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INVESTIGATING RAILWAY REGULATION

After a period for absorbing details a wise teacher gives a student an opportunity for reflecting on what he has learned, for getting a general bird's-eye view of his progress. 'Tis a simple pedagogical theory—that of absorption and reflection—but, like other simple theories, it can be of real service in problems more complex than that of youthful education. Take, for example, the elusive and complicated question of railway regulation in this country. For more than the last two decades the study of the regulatory power has been in reality one of details. Lawmakers and commissioners in each State and for the nation as a whole have been making great strides in regulatory requirements and practices, but the development of the idea of regulation and the increase in the size and importance of the public utility field have been so rapid that no time has been spent in reviewing the progress made up to any date. It is well, therefore, that there should now be a general review of the field, and for this reason we welcome the resolution by Senator Newlands for the appointment of a joint congressional committee to investigate the regulation of railways from the beginning. Too much legislation affecting transportation lines has been passed without a clear conception of the value of existing laws and the goal to be reached by future enactments, and the present administration will perform a most valuable and essential service if out of the present regulatory maze it can formulate a constructive summary for future guidance.

COMPANY SECTION PROGRAMS

The program committees of the American Electric Railway Association company sections have an intricate problem on their hands in providing for continuity of interest and enthusiasm in section activities. This problem is complicated rather than simplified by the reduction in dues, which will bring into the membership many more of the rank and file of the industry. The work must consist of one or more of the following components: instruction in the elements of the business, social intercourse and entertainment for general culture, and technical discussion of departmental topics. In planning the work the committees must have clearly in mind the purposes which they wish to accomplish and the preparation, needs and desires of their audiences. They must have the hearty co-operation of the local memberships in their plans. Our observation leads to the conclusion that the sections in general are not as yet very definite in their ideas and plans. There are now company sections in Milwaukee, Denver, Newark, Washington, Manila, Chicago and New Haven, while a new one will be formed in Washington in January and undoubtedly others will follow shortly. The older sections have had experience in conducting meetings, and this is available for the younger ones. The principal incentive to the formation of local sections of a national society rather than independent local clubs or associations is the expected stimulation from other sections. To obtain this stimulation in the present instance the sections must exert themselves to obtain the results of each other's experience. Why would it not be well for representatives of these sections to get together, say at the Chicago mid-winter meeting, for the purpose of discussing their program problems? "How Best to Serve the Local Section" would be a topic well worthy of the best thought.

CLEARING HOUSE FOR SAFETY LITERATURE

The statement made by H. A. Bullock elsewhere in this issue indicates that the National Safety Council has had a remarkable growth during the past four years and is even yet in the period of rapid acceleration. The time was ripe for some agency or other to gather the results of the large expenditures of energy and money which had been made by hundreds of corporations individually, and to make these results generally available. Electric railways have been individually very active in safety work as is indicated by a glance through the issues of the Electric Railway Journal for a few years past. The movement which has taken form in this council began in the manufacturing industries, but the transportation interests were not slow in "getting on the band wagon" where they now take an active part in the music. There are at least two elements in this organization which appeal to us as worthy of commendation. First, it represents a spontaneous effort to provide a clearing house for safety ideas. As soon as the plan was formulated the corporations and individuals possessed of such ideas and wanting more gravitated to it as the natural nucleus of safety publicity. In the second place, it is an economical device for accomplishing its purpose, for it acts primarily as a means of communication among its members. The council works in co-operation with other agencies for the conservation of human life and endeavors to avoid duplication of energy and money expenditure. The fact that the electric railways are now to have special service, the first special service to be furnished, is evidence enough of the attitude of the council to our industry and its desire to bring about effective co-operation among electric railway companies.

ORDERS FOR 1916 SUPPLIES

A prominent manufacturer of electric railway apparatus recently called our attention to the existence of a certain skepticism on the part of some electric railway managers as to the necessity for slow deliveries on 1916 orders. There is no doubt, however, that deliveries of electric railway apparatus will have to be slow, and in all probability they will tend to become even slower as 1916 progresses, so far as the manufacturers of railway apparatus have to depend for part of the equipment upon the producers in the iron, steel and zinc markets. In the general steel market, for instance, orders are now being booked for delivery in the third quarter of 1916, and iron cannot be more plentiful than steel because steel manufacturers are prepared to utilize all of the iron that they can get. Statistics indicate that the present rate of steel production in this country is about 39,000,000 tons per annum, and that it cannot be substantially increased. Under these conditions both steel and iron are bringing big prices. Copper is easier, but the export demand has taken on new life within a few weeks past and domestic consumption in general industries is rapidly increasing. The long depression permitted the accumulation of large stores of copper, hence, while the price is high, there is no prospect of immediate shortage. Zinc occupies a position midway between steel and copper. The munitions demand has been heavy, but the galvanizing business has not called for its usual supply. Zinc can therefore be had somewhat more promptly than steel. The lesson in all of this for the electric railways is that 1916 orders must be placed early if disappointment regarding deliveries is to be avoided. The best interests of the industry demand foresightedness.

SKIP-STOP SITUATION IN ST. LOUIS

The peculiar turn that has been taken by the skip-stop campaign in St. Louis, as outlined on another page of this issue, is by no means creditable to the principle of regulation. The plan of eliminating stops, after being overwhelmingly approved by the railway passengers, appears now to be held up by the regulatory body that exercises legal control over the operations of the railway, and though the riders obviously want the introduction of the improved method of operation, and the railway company is equally willing to put it in force, there is a possibility that the plan is not going through. The reason is, plainly enough, opposition on the part of storekeepers and real estate holders at street corners, who fear the effect of the change, notwithstanding the fact that any number of successful retail businesses have been established in the middle of a block, where the cars never stop anyway. However, the most illogical feature of the proceeding is that the influence of outsiders can be exerted in such a matter in opposition to the wishes of the railway and its patrons. If both the passengers and the railway company are satisfied with the skip stop, one would imagine that this should settle the matter. They are the interested parties, and that a body of storekeepers and others who may never use the cars at all should be able by protesting vehemently to interfere with their mutually satisfactory plans would be absurd if it were not so pathetic. Admittedly, the Public Service Commission is placed upon the horns of a dilemma. If the skip stop is not ordered the railway patrons will be angry, and if it is ordered the storekeepers claim that they will be peeved. No matter what is done some one will be displeased, and it takes a strong commission to act under those circumstances. But, incidentally, we wonder why the commission feels itself compelled to exert its jurisdiction in a matter that is so peculiarly one to be settled between the railway and its patrons. As a matter of fact, should it really have jurisdiction?

THE INDEX AS A SYNOPSIS

An index is undoubtedly a dry and most uninteresting looking piece of reading matter. Usually a person does not consult it except when searching for information on a definite and particular subject. For those periods of retrospection, however, which most of us use to mentally docket and arrange our ideas and conceptions, the hint is offered to pick up the half-yearly issues of this paper that contains the comprehensive indices of the preceding twenty-six numbers and go over the subjects listed therein.

The value of a review of any field of study is well known. In no other way can the salient points be fixed in their proper perspective, retained in the mind and the whole subject crystallized so effectually. The chief benefit from examinations in school and college is not the mere day-by-day study of the test nor the restoring temporarily to memory of a large volume of rules or facts or dates, but the real lasting benefit occurs from the broadened viewpoint and the crystallization in the student's mind of the essentials of the work done during the preceding year or half year. The formidable looking index of this paper (and to be of maximum value it must be complete and therefore voluminous) really performs this function. In this respect it is similar to the summary or digest that usually prefaces the detailed report of the expert on a problem in construction or finance or on an operating property, when submitted for the guidance of the man who must make the decision.

The electric railway industry is so many-sided and the problems before it are so numerous and varied that the hard-pressed official of a traction company can scarcely carry in his mind all phases of his chosen profession. We have been told by a busy man of this kind, active in railway work, that he has found the time well spent which is devoted to running over the index at the end of each half year and marking articles to be reread or noting subjects for further study. The relative importance and timeliness of the several topics will be indicated by the frequency of reference, and the geographical extent or distribution can also be determined to a degree. It happens at times also that owing to unusual demands of work some issues are not looked over completely. If there are such instances, a survey of the index will prevent important articles from being entirely overlooked. Again, a particular need or ques-

tion may suddenly have assumed large proportions on a property and by referring to the ever-helpful index the busy manager can promptly get hold of recent data and the practices of other companies. This is indeed one of the points of superiority of the general paper in any field, as compared with the periodical which is devoted to recording the events in a part of the field only. It gives the broad survey which is always helpful and usually necessary to a comprehensive and complete understanding of all of the important events in any industry and their correlation with each other.

In the columns of this paper are recorded the essential facts and latest available information and data on the progress of the business, whether it is financial, legal, managerial, engineering, transportation or accounting, and the semi-annual index is the skeleton key to this fund of reading matter. Therefore, in addition to its direct use as an index, it is appropriate for us to call the attention of readers in this issue to its supplementary use as outlined.

IT PAYS TO ADVERTISE THE OTHER FELLOW

How to stimulate passenger traffic is a live topic these days among both city and interurban railway managers. This fact was most forcibly emphasized at the Indianapolis meeting of the Central Electric Railway Association, and as a result general advertising as a means of increasing passenger traffic is to be investigated. The experience of some companies along this line clearly indicates that it pays to advertise, not only one's own service but the other fellow's, when it will induce travel. The Detroit United Railway passenger department has pursued this plan very profitably. Through the constant display of banners and car cards steam road excursions from different points on this company's lines are announced; attractions at theaters in the important cities along the route, circuses and carnivals are also advertised. In fact, any and every form of entertainment in which the passenger department believes the public will be interested is called to its attention. This practice has tended to make new patrons and increase the traveling propensities of the regular riders.

In preparing advertising of this kind the entertainment is first announced and then the public is urged to use the cars to reach the point where the entertainment is to be given. One needs only to compare the attendance at a circus side show where there is a widely advertised two-headed calf with that at the unadvertised museums of natural history to determine whether this form of advertising pays. Recently the Detroit United Railway had an opportunity to test the public's interest even in this direction. It called attention to the existence and location of an art museum where the attendance had dwindled because no form of advertising had been used, and the result was most profitable to the company. Electric interurban and street railway companies usually announce the dates of county fairs, circuses and other important events, but they often fail to keep constantly before the public the permanent points of interest to which regular travel may be maintained. One phase of the Chicago Surface Lines' advertising campaign has been along this line, and the results indicate that the constant use of all forms of advertising is certain to kindle the public's desire to travel and thus aid in increasing revenue.

WHEEL AND RAIL CONTACT AFFECTS WEAR LIFE

Unequal contact between the wheel treads and the rail which concentrates an enormous pressure on a limited area, is one of the causes of rail corrugation and tends to shorten rail life. This is the main conclusion evolved from R. C. Cram's study of this phenomenon. Curved heads for girder rails as a remedy, as the author states in an article published elsewhere in this issue, is not a new idea, but is a departure from accepted American practice. Several tramway companies in England and on the European continent have had convex rail heads on girder rails in service for the past five years. On the Leeds Tramways, for instance, a 7-in. girder-grooved rail with a convex head inclined slightly toward the groove, was adopted after comparing several hundred gagings of partly worn rail and tire sections. More than 6000 tons of this section of rail have been laid in Leeds since January, 1910, and the service results, so far, indicate that extrusion of the metal on the rail head has been eliminated, or at least 500,000 cars over one section of track have failed to develop this difficulty which is common to the flat-head rail sections. Furthermore, rail wear was found to be uniform across the head, and after five years of service the head retained its convexity. The experience in Leeds substantiates Mr. Cram's findings and points a way to prolong both rail and wheel wear life.

