance of the poles greatly preserved over the old method of prying them out with steel bars by using two ordinary 10-ton ratchet jacks borrowed from the track gang. This method, shown in the cut, has been used for many years on the United Railroads of San Francisco.

The earth is removed around the pole about the top of the ground, a wrapping of heavy chain is put on for the jacks to push against, planks are provided to distribute the pressure of the bases of the jacks and the pole is quickly hoisted up to a point from which it can be easily pulled over by a rope previously attached to its top, the time of pulling having been selected so that the leverage of the pole is so nearly counterbalanced by the resistance of the earth that the pole comes down gradually and escapes the danger of being broken by the fall.

This two-jack method was found more satisfactory than the use of a single jack which acts more to push the pole against the side of the hole opposite to the jack than to raise it vertically.

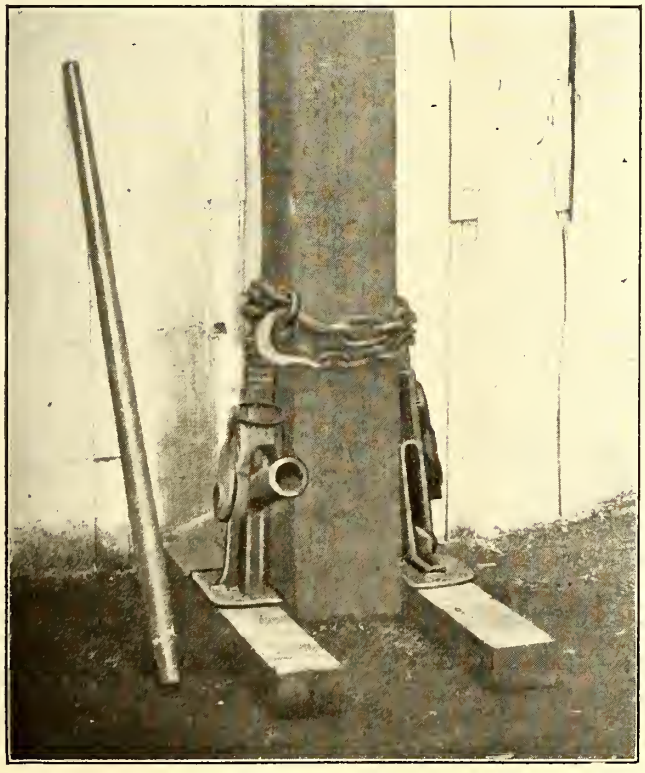
The chain bites into the soft wood of the pole and mars it a little but its use is far preferable, as to resulting appearance of the pole, to the old way of lifting the pole out by jabbing digging bars into the pole for use as pries. This jacking-out way is also more rapid than the digging bar method and can be more closely regulated.

For pushing wood poles along a trench the single jack standing across the trench at the ground level and acting more or less vertically serves the horizontal progress purpose excellently.

For moving extra heavy box-girder poles the jacks are laid flat in the bottom of the trench and act against the block of concrete horizontally.

In electric light and power and in telephone and telegraph work where the poles are set in the excavated material and merely to sustain a vertical load, and where no side stresses other than wind pressures are anticipated, a single jack may suffice for taking out wood poles, but in electric railway work where the poles are set to sustain not only vertical pressures but large and very "live" horizontal stresses and are often set in broken rock, etc., two jacks are found necessary. Sometimes extensive excavation is necessary before even two jacks can budge them.

The jacks are seen in the cut to face opposite ways. They are thus placed so that the ratchet releases may be on the outside and accessible for repeated use as the chain is lowered in the progress of the pole raising.



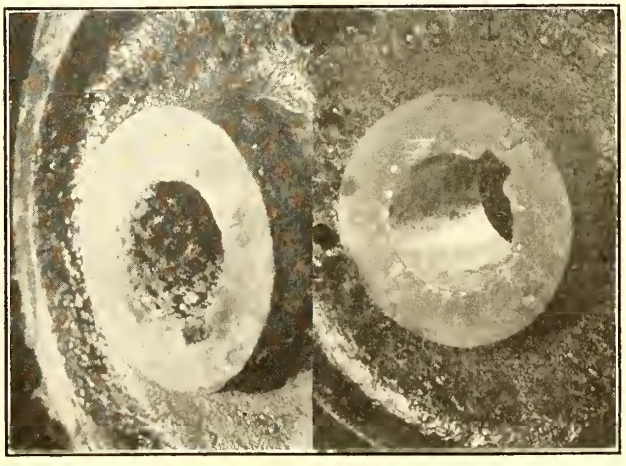
TWIN JACKS IN PLACE FOR POLE REMOVAL—PREFERABLE TO THE USE OF ONE JACK OR DIGGING BARS

Reducing the Bore of a Gear by Means of the Electric Arc

BY JOHN B. BLACKLOCK
Master Mechanic Atlantic City & Shore Railroad, Atlantic City, N. J.

The accompanying illustrations show a job performed in the shops of the Atlantic City & Shore Railroad in which the bore of a large wormwheel was reduced about 1/16 in. This reduction was considered too small to permit the satisfactory use of a bushing, so we resorted to welding, with the result as shown. The original bore was 3½ in. and the hub 8 in. long. After boring the gear was pressed on the shaft with a force of 15 tons.

In this and other welding jobs performed in the company's shops a water rheostat is used to control the cur-



WORMWHEEL WITH NEW METAL WELDED IN BORE, BEFORE AND AFTER RE-BORING

rent and trolley voltage is used. The water rheostat was mentioned in the issue of the ELECTRIC RAILWAY JOURNAL for July 3, 1915, page 24. In the testing corner of the shops is the switchboard illustrated in connection with the article and directly below it is a barrel filled with brackish water. An iron plate suspended in the water, forming one terminal of the rheostat, is controlled in position by a handwheel on the switchboard. The other terminal is a ground plate in the barrel bottom.

The welding current flows through a circuit breaker, an ammeter and a knife switch to the welding handle, and the suspended plate is electrically connected to the article to be welded. For all ordinary work the rheostat gives no trouble, although on a heavy job taking, say, thirty minutes, the water becomes quite hot.

Simple Method of Graphically Determining Air-Brake Leverages

BY H. M. LLOYD
Equipment Engineer British Columbia Electric Railway, Vancouver, B. C.

With the almost universal use of air brakes on both city and interurban equipments has come the necessity of paying more attention to the proportions of the levers in the truck and foundation rigging, so as to make as nearly as practicable a uniform braking percentage on all cars of the same type.

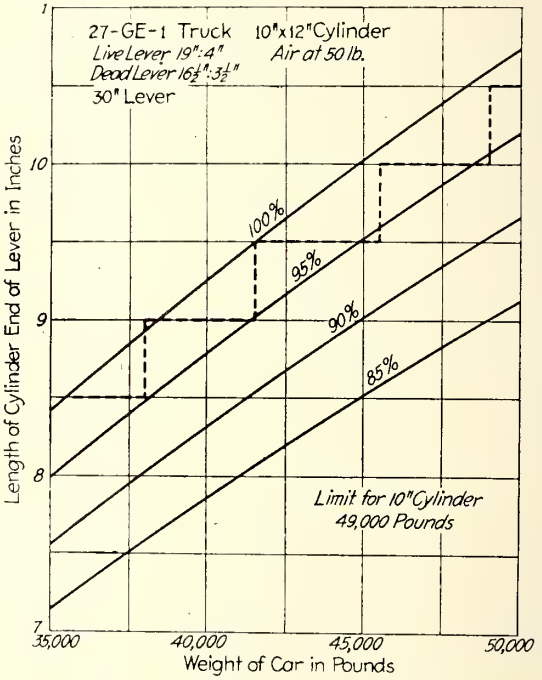
In single-car operation, such as that of the usual city service, suppose that a motorman on one shift has a car with a high braking percentage, and has become accustomed to the "feel" of his car when making the quick stops usual in such service, and on the next shift receives a car with a low percentage. I think that he would have some excuse for failing to stop his car on the crossing, or even for failing to avoid a collision, owing to the lower percentage requiring a much quicker application of air than the last car he was handling. Or vice versa, would he not have some excuse for piling his passengers into the front end of the car, or skidding wheels, if the car he has just taken over has a higher percentage than the one he had before? Then in train operation an unequal percentage is liable to cause a surging between cars, to the discomfort of passengers, and causing unnecessary strains upon the draft gear, which has not the assistance of spring vestibule buffers to steady it, as in steam road equipment.

Therefore, with a standard type of air equipment and trucks, by adjusting the distance between the push-rod holes and tie-bar holes in the cylinder levers, the total leverage ratio can be adjusted to give a standard percentage of the light weight of the car, at least within reasonable limits. For all equipments having the same design of trucks, and assuming a certain maximum application of air pressure, a curve graph, such as shown in the accompanying figure, can be readily plotted, from which, as soon as any car has been weighed, the position of the tie-bar holes in the cylinder levers can be at once determined for any desired leverage ratio. In the chart herewith shown, which is for a city equipment, the dotted line gives the locations of the hole at ½-in. intervals. For instance, with the hole at 9½ in., the total percentage would be between 95 and 100 (theoretically) on all cars weighing between 45,500 lb. and 41,500 lb., if the truck levers are correctly proportioned.

Similar graphs can be easily prepared for other equipments, so that whenever a car has been lightweighed its leverage can be at once checked.

On city equipments adjustments within ½-in. limits are sufficient, as there are two or three causes which contribute to variations in the total percentage, and make closer adjustments impracticable. In the first place, the "straight air" equipment general on city cars gives maximum cylinder pressure varying with the pressure in the main reservoir, between the limits of cutting in and out the air compressor, which is usually about 30 per cent of the lower limit. Again the proportion of loading to light weight is greater on city than on interurban cars. Another cause which may appreciably offset the total light weight is found when steel wheels or tires are used in the variation in weight due to turning them. The principal cause, due to variation of air pressure, could be minimized by raising the reservoir pressure, and supplying the air through a pressure reducing valve and a small equalizing reservoir, but the necessity for this additional equipment hardly warrants the added expense.

On interurban cars where automatic air-brake equipment is generally used, with the addition of automatic slack adjusters, the application pressure in the brake cylinders is practically constant. Variations due to loading are usually less, excepting perhaps on express or baggage cars, because of the greater weight per passenger of interurban equipments; and the proportion of wheel weights to the whole is less. It is, therefore, practicable to make a much closer adjustment of leverage, to within the limits of ¼ in., or even ⅛ in. if heavy equipments are in use, and in charts for such cases the dotted line may not be quite so useful.



GRAPH FOR DETERMINING AIR BRAKE LEVERAGES

The use of such charts as these assumes, of course, that care is taken to keep all the truck levers standard as to their proportions, and to some extent their angular relations to each other when shoes are on the wheels. On some types of trucks, the short end of the lever, particularly the "dead" levers is such that wear of 1/16 in. in the pin holes may seriously unbalance the shoe pressures on the opposite pairs of wheels, disturbing the total leverage ratio, and increasing the tendency of certain pairs of wheels to lock and skid. This can be largely avoided by the use of case-hardened bushings in the pin holes.

In this connection, some well-known designs of trucks are faulty, in the writer's opinion, in that the "dead"

levers are allowed to rest against stops which move with the compression of the truck springs so that the length of that arm of the lever is constantly changing. The result is that the shoe pressures are unbalanced, frequently enough to cause locking of the wheels. Of course, theoretically, even this may be of advantage on one truck, depending upon the direction in which the car is moving, but in practice the results are more often troublesome than otherwise.

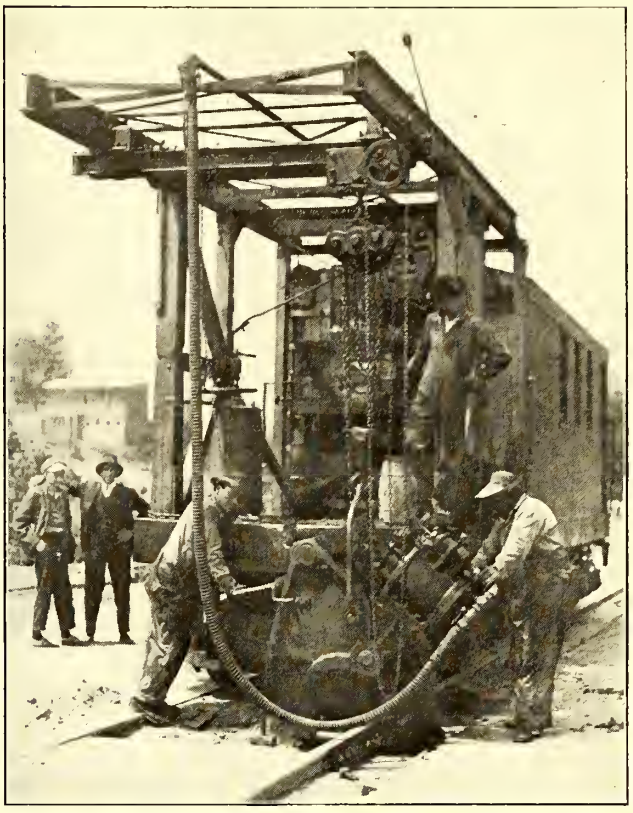
Electric Railway Track Construction in Paved Streets

BY THOMAS W. BLINN
Formerly Assistant Engineer Maintenance of Way Northern Ohio Traction & Light Company, Akron, Ohio, Now With Solvay Process Company, Syracuse, N. Y.

It has been the experience of the Northern Ohio Traction & Light Company, in track construction laid in paved city streets, that the most approved types of rail section, track fastenings and steel ties, with concrete base, are necessary to withstand the extra heavy loads resulting from increased traffic, owing to heavy modern types of cars as well as of motor vehicles.

The standard roadbed installed on this company's new track extensions and renewals in the cities of Akron and Canton, Ohio, calls for 7-in. 95-lb. high T-rail, Lorain Steel Company's section No. 400, 60 ft. long, with Carnegie steel ties, section M-25, 7 ft. long, 4¼ in. high. This high T-rail, the company claims, is a vast improvement over the girder rail, such as the 73-291 section. The T-rail, when taken from the mill, is rolled with the proper distribution of metal, whereas the girder rail breaks more easily and the fracture shows improper metal distribution, which is possibly due to improper rolling. As to wear, the ball of the girder rail is worn away by the flange of the car wheels and finally allows the car wheels to strike the tread, causing the rail to bend inwardly, throwing the track out of gage and necessitating the spacing of the tie rods closer together. The T-rail does away with this improper wear and depreciation, and allows the flange of the wheel to wear away the head without necessarily affecting the gage of the track.

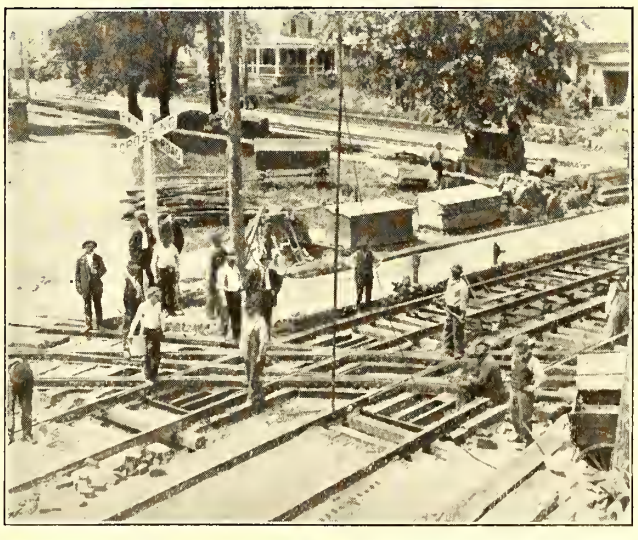
The only argument in favor of the girder rail is its possible use for vehicular traffic. Teamsters and drivers claim that this treadway provides a smooth means of travel for the wagon wheels and affords easier access to and egress from tracks on paved city streets. This argument is uncalled for because, in the first place, the tracks are not for vehicular traffic, and should not afford encouragement in that line; secondly, by the use of proper nose-block and good grouting the same condition can be obtained with the T-rail.