The principal lesson to be learned from the results of such an important study is that rail heads and wheel contours should not be designed independently of each other. The wear life of each is so dependent upon the character of contact made that it is vital to maximum life to have a uniform wheel bearing across the rail head. It is also our opinion that the character of wear on steel wheels bears a very intimate relation to the rail-head sections over which they operate. In other words, a change from the flat head to the curved head section is quite certain to change the character of wheel wear. Doubtless the design of a wheel contour and a girder-grooved rail head which would provide full contact from the fillet at the gage line to the outside of the wheel tread would produce still different results. Moreover, it appears that the proper contact between new wheels and new rails would make both wear more uniformly. If this result could be obtained it would be of little moment whether new wheels were operating over old rails or whether old wheels were operating over new rails, because the line of contact in either case would give practically a full tread bearing. In conclusion we are strongly of the opinion that Mr. Cram is working along the right line. Whether it would be well to await the service results of this experiment or whether further tests should be conducted are questions worthy of the immediate consideration of the committee on way matters of the American Electric Railway Engineering Association.

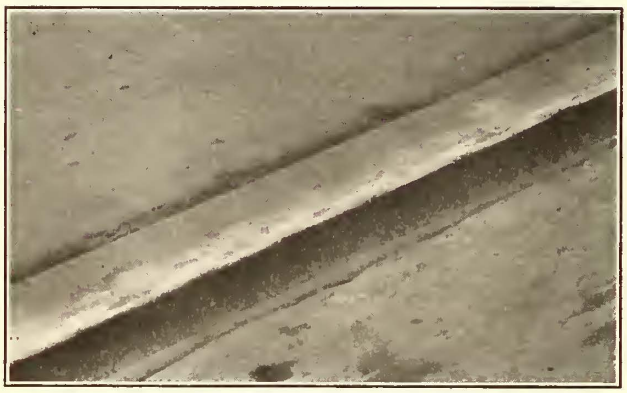
Curved Heads for Girder Rails in Brooklyn

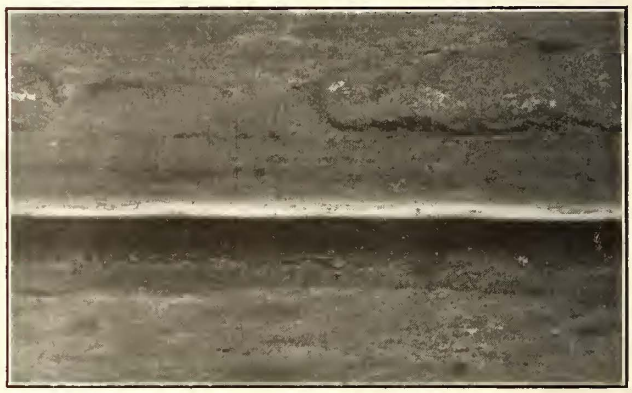
The Author Demonstrates That, as Corrugation Is Caused by Excessive Pressure or Force per Unit Area at the Wheel Tread, Increasing the Tread Area by Conforming the Rail-Head Contour to That of the Worn Wheel Reduces Corrugation

BY R. C. CRAM, ASSISTANT ENGINEER WAY AND STRUCTURE DEPARTMENT, BROOKLYN RAPID TRANSIT SYSTEM

Rail corrugation is a never-failing subject for argument and speculation. Many theories have been advanced as to what may be its cause, but to date there is no agreement upon any one particular factor as being the principal or controlling agent in producing the phenomenon.

The description in the issue of the ELECTRIC RAILWAY JOURNAL for July 3, 1915, page 26, of an experiment being made in England with a special differential gearing for car operation has created a renewal of interest in the study of the subject. In the meantime other study and experimentation has been going forward both in the United States and in Great Britain with respect to the design of the rail itself. Perhaps this has been induced, in the main, by the generally accepted fact that grooved and tram girder rails appear to be easy victims to corrugation while plain girder (high-T) and standard section rails do not.





CURVED RAIL HEADS—FIGS. 1 AND 2—TYPICAL RAIL CORRUGATIONS ON PLANE HEAD, DEPTH 0.001 IN. TO 0.005 IN.

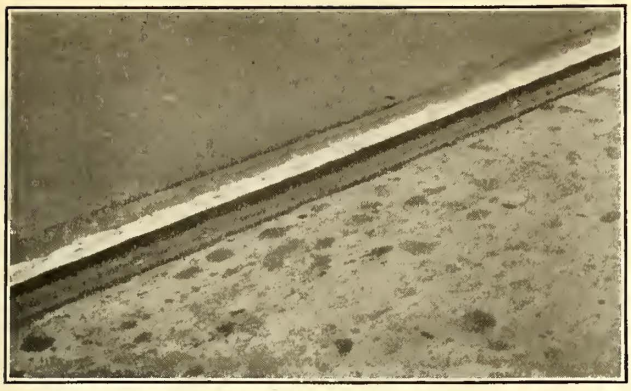
A study of the numerous designs of modern grooved and tram girder rails shows that there are several elements in their design which are common to the type and which are not found in plain girder rail designs. These elemental differences may be found in (a) the head contour; (b) the groove or tram; (c) the relative position of the gage line and the center line of the web, and (d) the comparative thinness (in older sections at least) of the webs of the tram and grooved rail designs.

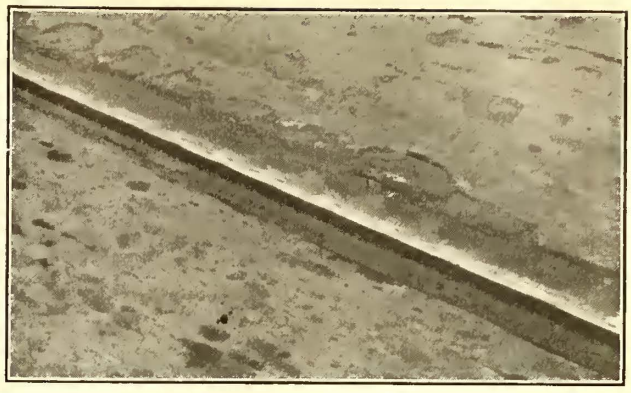
The second element is undoubtedly the most obvious, and a study of its influence would be interesting, particularly with regard to the effect of the grooved or tram portion as a stiffener against lateral movement of the rail head. A comparatively simple experiment could be made by planing off the tram in varying amounts on different rails until it was entirely eliminated and placing these rails in line under traffic jointly with others not so treated.

AN EXTREME CASE OF CORRUGATION

It is with the first element, however, that this discussion has to do, and our attention was drawn to it as the result of a case of very rapid corrugation which developed in a period of about five months on track laid with our standard grooved girder section Lorain Steel Company's 105-433, the general head contour of which is shown in Fig. 14. The rails were laid with cast-weld joints on wood ties in natural soil ballast, and there was a general elevation in grade of about 6 in. over that of the old track which it replaced. The rails were of Class B grade (high carbon), treated with an alloy. The tracks were paved between outer rails with 5-in. granite, with cement-grouted joints on concrete base and with asphalt outside in the roadways and immediately in contact with the outer rails. As nearly as careful observation and inspection during installation could determine, there was no particular construction feature which differed from our standard as installed for the past three years. The street is wide, it has a grade between 1 per cent and 2 per cent and the car traffic is frequent and fast. The cars mainly are our new, comparatively light, center-entrance type.

Inasmuch as the development of corrugation to an equal degree had usually required from one to two years, it followed that more than ordinary interest in the matter was aroused. The surface and gage of the line were carefully checked and found to be as nearly perfect as could be expected. The mill inspection reports were examined for variations in chemical composition, and as the rails were located by heat numbers when installed this was a comparatively easy task. They were relocated and their positions in the track were indicated on the curbs of the street. The corrugation was found to be generally distributed over the entire section of track and was not confined to any particular line of rails nor to rails of any particular heat number. Other rails of the same heats were examined at the storage yard, and careful comparison was made with these and templet drawings of the rails. Figs. 1 and 2 illustrate the character of the corrugations, which, at the time the views were taken, had reached depths ranging from 0.001 in. to 0.005 in. Measurements taken in October at the same places now show depths averaging 0.01 in., which indicate a rate of increase in depth of about 0.001 in. per month. Figs. 3 and 4 illustrate the development five months later than Figs. 1 and 2 at the same places.





CURVED RAIL HEADS—FIGS. 3 AND 4—APPEARANCE OF CORRUGATION SHOWN IN FIGS. 1 AND 2, FIVE MONTHS LATER

The wave lengths are now fully defined at about 3 in. from crest to crest, and the corrugation has reached the depth at which we usually find it advisable to begin the work of removal by grinding. Figs. 5 and 6 are excellent views of the worst conditions at the present time.

MERITS OF CURVED RAIL HEADS

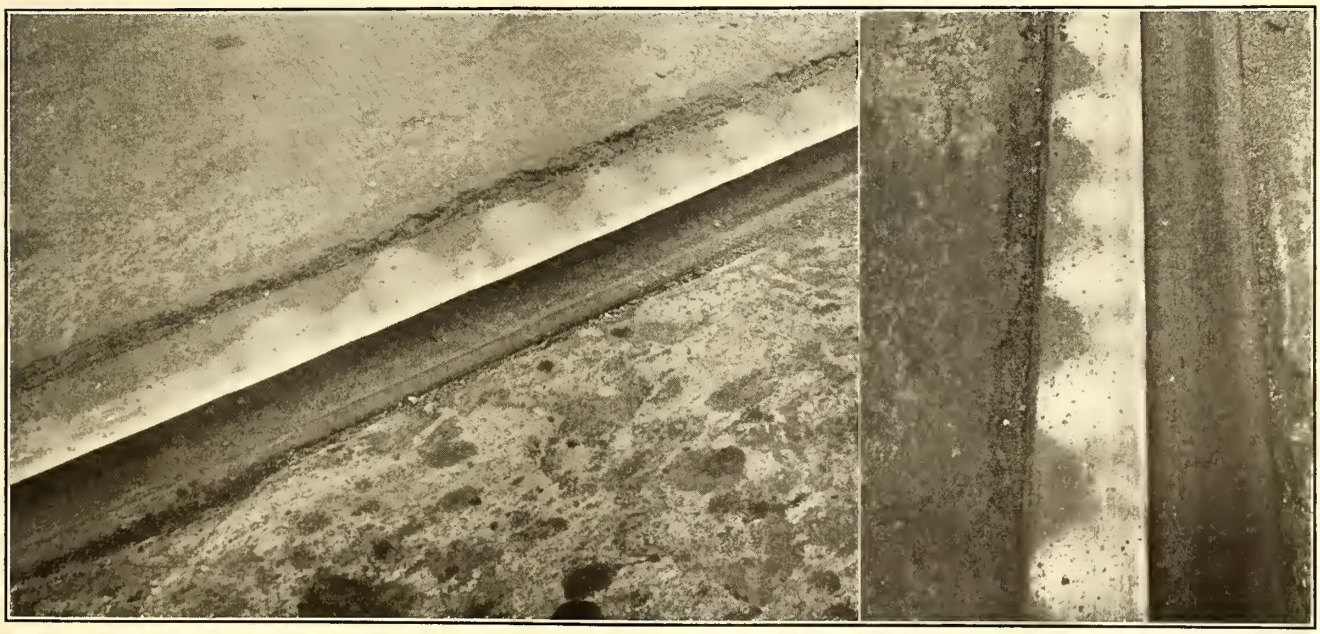
The investigation of the conditions found, along the lines mentioned, led to the discussion of the subject with the engineers of the rail manufacturers and the alloy manufacturers, and the whole matter was again gone over on the ground with them. The net result of these conferences was the suggestion made by the rail manufacturers that we investigate the merits of rails having curved heads, which they were prepared to roll without increase in cost provided the other features of our standard rails were kept as at present.

There was nothing novel in this suggestion, as such. An examination of rail catalogs shows that there have been some twenty-five girder rail sections rolled which had curved heads. In fact, most of the early stringer rails and succeeding shallow tram girder rails were so designed. Just what led to the general abandonment of this feature of girder rail design is not entirely clear, although it may be that when a depth of 9 in. was reached there were rolling troubles which were then hard to overcome in some mills without excessive costs. Another and probably the chief reason for the adoption of the inclined plane head may have been the desire to make the rail head suit the prevailing wheel coning in an effort to secure more wheel contact. In the meantime nearly all plain girder (high-T) rails have retained the curved head feature.

Furthermore, the advantages to be gained from the curved head design were pointed out by C. B. Voynow of Philadelphia in the "Analysis of Rail Section," which was a part of the report of the committee on way matters of the American Electric Railway Engineering Association, printed in the 1911 Proceedings under the heading "Girder Rail Sections." It is quoted as follows:

"(*b*) *Outline of the Tread.* The tread is made a plane, inclined to the gage. The wear of all mechanical parts indicates that straight lines and plane surfaces should be avoided. Worn rails show rounded heads. A flat head would get less work or compression in rolling, and therefore would be of less dense texture on the wearing surface. Worn rails show also the tread inclined at some angle to the gage. From the above it seems desirable to make the tread of a curve of some radius, but the difficulty of grinding joints on a rounded head and also the added difficulty in rolling, pointed out by the manufacturers, determined the design of the tread, as shown."

It will be noted that difficulties due to accurate joint grinding and added difficulty in rolling were the reasons assigned for the adoption of an inclined plane head in-



CURVED RAIL HEADS—FIGS. 5 AND 6—EXTREME CORRUGATION ON PLANE HEAD RAILS, SHOWING CLEARLY THE ACCOMPANYING PEENING EFFECT

stead of a curved head, and the angle of inclination is the same as the coning of the standard wheel tread.

A Study of Worn-Wheel Contour

Observations for the past three seasons have shown that the first wear area on the head of the company's standard L. S. Co. 105-433 section when new is confined to a width of about ⅜ in. and is very close to the fillet connecting the top with the gage side as indicated in Figs. 7, 12 and 19, and it requires about a year under average traffic for this width to increase to 1 in. It was concluded that there must be some peculiar wheel position or wear which would have this effect in view of the fact that our standard wheel contour when new has the same angular inclination below the horizontal (1 deg. 30 min.) as is found in our standard rail head when new. Hence if wheel heads were holding their correct contour, some evidence of nearly full contact over the new rail heads should be found.

It was thought that wheel contours should be studied, and the mechanical department of the company was requested to furnish molds showing wheel wears in various stages. These were secured and from them a composite worn tread and flange was derived, as shown in Fig. 7.

The tread of the wheel was found to assume a curve of about 16 in. radius inclined at an angle of about 4 deg. below the horizontal. The effect secured by plotting this tread on the company's standard rail is shown also in Fig. 7. The bearing is found to be confined to a small area very close to the fillet and it has a width of contact approximating ⅜ in., which is substantially the width of the first rail wear area. The increase in the inclination of the worn tread from 1 deg. 30 min. is thus seen to have the effect of making the wheel work close to the gage line, with a strong tendency to crowd the rail metal over the fillet. This is exactly what happens, as we find a peening at the fillet within a very few days after new rails are put in service. A piece of this peened metal may be seen clearly in Fig. 5.

The contrast between new and worn wheels in tread angularity is more fully shown in Fig. 11. Attention is also directed to the large wheel tread area not in contact with the rail head shown in Fig. 7.

It becomes a simple matter to determine approximately the amount of rail wear necessary to obtain full contact theoretically with such a worn wheel on a new rail head. This is accomplished by lowering the wheel outline vertically until such contact is made as in Fig. 8, which requires a displacement rail of head metal to a depth of about 0.06 in., and it will be noted that when this is reached the greatest wear area has extended back from the gage fillet about 1⅛ in., which represents about the same width of contact usually found after about one year, and which is also about the usual greatest width of the crests of corrugations at the time it becomes necessary to grind them out.

Excessive Rail Wear Due to Load Concentration

The first inference to be drawn from these observations is that even under the heaviest car traffic conditions it is practically impossible to wear away such an amount of metal within so short a space of time as one year, and therefore the rail metal cannot act otherwise than to flow or cold roll under the extremely heavy concentrated loading produced by the condition obtaining, and some of the metal flows forward ahead of the wheels while some flows laterally over the gage line fillet where there is little or no support sidewise against such action. The side flow is also assisted by the increased coning of the curved wheel treads (about 4 deg.), which naturally tends to make the wheels seek to center themselves more rapidly than they would if the coning were kept nearer to the original inclination of 1 deg. 30 min. This also tends to increase the pushing effect of the wheel at the area of least support against such action by increasing wheel tread widths at the flanges, which in turn increases the permissible sidewise action allowable before being checked by the wheel fillets at the flange. Side flowing or peening is also the first evidence of movement of the rail metal, and the peening increases as corrugations increase in depth until such time as the peenings are cut off by the vertical movement of the wheel flanges in following the corrugated contour. Hence it seems that a considerable portion of the metal must disappear in this manner, which is confirmed by the fact that we continually find the peened metal cut off and lying in the groove.

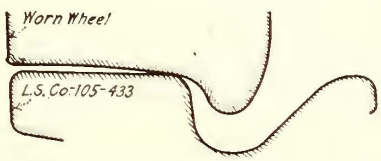


FIG. 7 - Average worn wheel - relative position on a new inclined plane rail head.

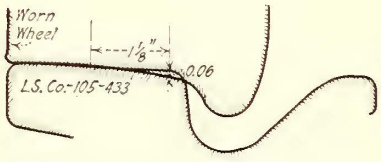


FIG. 8 - Amount of head wear required to secure full contact over head with worn wheel tread.

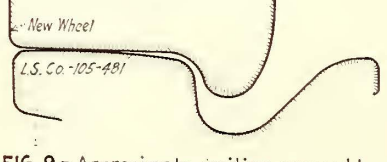


FIG. 9 - Approximate position assumed by a new wheel tread on new curved head.

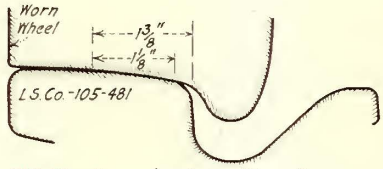


FIG. 10 - Approximate position of average worn wheel on new curved head.

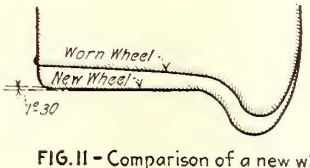


FIG. 11 - Comparison of a new wheel with average worn wheel.

CURVED RAIL HEADS—FIGS. 7 TO 14—CURVED HEADS FOR GIRDER RAILS. HEAD AND WHEEL CONTOURS SHOWING BENEFITS DERIVED FROM CURVING OF RAIL HEADS

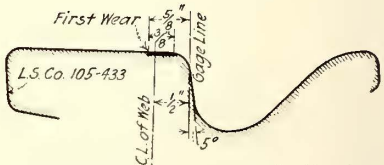


FIG. 12 - First wear area on B.R.T. Std. rail indicated by heavy line.

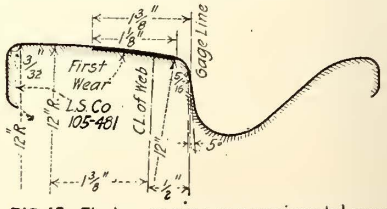
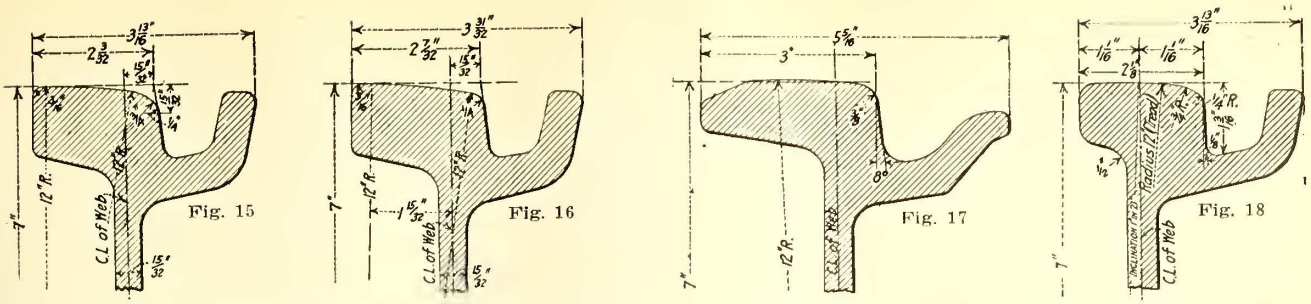


FIG. 13 - First wear area on experimental curved head rail indicated by heavy line. Effective contact secured is 3 times that shown in Fig. 12.

FIG. 14 - Comparison of head contours L.S. Co.-105-433 and L.S.Co.-105-481 (New Curved Head).



CURVED RAIL HEADS—FIGS. 15 TO 18—CURVED-HEAD RAILS IN EXPERIMENTAL USE IN DUBLIN, IRELAND, AND CALCUTTA, INDIA; IN GLASGOW, SCOTLAND; IN THE CENTRAL WEST, U. S. A., AND IN LEEDS, ENGLAND, RESPECTIVELY

The second inference to be drawn is that some effort should be made to counteract such injurious effects by trying to increase the load concentration area and shifting its position with respect to the gage line. Evidently the simplest way to do this is to attempt to secure a greater range in the area of contact between the wheel and the rail head from the very beginning of rail service. It follows that with wheels worn to a curve of some form, it will only be possible to accomplish this by conforming the rail head to a similar or nearly similar curved shape. In support of this it may not be out of place to note that, as previously stated, worn rails all show curved heads, and after reaching a certain fixed form of curve we seldom find corrugation. Also, corrugations do not very often reappear after grinding provided the grinding has conformed the head to an angle approximating the angle of inclination downward toward the gage line which the worn curved head has assumed.

Cold Rolling by the Load Does Not Prevent Corrugation

Furthermore, the idea that cold rolling alone, when not accompanied by corrugation, hardens the rail head to such a degree that it is impossible to form corrugations does not appear to be substantiated by the fact that corrugations appear on new grooved girder rails of the hardest composition, which latter should approximate, if it does not exceed, the degree of hardness produced by cold rolling. Corrugation also appears rather suddenly on old girder rails after they have been in service a number of years without previous evidence of a tendency to corrugate, and the rails have certainly received the benefit of cold rolling as a hardening agent. For these reasons we are forced to consider the design of the rails as being the more responsible and, as has been shown, there is evidence in the early service of new rails which tends to place the responsibility upon design. There is also considerable reason for the belief that old rails corrugate, finally, because of the same action of the worn wheels. This can be accomplished by any change in rail position, either through regaging, which brings a small head area under wheel contact, or through changed position, gradually accomplished by failure of ties and fastenings which produces similar results. In each case the worn wheels take a new position with highly concentrated loading on the rail head, and this factor alone would seem to explain why the rails corrugate under such apparently opposing conditions.