RIVETING RAIL JOINTS BY COMPRESSED AIR AT 115 TONS PRESSURE

In the new work in Akron and Canton provision is made for joint expansion or contraction, each rail being butted in close, forming a unit construction. The rail joints are riveted with 1 3/16-in. x 5¼-in. cone-shaped rivets, by means of an electrically-driven compressed air machine, at 115 tons pressure, as shown in an accompanying illustration. Under favorable conditions a joint of six holes can be riveted in about six minutes, averaging one rivet per minute. The company's standard calls for staggered joints in all track work. Instead of using the Carnegie steel ties at the

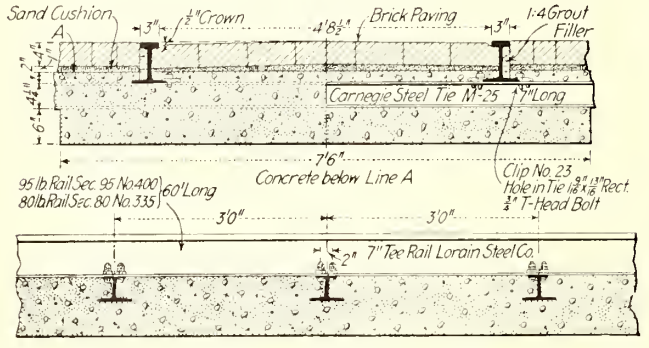
COMPLICATED SPECIAL-WORK LAYOUT AT BUSY STREET INTERSECTION IN AKRON



SPECIAL WORK AT INTERSECTION OF DOUBLE TRACK ELECTRIC LINE WITH CROSSING POINTS OF TWO STEAM RAILROAD LINES

joints, a steel twin tie manufactured by the International Steel Tie Company, Cleveland, Ohio, is used. The company places 6 in. of concrete under ties, concreting from within 5 in. from the top of the rail, and allowing 1-in. sand cushion, ½-in. crown and 4-in. Metropolitan paving block, with nose brick at the inside of the rail, and 1 to 4 cement grouting next to the rail. The joint grilling is 2½-in. x 5-in. x 5-in. standard with 1¼-in. holes. Track centers for double track are 10 ft. apart. Paving is laid in the devil strip between rails and 18 in. outside of tracks.

The view on page 371 of a seven-eighth grand union gives a comprehensive idea of the magnitude and extent of trackage, and general layout required at this busy street intersection, where two main trunk lines meet. This installation is at South Main and Exchange Streets, Akron, Ohio. The special work was built by the Cleveland Frog & Crossing Company, Cleveland, Ohio, and 7-in. 140-lb. guard rail is used. The layout has a hard center solid manganese center construction. Switches and mates are the standard length, 13 ft. 6 in. In order to get proper car clearances here, the track centers were built 11 ft. apart at each end of the special work, not affecting materially the general layout of the tracks. The spacing of the 1¼-in. holes in the joint drillings was 2½ in., 4 in., 4 in. For bonds, one ⅞-in. hole was drilled 4½ in. from the end of rail,



LONGITUDINAL AND CROSS-SECTIONS OF TYPICAL TRACK CONSTRUCTION IN AKRON, SECTIONS TAKEN BETWEEN JOINTS

in line with the splice drilling, but soldered terminal bonds were actually used throughout the track work. The flat terminals were soldered to the rail after the contact area was prepared by grinding. Heat was applied by a blow torch. The 7-in. high T-rail had sufficient area on the top of the rail base for bonding, and this afforded easy access for the grinding machine. Bonds were 24 in., 30 in. or 36 in. long, depending upon the weight of rail and the drillings in the joints. The company used 30-in. bonds for 80-lb. rails and 36-in. bonds for 95-lb. rails. On this piece of special work the bonding was installed through as well as around the layout, connecting each piece of special work to the copper cable which links around the special work and linking each joint in the special work, as in straight-away track construction.

Under railroad crossings a light 56-lb. or 50-lb. scrap rail was connected to each track, thus forming a good, permanent bond.

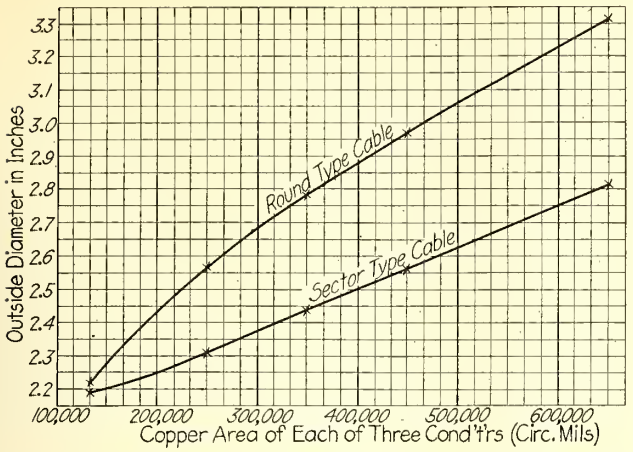
The special work described above was installed in eleven working days under traffic in both directions. The entire work, including paving, bonding and overhead work, was completed in eighteen days. A Kent Machine Company's continuous concrete mixer was used, as shown on the tracks in the upper right-hand corner. The average was 60 ft. per hour per single track. A 1:3:5 mixture of Universal Portland cement, washed sand and gravel was used. Wood ties were placed under the special work, the total depth to the subgrade being 19 in. The base was a 6-in. layer of concrete, a 1-in. sand cushion was placed upon it, and the paving was of 4-in. Metropolitan brick. Other materials used at this intersection alone included more than 77,000 paving bricks, 896 No. 1 white oak ties (128 used for sleepers), nine kegs of track spikes, 422 tons of gravel, 287 tons of sand, 1958 bags of cement for the base, and 218 bags of cement for pavers.

Owing to the crossing of two steam tracks over the double-track electric line, a complicated system of frogs was necessitated, as shown in a second view on page 371. Here the intersection of the Baltimore & Ohio Railroad with the Akron-Barberton & Belt Line Railway comes in the devil strip of the double-track electric line on East Exchange Street, Akron. The rail section here is 100-lb. A. S. C. E., with 2½-in.-5-in.-5-in. joint drilling. This special work of hard center solid manganese construction was built on a heavy steel underframe, furnished by the International Steel Tie Company, Cleveland, Ohio. About 10 in. of crushed No. 3 limestone was tamped under the frame. The frame was concreted in three parts before placing it in position. The whole was concreted up to the top of the rail and welded with strips of soft metal to the special work with a welding machine manufactured by the Indianapolis Switch & Frog Company, shown to the right in the crossing illustration. The use of a heavy steel underframe welded to the special work is more or less a matter of experiment with this company, but it is expected to stand up against the heavy traffic and peculiar special work layout which is necessary at this locality.

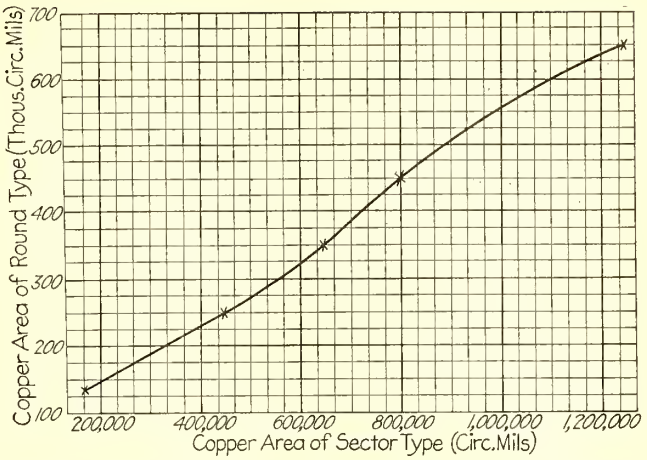
Electric Interurbans in Spain

According to the *Elektrische Kraft und Betriebe*, fifteen of the interurban electric railways in Spain, which include the greater part of the lines of this description and which aggregate a single-track mileage of 183 miles, are of 1 meter gage. One of these railways, running from Pampeluna to Sanguesa, 11 miles, is operated by single-phase current at 6000 volts and 25 cycles; all the others use continuous current at 500-600 volts, with the exception of the 26-mile Viga-Mondariz line, which is still under construction and which will use direct current at 1200 volts. Another line under construction which will use direct current at the same pressure is the Barcelona-Sabadel-Tarasa line. Three lines running out of Bilbma, totaling 50 miles, will use the d.c. 500-600-volt system. Of ordinary electric railways the Gergal-Santa Fé-Mondigur ore-hauling line near Almeria is the only one in use. This three-phase regenerative system was described in the ELECTRIC RAILWAY JOURNAL of Aug. 15, 1914. A more important long distance line, whose electrification was under consideration just before the outbreak of the war, is that which connects Huelva with the famous Rio Tinto copper mines; this line, devoted almost exclusively to the transportation of ore, is 50 miles long and has a gage of 1.30 meters (4 ft. 3 in.). For its operation it is intended to use three-phase current at 3000 volts and 50 cycles; the locomotives are fitted with two motors of 600 hp. each.

A commission nominated by the Spanish government is at present occupied with a scheme for a steam and express electric line from Madrid to the French frontier, the termination of which will probably be at the new Somport tunnel which passes through the Pyrenee Mountains.



SECTOR CABLE—RELATION BETWEEN DIAMETERS OF ROUND-TYPE AND SECTOR CABLES, OF SAME AREA AND EQUIVALENT INSULATION THICKNESS

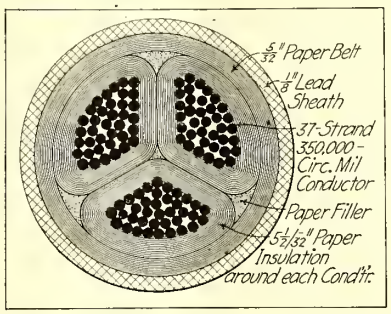


SECTOR CABLE—RELATION OF CONDUCTOR AREAS OF ROUND-TYPE AND SECTOR CABLES, OF SAME DIAMETER AND INSULATION THICKNESS

Sector or "Clover Leaf" Cable

Sector cable is rapidly coming into use partly to increase duct capacity. For equal copper temperatures and conductor cross-sections a sector cable will carry greater loads than one of the round conductor type because it affords better transmission of heat from conductors to sheath.

Based on equal rises in copper temperature and equal diameters, the currents which sector cable and round-conductor type can carry are approximately in the ratio of the corresponding cross-sections. For instance, a 2.5-in. round-conductor cable having a conductor cross-section of 250,000 circ. mils has about five-ninths the current-carrying capacity of a 2.5-in. sector cable which has a cross-section of 450,000 circ. mils.

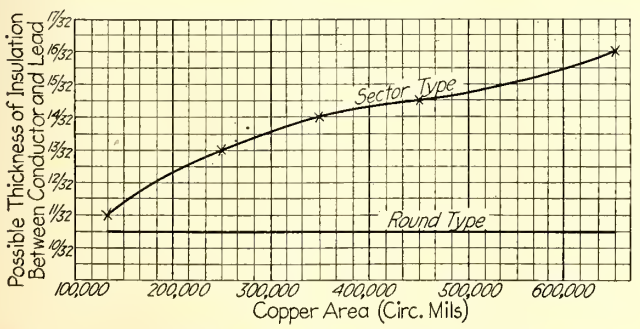


SECTOR CABLE—SECTION SHOWING RELATION OF INSULATION, CONDUCTORS AND SHEATH

As to cost, sector cable is slightly less expensive than round-conductor in sizes from No. 000 B. & S. gage up, owing to the small quantities of material required. The difference in price becomes more marked with the larger sizes, but is not in direct proportion to the difference in amounts of materials used, as the fabrication of sector cable is much more difficult than that of the round-conductor type. However, for the same carrying capacity sector cable is considerably cheaper. When armored cable must be employed, the sector-conductor type has the additional advantages of requiring less armoring material and possessing a larger percentage of conductor cross-section than unarmored cable.

Other comparisons are shown by the accompanying curves. One indicates the relative outside diameters of round-conductor and sector cables having the same copper areas and thickness of insulation. Another shows the increased copper area which can be made available in a given diameter and with a definite insulation thickness by substituting sector cable for the round-conductor type. A third diagram indicates the amount by which the insulation thickness may be increased without altering the conductor cross-section or increasing the outside diameter by using sector cable instead of round-conductor cable.

All of the comparisons are based on round-conductor cable insulated for 6600 volts, that probably being the type most commonly required by central station companies. For lighter insulation walls the advantages of sector cable become more marked, while for heavier walls the reverse is true. With ordinary wall thickness sector cable possesses no practical advantages for sizes smaller than No. 000, because the theoretical gain which can be shown for cable as small as No. 00 is offset by the practical difficulties which are met in attempting to maintain the sector shape of the conductors when the cable is being formed.



SECTOR CABLE—RELATION OF INSULATION THICKNESS, CONDUCTOR TO SHEATH, IN ROUND-TYPE AND SECTOR CABLES, OF SAME DIAMETER AND CONDUCTOR AREA

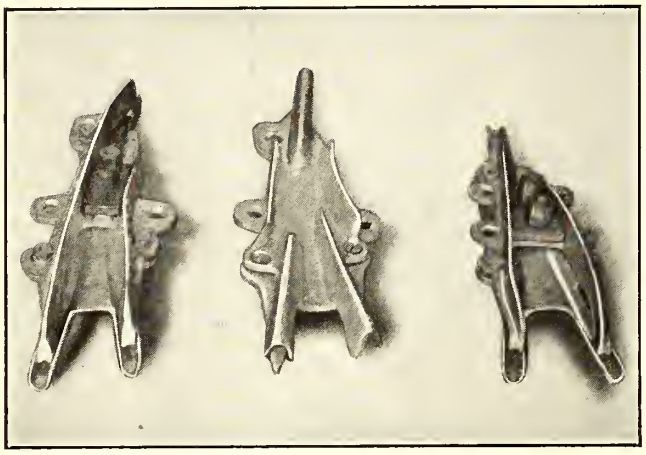
Proposed Tramway Extensions for Rome, Italy

The administration of the Municipal Tramways, Rome, Italy, is drafting a broad scheme of tramway extensions and street improvements conjointly, which is to be undertaken when the whole of the city's network is under municipal control. Ten new lines are to be built, and the administration plans to construct underground tramway lines of moderate depth which will represent an intermediary stage between the existing surface systems and the deep tube line of the future, which must be constructed when the population of the city amounts to 1,000,000. The provisional moderate depth underground lines are, it is stated, an actual necessity, owing to the daily growing congestion of the traffic in the streets of the city. The ten new lines projected are to be constructed gradually, preference being given to radial trunk lines and the most active traffic routes. The total length of the new lines projected is about 1300 miles.

Trolley Frog with Renewable Switch Pan

James C. Barr, Boston, Mass., states that the Elwell Q-17 frog, shown in the accompanying illustrations, is now used exclusively by the Bay State Street Railway as far as new purchases are concerned. The company has had the frogs in use about two years.

The frog consists essentially of a permanent frog bridge to which a renewable switch pan is bolted. Both main parts are ordinarily of malleable iron, but can be



LEFT-HAND, RIGHT-HAND (INVERTED) AND "V" FROGS

made of bronze if desired. The weight, complete with nuts, bolts and washers, is about 9½ lb. The frog is 18½ in. long over all, either right-hand or left-hand style.

The frog bridge is installed with permanent guy wires, and it is designed strong enough to bear all line tension without buckling. The switch pan can be replaced in sixty seconds, as the removal and replacement of only three bolts is involved in renewing the pan. This operation takes the place of the older one, involving disturbance of guy wires and trolley wires and frog alignment, which required from thirty minutes to three hours.

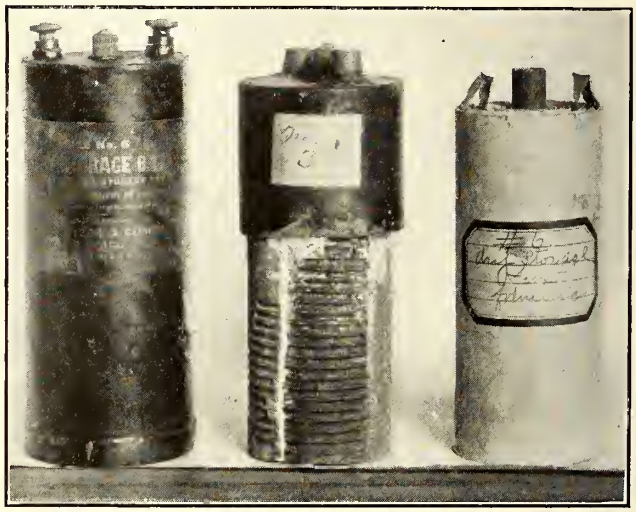
FROGS INSTALLED IN LYNN, MASS.