It may be asked why T-rails do not act similarly under the same conditions, and the answer appears to lie in the difference in design. The load, even when so heavily concentrated, is better distributed to the web both vertically and laterally, and there is no stiffening tram or groove to offset more free and uniform head movement laterally under the sidewise movement of the wheels caused by the excessive coning. Hence the corrugations, though tending to form to a somewhat lesser degree, are ground out by the wheels, which are more free to assume such varied positions on the head as to assist in the grinding. This point appears to be substantiated by the fact that we find the head metal of standard section (low T-rails) constantly peening or extruding on both sides upon examination of such rails in service on our elevated lines.

A Study of Worn Rail Head Contour

Having studied the worn wheels and their possible effect on new rails, attention was then directed to worn rails. Advantage was taken of openings for joint repairs on three most important, heavy traffic lines, and a great many scribings were made from rail heads at points far enough away from joints to be free from excessive wear due to joint conditions. These scribings furnished a set of measurements from which it was possible to secure an average head contour of our standard 7-in. grooved girder rails worn in service for seven years on both steel and wood tie construction. This composite contour was found to have a curved head of a radius of about 12 in. with an angle of inclination toward the gage line of about 3 deg. below the horizontal.

It was decided that it would be worth while to experiment with the curved head rails and, therefore, a new head design was evolved, as shown in Fig. 13, which has been rolled by the Lorain Steel Company as section 105-481. It will be noted that there is no substantial change in weight. A comparison of the contours of the two rails 105-433 (plane head) and 105-481 (curved head) is shown in Fig. 14, while early wear is shown in Figs. 20 and 21.

Results Obtained with Curved Head Rails

It was expected that new wheels might give some trouble on the new rail due to raising the flange slightly —and these were plotted as shown in Fig. 9. From this it was thought that the new wheels would work fairly well with little danger of derailment, which latter question was raised by the mechanical department. It appeared that comparatively few wheels in service are new, and derailments could be expected on worn rails for the same reasons if there were any particular danger from this point.

About 630 tons of this rail have been rolled and some 300 tons (approximately 9600 ft. of single track) have been installed this fall. In order to test the rail fully, about 700 ft. of single track has been laid on steel ties having 6 in. of concrete under them and a total of 10¼ in. of concrete under the base of the rail throughout. The new rails have also been laid in conjunction with our standard plane head rails in all cases, so as to secure a comparison under the same traffic.

It may be of interest to note by reference to Fig. 13 that a first contact width of about 1⅛ in. was predetermined, and this width was found actually in the mark-

ings under the first car wheels to pass over the rails. The attempt is also being made to secure careful records of the wear as it progresses, by means of plaster of Paris casts made at definitely located points.

The accompanying Figs. 15-18 illustrate similar curved head rail designs now being experimented with in Dublin, Ireland, and Calcutta, India; in Glasgow, Scotland; in the Central West, U. S. A., and in Leeds, England, respectively.

In closing it may be stated, from the experience already gained during installation, that the two principal objections to the curved head feature, viz., rolling and joint grinding difficulties, are really of very little moment and may be disregarded. The rail mills have had no trouble in turning out a satisfactory product, close to templet, with a marked similarity of head contours which has tended to reduce the amount of grinding at joints necessary to secure good head surface. The work of grinding the joints is not difficult and very satisfactory results have been obtained. This is true also with respect to the compromise joints where the plane head rails are joined to the curved head rails.

The performance of the new rail section under traffic shows that the desired increase in first contact area, with the incidental location of the load center at a greater distance back from the gage line, have been secured and no peening of metal at the gage line has been found after a service of about eight weeks. This peening may be found in our new plane head rails within five days after being placed in operation.

Conclusions

An attempt has been made in the foregoing discussion to present a statement of the main features which were considered before reaching a decision to give a service trial to the curved head design, together with some information obtained from trial installations which seem to warrant the following conclusions:

1. Rail corrugation has become so general that it is being accepted with more or less complacency, and the rapid improvement in rail-grinding apparatus has made the removal of corrugation quite an easy matter, which has tended to temporarily divert attention from the study of its causes.

2. The present general practice of eliminating corrugations by grinding, on new rails at least, is simply an expedient which is not only expensive but also wasteful —expensive in actual grinding cost and wasteful of otherwise useful rail head metal lost in the process.

3. A study of the now generally accepted theory of wheel and rail contact, and their resulting pressures, based on the experiments made by Professor Johnson and by G. L. Fowler, combined with a study of the actual conditions of rail head and wheel tread wears, lead to the belief that the inclined plane head design was based on a misconception of the theory of contact and was at variance with the requirements of correct design, as indicated by both wheel and rail wears.

4. The curved head design, on the other hand, by providing a range of contact over new heads about three times that presented by new plane heads and much further back from the unsupported metal near the gage line fillet, seems to satisfy the requirements of the theory of contacts as well as the conditions of wears found in service.

5. The curved head design practically eliminates the excessive amount of metal on inclined plane heads which must be removed in some manner before the heads can conform themselves to what may be called the accommodation wear curve found on all rails except those just installed. Such a curve of substantially uniform shape is found not only in the worn rails of any one system, but also in all groove and tram girder rails throughout the country.

6. The adoption of a curved head design involves a return to an early principle of grooved and tram girder rail design which has never been generally abandoned in T-rail designs. It presents no rolling mill or joint

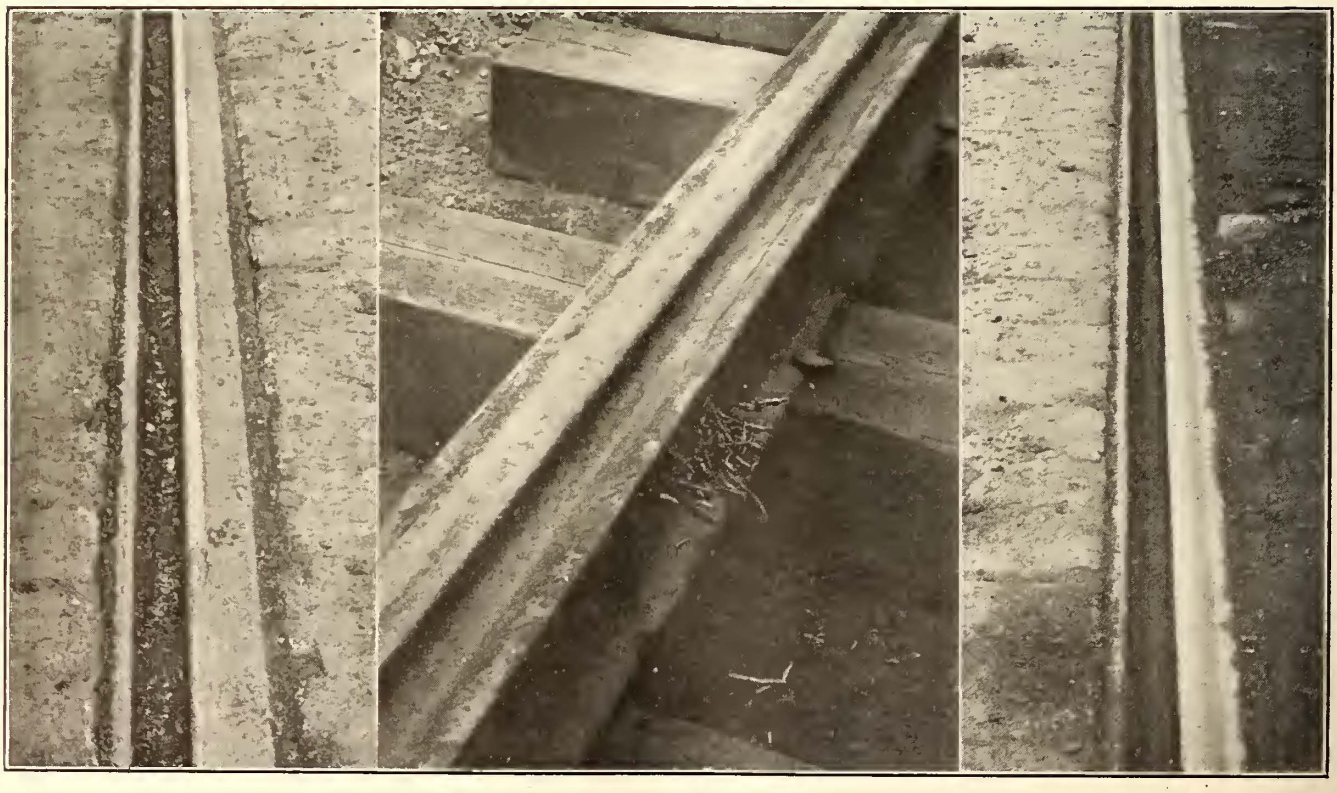


Fig. 19 Fig. 20 Fig. 21

CURVED RAIL HEADS—FIG. 19—FIRST WEAR ON STANDARD B. R. T. RAIL. FIGS. 20 AND 21—FIRST WEAR ON CURVED-HEAD RAIL

grinding difficulties; there should be no increase in cost, and a curved head may be incorporated in practically all grooved or tram girder rails without altering any other features of the design.

7. In view of all these points in its favor it is thought that the curved head design merits the most careful investigation because of the potential value in tending to minimize the inherent tendency of all rails to corrugate.

8. An interesting point which arises is the question as to the desirability of providing wheels with curved treads also. It is not impractical from the manufacturing standpoint, as far as steel wheels are concerned, and a considerable saving in wheel wear could be anticipated. In any event, actual wheel wears show that the straight tread is very soon lost in service and that comparatively little attention is given to tread wear with respect to maintenance of straight contour because wheels are shopped only for turning required by flange wear. In view of the fact that the majority of wheels and rails which come in contact are worn to curved contours, it seems somewhat impractical to expect to get the best mechanical results by imposing curved wheel treads upon plane rail heads or vice versa, and it would appear to be more logical to have the two contours conform to nearly similar curvatures from the very beginning of their contact.

Electric Car Maintenance*

Appearance of Cars Reflects Grade of Service Rendered—Value of Charting Defects and Scientific Inspection of Equipment

BY J. F. LAYNG, GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

In considering car maintenance it should be remembered that the general appearance and condition of the car is a direct indication of the grade of service that is being given. The underlying principle of keeping up the appearance and condition of the car is based upon inspection and overhauling. These are two distinct classes of work.

Inspection shows what work is necessary to do on a car to maintain it at the highest state of efficiency and at reasonable cost. There are two other very important indexes as to the states of efficiency, of workmanship and its direction. The first is the pull-in report, and the second is monthly segregated maintenance cost. These figures will be more readily appreciated provided they are charted. I have reviewed the pull-in report for the past year of a city system operating 800 cars, and by looking over this chart it can be seen in what months of the year the different classes of failures are experienced. These reports are divided under five different headings, which are: car bodies, trucks, electric equipments of cars, motors, air brakes.

Car bodies are further classified into car-body parts, sash or glass, ventilators, registers, gong signals, sand box, drawbars, fenders, trapdoors, seats, doors and operating mechanism, signs, heaters, headlights, light circuits, window shades.