Among other advantages claimed for this frog are the following: The cost of renewal is low, less than one-half that of a new frog, as the renewable pan performs all switching duty, while the total saving in maintenance cost is said to be 75 per cent. No clamping devices are required to hold the trolley wires in the grooves in the pan, as they are snapped under strong jaws and remain in permanent tension and alignment.

The illustrations give details of construction of the frog. One shows, from left to right, the left-hand frog, the right-hand frog (inverted) and the V frog. The other is taken from a photograph of two left-hand frogs installed at Central Square, Lynn, Mass., near the Boston & Maine viaduct. On account of the location near the viaduct the height above the rail is but from 15 ft. to 16 ft., imposing hard service on the frog. The nearer frog in the picture passes about 500 cars in twenty-four hours and its switch-pan life is about eight months. Cars pass this frog with controllers on the first few notches and with consequent heavy draft of current.

Storage Battery Substitute for Dry Cell

A dry storage battery of practically the same size as the standard No. 6 dry cell has recently been put on the market by S. S. Stolp, Chicago, sole sales agent for J. P. Mentzer & Company, also of Chicago. Unlike the ordinary storage battery, this one contains a non-flowing electrolyte in a cylindrical cell made of a paper fiber which is proof against water, acids and electrolysis, and is unbreakable. In the center of the cell is a tube to supply water to prevent drying out. This tube also serves as a gas vent and as a means of taking up the changes in volume of the electrolyte during charge and discharge. The positive and negative elements are made from rolled



VIEW OF DRY STORAGE BATTERY COMPLETE, PLATE CONSTRUCTION AND PARTLY FORMED ELEMENT

strips of corrugated lead, and the electrolyte is an amorphous, non-crystallizing, white substance which is said to possess exceptionally high absorbing power. Tests have shown that the battery can be recharged an indefinite number of times at a lower price per charge than the original cost of the ordinary dry cell. The rating of the battery is ½ amp. for forty hours, 1 amp. for eighteen hours, 2 amp. for eight hours, or 3 amp. for five hours, and the average discharge potential is 2 volts. The manufacturers recommend this dry storage battery as a substitute for the dry cell in the bell and buzzer signal systems for street railway cars. The complete cell, plate construction and partly formed element are shown in the accompanying illustration.

As a precaution against fire the Louisville & Southern Indiana Traction Company, New Albany, Ind., has installed a 10-hp. d.c. motor, which drives the various wood shop tools, in a glass case. This inclosure not only accomplishes its purpose but protects the motor from accumulations of dust and permits visual inspections to be made while the motor is in service. The glass case is inexpensive, yet at the same time meets the requirements of insurance inspectors.

NEWS OF ELECTRIC RAILWAYS

NEW YORK TESTIMONY PILING UP

Committee Delves Into Finances of a Decade Ago—Statement by President Williams of the B. R. T.

The record of testimony in the Thompson investigation is appalling. The committee has dragged its weary way lately through the maze of the negotiations attending the planning and execution of the contracts for the subways now under construction. Even now there exist in some quarters the same wide differences of opinion in regard to the contracts that voiced themselves during the negotiations. In consequence of some of the testimony offered before the committee, Comptroller Prendergast, the only member of the Board of Estimate of New York now in office who voted for the contracts, issued a statement on Feb. 12 in which he said that he felt it his duty to raise his voice against the storm of misconception, and in some cases malicious representation. In this connection he said:

"With a single notorious exception, there has not been a single statement made during the last week regarding these contracts which was not a matter of public discussion and record months before the contracts were signed and the subject of the most active contention during the six weeks immediately preceding the signing of these contracts. The objections made then are exactly the same things that have now been 'discovered' by the Thompson committee. If the record shows anything at all, it shows conclusively that every one of those objections to the contracts was beaten down in argument. The almost general public approbation with which the signing of the contracts was received is all the evidence that is required in substantiation of this statement.

"I now want to refer to one notorious matter which has been brought out by Mr. Colby; that is, the alleged collusive arrangement said to be a part of the contract for third-tracking the elevated railroads. It has been maintained that the percentage of profit to be allowed the contractor would represent something near $2,000,000. It has been testified before the committee that Mr. Shonts, president of the Interborough Rapid Transit Company, told a former director of the railroad that it was necessary to make this arrangement in order that certain commitments and obligations might be taken care of. A story of this kind naturally arouses curiosity of a serious character regarding the nature of these commitments and obligations.

"It is to be regretted that upon the publication of this charge Mr. Shonts did not immediately demand a hearing before the committee for the purpose of meeting the charge and explaining it thoroughly. Personally, and as an official, I hope the committee will sift this transaction to the very bottom. It will deserve commendation for disclosing the real truth.

"This much must be understood now, however. The city had nothing to do with making that contract for the third-tracking. The work was to be done by the railroad with its own money, the city not contributing a dollar."

On Feb. 10 the New York *Times* published a story to the effect that the directors of the Brooklyn Rapid Transit Company had voted a honorarium of $100,000 to President T. S. Williams of the company in appreciation of his work in connection with the subway contracts. Mr. Williams promptly issued a statement in which he said:

"While it is of no public concern, the Brooklyn Rapid Transit Company (not the New York Municipal Railway Corporation) did show its acknowledgment of my services by paying me the sum of $100,000, given, as the report of a committee of the directors states, 'in recognition of his unusual services and time spent in negotiations with the city relative to the subway contracts.' This payment was not solicited or suggested by me. It was the voluntary and appreciative act of the directors.

"I suppose the Thompson committee will in due time take up the matter of all our expenditures under the city contracts and also the city's expenditures, and we shall be glad to give them full information. Our record is as clean as a hound's tooth. There has not been a dollar of graft. Supervision of our plans, contracts and accounts by the city has cost the joint enterprise probably not less than $1,000,000 extra money, and when our part of the total cost is compared with the city's we are the ones who have the greatest cause for complaint."

On Feb. 10 H. M. Fisher, secretary of the Interborough Rapid Transit Company, was questioned in regard to the history of the company. He was taken very briefly over much of the ground covered by the Public Service Commission in its investigation of traction finances in New York made almost a decade ago. He was also questioned in regard to the Interborough-Metropolitan Company and its successor, the Interborough Consolidated Corporation. Mr. Fisher said that the Interborough-Metropolitan Company had paid dividends at the rate of 5 per cent per annum for about a year and a half, the last payment being made in July, 1907. The Interborough Consolidated Corporation had been organized to conform the nominal capital of the Interborough-Metropolitan Company "to the present condition of its assets and thus enable the stockholders of the Interborough-Metropolitan Company to participate justly in its recurring annual surplus profits, which previously were not divisible."

On Feb. 11 Senator Thompson read a letter from John C. Wilson, who wrote that for fifteen years he had held 2700 of the 11,872 shares of stock of the Interborough Company not owned by the Interborough Consolidated Corporation. Mr. Fisher regarded Mr. Wilson as a chronic kicker. In his letter Mr. Wilson said:

"I have long believed that the directors have taken advantage of their position to make personal profits for themselves and their friends through the payment of unnecessary and excessive salaries, bonuses, commissions, etc., and I have endeavored to the best of my ability to expose and thwart them."

On the same day Chairman Straus of the Public Service Commission said:

"The public may rest assured that the present Public Service Commission will see that the cost of construction of the dual system will not be padded by improper or extravagant items of any character. Under the contracts no items can be capitalized until they have been formally acted on here. If any payments have been made not warranted by the findings of the commission no part of them will be charged up against the city.

Mayor Mitchel had this to say on the bonus subject:

"In so far as the bonuses, if paid, as alleged, either now or an attempt be made to add them to the construction cost of the subways, the city should and will oppose by whatever means it has. Beyond that I cannot say what the city will do, because I do not know anything about it personally."

Regarding Senator Thompson's effort to reach J. P. Morgan by cable in Europe, members of Morgan & Company were quoted as saying:

"Senator Thompson's message is surprising in view of the fact that upon Mr. Morgan's departure, a member of the firm, in reply to the chairman's inquiry, explained fully to him that the exact date of Mr. Morgan's return was indefinite, owing to the extent of business matters that he was obliged to cover. Mr. Morgan, it will be remembered, appeared as a witness before the committee several weeks ago, and at that time he expressed a desire to serve the committee in any way that he could. His trip to Europe was planned as long ago as last November."

Recapitulation of the testimony before the committee shows that in the five years since the subway negotiations became acute, and largely on account of these negotiations and the resulting contracts, the Interborough Rapid Transit Company and the New York Railways spent nearly $3,500,-

000 on counsel. Special payments in this time totaled $316,-032. In addition the Interborough Company paid to its legal staff at $300,000 a year $1,500,000, the New York Railways paid its staff $260,000 a year or $1,300,000. The New York & Queens County Railway paid its staff $25,272 a year or $126,360. Richard Reid Rogers was paid $30,000 a year or $150,000 for the five years, with a bonus of $50,000, making the total payment to him $200,000 and the grand total of payments $3,442,392.

Theodore P. Shonts, president of the Interborough Rapid Transit Company, was the witness on Feb. 17. He was questioned at length in regard to his previous railroad connections, his remuneration in his various positions and the bonus of $150,000 voted to him by the directors and recorded in the minutes as "for services of an extraordinary character and of great value to the company." Mr. Shonts explained that this was "for duties outside of those for which I was originally employed to perform, $125,000 at one time and $25,000 at another." Most of Mr. Shonts' investments were in Interborough-Metropolitan stock, of which he said that "I bought more than I had a right to." Mr. Shonts also told about the conference on subway matters that he had with the late Mayor Gaynor at the latter's farm at St. James, Long Island. As a result the Mayor had two engineers go over the subway data and report to him, after which the Mayor's attitude changed and the company had a fair hearing. It was explained that the retainer of $17,500 paid to ex-Comptroller Grout of New York was in connection with expert information supplied in regard to the finances of the city, its debt limit and its ability to meet the obligations which the rapid transit contracts would impose.

PACIFIC ELECTRIC IMPROVEMENTS PROPOSED

Work to Commence Soon on Improvements Which Are to Cost Several Millions

The Pacific Electric Railway, Los Angeles, Cal., will begin construction work this spring on improvements that will cost several million dollars, chief among which are car shops to be erected at the new industrial townsite of Torrance, about 10 miles south of the city, for the joint use of the company and the Southern Pacific Railroad. The plant will cover a site of 125 acres. The buildings will be mostly of steel frame construction and will be so designed as to provide for the construction of all future cars for the electric line. It is rumored that with the completion of the plant the Southern Pacific will abandon its shops at other places and will confine its field of manufacturing activities to Torrance.

The Pacific Electric Railway's present shops on East Seventh Street, Los Angeles, handle repair work only and provide storage facilities. They are to be vacated to make way for a new $10,000,000 market terminal. Here new switches and spurs of a total length of about 2 miles are to be constructed to serve the many warehouses of the terminal company and freight depots for incoming and outgoing produce.

The abandonment of these structures will necessitate the construction of new carhouses and storage tracks, and instead of having one large central station for the housing of nearly all cars from all divisions, as at present, arrangements have been made to provide separate stations for each division. They will be located at Covina Junction for the eastern division, which includes lines to San Bernardino, Pasadena, Alhambra, Sierra Madre and Covina; at Vineyard Station for the western division, including lines to Venice, Santa Monica, Sawtelle, Beverly and Redondo Beach, and at Sixth and Alameda Streets, Los Angeles, for the southern division, including lines to Long Beach, Whittier, Santa Ana, Balboa Beach and San Pedro. The total capacity of these will be several thousand cars.

In addition to these improvements the company has recently contracted with the city to construct tracks to serve municipal docks and warehouses at San Pedro harbor. It is also preparing to reconstruct a number of bridges, repair track damaged by the recent floods, eliminate grade crossings at Rose Hill, and, as previously reported in the Electric Railway Journal, build an elevated line along Sixth Street, to cost $166,000, and rearrange tracks and build umbrella sheds at its Hill Street station.

$375,000 IN EQUIPMENT ORDERED

Lehigh Valley Transit Company Orders Fifteen Cars, Signals and Generating Equipment

Orders for new equipment to cost $375,000 have been placed within the past few days by the Lehigh Valley Transit Company, Allentown, Pa. Following the installation of this material, a number of changes will be made which include the possibility of the operation of three-car trains on the Philadelphia Division and the guarding of every mile of track operated by the company with the automatic signals.

Included in the equipment order are twelve 52-ft., all-steel, center-entrance limited cars for use on the Philadelphia Division, to be made by the Southern Car Company, High Point, N. C. This will provide a total of twenty-four limited cars for travel on the Liberty Bell Route. An order has also been placed for three additional all-steel cars for use in the Easton-Bethlehem-Allentown limited service.

To provide sufficient generating capacity in the Allentown power station for the rapidly growing railway and commercial load, an order has been placed with the Westinghouse Electric & Manufacturing Company for a 10,000-kva. turbine, the largest yet installed on the property. This will give a total available rating of about 30,000 kva. The same company will also supply about six 60-cycle rotary converters to enable the standardization at 60 cycles of all substations except those on the Philadelphia Division. Two new 25-cycle substations will be erected on the latter division, on the Lehigh Mountain, near Allentown, and at Quakertown.

Orders have also been placed with the Nachod Signal Company, Louisville, Ky., for complete automatic signal equipment covering every line of the company not heretofore equipped with the automatic devices. These include the local lines in Allentown, Bethlehem, Macungie line, the Nazareth, Easton and Egypt lines.

For some time past surveys have been in progress looking toward the double-tracking of the line between Bethlehem and Easton, and when this work is completed practically the entire system between Allentown and Easton will be double track. As soon as permission has been granted by the Public Service Commission, work will also be started on the change of location of the tracks just west of Easton, where at present the line crosses the railroad tracks on a trestle. It is planned to have the tracks pass under the railroad, thus eliminating a dangerous curve and an 8 per cent grade.

IMPROVEMENTS TO GALESBURG PLANT DECIDED

The Galesburg Railway, Lighting & Power Company, Galesburg, Ill., proposes completely to rebuild the boiler room end of its plant, and will install a row of boilers facing the present boilers. This will mean widening the boiler room about 24 ft. This year the company will install two 500-hp. Stirling type boilers with stokers, and put in coal and ash handling apparatus with coal bunkers to take care of approximately 1000 tons of coal, a 250-ft. concrete stack 14 ft. at the top, and two 2500-hp. feedwater heaters, and other auxiliary equipment. This will give the company a most modern boiler plant. In the engine room the company will install an 800-kw. direct-current, engine-driven railway unit. The engine will be of the Corliss type, non-condensing, to be used for steam heat load in the winter.

CONSTRUCTION MATERIAL WANTED

The L. A. Wells Construction Company, 34 Wade Building, Cleveland, Ohio, is in the market for 2300 tons of steel rails and connections, soft-wood ties, 35-ft. poles, trolley and high-tension wire, special work for overhead construction, copper bonds, six 50-ft. cars and electrical apparatus for power house and substation. The company is also prepared to receive figures on grading, approximately 250,000 yd. The material mentioned is to be used in constructing and equipping 23 miles of electric railway to be built from Fort Scott, Kan., to Mulberry, Kan. Work is to start as soon as the weather will permit.

The road will be known as the Fort Scott & Pittsburg Railway. It was first projected in 1912. The company is represented in Fort Scott by H. A. Cooper, with offices in the Redfield Building.

STATUS OF WILKES-BARRE INJUNCTION

The Wilkes-Barre (Pa.) Railway has issued the following statement in regard to the injunction in the strike case pending there:

"In view of the confusion that seems to have arisen as to the statement that the case of the Wilkes-Barre Railway against the Amalgamated Association of Street Railway Employees, Local No. 164, et al., has been continued until March 10, it is announced that this date refers solely to the equity division of the action, or that section of the prayer that asks for damages. The court procedure allows the defendants thirty days in which to file an answer to a complaint, with such extension of time as may be agreed on by counsel or directed by court. It is this procedure that leads to the consideration of the question of damages being postponed until March 10.

"In the matter of the continuation of the injunction itself the only postponement is that necessary for the proper transcription of the record. This, it is assumed, will be a matter of two or three weeks, after which, upon argument, the question at issue will go to the court.

"Inasmuch as a number of inquiries were made of the officials of the Wilkes-Barre Railway as to their opinion of the failure of the defendants to offer evidence, the company states that in view of the fact that the matter is now before the court any comment would be improper and in bad taste."

SENATE VOTES FOR OWNERSHIP INQUIRY

Joint Investigation of Government Ownership and Operation of Public Utilities Proposed

The Senate on Feb. 15, by a vote of thirty-nine to twenty-two, adopted an amendment directing a joint committee of the House and Senate to investigate government ownership and operation of all public utilities engaged in interstate commerce. The amendment was added to the joint resolution presented by Mr. Newlands of Nevada, chairman of the committee on interstate commerce, providing for a joint committee of five members from each house to make a sweeping investigation of traffic conditions along the lines suggested in President Wilson's address convening Congress. The resolution itself, to which the amendment was added, did not reach a vote. The amendment adopted reads, as an addition to the instructions of the proposed joint committee:

"Also the subject of government ownership of all public utilities, such as telegraph, telephone, express companies, and railroads engaged in interstate and foreign commerce, and report as to the wisdom or feasibility of government ownership of such utilities and as to the comparative worth and efficiency of government regulation and control as compared with government ownership and operation."

Senator Borah of Idaho earnestly advocated the amendment providing for an investigation of government ownership of railroads. He said that in the event that government regulation and control are found to be breaking down, government ownership was bound to be one of the great questions before the country. Senator Borah said the war in Europe had done more to emphasize the question of government ownership than could have been accomplished in a normal way in fifty years. He referred to Germany as the greatest example of efficiency and organization, where public utilities are largely government-owned, and pointed out that England and France have been compelled to take gigantic strides in the same direction as a measure of safety in this war. He expressed the opinion that after the war neither country will move back to its original status. Senator Borah said the proposal to investigate the subject was wholly educational in intent, and he believed the American people, as well as the Congress, would be better equipped to meet the question if all the facts were gathered.

The resolution and the amendment have since been passed.

In an interview which he gave last October Senator Borah expressed the opinion that regulation was not satisfactory to the public or to the owners of the properties. A summary of his remarks made at that time was published in the issue of the ELECTRIC RAILWAY JOURNAL of Oct. 30, 1915, page 923.

NEW MOVE IN TOLEDO INVENTORY CASE

Attorneys for the Toledo Railways & Light Company, Toledo, Ohio, have notified the Ohio Public Utilities Commission that no inventory and appraisal of its property will be filed with that body, because the law does not give it authority to issue a blanket order that all public utility corporations shall furnish this information. The order, known as No. 176, was issued about two years ago by former members of the commission who claimed to have the authority under the public utility law.

Representatives of the city of Toledo have been protesting against the action of the commission in allowing the company an extension of time in which to file its inventory and appraisal. The city never made a formal complaint with the commission, but has been depending upon this blanket order. The company does not deny that the commission has authority to make a specific order, after the city has filed a complaint and indicated the lines along which it desires the valuation, together with its purpose in making the complaint, but attorneys for the city indicated to the commission that there is no intention of filing such a complaint. The matter has been referred to Attorney General E. C. Turner for an opinion.

GEARY STREET CASE DECIDED

A decision of the Supreme Court at San Francisco, handed down on Feb. 9, upholds the contention of the United Railroads that the city of San Francisco, Cal., in refusing to stop the operation of certain Geary Street cars on lower Market Street and the ferry loop is acting illegally. The court granted the appeal of the United Railroads for a writ of mandate to compel the lower court to cite Mayor Rolph, the members of the Board of Works, and Thomas A. Cashin, superintendent of the municipal lines.

The city based its contention on the claim that the injunction granted the United Railroads, ordering the city to stop operation of its cars, was "mandatory" instead of prohibitive, and inasmuch as an appeal automatically holds up the operation of a mandatory injunction, the city's attorneys contended that the Mayor and other officials were not guilty of contempt in the continuance of the car service.

The decision of the Supreme Court was written by Justice Henshaw and concurred in by four other judges. The effect of the decision, it is affirmed, will be to put the Mayor and other city officials in contempt of court if they continue to operate the cars, and the United Railroads' attorneys will be enabled to demand a contempt citation for the city officials if the operation of the cars in question is not discontinued.

DECISION FAVORABLE TO COMPANY IN BALTIMORE PAVING CASE

In the case brought against the United Railways & Electric Company, Baltimore, Md., in regard to the paving obligations of the company, the Court of Appeals of Maryland on Feb. 10 held that the company is not required to do any paving, but merely to keep its tracks in repair once the paving is done. The decision was rendered in a suit of the city to collect $22,450 for a special section of paving. In the decision the court says that the company received no special benefits from the paving improvements, and that it would be just as reasonable to assess owners of automobiles or other vehicles using the streets for paving costs as to make the street railway pay for them.

On Feb. 11 City Solictor Field of Baltimore announced that he would advise Mayor Preston to take the paving case to the Supreme Court of the United States. He is quoted in part as follows:

"If we should not succeed there (in the Supreme Court) then, it seems to me, if there is no other way in which we can compel the company to make its proper contribution to the public burdens, that the city should get ready to exercise its option to take over the lines of the old Baltimore City Passenger Railway, which are the cream of the system. The city has the right to take this property over at recurring periods of fifteen years. The next opportunity will be in 1919."

PRESIDENT PELLISSIER TESTIFIES

Hearings in the arbitration case of the Holyoke (Mass.) Street Railway were continued during the week ended Feb. 19. President L. D. Pellissier presented financial data pertaining to the company's operations. The witness said that for several years prior to 1912, surpluses amounting to about $10,000 had been earned, but that of late money has had to be taken from the surplus to pay the 8 per cent dividends until recently declared. The company's stock had declined in value and had recently been offered for sale at less than par. There were 371 stockholders, of whom 192 were women. The average increase in wages of regular employees since 1907 had been 30.5 per cent, whereas the increased cost of this labor to the company, owing to a shorter working day, had been 37 per cent. Since 1912 the increased cost to the company had been 18 per cent, and in the last three years the hours of labor had been reduced at least thirty minutes a day. More open cars with glass fronts had been put on to protect the motormen, and the accommodations for the men at the carhouses had been improved with recreation and locker rooms. About $15,000 had been paid by the company in the last three years for accident insurance for the men. The increase in work had been small. The average daily collection per conductor in 1915 was $20.70 against $19.60 in 1912, a gain of twenty-two fares and an average of 0.6 more transfers. For every dollar of added revenue obtained by the company the motormen and conductors received 32 cents.

Carhouse and Fifteen Cars Destroyed.—The carhouse of the Chambersburg, Greencastle & Waynesboro Street Railway at Waynesboro, Pa., together with fifteen of the company's cars, was burned in a spectacular blaze on Feb. 15. The loss is placed at $50,000, and only four cars remain.

New Offices Occupied in Washington.—The general offices of the Washington Railway & Electric Company, Washington, D. C., for many years located at Fourteenth and East Capitol Streets, have been moved to its new building adjoining the Potomac Electric Company Building, Fourteenth and C Streets, Northwest.

Chicago Traction Commissioners Sign Contract.—William Barclay Parsons, Robert Ridgway and Bion J. Arnold, the engineers selected to investigate and recommend a solution of Chicago's local transportation problem, signed contracts with the city on Feb. 14, 1916. Immediately following this official act, the commission organized with Mr. Parsons as chairman, and decided to call itself the "Chicago Traction & Subway Commission." Chairman Parsons announced that the first public hearing would be held on Feb. 16.

Commissioner Sanders Favors New Construction.—Street Railway Commissioner Fielder Sanders told the street railway committee of the City Council of Cleveland on Feb. 14 that the ordinance, authorizing the Cleveland Railway to relay 25 miles of track this year should be passed. Councilmen Stolte and Meyers opposed the company's plan of relaying 10 miles of track on Broadway and Cedar Avenue. Commissioner Sanders said that track improvement should receive attention to the exclusion of the construction of new division houses and shops.

Montgomery Traction Must Pay.—The United States Circuit Court of Appeals has affirmed the decision of the District Court that the contract of the Montgomery Light & Traction Company with the Montgomery Light & Water Power Company, operated by Henry L. Doherty & Company, is valid. This constitutes a precedent in establishing the validity of a continuing contract when damages cannot be definitely ascertained. This contract called for the Doherty Company to furnish current to the Montgomery Light & Traction Company, and for four years prior to the suit this has been done. Nearly $100,000 was involved in addition to the validity of the contract, and since the time the suit was filed another $100,000 has accrued.

New York Commission to Move to Equitable Building.—The Public Service Commission of the First District of New York has decided to rent the twenty-fourth and twenty-fifth floors in the Equitable Building, New York City, and the seventeenth floor of the City Investing Building for $110,000 a year, giving up quarters in the Tribune Building, the Woolworth Building and the Immigrant Bank Building, which quarters now cost the commission $122,000 a year. The working staff of the commission is now housed in three buildings. The commission is to get 2000 sq. ft. more office space than it is renting now, with more light and better service. The commission will begin moving from its present quarters on April 1.

Friendly Suit to Enjoin Subway Work in Cleveland.—A friendly suit was filed in the Common Pleas Court of Cuyahoga County, Ohio, on Feb. 11 to enjoin the County Commissioners from selling bonds to secure funds to build subway approaches to the new Superior-Detroit bridge across the Cuyahoga River in Cleveland. The prosecuting attorney filed the suit. The petition charges that the vote of the people on building a county bridge did not authorize the commissioners to issue bonds for building a subway; that the commissioners are without power to modify the plans for approaches; that they have no authority to spend money for subways in Superior Avenue, a city street, and that the proposed subway approaches cannot legally be considered as approaches.

Writ of Review Asked in Seattle Case.—Ralph S. Pierce, assistant corporation counsel of the city of Seattle, Wash., has petitioned the Thurston County Superior Court at Olympia for a writ of review of the order recently made by the Public Service Commission denying the appeal of the city of Seattle for the dismissal of the petition of the Puget Sound Traction, Light & Power Company to be relieved of certain of its franchise obligations. Mr. Pierce argues that the power of the Public Service Commission with respect to relieving the company of any of its franchise obligations is limited to the fixing of rates on a proper showing that the company is not making a sufficient return on its investment. If the writ of review is granted, the case of the company in which it sought relief from paving obligations will be transferred to Thurston County for argument.

Tacoma Falls Back on Privately-Owned Power Company.—The municipally-owned hydro-electric plant of Tacoma, Wash., has finally had to rely upon a private power company for protection against emergencies and periods of low water. The city has made a contract with the Tacoma Railway & Power Company providing for the interchange of electric energy, the company agreeing to furnish as much as 10,000 hp. when required to supplement the output of the municipal plant. In addition to this contract the company has been granted a franchise permitting it to serve power business in Tacoma direct from its lines, and also receives certain concessions in its street railway franchises. Following the failure of a proposed company to build a steam heating plant and provide a steam auxiliary for the city's water power, the city officials adopted a program of co-operation with the Railway & Power interests.

Acting on the Hydro-Radial Railway By-Laws.—Two municipalities, Waterloo and St. Mary's, have failed so far to pass the third readings by the Council of the hydro-radial by-laws passed by the people. At a prolonged session of the Waterloo Town Council on Feb. 8 the motion to give the third reading to the by-laws was defeated by a vote of five to four. The majority of the councilors were not satisfied with the assurances received from Sir Adam Beck that the route to be selected through Berlin and Waterloo would be satisfactory to both municipalities. It is quite likely a conference will be held with regard to St. Mary's, as the town solicitor fears the hydro-radial debentures will exceed the borrowing power set forth in the municipal act. The Hydro-Electric Power Commission of Ontario has hitherto regarded hydro debentures exempt, and still thinks so. Should it be necessary, special legislation will be asked, amending the hydro-radial act. Blanchard Township, which defeated the by-law last January, has decided to resubmit it to the vote of the electorate on March 13. The City Council of Toronto has passed the recommendation of the Board of Control, requesting Sir Adam Beck to seek an amendment of the hydro-electric railway act, 1914, to make it clear that the city has complete control of all its streets excepting such as were given for the right-of-way for the proposed hydro-radial line.

Financial and Corporate

SECURITIES HELD BY U. S. BANKS

Public Utility Bond Holdings Increase 13.7 per Cent and Railroad Bond Holdings 1.74 per Cent for Year Ended June 30, 1915

The report of the Comptroller of the Currency for the year ended June 30, 1915, shows that the amount of public utility bonds held by banks in the United States increased 13.7 per cent, while the holdings in railroad bonds increased only 1.74 per cent. This showing compares with a 19.0 decrease in public utility bonds and a 9.4 increase in railroad bonds in 1914, and a 19.5 increase in public utility bonds and a 6.2 per cent decrease in railroad bonds in 1913. The net change in 1915 from the 1912 figures is an increase of 10.0 per cent for public utility bonds and an increase of 4.4 per cent for railroad bonds.

The various classes of securities held by the banks of the country and the changes for the last year are shown in the following table (in millions):

Class	June 23, 1915	June 30, 1914	Increase	Per Cent Increase
United States	$811.2	$823.5	*$12.3	*1.50
State, county and municipal	1,494.0	1,353.4	140.6	10.37
Railroad	1,704.6	1,675.3	29.3	1.74
Public utility	663.9	583.9	80.0	13.70
Unclassified bonds, stocks, etc.	1,208.2	1,148.8	59.4	5.17
Total	$5,881.9	$5,584.9	$297.0	5.32

*Decrease.

It will be observed that holdings of United States bonds decreased and that investments by the banks in state, county and municipal bonds showed the largest increase in amount and the second in percentage of gain, the first place in percentage of increase being held by public utility bonds, which were second in amount of increase.

The following table (in millions) shows the various classes of securities held by the several classes of reporting banks on June 23, 1915:

Classification	State Banks (14,598)	Mutual Savings Banks (630)	Stock Savings Banks (1,529)	Private Banks (1,036)	Loan and Trust Companies (1,664)	National Banks (7,605)
United States.	$2.8	$17.0	$5.5	$0.3	$2.1	$783.5
State, county and municipal	101.7	848.6	54.3	3.7	241.2	244.5
Railroad	81.2	818.5	21.1	3.5	401.1	379.2
Public utility..	66.7	109.2	34.1	1.2	232.4	220.3
Other bonds, stocks, warrants, etc....	168.0	76.5	43.3	6.6	472.8	440.9
Total	$420.4	$1,869.8	$158.3	$15.3	$1,349.6	$2,068.4

The most striking changes in holdings were made by savings banks and national banks. The savings banks, mutual and stock combined, showed the largest increase in holdings of public utility bonds, adding $54,800,000 of such securities during the year while at the same time reducing their railroad issues by $20,000,000. National banks, on the other hand, increased their railroad holdings by $37,500,000, but added only $2,100,000 of public utility bonds. This showing was quite the reverse of that made in the preceding year, when the savings banks decreased their public utility holdings by $46,800,000 but increased their railroad issues by $38,100,000, while the national banks added $20,800,000 of public utility bonds and dropped $3,500,000 of railroad bonds.

State banks showed an increase of $15,900,000 in public utility bonds and $4,600,000 in railroad bonds, as compared to a decrease of $2,100,000 and an increase of $11,100,000 respectively in the preceding year, while trust companies, which in 1914 cut off $109,600,000 of public utility bonds and bought $98,100,000 more railroad bonds, increased their holdings in both issues for 1915 by $7,700,000 and $5,800,000 respectively. All classes of banks showed increase in their holdings of state, county and municipal bonds, the approximate gains being $68,500,000 for national banks, $40,000,000 for trust companies, $31,000,000 for savings banks and $11,000,000 for state banks.

ANNUAL REPORTS

The J. G. Brill Company

The sales value of the combined output for the calendar year 1915 of all the plants owned and operated by The J. G. Brill Company, Philadelphia, Pa., amounted to $4,403,117, as compared to $9,154,434 in 1913 and $4,903,511 in 1914. In only two other years, 1908 and 1909, did the sales fall below the point reached this year. It is said that the general business of electric car and truck manufacturing reached a condition of depression during 1915 that was without parallel in the history of the industry. The company obtained at least its full share of all orders placed during the year, but the prices resulting from the competition brought about by such conditons were of necessity extremely low. The general conditions in the company's field began to improve during the latter part of the year, and the improvement is said to be continuing and increasing, so that 1916 is begun under much more hopeful conditions. On Feb. 5, 1916, the combined orders of the company and its subsidiaries amounted to $4,765,985, as compared to $1,147,100 of work on hand on Feb. 6, 1915.