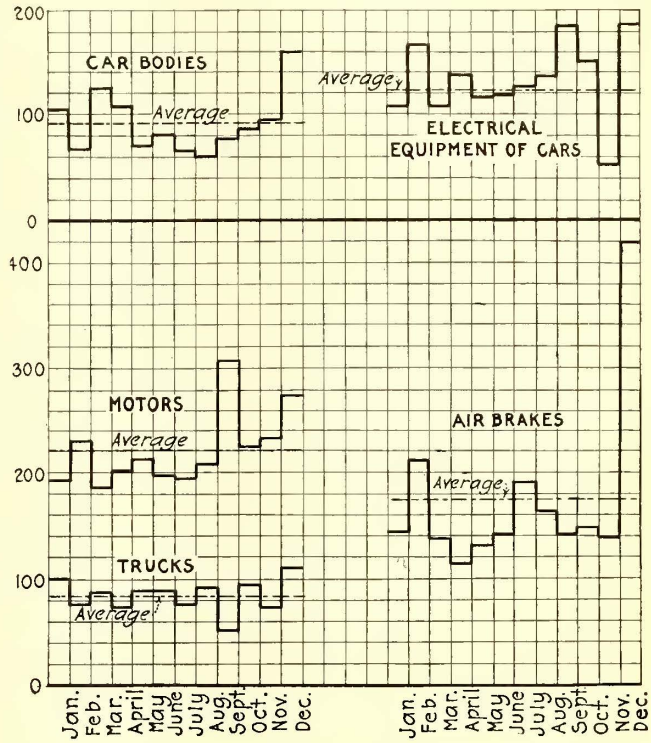
Under trucks the following defects have been classified: wheels, axles, journal bearings, truck frame, brake heads and shoes, brake rods, brake levers, bolster springs, loose brakes, tight brakes,

Under electric equipment of cars the following defects have been classified: trolley base, trolley pole or wheel, wiring, fuse box, circuit breaker, controller, grid resistance.

Under motors the following defects have been classified: field coils, armatures, brush-holders, gears, pinions, gear case, motor frame, motor leads.

Under air brakes the following defects have been classified: compressor, motor, governor, air brake parts frozen, engineer's valve, reservoir, piping or brake cylinder.

The chart shows, for instance, a large number of failures of air brakes during the winter months. Many of these defects were due to frozen air parts, and after the chart had been made the company realized that it had to give a general overhauling to the air piping and place additional reservoirs on the cars. Unless the defects are definitely classified and charted it is practically impossible to secure the proper perspective of troubles experienced. When the defects on a particular classification amount to too high a figure it is advisable



SUMMARY OF PULL-IN REPORTS

to extend the charting of the individual items to determine what should be done on individual pieces of apparatus.

Scientific inspection will do more to promote efficient, dependable service than any other single thing. There are two general systems of inspection: the periodic basis and the mileage basis. Both can be worked out in many places to give equally dependable results, but there are some classes of work in which the mileage system is the only one which can logically be followed. For instance, on interurban lines, where there is relatively a small number of cars, with the rotational system of inspection, some cars would not receive attention in proportion to the work which they are performing. Cars of nearly every character should be inspected on a 1000-mile basis. Any rotational system based on approximately this mileage would be efficient.

At a typical carhouse with a force of fifteen men the day force would consist of a foreman, two controller men, two truck men, two truck men helpers, two air-equipment men, one car-body man and one terminal inspector, and the night force of three men, whose duties are to adjust brakes and look after small troubles reported by the motormen. From this it will be seen that all of the real work is done during the daytime. It has been found that night work is most inefficient. The best

*Abstract of paper presented at meeting of Pennsylvania Street Railway Association, Scranton, Pa., Dec. 14, 1915.

grade of men will refuse to work at night, as they can readily find more congenial employment. The car-cleaning force consists of six persons in the day and three at night. To inspect the 2000 cars on the line in question 150 employees are required. This is an average of 13.3 cars per inspector. The overhauling of these cars requires 250 employees, which is eight cars per employee. Where cars are inspected in rotation very little clerical work is involved and there will be a uniform amount in the shop at all times.

On motors the two principal things to consider are the condition of the bearings and the lubrication. Free oil around the motor is one of the most frequent sources of trouble that we have. Any point where the oil flows on the surface means that in a very short time there is an accumulation of dirt which will naturally cause insulation break-downs, and the oil will also cause the insulation to deteriorate rapidly. The other feature about motor inspection is the general condition of the commutation. If the brush-holders are well kept up and the insulating supports clean, there will be but few troubles from this source. By keeping up the brush-holders is meant uniform and proper tension on the brush springs, and that the shunts, hammers and brush-holder slots are kept up to practically the original standard. The motors should be blown out at regular intervals, depending, of course, upon the condition of the roadbed and general methods of operation.

The proper care of a controller consists of keeping the contact surfaces smooth and to replace tips when they are worn excessively. To secure the best operation, the adjustment of the fingers of platform controllers should be so made as to give a simultaneous break on all points that are in the same angle of contact. The next important feature in controller maintenance is proper lubrication and the keeping of all surfaces free of dirt. This especially includes the arc deflectors or, in the case of contactor control, the arc chute sides. It has been found that there is sometimes a tendency among the maintenance men to use insulating paints on controller surface parts that were insufficiently cleaned. The new paint makes the surface look clean, but the dirt is still suspended in the paint and is the cause of future troubles. The lubrication is very closely related to the work of keeping the controller clean. Excess oil means an accumulation of dirt, which causes insulation failures. Lubrication in controllers, as in motors, should be put only where it belongs.

Recently I visited a railway company that in the past had had a large amount of trolley troubles which were largely eliminated by the proper adjustment of the trolley spring tension. The height of the trolley wire was varied from 18 ft. to 20 ft. Standard gage ropes were used of such a length that when the end is placed on the rail head the trolley wheel would be at 18 ft. elevation. A spring balance constitutes a part of the gage rope, and the spring tension is then properly adjusted.

One of the most profitable methods of making savings on a good many systems is that of replacing old equipments. I know of one particular case where by an expenditure of approximately $400 the maintenance of motors would be reduced from $191 to $7.50 per year. This is only one instance of many where large savings can be made, and it must be remembered that a motor that is costing a large amount of money to maintain is a motor which causes a proportionate number of detentions to service, and that all the expenses which are directly charged as maintenance represent but a small portion of the general cost of a defective motor to the company's business.

Another feature which should be mentioned in connection with shop maintenance is that considerable benefit is derived from having monthly meetings of the maintenance men to review all of the troubles which have been experienced during the past month and see what can be done for their elimination. Successful maintenance means continually being on the job, and requires a large expenditure of careful thought and intelligence, not only on the part of the management but also of the men themselves.

Safety Appliances in Car Shops*

Suggestions for Stimulating Interest of Employees in Accident Prevention—Other Suggestions Covering Fire Hazard and Safety Devices on Equipment

BY H. P. MEGARGEE, ASSISTANT TO VICE-PRESIDENT AMERICAN RAILWAYS, PHILADELPHIA, PA.

Most accidents are due to the human element, and their prevention is most difficult. Ignorance may be remedied to a degree by instruction, but carelessness, generally, is merely forgetfulness. The oldest and best workmen are often the ones injured. They become so familiar with danger that they forget its presence, with the inevitable result. At the congress of the National Safety Council last fall much of the discussion concerned this factor. It was the thought of that body that no pains should be spared in arousing the interest of the employees themselves in this matter of safety. The management should have permanent committees of the men appointed to meet and consider protection; suggestions for the elimination of risks by these committees and by individuals should be encouraged, passed upon and adopted if practicable; prizes should be offered for the best suggestion of the month or year, and safety-first literature distributed. In a word, every possible means should be employed to keep the safety-first idea always present in the minds of those exposed to danger.

The initial step in the production of a careful man is to provide him with a clean, healthful workplace and with safe tools and surroundings, and this brings us to the question of safety devices. The first principle to be observed is that every appliance should as nearly as possible automatically prevent accidents even though the workman is careless. To get a conception of the measures necessary to safeguard a representative railway shop, we shall examine one in detail.

First, we have the building itself, and here, probably, the most important consideration is the fire hazard, for a workman injured by fire while in the course of his employment is entitled to compensation to the same degree that he would be if injured in any other manner. We must see that proper fire fighting apparatus is installed and in place, that dangerous practices likely to cause fires are not indulged in, and that electrical and similar hazards are eliminated. Where doorways open upon tracks, they should have railings and warnings posted. Stairs should have slip-proof treads and proper spacing of steps. They, with hatchways, elevator shafts and other openings, should be inclosed or guarded with railings. Skylights should have wire mesh or insert wire glass in them. Ladders, when fixed, should be of steel with not less than 15 in. between stringers and 12 in. to 15 in. between rungs. Portable straight ladders should be supplied with adjustable non-slip shoes. Any stock and parts in process of construction should be placed upon racks or piled out of the way.

With regard to power transmission: Vertical belts

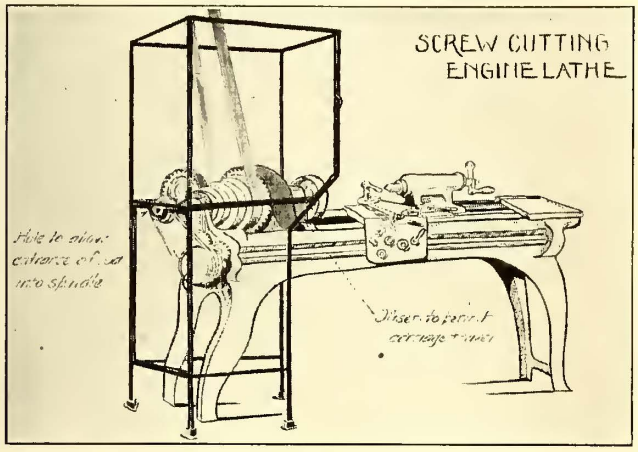
*Abstract of paper presented at meeting of Pennsylvania Street Railway Association at Scranton, Pa., Dec. 15, 1915.

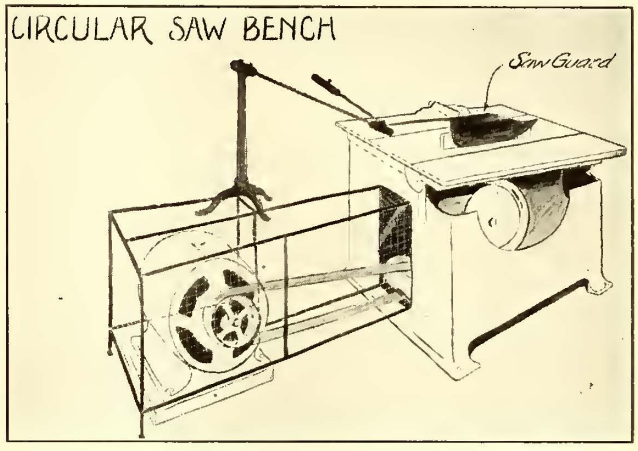
should be guarded to a height of 6 ft. from the floor. All gears when power driven should be completely incased, or at least beyond the root of the teeth. Pulley and clutches within 36 in. of a bearing should be entirely incased on the side nearest the bearing, and collars, couplings and set screws on revolving machinery should be of the safety type.

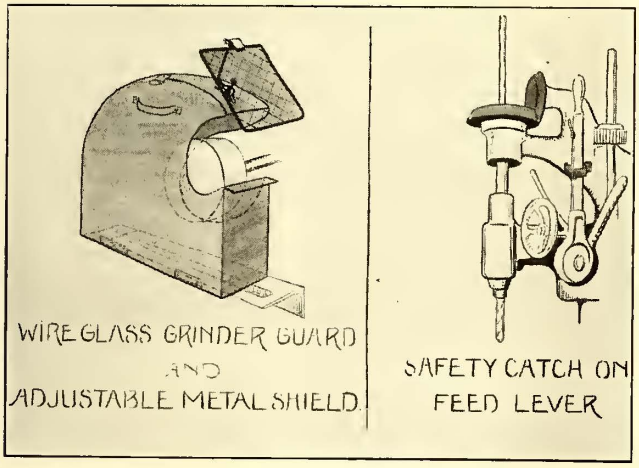
Slings should be tested and tagged with the date tested, and the foreman should make a daily examination for cuts or crushed fibers.