The operation of the plants of the company for 1915 resulted in a combined profit of $280,299, after charging against earnings the sum of $174,897 for all maintenance and repairs to the property. From this amount of profit there was set aside into the reserves for depreciation an amount of $163,973, so that the net profit amounted to $116,326. After making certain adjustments in the surplus account and paying dividends of $183,200, the net surplus at the end of the year totaled $1,247,982.

The management was able during the year to obtain orders for the manufacture of material for export as a result of existing conditions in Europe, such exports including principally motor-transport bodies and shell forgings. Many delays, however, unavoidable as far as the company was concerned, prevented the completion of a large measure of the shell orders, with the result that much of the profit which it was hoped would be realized thereon in 1915 was not earned in that year. An extension of the time of delivery well into the present year has been granted.

Interborough Consolidated Corporation

The income statement of the Interborough Consolidated Corporation, New York City, for the seven months ended Dec. 31, 1915 (the portion of its fiscal year since its formation to readjust the Interborough-Metropolitan Company on June 1, 1915), follows:

Surplus, June 1, 1915, exclusive of dividend accruals on Interborough Rapid Transit Company stock	$2,084,474
Dividends on Interborough Rapid Transit Company stock	$4,239,100
Interest and dividends on securities owned	24,095
Interest on loans, bank balances, etc.	33,656
Profit realized on securities sold	147,977
Total income	$4,444,828
Total surplus and income	$6,529,302
Interest, taxes, administration and general expense, sinking fund, etc.	2,436,890
Surplus available for dividends	$4,092,412
Dividends on preferred stock	2,058,322
Net surplus	$2,034,090
Appropriation for retirement of $200,000 of Interborough-Metropolitan ten-year 6 per cent collateral gold notes	200,000
Surplus balance Dec. 31, 1915	$1,834,090

The statement of income and disbursements as shown above covers seven months' operation. During this period three quarterly dividends of 1½ per cent each were declared upon the preferred stock of the Interborough Consolidated Corporation, whereas the income account shows full dividends received upon the Interborough Rapid Transit Company capital stock for only six months. The income for the period is therefore $847,820 less than it would have been under regular conditions of accounting for a full nine months' period. The administration and general expenses for the seven months include costs and expenses incidental to the consolidation agreement of April 23, 1915, amounting to approximately $116,000, by which amount they are in excess of the ordinary expenses of administration.

In regard to the subsidiary companies it is said that the surplus from operations of the Interborough Rapid Transit Company for the six months ended Dec. 31, 1915, was $3,899,153, an increase of $209,198 over the same period last year. The increase in surplus for December was $179,276, and for October, November and December $380,141. The improvement in traffic began in October, and each subsequent month showed a substantial increase over the previous month, indicating a return to normal business conditions. The net corporate income of the New York Railways for the five months ended Nov. 30, 1915 (December not yet available) increased $141,788 over the same period last year. The revival of business was reflected in increased earnings beginning with September, and this improvement has continued without evidence of abatement. The earnings of the New York Transportation Company have increased at a substantial rate during the last year, justifying the expectation that at some no distant day a distribution of dividends can be made on these shares.

Prolonged negotiations are said to have resulted in the acquisition by the New York Railways of substantially all of the claims outstanding against the receivers of the New York City Railway and Metropolitan Street Railway. There remains unadjudicated the question of allowances to the various receivers, counsel and others who claim the right to be paid out of the funds in the hands of the court. In view of this situation an application has been made to the United States District Court for the discharge of the receivers and the release of funds now held by them, reserving therefrom an amount sufficient to cover outstanding claims until they can be purchased or adjudicated by the court.

New York State Railways

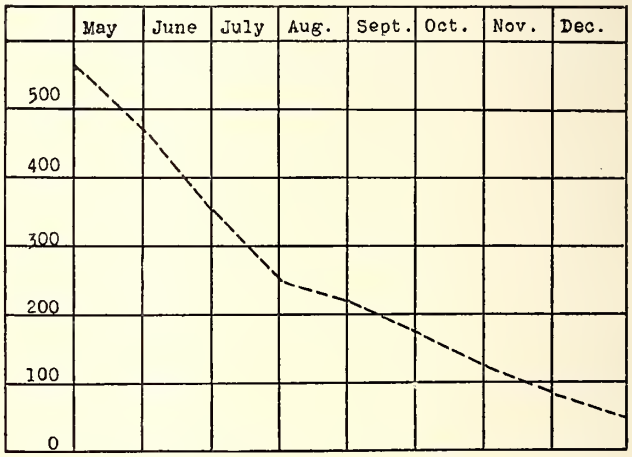
The statement of income, profit and loss of the New York State Railways, Rochester, N. Y., for the year ended Dec. 31, 1915, combined with that previously published for the preceding fiscal year, follows:

	1915	1914
Earnings from operation	$7,264,674	$7,595,001
Expenses of operation (including depreciation)	4,487,270	4,600,572
Net earnings from railroad operation	$2,777,404	$2,994,429
Taxes	456,577	496,659
Net earnings	$2,320,827	$2,497,770
Net non-operating revenues	166,903	165,466
Gross income	$2,487,730	$2,663,236
Income deductions (interest and rentals)	1,389,119	1,355,466
Net income	$1,098,611	$1,307,770
Schenectady Railway Surplus—New York State Railways proportion 50 per cent.	*15,162	18,992
Ontario Light & Traction Company surplus—New York State Railways proportion 100 per cent.	7,090	2,453
Total income applicable to dividends	$1,090,539	$1,329,215
Dividends preferred stock, 5 per cent.	193,125	193,125
	$897,414	$1,136,090
Dividends common stock	797,880	997,350
Balance	$99,534	$138,740

*Deficit.

The 1915 annual report of the company does not contain any comparative data for 1914, but a reference to the above figures inserted from the 1914 report will show the exact meaning of the statement in a sheet supplement of the 1915 report to the effect that the gross and net earnings for the last year were materially affected by jitney competition and by the general business depression. The earnings from operation decreased $330,327 or 4.3 per cent, while the expenses of operation (including depreciation) decreased $113,302 or 2.4 per cent, so that the net earnings from railway operation showed a loss of $217,025 or 7.2 per cent. Taxes, however, fell off $40,082 or 8.0 per cent, with a slight increase of $1,437 or 0.8 per cent in net non-operating revenues, so that the gross income showed a decline of $175,506 or 6.6 per cent. The income deductions (interest and rentals) increased $33,653 or 2.4 per cent, with the result that the net income of the company decreased $209,159 or 15.9 per cent. The New York State Railways 50 per cent proportion of the Schenectady Railway's surplus fell off from a surplus of $18,992 to a deficit of $15,162, but its 100 per cent proportion of the Ontario Light & Traction Company's surplus increased from a surplus of $2,453 to a surplus of $7,090, so that the total income applicable to dividends was diminished by $238,676 or 17.9 per cent. The 5 per cent preferred dividends were maintained, but the 1914 common stock dividend of 5 per cent was cut in 1915 to 4 per cent, and the surplus amounted to $99,534, as compared to $138,740 in 1914.

In regard to jitney competition and the outlook for the future, the supplement to the report contains some explicit and interesting data. The jitneys operated in Rochester during May exceeded 550, but since that time the number has been continually decreasing, until during January, 1916, the number in operation varied from thirty to forty, or less than 8 per cent of the total number operated in May. The accompanying illustration shows very clearly the decline in the jitney movement during the year. During the last two months of 1915 the gross and net earnings of the company were greater than in any November and December in its history, this being the result of the decline in jitney competition and of the revival in general business. The



GRAPH SHOWING DECLINE OF JITNEYS IN ROCHESTER

following comparative summary of operations for the two months referred to shows clearly that much better conditions existed during these months than during the year as a whole and indicates more reasonably what is to be expected as the lines continue to operate under more normal business conditions and with freedom from unfair competition:

	Amount	Increase	Per Cent Increase
Earnings from operation	$1,332,222	$103,043	8.38
Expenses of operation	779,767	45,462	6.19
Net earnings from railroad operation	$552,455	$57,581	11.64
Taxes	75,399	*5,764	*7.10
Net earnings	$477,056	$63,345	15.31
Net non-operating revenues	33,039	*442	*1.32
Gross income	$510,095	$62,903	14.07
Income deductions	229,649	*1,724	0.75
Balance available for dividends.	$280,446	$64,627	29.94

*Decrease.

The previously mentioned deficit on the part of the Schenectady Railway may be partly attributed to the decline in earnings from operation, which at $1,178,215 represented a decline of $126,088 or 9.6 per cent. The expenses of operation, however, totaled $762,211, a decrease of $71,161 or 8.5 per cent, and the net earnings of $416,003 from railway operation showed a loss of $54,928 or 11.7 per cent. The increase of $6,510 or 7.6 per cent in the total of $91,313 for taxes was heightened by the drop in net non-operating revenues from a surplus of $5,683 to a deficit of $51, and after a slight increase in income deductions, the net income at $215,674 showed a loss of $68,311 or 24.0 per cent, as compared to the preceding year. Dividends were maintained at the usual rate of 6 per cent, with the result that the year showed a deficit of $30,325, as compared to a surplus of $37,985 for the preceding year.

During 1915 the earnings from operation of the Ontario Light & Traction Company, Canandaigua, N. Y., totaled $59,825, a gain of $5,845 or 10.8 per cent, while the expenses of operation were $37,429, an increase of $829 or 2.2 per cent,

leaving net earnings from operation of $22,396, an increase of $5,016 or 28.8 per cent. Taxes and uncollectible bills increased from $2,678 to $3,833, net non-operating revenues from $5,288 to $6,624, and income deductions from $17,472 to $18,096, so that the net income amounted to $7,090, as compared to $2,453 for 1914.

KANSAS CITY PROPERTIES SOLD

Judge Hook Confirms Sales and Kansas City Railways Holds First Meeting

Acting for the reorganization committee of the Kansas City Railway & Light Company, Clyde Taylor has purchased at receivers' sale the Metropolitan Street Railway properties for $3,600,000, the Kansas City Elevated Railway for $150,000, and the Kansas City & West Port Belt Railway for $100,000. Unspecified assets were also purchased for the sum of $10,000. Mr. Taylor also purchased the Kansas City Electric Light Company for $400,000, and this will be turned over to the Kansas City Electric Light & Power Company, the newly organized operating company for the electric light properties.

The first meeting of the Kansas City Railways was held on Feb. 15. Philip J. Kealy was elected director and president, succeeding John M. Egan. The meeting followed the confirmation, in the federal court, by Judge William C. Hook, of the sales of the various properties before noted. Mr. Kealy has also been made general manager of the light company, pending the election of a general manager, and he is to handle the details of separating this company from the street railway. He succeeds Louis H. Egan. There has been no meeting of the new light company.

The proceedings in the federal court were brief, and without objection, the form of decree and the forms of the various securities and conveyances being approved by the various interests and the city. A special order of court was made providing that securities which had not been formally presented under the "plan" may yet be filed and participate, it being understood that further orders will be made if necessary so that all owning securities may be protected. Another special order provided that either receiver may sign certificates and other documents in the absence of the other, the one signature to be valid for both.

The confirmation of the sales puts the Kansas City Railways in charge of the railway properties. The receivers will continue for ninety days to receive claims and finish details. One of the first acts of the new company was the appointment of Richard J. Higgins, city counselor of Kansas City, Kan., as counsel for the company on the Kansas side. O. L. Miller, who has been counsel, will continue as associate.

ADJUSTMENT OF OHIO LEASES

Ohio Electric Railway Is Arranging Lease Changes to Lighten Earnings Charges

Previous issues of the ELECTRIC RAILWAY JOURNAL have contained references to the Cincinnati, Dayton & Toledo Traction Company, which has been under lease to the Ohio Electric Railway for about ten years. The Ohio Electric Railway operates the property on the basis of a rental sufficient to pay interest on $5,000,000 of bonds and dividends at the rate of 5 per cent on $250,000 of preferred stock and $2,000,000 of common stock. While the road operates an exceedingly good territory and secures large gross earnings per mile, it has never paid in net earnings the amount that the Ohio Electric Railway has paid out in rentals. This company, therefore, has endeavored to make a readjustment of the lease so that it could continue to operate the road without such enormous losses as it has been compelled to sustain up to this time.

Negotiations with the Cincinnati, Dayton & Toledo Traction Company are not yet completed. It is said, however, that an arrangement has been about completed by which the Ohio Electric Railway will continue to operate the line for a period of six months and thereafter unless cancellation is desired, and pay to the lessor the entire net earnings, which will in turn be applied to the interest on the underlying bonds amounting to $2,300,000, and then to other obligations of the road. A bondholders' protective committee has been formed to conserve the interests of the holders of the consolidated 5 per cent mortgage bonds, amounting to $2,700,000, and the agreement between the Ohio Electric Railway and the lessor is also joined in by this committee.

Application for a receiver for the Cincinnati, Dayton & Toledo Traction Company has been made by the holder of a $1,000 bond, but it is not anticipated that this will interfere with the carrying out of the arrangement proposed, particularly as the bondholders' committee has more than 60 per cent of the consolidated mortgage bonds in hand.

The Ohio Electric Railway has also arranged to readjust some of the leases with other properties which it operates, as, for example, the Dayton & Western Traction Company extending from Dayton, Ohio, to Richmond, Ind. A readjustment of the lease of this property has been effected by which the lessee instead of paying 5 per cent on the preferred and 6 per cent on the common stock will in the future pay 5 per cent on the preferred and 3 per cent on the common stock until the road earns a net sufficient to allow the payment of the additional 3 per cent on the common.

American Railways, Philadelphia, Pa.—The $2,300,000 of three-year 5 per cent secured notes of the American Railways, dated Feb. 1, 1916, referred to in the issue of the ELECTRIC RAILWAY JOURNAL of Feb. 5, page 287, were disposed of to Newburger, Henderson & Loeb and Bioren & Company, Philadelphia, Pa.

Androscoggin Electric Company, Portland, Me.—Maynard S. Bird & Company, Portland, Me., recently offered $140,500 of first and refunding mortgage 5 per cent gold bonds of 1914 of the Androscoggin Electric Company due on Oct. 1, 1934, without call privilege. The interest on this issue is payable in April and October at the office of the Union Safe Deposit & Trust Company, Portland. The bonds are to be in the denomination of $500 and $1,000. The Androscoggin Electric Company was incorporated in Maine on Oct. 26, 1914, and purchased the properties of the Lewiston & Auburn Electric Light Company and the Portland-Lewiston Interurban Railroad.

Ardmore (Okla.) Electric Railway.—The property of the Ardmore Electric Railway has been sold under foreclosure to Warren A. Craven, Milton, Iowa.

Brooklyn (N. Y.) Rapid Transit Company.—Eleven of the subsidiary companies of the Brooklyn Rapid Transit System recently held annual meetings. In the board of the New York Consolidated Railroad, which operates the elevated and subway lines, J. J. Dempsey, superintendent of transportation of the company, was elected a director to succeed John W. Weber, and Walter St. John Benedict was elected a director to succeed John Englis, deceased. The other directors were re-elected. In the Coney Island & Brooklyn Railroad directorate L. Van Cott, purchasing agent of the Brooklyn Rapid Transit Company, was elected to succeed John Hill Morgan, resigned. In the South Brooklyn Railway, A. R. Piper, Walter St. John Benedict, J. J. Dempsey, O. J. Covill and William Siebert were elected directors to succeed T. S. Williams, C. D. Meneely, N. F. Brady and H. C. Du Val, who retired from the board, and John Englis, deceased.

Cleburne (Tex.) Street Railway.—The Cleburne Street Railway has been purchased by F. C. Cotton, Denver, Col., and associates, from John W. Floore, former owner. The line is being overhauled by Daniel DeWitt, former manager of the company, who stated that he expected to have cars operating by Feb. 15. Cars have not been run for more than a year.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—The Ohio Public Utilities Commission on Feb. 9 authorized the Cleveland, Southwestern & Columbus Railway to purchase the Crestline plant of the Crawford County Gas & Electric Company for $16,920 and to issue $10,000 two-year and three-year notes as part payment.