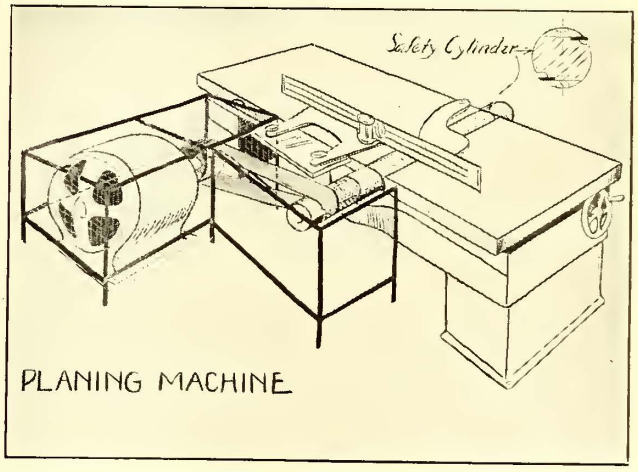
As to the machines themselves, I would refer you to the requirements of a safeguard, from the "Universal Safety Standards of the Workmen's Compensation Bureau," a book which should be contained in every street railway company's library. This book says of a safeguard: (1) that it should afford all possible safety to the operator and surrounding workmen; (2) that it should be, if possible, automatic in its action, application or operation; (3) that it should be, if possible, an integral part of the machine itself, and (4) that it should not materially diminish the output or efficiency of the machine to which it is applied. If these principles are kept in mind and strictly adhered to, successful safeguarding is assured.

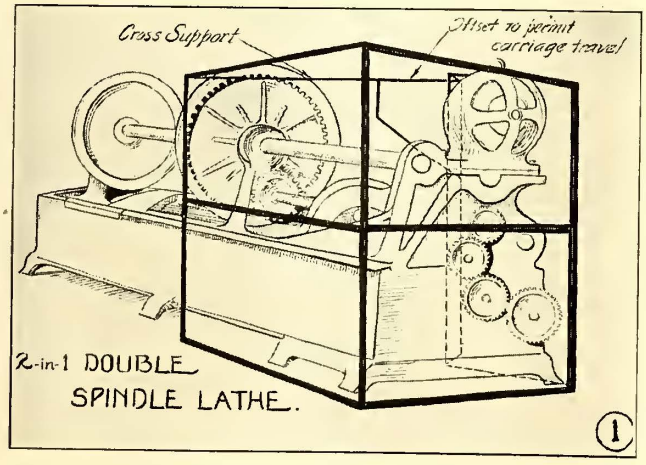
With regard to the type of guarding for individual machines, I have prepared drawings which show better than I can explain verbally how this is done. The sketches are taken directly from the machines in use in the Chicago & Joliet Electric Railway's plant and represent the best practice in safeguarding. I am of the opinion that, with this installation, a very successful attempt was made to use a single substantial screen

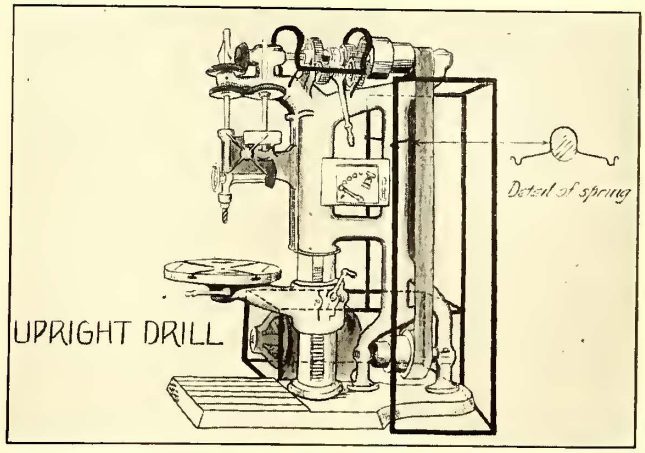












SKETCHES SHOWING MACHINE TOOL SAFETY GUARDS, CHICAGO & JOLIET ELECTRIC RAILWAY

or casing as far as it was possible and not to have a number of "gingerbread" guards stuck all over the machine. All parts to which access need not be had in the operation of the machine are grouped behind one guard.

A very interesting phase of the question is that of the expense involved, and in conclusion I give you the cost of protecting a typical plant. I have in mind one of our subsidiaries—a company operating about fifty cars and having shop facilities for that number. About fourteen machines were guarded in approved manner and several special safety devices were purchased, and the entire cost of labor and material was less than $400.

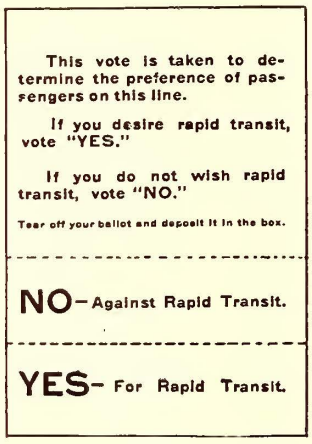
If you consider that a single workman receiving $12 a week in wages would have to be laid up only for a period of sixty-seven weeks to receive this amount—and should he be disabled by a permanent injury such as the loss of a hand he would be entitled to 50 per cent of his wages for 175 weeks, or $1,050, it is apparent that the question of the cost of installing a reasonable number of safety appliances is so slight as to be absolutely negligible.

Skip Stops Held Up in St. Louis

Plans for Faster Schedules Have Been Approved by a Four-to-One Popular Vote—Adoption Now Awaiting Approval of Public Service Commission

A somewhat remarkable situation in connection with the recently-tested skip-stop plan has arisen in the city of St. Louis, as the order for its establishment, after a period of trial operation that proved satisfactory to the railway company's patrons, is apparently being held in abeyance by the local authorities. This failure to act is presumably based upon protests that have been made by a few property owners at the points where stops have been eliminated, although the patrons of the line have expressed themselves strongly in favor of the change.

The skip-stop plan for St. Louis was conceived about one year ago, when the local railway company decided to take up with the city authorities and with the State Public Service Commission the savings in time that could be effected for passengers by reducing the number of stops. The city of St. Louis is rather irregularly built, some of the blocks being short and some long. Under the old custom which grew up with the horse cars, the cars had been making stops at every street intersection. With electric operation, however, the different conditions made it evident that, if certain stops were eliminated in a manner which could not be objected to by the passengers, at least 10 per cent in running time could be saved. The railway company, therefore, called the attention of the municipal department of public utilities and also of the State Public Service Commission to these facts, and both organizations were so much interested in the matter that each delegated engineers to go over the scheme to determine what could be done. After an investigation, the commission's engineers reported that 28 per cent of the present stops could be eliminated without hardship to any of the passengers and with great advantage to all of the riders, especially to those making the longer trips.



ST. LOUIS SKIP-STOP—SAMPLE BALLOT FOR POPULAR VOTE

Although there seemed to be no question as to the advantage of the stop-elimination plan, both the municipal department of Public Utilities and the State Public Service Commission hesitated to issue an order in the matter. The railway company, therefore, made a formal petition to the State commission for the proposed elimination of stops, and a public hearing was held in St. Louis. At this hearing specific objection was made to the elimination of only twenty-eight stops out of a proposed total of 770. These objections came entirely from property owners and storekeepers at the proposed points where stops were to be cut out, these people fearing that their interests would be affected.

The State commission then took the matter under consideration and authorized a test to be made of the proposed plan on two of the railway company's lines, this test being of ninety days' duration. The commission, however, did not permit a test of the plan in the exact form which had been originally proposed, because in its order for the test certain stops were replaced in the schedule, and this reduced the possible saving in time. The selection of lines was also unfortunate because on some of the other lines of the system, where the blocks were shorter, a much better showing for the skip-stop scheme could have been made. In its order, also, the State commission incorporated a clause requiring the railway company to make application at the end of the test period to the municipal authorities for permission to eliminate the stops permanently, although the commission itself had several times held that the State public service law has removed from the municipal authorities all control over the service of public utilities.

The company proceeded, however, to make the test authorized by the State commission, and, near the end of the test, the passengers on the two lines concerned voted on the question as to whether or not the plan was acceptable to them. On one of the lines the vote showed approximately three to one in favor of the plan, and on the other line approximately four to one in favor of it, about half of the total number of riders on both lines having cast ballots. An attempt was made to have both the municipal department of Public Utilities and the State Public Service Commission assist in arranging this vote and supervise the counting, but neither body was willing to take any part in it. On Dec. 14, the company filed with the commission a report on the test and a petition for permission to install a modified alternate stop plan. This petition is now under consideration by the commission. An abstract of this document follows:

Petition to Public Service Commission for Skip-Stop Order

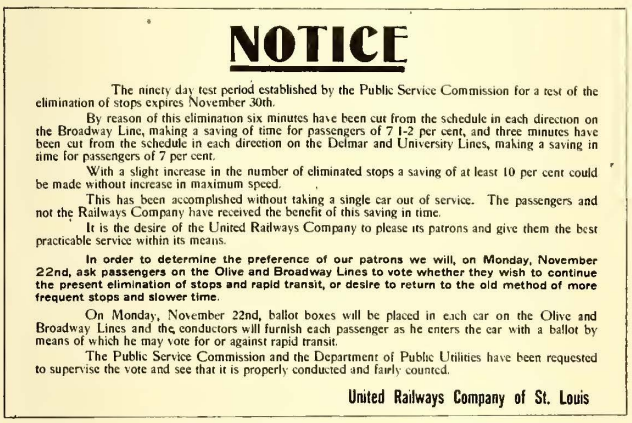
The petition begins with a report outlining the conditions that led up to the test of the new plan, by stating that on Aug. 5, 1915, the Missouri Public Service Commission had issued an order authorizing the United Railways Company of St. Louis to make a test, beginning on Sept. 1. From this it was found that savings of 7 per cent on one line and 7½ per cent on the other were made in the running time without taking a single car out of service, although the commission did not allow the company to eliminate all the stops asked for in the original petition. However, the test was carried through with no more than the usual temporary confusion when any change in running conditions is made.

To determine the wishes of the passengers on the two lines in question, the railway company asked, on Nov.

22, for a vote on the question of rapid transit as brought about by the elimination of stops, invitations having been extended to the commission and to the director of public utilities in St. Louis to supervise the voting, but not being accepted. In order to bring the matter prominently to the attention of the passengers bulletins were displayed in all of the cars on the lines in question on Nov. 19-22, and advertisements were carried in four Sunday newspapers on Nov. 21. On Monday, Nov. 22, advertisements were carried in five English daily newspapers and two German daily newspapers.

Ballots were distributed by the conductors to all the passengers, including those paying cash fares and those offering transfers, and a ballot box, on the front of which was painted "Vote Here for Rapid Transit," was placed in a prominent position at the front end of each car near the exit.

On Nov. 22 a large sign reading "Vote To-day For or Against Rapid Transit" was carried on the front dashboard of each car on the lines in question. There was some newspaper criticism as to the wording of the ballot which asked the passengers to vote for or against rapid transit. However, rapid transit was the result



NOTICE

The ninety day test period established by the Public Service Commission for a test of the elimination of stops expires November 30th.

By reason of this elimination six minutes have been cut from the schedule in each direction on the Broadway Line, making a saving of time for passengers of 7 1-2 per cent, and three minutes have been cut from the schedule in each direction on the Delmar and University Lines, making a saving in time for passengers of 7 per cent.

With a slight increase in the number of eliminated stops a saving of at least 10 per cent could be made without increase in maximum speed.

This has been accomplished without taking a single car out of service. The passengers and not the Railways Company have received the benefit of this saving in time.

It is the desire of the United Railways Company to please its patrons and give them the best practicable service within its means.