Cleveland & Eastern Traction Company, Cleveland, Ohio.—The item published in the ELECTRIC RAILWAY JOURNAL of Jan. 29, page 233, in regard to the election of directors for the Cleveland & Eastern Traction Company was in error. The following are the directors: H. P. McIntosh, H. P. McIntosh, Jr., A. G. Tame, Horatio Ford, R. A. Harman, E. M.

Halle, E. W. Moore, A. M. Snyder and C. A. Brand. A. G. Tame, C. Brand, Horatio Ford and H. P. McIntosh, Jr., were not elected new members of the board. They have been directors for some time. The directors of the Cleveland & Chagrin Falls Railway are: H. P. McIntosh, H. P. McIntosh, Jr., Horatio Ford, R. A. Herman, E. W. Moore, W. H. Price and A. M. Snyder. Mr. Ford and Mr. McIntosh were not elected new members, as they have also been directors of the company for some time.

Fort Dodge, Des Moines & Southern Railroad, Boone, Iowa.—A quarterly dividend of 1¾ per cent was paid on Feb. 10, by the Fort Dodge, Des Moines & Southern Railroad on its $1,500,000 of preferred stock.

Havana Electric Railway, Light & Power Company, Havana, Cuba.—The Havana Electric Railway, Light & Power Company has called for payment the $2,000,000 of outstanding 6 per cent two-year secured notes, dated Sept. 1, 1914. They are to be paid at 100½ and interest on March 1, 1916, at the office of the Guaranty Trust Company, New York, trustee. It is stated that a part of the $4,000,000 of general mortgage 5 per cent bonds due on Sept. 1, 1954, heretofore pledged as collateral for the notes, is being sold to provide funds to pay off the notes.

Long Island Railroad, New York City.—The Public Service Commission for the Second District of New York has authorized the Long Island Railroad to issue $13,000,000 of 4 per cent ten-year gold debenture bonds at par to repay the Pennsylvania Railroad for advances made for improvements since 1909. Dick Brothers & Company, New York City, asked an adjournment of the case before the commission pending the determination of an action brought by them in the Supreme Court to separate the Pennsylvania Railroad and the Long Island Railroad, to secure an accounting by the directors of the Long Island Railroad for all money spent for improvements since 1901 and to cancel certain indebtedness for advances from the Pennsylcania Railroad. The commission states, however, that if Dick Brothers were really concerned over the issue of the present securities as affecting their equity suit, they should and undoubtedly would have obtained a restraining order from the court, as they had been informed of the case before the commission for the last year.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—The Railroad Commission of California has authorized the Los Angeles & San Diego Beach Railway to pledge $30,000 face value of its first mortgage 5½ per cent sinking-fund gold bonds as collateral security for a note to the Merchants' National Bank, San Diego, dated Nov. 5, 1914, for $21,000.

Middle West Utilities Company, Chicago, Ill.—The Illinois Trust & Savings Bank, Russell, Brewster & Company, McCoy & Company and N. W. Halsey & Company, Chicago, Ill., and A. H. Bickmore & Company and the William P. Bonbright Company, New York, are placing at 96⅝ to yield 6½ per cent a block of $4,500,000 of ten-year 6 per cent collateral gold bonds of the Middle West Utilities Company of 1915. The bonds are being issued to reimburse the treasury for improvements, additions, etc., and will retire all the outstanding three-year 6 per cent notes due on June 1, 1916, thus making the $6,500,000 of collateral trust 6 per cent notes the company's only funded obligation.

New York (N. Y.) Railways.—It was agreed on Feb. 15 that the interest on the 5 per cent adjustment mortgage bonds of the New York Railways for the six months ended Dec. 31 should be 3.2 per cent, a larger percentage than had been allowed for any previous six months' period. The payment for the first half of 1915 was 1.37 per cent, so that the return for the year will be 4.57 per cent, compared with 3.05 per cent paid in 1914. The earnings of the New York Railways are said to be improving and counting $4,000,000 to come shortly from the assets of the Metropolitan Street Railway, and $7,000,000 in real estate not used in operation, the ready cash assets amount to about $15,000,000. The first mortgage bonds outstanding are only $17,000,000.

Pittsburgh (Pa.) Railways.—The Colonial Trust Company, Pittsburgh, Pa., trustee for the issue, is offering at par and interest $200,000 of 5 per cent car trust gold bonds of the Consolidated Traction Company, to be dated April 1, 1916, and due $20,000 annually on April 1, 1917 to 1926, inclusive. The bonds are in the denomination of $1,000 and the interest is payable in April and October. The bonds are a first lien on twenty-five double-truck steel motor cars and twenty-five double-truck steel trailers costing $221,000, of which $21,000 is to be paid in cash.

Norton & Taunton Street Railway, Norton, Mass.—The property of the Norton & Taunton Street Railway was sold under foreclosure on Feb. 7 at Norton for $250,000 to the representative of the bondholders.

Public Service Corporation of New Jersey, Newark, N. J.—The Public Service Corporation of New Jersey has sold to Drexel & Company, $7,500,000 of three-year 5 per cent notes. The proceeds of the sale will be used to retire a similar amount of notes maturing on March 1.

DIVIDENDS DECLARED

Central Arkansas Railway & Light Company, Hot Springs, Ark., quarterly, 1¾ per cent, preferred.

Central Mississippi Valley Electric Properties, Keokuk, Iowa, quarterly, 1½ per cent, preferred.

Terre Haute Traction & Light Company, Terre Haute, Ind., 3 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE (LA.) ELECTRIC COMPANY

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$18,056	*$8,354	$9,702	$3,175	$6,527
1 "	"	'14	17,128	*9,524	7,604	2,052	5,552
12 "	"	'15	190,852	*108,204	82,648	26,947	55,701
12 "	"	'14	178,825	*114,279	64,546	25,023	39,523

CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.

1m.,	Dec.,	'15	$36,268	*$19,626	$16,642	$6,536	$10,106
1 "	"	'14	29,794	*18,778	11,016	6,694	4,322
12 "	"	'15	357,214	*206,428	150,786	79,172	71,614
12 "	"	'14	349,893	*211,119	138,774	77,579	61,195

COLUMBUS (GA.) ELECTRIC COMPANY

1m.,	Dec.,	'15	$70,227	*$26,866	$43,361	$28,677	$14,682
1 "	"	'14	59,937	*27,603	32,334	28,791	3,543
12 "	"	'15	721,217	*322,040	399,177	344,544	54,633
12 "	"	'14	681,606	*298,334	383,272	324,637	58,635

DALLAS (TEX.) ELECTRIC COMPANY

1m.,	Dec.,	'15	$168,163	*$101,577	$66,586	$35,861	‡$31,925
1 "	"	'14	186,415	*96,203	90,212	33,390	56,822
12 "	"	'15	1,828,488	*1,120,174	708,314	399,561	‡304,953
12 "	"	'14	2,208,879	*1,287,660	921,219	370,961	550,258

HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.

1m.,	Dec.,	'15	$26,888	*$12,091	$14,797	$5,522	$9,275
1 "	"	'14	21,486	*13,823	7,663	5,605	2,058
12 "	"	'15	276,661	*157,537	119,124	66,517	52,607
12 "	"	'14	276,633	*178,857	97,776	67,063	30,713

JACKSONVILLE (FLA.) TRACTION COMPANY

1m.,	Dec.,	'15	$53,618	*$36,772	$16,846	$14,736	$2,110
1 "	"	'14	56,142	*38,473	17,669	13,188	4,481
12 "	"	'15	611,568	*428,839	182,729	177,898	4,831
12 "	"	'14	715,255	*468,055	247,200	152,642	94,558

KEY WEST (FLA.) ELECTRIC COMPANY

1m.,	Dec.,	'15	$9,505	*$6,619	$2,886	$2,559	$327
1 "	"	'14	10,026	*7,324	2,702	2,636	66
12 "	"	'15	112,840	*82,040	30,800	30,595	205
12 "	"	'14	132,252	*86,654	45,598	30,666	14,932

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1m.,	Dec.,	'15	$28,944	*$15,691	$13,253	$7,438	$5,815
1 "	"	'14	29,461	*16,527	12,934	7,699	5,235
12 "	"	'15	289,155	*179,025	110,130	91,268	18,862
12 "	"	'14	303,515	*194,084	109,431	91,431	18,000

PENSACOLA (FLA.) ELECTRIC COMPANY

1m.,	Dec.,	'15	$23,935	*$13,008	$10,927	$6,883	$4,044
1 "	"	'14	20,107	*12,608	7,499	7,251	248
12 "	"	'15	258,042	*146,820	111,222	85,704	25,518
12 "	"	'14	264,840	*169,792	95,048	86,727	8,321

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m.,	Dec.,	'15	$699,702	*$414,998	$284,704	$182,417	$102,287
1 "	"	'14	717,550	*415,774	301,776	177,741	124,035
12 "	"	'15	7,559,583	*4,754,763	2,804,820	2,179,985	624,835
12 "	"	'14	8,450,974	*5,007,008	3,443,966	2,118,856	1,325,110

*Includes taxes. ‡Includes non-operating income.

Traffic and Transportation

PLAN TO ENCOURAGE THRIFT IN BROOKLYN

Scheme Under Consideration for Interest Payments on Savings and for Loans to the Needy

T. S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, announces in the *B. R. T. Monthly* for February that the company is studying plans for encouraging thrift among its employees. Mr. Williams has headed his statement "The Need for Thrift." He quotes at random statements of typical cases of need among employees taken from reports made to him by George W. Edwards, welfare administrator of the company, a man who himself rose from the ranks in Brooklyn and an unusually successful administrator, to whom the men turn instinctively for succor in their hour of trial. In concluding his statement Mr. Williams said in part:

"For the sake of our men and their families, as well as for the good of the railroad system, we want to assist all our workers to acquire the saving habit. Then when trouble comes, whether it be in the shape of serious accident, or prolonged illness, or loss, or financial sacrifice for others, the accumulated savings may at least tide us over the dark days and exempt us from that uncertain dependence upon charity against which every proud spirit rebels. And the consciousness of such a laid-by store is in itself a great factor in happiness and contentment—even though we never may be obliged to draw upon it.

"How practically and best to encourage thrift is a difficult problem, and before announcing our plan we are studying the question from every angle. Involving as such a plan does the principles of savings and loan associations the restrictions of law must be considered and observed. We hope before long to present the form of an organization which will broadly answer the purpose. But whatever plan is adopted will furnish principally a medium whereby savings may be deposited and invested, and whereby moderate loans in worthy cases can be facilitated at low rates of interest. The success of the undertaking, and the results which we wish it may produce, will depend upon the individual support which it gets from our men and the cultivation of the habit of thrift—whether through the use of such an agency or otherwise. And with, or without, a formal plan, the need for thrift is the impressive lesson of those pathetic paragraphs which I have quoted."

The welfare activities of the Brooklyn Rapid Transit Company have been referred to frequently in the past in the ELECTRIC RAILWAY JOURNAL. From small beginnings made many years ago the field of work along welfare lines has been extended from time to time until now it includes many different forms of activity, in some of which the company was a pioneer. These forms of activity are referred to by Mr. Williams in answering the question as to what the company is already doing to mitigate such cases of suffering as he quoted. In this connection he says:

"In the first place, and most important, we aim by good wages, reasonable hours and suitable depot and shop quarters to encourage comfortable and wholesome living. In the second place, we employ a staff of physicians, under direction of Dr. Gibson, to look after the health of employees. In the third place, we, through special committees and protective measures, seek to make conditions of employment reasonably safe against accident and to stimulate interest in avoidance of the physical risks which particularly attend our occupation. In the fourth place we assume a part of the burden of accident by making financial compensation for time lost, earning power diminished, and doctor's bills. In the fifth place we provide additionally, through the Benefit Association, for payments to members incapacitated by sickness or accident, and for moderate insurance to the family or next of kin in case of a member's death. In the sixth place we have established life insurance in the minimum amount of $1,000 for all our employees who wish to avail themselves of it—without medical examination and at probably the lowest premium rates for similar insurance afforded anywhere in the world. In the seventh place we have old age pensions for those who have worked long and faithfully, so that as they lay aside regular duty they continue to draw pay for past services."

THROUGH SERVICE PROVES PROFITABLE

Through high-speed service on the line of the Terre Haute, Indianapolis & Eastern Traction Company between Terre Haute and Indianapolis, Ind., has converted into highly profitable runs four of the poorest-paying limited runs operated between these points. Two regularly scheduled limited trains, one leaving Indianapolis at 9.30 a. m. and the other at 3.30 p. m., were selected for the west-bound trips, and one leaving Terre Haute at 10.30 a. m. and the other at 4.30 p. m. for the east-bound trips. It requires two hours and five minutes to make the 72-mile run between the two terminals, as compared with one hour and forty minutes, the best time made by the trains on the competitive steam road. The electric railway schedule includes three pasenger stops and eight service stops between the city limits of the two terminals, and street stops for passengers in both terminals. Taking everything into consideration this is considered about the fastest time made by an electric railway in Indiana.

Schedules were planned so that a business man could go to his office, open his mail, and later take a car to either Terre Haute or Indianapolis. At his destination he would have plenty of time to transact his business and return to Indianapolis or Terre Haute for dinner in the evening. Although these trains, as mentioned before, were unprofitable when run on a slower schedule and leaving the terminals during the light-traffic periods, they now earn 15 cents per car-mile more than the average of all the other limited runs. This service was begun on Nov. 7, 1915, and the average fare per passenger and per mile for these trains and the regular limited trains during the holidays are shown in the accompanying table. It must be borne in mind that these average fares are for four through trains as against eleven regular limited trains.

	Highlanders		Other Limiteds	
	Average Receipts per Car-mile, in Cents	Average Fare per Passenger, in Cents	Average Receipts per Car-mile, in Cents	Average Fare per Passenger, in Cents
Dec. 24	49	57	40	36
Dec. 25	74	72	73	43
Dec. 26	79	60	47	33
Dec. 27	78	59	64	42
Dec. 28	69	68	47	40
Dec. 29	49	64	39	44
Dec. 30	59	59	39	36
Dec. 31	62	69	53	35
Jan. 1	43	60	38	37
Jan. 2	72	64	50	39
Average of total	63.4	63.2	49.0	38.5

In connection with this service it is also interesting to note that the name selected was obtained in an advertised prize contest. The publicity gained through this medium has also proved of much value. More than 785 names were suggested. The name "Highlanders," which was selected, was considered appropriate because it is a translation to the English of Terre Haute, which means highland. The regular limited cars are used for this service. These cars seat fifty-six passengers and are provided with smoking and baggage compartments. The through service on this line has proved so profitable that the management contemplates extending the plan to several other lines. The installation of the service was referred to in the ELECTRIC RAILWAY JOURNAL of Nov. 20, 1915, page 1060.

COMMISSION FIXES CHICAGO & MILWAUKEE ELECTRIC RATES

The Railroad Commission of Wisconsin handed down a decision on Jan. 25 establishing a new basis of cash and ticket fares for the Chicago & Milwaukee Electric lines. These new rates, which will become effective on Feb. 25, provide for no change in the Milwaukee, Wis., city fare, which is 5 cents, but the rate charged for all tickets between the Milwaukee city limits and Wisconsin State line will be on a straight 2-cents-per-mile basis. Cash fares collected on the trains will also be based on 2 cents per mile,

but collections will be made in the next higher multiple of 5 cents. The order also provides for a $1 book containing 100 coupons which may be purchased by mail. This was required for the convenience of passengers originating at points were no ticket agents are maintained. These coupons will be acceptable in connection with cash, and make it unnecessary for conductors to carry pennies in change. The minimum fare for any ride is 5 cents.

In April, 1915, the railway received permission from the Wisconsin Railroad Commission and the Interstate Commerce Commission to increase rates on tickets to approximately 2 cents per mile and, at the same time, maintained the 5-cent zone system for cash fares. Application was also made to the Public Utilities Commission of Illinois, but no decision has been rendered. The Illinois commission expressed a willingness to authorize the change in rates permitted by the Wisconsin and the Federal commissions. The railroad company, however, also asked for relief from a number of franchise fare requirements, and as yet the Illinois commission has not rendered a decision covering all the points involved.

Under the 5-cent zone system with a 2-cents-per-mile rate for tickets, the average fare was approximately 1.8 cents per mile. If the new rates established by the recent decision of the Railroad Commission of Wisconsin are made to apply in both Wisconsin and Illinois, the minimum fare will be 2 cents per mile. As the situation now stands different rates of fares are charged in Wisconsin and Illinois, and for interstate trips. When negotiations now under way for an entrance into Chicago over the Northwestern Elevated Railway have been closed application will be made to the regulative bodies to authorize a readjustment of rates on a common basis.

More One-Man Cars for Everett.—The Everett Railway, Light & Water Company, Everett, Wash., has asked the Council for permission to operate one-man cars on the Bay Side-River Side line. Four such cars are already in service.

Express Service Approved.—The Illinois Public Utilities Commission on Feb. 8 announced the issuance of an order granting a certificate of convenience and necessity to the Centralia & Central City Traction Company, Centralia, Ill., permitting the company to operate an express service between Centralia and Central City.

Jitney Referendum Petition Short.—Charles M. Bryan, city attorney of Memphis, Tenn., holds that the petition presented in behalf of the Memphis Street Railway asking a referendum vote on the jitney franchise ordinances was short thirteen names and that an election could not therefore be ordered. The attorney for the railway stated that the issue would probably be taken to the courts.

Catering to the Night Hawk.—The International Railway, Buffalo, N. Y., has created a night-car schedule information bureau at its offices so that passengers using cars between 1 o'clock and 5 o'clock a. m. can call the company on the telephone and learn the exact time a car may be expected to pass a given corner. Most of the lines are now operating a half-hour service during the night.

Excellent Operating Record of Indianapolis-Seymour Line.—The railroad department of the Interstate Public Service Company, which operates an interurban electric railway between Indianapolis and Seymour, and was among the first companies to take up safety-first work, reports through James Harmon, its safety agent, that accidents in 1915 show a decrease of 51 per cent over 1914. The company employs seventy-eight trainmen, and of that number thirty-nine had no accidents during the year 1915.

Hearing in Hoboken 3-Cent Fare Application.—The Board of Public Utility Commissioners of New Jersey has been holding hearings in Jersey City on the application of the representatives of the city of Hoboken to require the company to operate there for a 3-cent fare., E. C. M. Rand, New York City, testified on Feb. 10 as to the value of the property of the company in Hoboken for the city, but on Feb. 11 most of his testimony was stricken from the record at the request of the city attorney, because some of the estimates of property value were not based on first-hand information. The hearing is to be continued on March 1, 2 and 3.

Jitneys Form Pleasure Club in Oakland.—To evade the ordinance recently passed in Oakland, Cal., prohibiting jitneys from operating in the downtown section of that city, the "Oakland Pleasure Club" has been formed and membership cards are issued to jitney passengers riding for the first time and must be shown thereafter when they pay the 5 cents "dues." The membership cards read as follows: "This is to certify that ..... has signed the roll of the Oakland Pleasure Club and is a member thereof. J. R. Sorenson, secretary-treasurer." On the reverse side of the card is printed: "Any member of this club may make arrangements with the business manager for the free use of a car for Sunday pleasure trips and special occasions by providing for the chauffeur's wages and supplies to be used on the trip. W. J. Mitchell, business manager." It is not expected that any action will be taken by the city until expert opinion is rendered by the city attorney.

Lockport to Reconsider One-Man Car Action.—Officers of the Buffalo local of the Amalgamated Association of Street & Electric Railway Employees appeared before the Lockport City Council and opposed any favorable action by the city on the one-man crew system on the Lockport local cars, in return for which the International Railway proposed to build a modern terminal station for the interurban lines. The proposition was recently lost in the Council by a vote of six to four, but the matter will be reconsidered. Two years ago the city adopted an ordinance requiring two men on every car, but the company secured an injunction, and the matter is pending in the courts. Officials of the company pointed to the fact that the members of the Lockport Board of Commerce say service in Lockport has never been more satisfactory than at present with the one-man system. New cars are being operated over all city lines on a frequent schedule and there is no cause for complaint.

East Boston Tunnel Tolls Abolished.—The 1-cent toll charge collected from each passenger in the East Boston tunnel of the Boston (Mass.) Elevated Railway was abolished on Feb. 7, following an appropriation by the City Council to meet in part the necessary interest and sinking fund charges from the tax levy, in accordance with an act of the Massachusetts Legislature of 1915. The act carried a referendum provision which resulted in an affirmative vote last fall, but owing to the failure of the Council to appropriate the necessary funds for the present year the abolition of the tolls was delayed. Minor disturbances arose at the beginning of the present year when the public found that the toll was still in effect, but the company's inability to abolish the tolls without the taking of the final step by the city was soon made clear to the patrons of the line, and little further trouble resulted. The elimination of the toll charge now places the East Boston district on a par with all other areas of Greater Boston enjoying the 5-cent fare and transfer priviliges furnished by the company.

Accidents in Rhode Island.—The report of the Public Utilities Commission of Rhode Island for the year ended Dec. 31 has been presented to the Legislature of that State. The total number of accidents reported to the commission was 1034, a decrease of 129 from the number reported the preceding year. In these accidents fifty-four persons were killed and 1084 were injured, a decrease of sixteen in the number killed and 231 in the number injured. Of the persons killed twenty-seven were reported by railroad companies, twenty-two by electric railway companies, four by electric lighting companies and one by a gas company. Of the persons injured 402 were reported by railroad companies, 563 by electric railway companies and 119 by various other utilities. The total number of passengers reported killed was three, two of whom were reported by electric railway companies and one by a railroad company. Seven employees were reported killed, none of whom was in the employ of an electric railway. The number of highway travelers killed was twenty-three, an increase of one over the preceding year, and the number of trespassers was nineteen, a decrease of nine. Of the highway travelers killed, three were by railroad companies, nineteen by electric railway companies, and one by an electric lighting company. With one exception, all trespassers killed were reported by railroad companies.

Personal Mention

Mr. A. A. Miller, who has been traffic manager of the Gary & Interurban Railway, Gary, Ind., since its organization, has resigned and will become associated with the Troy Trailer Company.

Mr. George W. Bacon of Ford, Bacon & Davis, New York City, has accepted an offer from J. P. Morgan & Company to give all of his time for the present to their export department in connection with their munitions work. This will not interfere with his interest in the Ford, Bacon & Davis firm, which he will retain.

Mr. Howard Walker, formerly district superintendent of the Ohio Service Company, has been appointed to the newly-created position of general superintendent of the company's properties in Ohio. Mr. Walker will have charge of operation of all the company's properties in the State of Ohio acting in a capacity as assistant to Mr. C. H. Howell, manager of the Ohio Service Company.

Mr. John I. Beggs has increased his interest in the Southern Wisconsin Power Company and the Wisconsin River Power Company, but his relations with the St. Louis Car Company, of which he is president and general manager, have not changed. Mr. Beggs is spending somewhat more time in Wisconsin than for a few years past, but continues to manage and closely to supervise the administration of the St. Louis Car Company.

Mr. W. W. Lowe, superintendent of transportation of the Cumberland & Westernport Electric Railway, Cumberland, Md., has been promoted to the construction department of the New York offices of the Doherty organization. His work will be particularly along traction lines and for the next six months his headquarters will be at Frostburg, Md., where he will be available for calls to other traction properties controlled by Doherty & Company. Mr. B. Waller Duncan, general manager, has taken over Mr. Lowe's duties as superintendent.

Mr. C. T. Chapman, for the last year traffic manager of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn., will on March 1, sever his connections with that company, which has reduced its trackage to about 45 miles through the termination of a lease with the Chicago Great Western Railroad. Mr. Chapman prior to becoming connected with the company at Minneapolis was traffic manager of the Inter-Urban Railway, at Des Moines, Iowa, for four years, and for a number of years prior to that held responsible positions with other electric and steam railroads.

Mr. J. H. Pardee, president of the J. G. White Management Corporation, which is managing the property of the Manila Electric Railroad & Light Corporation, is visiting Manila. On Dec. 23 Mr. Pardee was the principal guest at a dinner given in his honor by Mr. C. Nesbitt Duffy, vice-president and general manager of the lighting and railway company. About 140 residents of the city, prominent in its government and business affairs, were present, and addresses were made upon the Philippines from various standpoints. Mr. Pardee spoke upon "The Philippines from the Standpoint of the Investor." Later, during his visit in Manila, Mr. Pardee presented the American Electric Railway Association medal for the best paper before any company section to Mr. J. F. Bury, assistant superintendent of transportation, who won the medal in the 1915 competition.

Mr. D. P. Abercrombie, Jr., who has been elected vice-president and general manager of the Connecticut Valley Street Railway, the Northern Massachusetts Street Railway and the Concord, Maynard & Hudson Street Railway and is clerk and treasurer of the Massachusetts Consolidated Railways, Greenfield, Mass., completed his education at Phillips Exeter Academy, class of 1893, and at the Massachusetts Institute of Technology, class of 1897. He engaged in engineering and contracting from 1898 to 1901. From 1901 to 1905 he was clerk and treasurer of the Greenfield & Turners Falls Street Railway, Greenfield, Mass., and from 1903 to 1905 also was clerk and treasurer of the Greenfield, Deerfield & Northampton Street Railway. From 1905 to 1916 he was clerk of the Connecticut Valley Street Railway; from 1911 to 1916 clerk and treasurer of the Concord, Maynard & Hudson Street Railway, and from 1911 to 1916 clerk and treasurer of the Massachusetts Consolidated Railways.

Mr. A. D. McWhorter, whose appointment as superintendent of the overhead lines of the Memphis (Tenn.) Street Railway in addition to master mechanic was announced in the ELECTRIC RAILWAY JOURNAL of Feb. 12, was born in Madison, S. C., in June, 1877. He attended the public schools at Atlanta, Ga., and began his street railway career as a conductor on the Atlanta Railway when he was seventeen years old. Later he left the transportation department to become night car inspector in the repair shop. At the end of two years he was appointed night foreman, in which position he served for four years. In 1890 the Atlanta Railway and the Consolidated Strect Railway were merged and Mr. McWhorter was appointed general foreman of the repair shops. After about three years in this capacity he accepted a position with the Atlanta Rapid Transit as general foreman of the repair shop. Six months later the Atlanta Rapid Transit and the Consolidated Street Railway were merged as the Georgia Railway & Electric Company. Mr. McWhorter remained as general foreman until March, 1905, when he resigned to become master mechanic of the Memphis Street Railway.

OBITUARY

T. K. Irwin, a director of the Joplin & Pittsburg Railway, Joplin, Mo., and one of the promoters of the company, died at his home in Carthage, Mo., on Feb. 12. Mr. Irwin was sevenry-seven years old.

G. H. Whitcomb, capitalist, Worcester, Mass., president of the Worcester & Marlboro Street Railway before it was absorbed by the Worcester Consolidated Street Railway, died in Worcester on Feb. 13. He was born in Templeton, Mass., seventy-five years ago and was graduated from Amherst College.

Eugene D. Martinez, electrical engineer of the Memphis (Tenn.) Street Railway, whose death was announced in the ELECTRIC RAILWAY JOURNAL of Feb. 12, had been ill for a number of months. Mr. Martinez was a native of New Orleans, La., and was graduated from Tulane University. Following his graduation he was connected as a mechanical and electrical engineer with the early installation of the electric railways in New Orleans. Later he served with Ford, Bacon & Davis and Stone & Webster, being connected with the latter as electrical engineer of the Houston (Tex.) Electric Company. In July, 1906, Mr. Martinez accepted the position of electrical engineer of the Memphis Street Railway.

Louis Duncan, Ph.D., formerly a member of the famous consulting engineering firm of Sprague, Duncan & Hutchinson, New York, died at his home in Pelham Manor, near New York, on Feb. 13, at the age of fifty-four. Dr. Duncan was graduated from Annapolis in 1880, and in 1883 was sent by the government to Johns Hopkins University to take a graduate course in physics and electricity. In 1887 he received his degree of doctor of philosophy at Johns Hopkins and then became a professor there. During the Spanish-American War he was major of the first volunteer engineers. and from 1899 until 1904 was head of the electrical engineering department of the Massachusetts Institute of Technology. At the time of his death he was a member of the firm of Duncan, Young & Company, consulting engineers, New York. His first most important electric railway engineering work was as consulting engineer for the electrification of the Belt Line tunnel of the Baltimore & Ohio Railroad. He also had charge of the change from cable to electricity of the Third Avenue system in New York, and later he was consulting engineer for the New York City Rapid Transit Commission. He also served as president of the A. I. E. E. from 1895 to 1897. Dr. Duncan possessed a keen, active mind and remarkable powers of engineering and mathematical analysis. During the last few years he has acted as a consulting engineer for a number of large electrical and water-power corporations.

Construction News

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

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

FRANCHISES

Chillicothe, Ill.—The Peoria & Chillicothe Electric Railway has received a franchise from the Council to construct a line in Chillicothe.

Morganfield, Ky.—G. L. Drury, as representative of the interests promoting the electric railway line between Morganfield and Uniontown, Ky., is now petitioning the Councils of both towns for rights-of-way within their limits. The county has already granted the necessary permission to use the road between the two communities.

East Liverpool, Ohio.—The East Liverpool Traction & Light Company has received a franchise from the Council to construct an extension to Grandview and complete other contemplated improvements to the company's holdings in East Liverpool.

Buffalo, N. Y.—A bill has been introduced into the State Legislature extending until Dec. 31, 1919, the time within which the International Railway may complete and place in operation the East and West Delavan Avenue and the Bailey Avenue lines over which the Council recently granted the International Railway a fifty-year franchise. The bill amends the act of a few years ago by the terms of which the company was to have completed these two lines in 1916, so as to give the company three years in which to complete the work. This is in accordance with the agreement between the company and the city made by the former City Council. The company has agreed to lay the Bailey Avenue tracks in three annual instalments.

Ottawa, Ont.—The Morrisburg & Ottawa Electric Railway has asked the Ontario Legislature for an extension of time in which to build its proposed line from Morrisburg to Ottawa. [May 15, '15.]

Beaumont, Tex.—The Beaumont Traction Company has received a franchise from the Council to remove its car tracks from Doucette Street for a distance of three blocks and to construct and operate an extension of the line to the Magnolia refinery, south of the city.

Burlington, Tex.—The Burlington Traction Company has asked the Council for a franchise to construct a line on South Winooski Avenue from Pearl to Main Streets, to connect with the tracks on those two streets.

Tacoma, Wash.—The Tacoma Railway & Power Company has filed an acceptance of the power contract and franchise agreement authorized by the Council, and under this contract the company has agreed to the following stipulations: The extension of the Pacific Avenue line to South Forty-sixth Street; changing the present south Tacoma route to operate over the Tacoma Avenue fill; and the connection of the Tacoma Avenue and Point Defiance lines at Division Avenue.

TRACK AND ROADWAY

Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.—This company reports that it expects to build a spur track to the Mobile & Ohio Railroad passenger station and to improve its line between Tuscaloosa and Holt.

Fresno (Cal.) Interurban Railway.—Construction work has been begun by this company on a 7-mile extension to its lines from Barton Vineyard to Kutner's Colony. Upon the completion of this extension construction work on the line to Clovis will be begun. This is to be followed by extending the Kutner Colony line to Centerville, 12 miles. Rights-of-way have been secured for all of the extensions except parts of the line to Clovis. The material for all of the construction work has been assembled and permission to proceed has been obtained from the Railroad Commission of California. The work will be done by the Mahoney Brothers Company of San Francisco.

Pacific Electric Railway, Los Angeles, Cal.—Construction work on this company's line to connect with Hawthorne and El Eegundo has been begun by the company at South Los Angeles.

***Pensacola, Fla.**—George H. Hervey has received notice from Washington that a bill authorizing him to construct and operate an electric railway on the military reservations of Fort Barrancas and Fort McRae has passed the Senate, after its favorable recommendation. It is planned to connect the proposed railway with the Pensacola Electric Company's line to Fort Barrancas.

East St. Louis & Suburban Railway, East St. Louis, Ill.—Work will be commenced at once by this company on the relocation of its track on the Rock Road, St. Louis, from the side to the center of the street.

Chicago & Milwaukee Electric Railroad, Chicago, Ill.—Plans are being made by this company to build a concrete and steel viaduct 50 ft. in length over a street in Glencoe, Ill. This company has been making repairs on its tracks on Genesee Street, Waukegan, Ill.