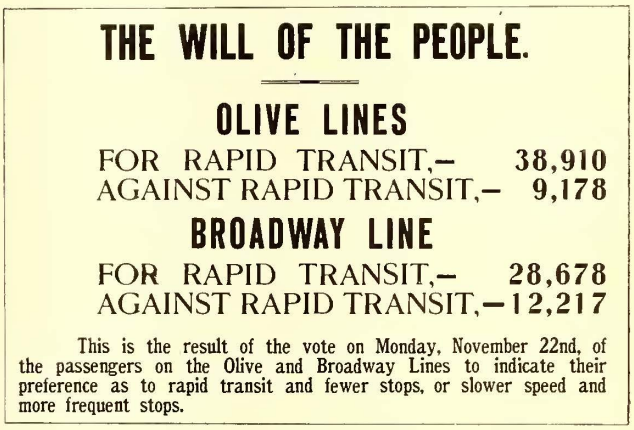
In order to determine the preference of our patrons we will, on Monday, November 22nd, ask passengers on the Olive and Broadway Lines to vote whether they wish to continue the present elimination of stops and rapid transit, or desire to return to the old method of more frequent stops and slower time.

On Monday, November 22nd, ballot boxes will be placed in each car on the Olive and Broadway Lines and the conductors will furnish each passenger as he enters the car with a ballot by means of which he may vote for or against rapid transit.

The Public Service Commission and the Department of Public Utilities have been requested to supervise the vote and see that it is properly conducted and fairly counted.

United Railways Company of St. Louis

ST. LOUIS SKIP-STOP—NOTICE POSTED IN CARS SEVERAL DAYS BEFORE VOTE



THE WILL OF THE PEOPLE.

OLIVE LINES

FOR RAPID TRANSIT,— 38,910
AGAINST RAPID TRANSIT,— 9,178

BROADWAY LINE

FOR RAPID TRANSIT,— 28,678
AGAINST RAPID TRANSIT,—12,217

This is the result of the vote on Monday, November 22nd, of the passengers on the Olive and Broadway Lines to indicate their preference as to rapid transit and fewer stops, or slower speed and more frequent stops.

ST. LOUIS SKIP-STOP—NOTICE POSTED IN CARS ON THE DAY AFTER VOTE

achieved by the elimination of stops and there was no misunderstanding as to what the ballot meant. The petition added that the company would have been glad to have submitted the wording either to the commission or to a municipal director of public utilities had either shown interest in the matter, but as the company did not have the benefit of their advice it was decided that many of the passengers might have been confused as to what was meant by "Elimination," whereas all would know what was meant by "Rapid Transit." Voting was continued on Nov. 22 from the time when the cars went out in the morning until they were turned in at night, at which time the ballot boxes were sealed and deposited in the vaults of the railway company. The counting of the ballots, in the presence of representatives from four newspapers, was completed the following afternoon. The result of the votes on the different lines was as follows:

Olive lines—For rapid transit, 38,910. Against rapid transit, 9178.

Broadway lines—For rapid transit, 28,678. Against rapid transit, 12,217.

The petition continued by saying that ever since the tests had been in force the officers of the railway company had been studying the results and methods by which these results had been attained. There is no question but that the majority of passengers favor rapid transit obtained in any way, but any scheme of attaining it by the complete elimination of certain stops is likely at first to meet pronounced though often selfish opposition from two classes of persons. These are, first, the property owners and storekeepers who fear the depreciation of property located at the affected corners for business purposes, and, second, those living in the neighborhood who have to walk further to reach the cars.

To meet such objections as have been made to the original plan and to treat all impartially, the company proposes a modified alternate stop plan which has been in use in the city of Cleveland for about two years and is so popular with the passengers that, according to the city street railway commissioner, they would not be willing to return to the old methods of operation. By this plan, the stops which are eliminated in one direction of travel are retained as stops in the other direction. It is proposed that the minimum distance between stops shall be 300 ft. and that the maximum distance between stops shall be 800 ft., so that the maximum additional distance which any passenger will be obliged to walk on account of the readjustment of stops shall be 400 ft. At the rate of 4 m.p.h. a passenger may walk 350 ft. in one minute; therefore, the loss of time in walking will probably be made up several fold by the saving in time on the car. However, at all transfer points and track intersections, and within the congested area of the business district of the city, no stops shall be eliminated.

The petition closed with a request to the commission for an order making the proposed rearrangement of stops permanent.

Service Conditions for Women Conductors in London

The Highways Committee of London, England, reports that the precise conditions under which the women will have to work on the London County Council Tramways can only be settled after some experience has been gained, and after it is seen how many men will be called up for service under the group system of Lord Derby's recruiting scheme. So far as possible, women will be engaged for full-time service and will then receive the same rate of pay as men. There might, however, be exceptional cases in which a long "spread over" occurs and one woman could hardly be expected to perform the full duty. It would probably be found convenient in these cases for one woman to take the early morning portion of the duties and another woman to take the late evening portion, and the full day's pay would be divided between the two women.

Massachusetts Northeastern Fare Hearing

Company Presents 6-Cent Fare Evidence Before Joint Session of Massachusetts and New Hampshire Commissions

The Massachusetts and New Hampshire Public Service Commissions at a joint session in Boston on Dec. 14 heard the contentions of the Massachusetts Northeastern Street Railway, Haverhill, Mass., for a general fare increase. John E. Benton, Keene, N. H., appeared as counsel for the company, and President David A. Belden filed a brief on behalf of the proposed changes. After the presentation of the company's evidence the hearing was adjourned to give the remonstrants an opportunity to prepare their case. Pending a finding the proposed changes have been suspended.

Mr. Benton urged that the road is entitled to a fair return upon the capital stock above fixed charges and operating expenses, pointing out that the Massachusetts commission has recently approved the outstanding capital stock. He said that every effort had been made to make the property yield some return to the stockholders, but that prior to the consolidation in 1913 under the present ownership, it was impossible to pay any dividend upon the stock of any of the ten companies then owning the properties. In 1915 the net operating revenue was about $40,000 less than in 1914. The current year thus far shows a loss in gross revenue, which, even if not continued through the year, will, together with an unavoidable increase in labor charges, make the net showing for the year $25,000 worse. The company desires to raise the cash fare from 5 to 6 cents, to increase the ticket-book rate 20 per cent, to introduce a new fare zone between Pelham Center and Hudson Center, to discontinue a lap-over privilege on the Merrimac Division and to make minor changes in fare limits. Mr. Benton said that these changes would yield less than a fair return.

Position of the Company

The company is composed of seven Massachusetts and three New Hampshire street railways and the Canobie Lake Park Company, operating a pleasure resort in Salem, N. H. In general the lines connect Haverhill, Lowell, Lawrence and Newburyport, Mass., with the Hampton Beach district in southern New Hampshire while other lines connect Nashua and adjacent towns with the cities of the Merrimac Valley of Massachusetts and the seacoast. The system now comprises 126 miles of single track, 80 of which are in Massachusetts. Exclusive of the beach sections, where only summer service is offered, the average length of the fare sections is 4.04 miles, which on the basis of a 6-cent fare is 1.48 cents per passenger mile.

All but two lines were built for operation as a unit system, and the separate incorporation of the eight other companies was the result of the routes crossing the State boundary. Carhouses, repair shops and substations were located with reference to the combined mileage in both States, and with one exception no company could give practical service without the connections afforded by one or more of the companies in the adjoining State. Four of the Massachusetts companies owned no carhouses or shops, and only one in this group had a substation or power equipment of any kind.

Although the gross operating revenue of the system increased from $646,009 in 1911 to $674,818 in 1915, there was a loss of $24,290 in the latter year compared with 1914, so that the net increase for the five years was only 4.46 per cent. Operating expenses increased $50,346 or 10 per cent for the five years, and taxes increased 64.16 per cent. Prior to 1910 no depreciation reserves were included in the accounts of the constituent companies, but in the five years ended June 30, 1914, the combined charge was $561,500, as required by the equipment life conditions. While the profit and loss accounts were unable to meet these depreciation charges without creating large deficits, it seemed best at least to recognize the necessity of a reserve account.

Maintenance expenses for the five-year period ended in 1914 averaged 20.75 per cent of the gross operating revenue, and for 1915 the ratio was 23.93 per cent. Energy is supplied at 13,200 volts to six substations by the Rockingham County Light & Power Company, Portsmouth, N. H., at a rate of 1.4 cents per kilowatt-hour with a provision for slight increases following the price of coal. The cost of purchasing power for 1915 was $144,288, and the cost of substation operation was $14,317, of which maintenance required $2,562 wages $10,804, and supplies and expenses $950. The total power cost was therefore $158,605.

With the exception of the Citizen's Electric Street Railway, Newburyport, Mass., and the Haverhill & Amesbury Street Railway, none of the companies included in the Massachusetts Northeastern consolidation ever paid a dividend. In the eleven years ended June 30, 1911, the former company paid an average dividend of 5.6 per cent, accumulated a floating debt of $45,000 and made no provision for depreciation. The physical condition of the property was such that dividends were suspended in 1911, since which time $94,020 has been expended on repairs and replacements in addition to the regular maintenance outlays. The Haverhill & Amesbury Street Railway paid 4 per cent in three years and 3 per cent in 1897, no later dividends being declared. Since its purchase in 1909, $223,351 has been expended in rehabilitation. The Massachusetts Northeastern has paid one dividend on its preferred stock amounting to $16,825. Since 1914 earnings have not warranted the dividend, and it has been passed.

With the 1915 travel, the proposed rates, together with the additional fare section, would produce an increase of $147,479 in passenger revenue if the traffic held up to normal. Omitting depreciation charges but including $13,000 for wage increases effective on Oct. 1, 1915, and providing for additional taxes on the capital stock or franchise value which would result from a dividend return if one were earned, the company would have operating expenses and taxes of $595,000 or $17,811 more than for 1915. With 5 per cent interest on the funded and floating debt and 6 per cent dividends on the common and preferred stock, the total requirements would be:

Interest on $1,000,000 bonds at 5 per cent	$50,000
Interest on $475,000 floating debt at 5 per cent	23,750
Dividends on $665,000 preferred stock at 6 per cent	39,900
Dividends on $1,500,000 common stock at 6 per cent	90,000
Operating expenses and taxes (est.)	595,000
Total	$798,650
Gross earnings, July 30, 1915, year	683,953
Theoretical increase due to new rates	147,479
Total	$831,432
Excess	$32,782

No allowance for depreciation is included in this tabulation, and the floating indebtedness in large part cannot be capitalized because it represents operating deficits and money borrowed to pay interest. To retire this in ten years an addition of $47,500 per year is required out of earnings. Hence the proposed new schedule will fall far short of providing fully for the company's needs and paying a full fair return upon the investment, even as that investment is now represented by the outstanding securities. It is not expected that the new rates will enable the company to pay a 6 per cent dividend upon its common stock. While the stock-

holders are entitled to this moderate dividend, if it can be earned, it is believed that a higher fare than that proposed would tend to discourage travel to such an extent that the net increase in revenue would be less than under the proposed schedule. Jitney competition is another uncertain factor. Some of the increases proposed will yield no additional revenue unless corresponding increases are allowed upon competing lines of the Bay State Street Railway. If the rates upon competing street railway lines are not less than those fixed by the proposed schedule, it may be estimated that the revenues will be increased from 10 to 15 per cent the first year after the new rates are in effect, and that this percentage may thereafter be increased from year to year.

The National Safety Council and Its Electric Railway Section

BY H. A BULLOCK, CHAIRMAN MEMBERSHIP COMMITTEE ELECTRIC RAILWAY SECTION, SECRETARY NEW YORK MUNICIPAL RAILWAY CORPORATION

The executive committee of the electric railway section of the National Safety Council met in New York City on Dec. 17 to receive reports from the sub-committees, and plans were put under way for important work along several lines.