Chicago, Ottawa & Peoria Railway, Ottawa, Ill.—This company will replace two or three small trestle bridges and reinforce one steel viaduct as soon as the weather permits. Contracts for this work have been let to the Joliet Bridge & Iron Company.

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—A report from this company states that a contract has been let to the Union Switch & Signal Company for equipping the single-track line between Wheaton and Geneva with its T.D.B. system of block signals.

Tri-City Railway, Davenport, Iowa.—The Council of the city of Rock Island is asking this company for the extension of a line south of Eighteenth Avenue on Seventeenth or Twenty-fourth Street entering territory recently annexed in South Rock Island.

***Keokuk, Iowa.**—Plans are being considered for an electric line from Keokuk to Iowa City, via Washington and Mount Pleasant, and forming a connection with Waterloo. Robert N. Carson, Iowa City, is interested.

New Orleans Railway & Light Company, New Orleans, La.—The City Council has directed the New Orleans Railway & Light Company to proceed with the construction of the South Claiborne Avenue line from Broadway to Carrollton Avenue. This action was taken on recommendation of Commissioner of Public Utilities W. B. Thompson. The extension must be completed by March 3.

Boston, Mass.—Bids will be received by the Boston Transit Commission until March 2 for the construction of Section F, Dorchester Tunnel. The section is located between Foundry Street and West Fourth Street, and includes the Broadway station with a loop and incline for surface cars. The structure is to be mainly of reinforced concrete and structural steel. Specifications and forms of contract may be obtained at 15 Beacon Street. [Nov. 20, '15.]

Metropolitan Street Railway, Kansas City, Mo.—The contract for grading the extension of this company's Troost Avenue line from Forty-eighth Street to Seventy-third Street has been awarded to Edward Meegan by the Board of Public Works. W. C. Mullins was awarded the contract for grading Twenty-fifth Street from Southwest Boulevard to Broadway. The company will also reconstruct the bridge over the Kaw River at Ohio Avenue. The structure will be a through riveted truss bridge, have one 400-ft. and one 215-ft. span, superstructure of steel and foundation of concrete. The American Bridge Company has the contract for the steel spans. The substructure work consists of remodeling one abutment, removing two piers and one abutment and building two piers and one abutment. Waddell & Son, Kansas City, Mo., engineers.

Fallon (Nev.) Electric Railroad.—At the annual meeting of the stockholders and directors of this company the old board of directors was re-elected. Manager E. S. Berney reported that the grading for the road is practically completed as far as Sand Point. The work includes bridges and culverts over the water courses and the grade is now in condition to receive ties and rails. The Southern Pacific

Company has built a switch about a quarter of a mile east of the Y to connect with the Fallon Electric Railroad's line and provide for the transfer of freight. Arrangements have been made with the Southern Pacific Company for the lease of rails for the entire trackage of the company with an option to purchase same. Tentative negotiations have been entered into for the purchase of ties pending the placing of the bond issue that is now being financed in the East.

St. John (N. B.) Railway.—This company is now operating its cars between East and West St. John over the new arch bridge, which replaces the old suspension bridge across the St. John River at the reversing falls.

Salem-Pennsgrove Traction Company, Salem, N. J.—Construction work has been begun on this company's proposed line from Salem to Pennsgrove. [Jan. 1, '16.]

City Electric Company, Albuquerque, N. M.—This company has placed an order with the Colorado Fuel & Iron Company for steel rails and track equipment to be used in the construction of the company's proposed extension to the University of New Mexico.

International Railway, Buffalo, N. Y.—It is reported that alternative plans have been submitted to the Ontario Railway & Municipal Board for changes on this company's line near Queenstown Heights, Ont., where a serious accident occurred on July 7, 1915. Some time ago, it is said, the board submitted a plan proposing a new down-grade single-track line which would take one continuous curve, leaving the existing line for up-grade traffic. The company's alternative plan is to partially reconstruct the existing double-track line by lengthening the curves and cutting down the gradients.

Interborough Rapid Transit Company, New York City.—Bids were opened for the second time by the Public Service Commission for the First District of New York for the installation of tracks on the White Plains Road extension of the Lenox Avenue branch of the first subway. This extension is a three-track elevated railroad extending from the present terminus at 180th Street, north over private property and White Plains Road to 241st Street, near the northern city boundary. The commission first opened bids for this work on Nov. 23, when the Coast & Lakes Contracting Company, Inc., was the lowest bidder at $53,930.50. This company stated that it had made a mistake in its bid and requested permission to withdraw. The commission, however, awarded it the contract. Subsequently the company asked that the contract be readvertised, and filed a stipulation with the commission agreeing to bid upon the readvertisement not more than $94,280.50, which was the amount it stated it intended to bid in the first place. According to the unofficial totals of the bids received on the second bidding the Coast & Lakes Company was the lowest bidder at the figure it stipulated to bid, the other bidders' figures being about $112,000 to $115,000. The contractor must begin work within thirty days after the delivery of the contract and complete it within four months.

New York Municipal Railway, Brooklyn, N. Y.—During the week the Public Service Commission for the First District of New York opened bids for the construction of Section No. 2-A of Route No. 12, a part of the Broadway-Fourth Avenue subway in Brooklyn, for operation under the dual system agreements by the New York Municipal Railway Corporation. Section No. 2-A lies in Flatbush Avenue between Prospect Park Plaza and the Brighton Beach Railroad at Malbone Street. The plans call for a two-track underground railroad, and the work must be completed within twenty months from the delivery of the contract for operation, and entirely completed within twenty-four months. This is a part of the line which will connect the Fourth Avenue subway with the Brighton Beach Railroad. All the rest of the line is now under contract. According to the unofficial totals of the bids the two lowest bidders were the Degnon Contracting Company at about $1,370,000, and the Litchfield Construction Company at about $1,468,000.

Lake Shore Electric Railway, Cleveland, Ohio.—Engineers of this company are preparing detailed plans for the proposed East Federal Street viaduct to replace the present structure and to eliminate the Himrod Avenue grade crossing, Youngstown. The cost is estimated at $672,000. Frank Lillian, city engineer, is preparing plans for the approach from Cedar Street, the cost of which is to be divided between the city and the Lake Shore Electric Railway.

***Xenia, Ohio.**—Arrangements have been effected by the Greater Dayton Association to lend its efforts to the furthering of a project designed for the construction of an electric railway from Xenia to Blanchester, via Wilmington and from Xenia to Washington Courthouse.

Enid (Okla.) City Railway.—Work will soon be begun by this company replacing all of the old girder rails in the city with 65-lb. T-rails. This will require the rebuilding of the Grand Avenue line from the northeast corner of the square to Walnut Street at a cost of about $5,000.

Sand Springs Railway, Tulsa, Okla.—Besides constructing various extensions, this company will double-track its line between Sand Springs and Tulsa.

***Spartanburg, S. C.**—Plans are being considered to construct a line from Spartanburg via Walnut Grove and Cross Anchor to Clinton. Among those interested are L. H. Wilson, president of the Bank of Cross Anchor; W. W. Harris, Clinton, and T. B. Thackston, Cedar Springs.

***Texas Airline Interurban Company, Columbus, Tex.**—This company is being organized to construct an interurban electric railway between Columbus and Gonzales and between Austin and Port Lavaca. Part of the right-of-way has been secured. Ben R. Hunt, Columbus, is reported to be interested.

Northern Texas Traction Company, Fort Worth, Tex.—Work will soon be begun by this company on the reconstruction of its Daggett Avenue track. The work will include the stretch from Jennings Avenue to Henderson Street. The 56-lb. rails will be substituted by 70-lb. rails.

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—Among the improvements contemplated by this company during this spring is the construction of car shops at Torrance, about 10 miles south of Los Angeles, for the joint use of the Pacific Electric Railway and the Southern Pacific Railroad. The buildings, which will cover a site of 125 acres, will be mostly of steel frame construction and will be so designed as to provide for the construction of all future cars for the line. The company's present shops on East Seventh Street, Los Angeles, which handle repair work only and provide storage facilities, are to be vacated to make way for a new $10,000,000 market terminal. Further details in regard to these improvements are published on page 376 of this issue.

Tulsa (Okla.) Street Railway.—Plans are being made by this company to erect a brick station on Kendall College campus.

Lehigh Valley Transit Company, Allentown, Pa.—This company has begun the construction of a new brick passenger and freight station at Center Square, Guynedd Valley.

POWER HOUSES AND SUBSTATIONS

Galesburg Railway, Lighting & Power Company, Galesburg, Ill.—This company will do some extensive improvement work this year, among the proposed changes being the enlargement and re-equipment of the boiler plant, the installation of a railway unit in the electric department, the replacing of much of the present gas pipe, new boilers at the plant and the sinking of a deep well. The heating plant will also be enlarged and the mains extended.

International Railway, Buffalo. N. Y.—This company has placed in position 500,000 circ. mil cables to carry 9000 kw. of electrical energy bought by the company for additional power on its local lines. In a statement Edward G. Connette, president of the company, said that the additional power is required to operate nearly 1000 cars daily on the Buffalo city lines. The five power substations are being equipped with additional machinery, including seven 1000-kw. rotary converter. Power will be carried direct from the Niagara Falls power plants to the substations by new 500,000 circ. mil cables. Several of the cables have already been strung in Broadway from Jefferson Street to the Bailey Avenue substation and in Seneca Street from the Imson Street substation to South Cedar Street. A total of $175,000 is being expended in this work, which is expected to be completed by spring.

Manufactures and Supplies

ROLLING STOCK

Boston Elevated Railway, Boston, Mass., has issued specifications for ten new surface cars.

Jersey Central Traction Company, Keyport, N. J., is inquiring for new air-brake equipment.

City Light & Traction Company, Sedalia, Mo., is expecting to purchase eight light one-man cars.

London & Port Stanley Railway, London, Ont., has ordered three interurban trail cars from the St. Louis Car Company.

Claremont Railway & Lighting Company, Claremont, N. H., expects to purchase one set of trucks for freight service.

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., expects to purchase within a month fourteen air-brake equipments.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa., on Feb. 15 lost fifteen cars in a fire which destroyed its car barn.

Rhode Island Company, Providence, R. I., contemplates fifty new cars similar in type to the equipment ordered in 1914. It is reported that the Laconia Car Company received the order for the car-bodies.

Cumberland & Westernport Electric Railway, Cumberland, Md., reported in last week's issue as expecting to purchase three interurban cars, has ordered this equipment, through H. L. Doherty & Company, New York, from the Southern Car Company.

Fort Scott & Pittsburg Railway, Fort Scott, Kan., a new line described on page 376 of this issue, is in the market for six 50-ft. cars, this equipment to be purchased through the L. A. Wells Construction Company, 34 Wade Building, Cleveland, Ohio.

Chicago & Milwaukee Electric Railroad, Highwood, Ill., will exercise its option to buy fifteen more all-steel passenger motor cars, similar to those ordered during 1915. The J. G. Brill Company will furnish the bodies and trucks; the Westinghouse Electric & Manufacturing Company, motors and control; General Electric Company, brakes.

Jamestown (N. Y.) Street Railway has ordered ten city cars with trucks from the St. Louis Car Company. These will have low floors, 24-in. wheels, four GE-247-B motors, fully-inclosed platforms flush with the main floor, cross-seats, all-steel framing, wood roofs and floors, continuous T-posts, steel letterboards, wood trim, and a length over all of 42 ft.

Oklahoma Railways, Oklahoma City, Okla., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 8, 1915, as having ordered six closed semi-steel, double-truck prepayment motor passenger cars from the St. Louis Car Company, has specified the following details for this equipment:

Seating capacity 44
Weight of car body only, 16,000 lb.
Bolster centers, length...17 ft.
Length of body.....29 ft.
Length over vestibule....40 ft.
Width over sills....8 ft. 3¾ in.
Width over all.....8 ft. 6 in.
Height, rail to sills. 3 ft. 3½ in.
Height, sill to trolley base, 8 ft. 6 in.
Interior trim, Birch, mahogany finish
Headlining ..3/16-in. Agasote
Roof .....Arched
Underframe .....Steel
Air brakes .....West.
Control K-35 G-2
Couplers .....Van Dorn
Curtain fixtures..Cur. Sup. Co.
Curtain material ...Pantasote
Destination signs.....Hunter
Fenders .....Ry. Co.
Gears and pinions ....Nuttall
Gongs ....Elec. Ser. Sup. Co.
Heaters ..Peter Smith, hot air
Headlights, Crouse-Hinds Type C, arc
Journal boxes.....Symington
Motors, 4, West. 92 A, outside hung
Paint ...Chicago Varnish Co.
Registers.....Sterling Meaker
Sanders....Elec. Ser. Sup. Co.
Sash fixtures..O. M. Edwards
Seats...Cross and longitudinal
Seat material.....Wood slats
Step treads.....Universal
Trolley catchers. Knutson No. 2
Trolley base..Standard No. 14
Trucks .....Brill No. 27
Varnish...Chicago Varnish Co.
Ventilators .....Peerless
Wheels .....American

TRADE NOTES

Q. & C. Company, New York City, announces that it has discontinued its representation of the Ross-Schofield system of circulation of water in locomotive boilers.

Ohio Brass Company, Mansfield, Ohio, has moved its New York office from the tenth to the eighteenth floor in the Hudson Terminal Building, 30 Church Street, Room 1822.

Hoyt & McWilliams, New York City, specialists in investment securities, announce that W. J. McGovern has become associated with them and will manage their public utilities department.

Philadelphia Holding Company, Philadelphia, Pa., has received an order to equip with four radial trucks the four cars recently ordered by the Corning & Painted Post Railway, Corning, N. Y.

Curtain Supply Company, Chicago, Ill., has received an order to equip with ring fixtures and Rex all-metal rollers the Pantasote curtains for the 200 subway cars recently ordered by the New York Municipal Railway.

Protective Signal Manufacturing Company, Denver, Col., has arranged to take over the manufacture and exclusive sales privileges for the automatic flagman signals owned by the National Signal Company, San Francisco, Cal.

F. B. Cutter Company, New York City, has recently sold thirteen double-truck used cars to one customer, for immediate delivery. The cars sold were all in good physical operating condition, and were bought on a first inspection.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has appointed R. L. Wilson, manager of the railway division, as assistant general superintendent, looking directly after trades apprentices, employment, working conditions and other matters of a similar nature.

DuPont Fabrikoid Company, Wilmington, Del., has received an order to equip with its Fabrikoid material the curtains for the thirty-one new cars recently ordered by the Wilmington & Philadelphia Traction Company, Wilmington, Del., from The J. G. Brill Company. The material is waterproof, washable and uniform in thickness, and comes to the purchaser in a roll, thus eliminating waste in cutting.

Mathews-Northup Company, Buffalo, N. Y., is urging the adoption of Tuesday, Feb. 29, as "Prosperity Day," and its celebration throughout the country. On this extra day of the year the country will be millions of dollars richer on account of the extra twenty-four hours of time in this year, as compared with last year, and the suggestion is made that all be urged to talk, think and feel prosperity, forget his personal worries and boost.

American Abrasive Metals Company, New York City, is calling attention to some figures recently obtained at the Safety Exposition at Cleveland, Ohio, which show the extreme importance of eliminating the commonplace hazard of falling or tripping. In the year 1915, in thirty-four corporations, comprising railroad, gas, electric light and power, and hydroelectric companies there was a total of 226 casualties. Of these accidents seventy-nine, or 20 per cent of the total, were caused by falling or tripping and resulted in 20 per cent of the total days of lost time. Falling objects caused sixty-six, or 17 per cent of the total number of casualties, and resulted in only 12 per cent of the lost time. Electric shocks caused thirty or only 8 per cent of the total number of casualties, and resulted in only 13 per cent of the total lost time.

ADVERTISING LITERATURE

Sherwin-Williams Company, Cleveland, Ohio, has issued a reprint of a paper entitled "Railway Paint Specifications, Why?" which was delivered by Philip L. Maury, manager railway sales department of this company at the twelfth annual convention of the Maintenance of Way Master Painters' Association.

NEW PUBLICATION

Authentic History of the United States Steel Corporation. By Arundel Cotter. The Moody Magazine & Book Company, New York City. 231 pages. Cloth, $2.

This book is not a compilation of steel statistics but a very interesting narrative regarding the formation, growth and policies of the United States Steel Corporation. Readers cannot but secure therefrom an excellent idea of what this mammoth corporation means in American industrial life.