The National Safety Council

Before taking up in some detail the work of the electric railway section it may be well to review briefly the remarkable history of the council itself. It was organized in a preliminary way four years ago and formally two years ago, principally at first by the steel and steam railroad industries. The president is Arthur T. Morey of the Commonwealth Steel Company, and W. H. Cameron, Chicago, Ill., is secretary and treasurer. A board of about fifty directors manages the work of the council through an executive committee of sixteen members. The rapidly growing membership now comprises 1450 firms and corporations, including forty-eight electric railways, and more than 5000 individual representatives of these interests.

The work of the council is organized in sections, of which two of immediate interest are those on electric railways and public safety. George O. Smith, Doherty Operating Company, is chairman of the former, and Edward C. Spring, Lehigh Valley Transit Company, of the latter. These two will work in close co-operation, electric railways joining one being automatically enrolled in the other.

Among the important activities of the council are the following:

1. An annual congress with separate sessions devoted to the discussion of important safety problems peculiar to each section, and certain general sessions devoted to the safety problems common to all sections.

2. Local councils in industrial centers, automatically including in their membership the local members of the National Safety Council. These local councils provide facilities for the safety education of employees through public meetings and round-table discussions, and, in general, create facilities for the systematic handling of the public safety and other problems common to the various industries in their respective sections.

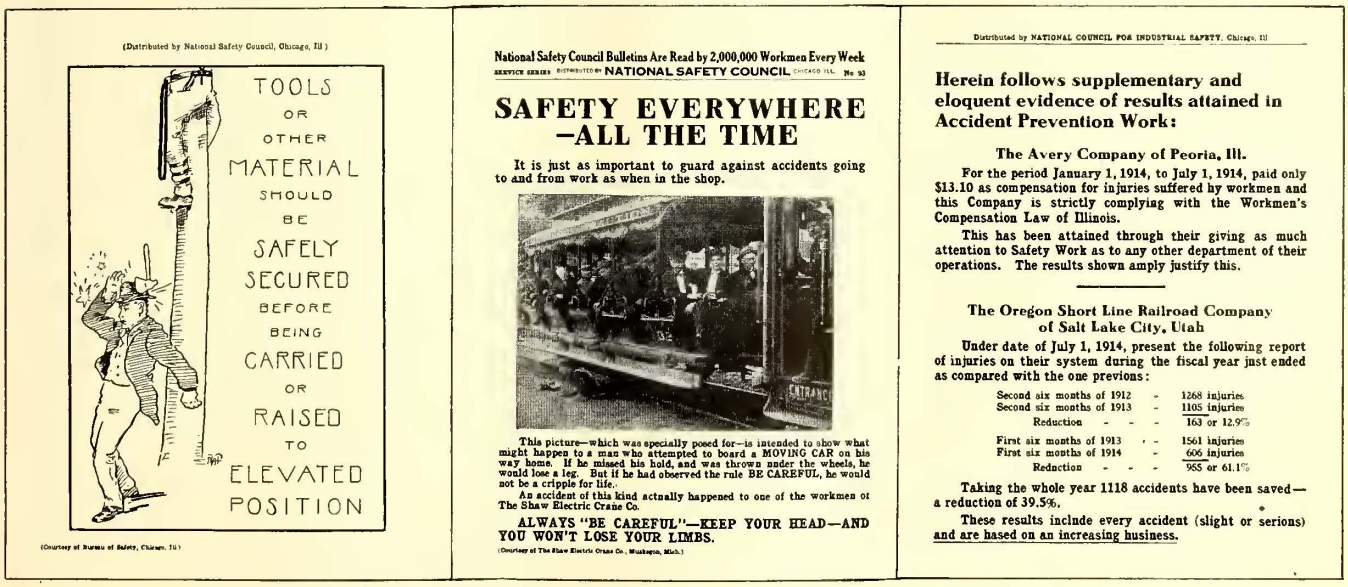
3. A weekly safety service, consisting of at least four bulletins distributed to all members every Monday. These bulletins represent the best information on safety topics and are directed to the stimulation of all those engaged in systematic safety work, and the education, particularly through pictures, posters, slogans, etc., of the rank and file of employees. The National Safety Council is, in large measure, the clearing house for the organized safety activities of the entire country.

4. Directive assistance in organizing and developing safety campaigns. The firms and corporations now belonging to the National Safety Council, particularly such companies in the transportation industry as the Boston Elevated Railway, the Brooklyn Rapid Transit Company, the New York Central lines, and the Delaware, Lackawanna & Western Railroad, have passed through the costly experimental stage in the safety education of their employees and the public. The National Safety Council is able to offer to others the results of the experience of these and hundreds of other concerns.

5. Information bureau service, involving answering, according to the most approved standards, the questions which are submitted by the members on safety problems in their respective fields.

6. The services of lecturers and safety experts, the council being able, through the co-operative activities of its members, to provide such services in connection with safety campaigns.

7. Motion picture and stereopticon slide service. The council maintains a collection of moving picture films and stereopticon slides which can be utilized by the members without charge.



NATIONAL SAFETY COUNCIL—TYPICAL POSTERS FROM GENERAL WEEKLY SERVICE

8. The services of the several technical committees which are at work standardizing and developing safety devices and practices.

9. Co-operation in sanitation, hygiene and general welfare matters. While the council is not primarily engaged in welfare work, nevertheless the subject of sanitation and hygiene is necessarily related to that of safety and it is able to give its members expert advice on plant hygiene, first aid instruction, the care of the injured, etc.

As the council is a co-operative organization, it is able to give the above service at a nominal membership payment, varying between $10 and $100 per year, the latter fee being that for employers of 10,000 or more persons.

The Electric Railway Section

Due to the size of the electric railway membership and to the satisfactory condition of the treasury special service to electric railway members will soon be inaugurated. Such members as the Boston Elevated Railway and the Brooklyn Rapid Transit Company have agreed to supply material for a weekly service.

NATIONAL SAFETY COUNCIL—AMERICAN CAR & FOUNDRY COMPANY'S POSTER

At the executive committee meeting already mentioned the committees reported in substance as follows:

The membership committee, of which the writer is chairman, stated that the enrollment has increased nearly 50 per cent since Oct. 1, and that printed matter will soon be sent out in an active campaign for new members.

The committee on standards, Henry B. Potter, Boston Elevated Railway, chairman, recommended that its work should be directed along these lines:

A standard code of principles underlying the forming of safety organizations in street railroad companies and methods of organization carrying out such principles should be prepared. While it was recognized that conditions in street railway organizations vary to such an extent that no single form of safety organization can be applied to all, the discussion developed the conviction that a clear statement of the principles underlying successful safety organizations already formed would be of great service.

Data on near-side stop practice should be compiled.

Uniform practices at grade crossings should be encouraged. In this particular the co-operation of the members of the steam railroad section will be solicited. Marcus A. Dow, New York Central lines, is chairman of the steam railroad section.

The committee on accident study and analysis, through Rex D. Billings, chairman, reported a plan for establishing for members of the electric railway section a special bulletin service of safety material. As already stated, the electric railway members have promised co-operation in this matter.

The details of the program for the sessions of the electric railway section at the next annual congress of the council, to be held in the fall of 1916, will be a special order of business at the February meeting of the sectional executive committee.

The executive committee of the electric railway section comprises the following: George O. Smith, Doherty Operating Company, chairman; Edward C. Spring, Lehigh Valley Transit Company, vice-chairman; C. B. Scott, Middle West Utilities Company, secretary; H. A. Bullock, Brooklyn Rapid Transit Company, chairman membership committee; Henry B. Potter, Boston Elevated Railway, chairman standardization committee; Rex D. Billings, Reading Transit & Light Company, chairman committee on accident study and analysis, and H. Irwin, Charlestown Consolidated Railway & Light Company, chairman program committee.

Trenton Fare Increase Denied

New Jersey Commission Refuses to Allow Trenton & Mercer County Traction Corporation to Withdraw Six-for-a-Quarter Tickets

The Board of Public Utility Commissioners of New Jersey in a recent decision disapproved the non-continuance of six-tickets-for-a-quarter by the Trenton & Mercer County Traction Corporation, Trenton, N. J., as announced in the Electric Railway Journal of Dec. 18. The following is an abstract of the salient points of the decision, which is now available in full.

Development of Case

Under date of Aug. 13, 1915, the board received a communication from the Trenton & Mercer County Traction Corporation to the effect that the company and its lessors had many years past sold six tickets for 25 cents; that, owing to decreased revenue and increased cost of operation, the company intended to discontinue this practice and to withdraw the tickets from sale, and that it would charge a 5-cent fare for carrying each passenger over five years of age. The Trenton & Mercer County Traction Corporation operates as lessee the properties of the Trenton Street Railway and its subsidiaries, the Mercer County Traction Company, the Trenton, Pennington & Hopewell Street Railway and the Trenton, Hamilton & Ewing Traction Company. The tickets mentioned above were accepted as the equivalent of a 5-cent fare on all the leased lines.

On Aug. 17, 1915, the board suspended the increase as proposed by the company, and hearings were then held. The company contended that the board was without jurisdiction to inquire into the justice and reasonableness of the proposed change because the ordinances passed by the city of Trenton constituted inviolable contracts by which the rate of fare for each passenger over five years of age was fixed at 5 cents. In the board's opinion, however, neither the acts of incorporation nor the ordinances supported such a claim or prevented the exercise of the jurisdiction conferred by the regulatory act.

Method of Getting at Valuation

The question, in the board's opinion, therefore became one of the justice and reasonableness of the proposed change. In investigating along the primary subject of value, it was found that the books produced for the Trenton Street Railway and its subsidiaries were incomplete and did not disclose the actual cost of the

properties. They gave some information as to the amounts of stock and bonds issued by the subsidiary companies, but such data were held to bear no necessary relation to reasonable cost or value.

There was in evidence a valuation made by the board's engineer, Mr. Betts, in the spring of 1911 in connection with the lease of the properties to a new operating company. There was also a general valuation by Rankin Johnson, president of the company, based upon an investigation made by him in 1910. In addition, there was a valuation compiled for the purpose of this case by engineers representing the city, Messrs. Rand and Brackenridge, and a fourth valuation made up practically as of the present time by Mr. Johnson. The board decided that the best estimate of value could be made up by taking the Betts report of 1911, deducting from the inventory in that report the items which had since disappeared, adjusting the values where the present testimony showed substantial error, and adding amounts found by the board's examiners to be properly chargeable to road and equipment from February, 1911, to the present time. The value placed upon the property in 1911 was $2,387,950, overhead charges being omitted, and after the deductions and additions mentioned were made, a reproduction value as of Sept. 30, 1915, was found to be $2,905,500. From this sum the board deducted $220,000 for accrued depreciation giving a present value of $2,685,500 as of Sept. 30, 1915. The board stated that the deduction made for accrued depreciation was based upon actual depreciation ascertained by inspection, and not upon theoretical depreciation.

Overhead Charges

In the matter of overhead charges the board considered that an allowance of 15 per cent was sufficient to cover engineering, errors and omissions, contingencies, and interest during construction, in view of the piecemeal manner in which a number of the lines and extensions were constructed. Calculated upon the items subject to such charges, an amount of $324,000 was obtained. For organization expenses 2½ per cent upon the bare structural cost was allowed. This cost was assumed to be $2,500,000, giving an allowance of $62,500. The board allowed for contractor's profit the sum of $140,000, which it regarded as liberal in any circumstances.

Materials and supplies properly belong under working capital, but these items were included in the appraisal of the physical property, and in view of the facts testified the board did not deem proper any further allowances for working capital. The record contained no proof of development cost or of inadequacy of a fair return at any time upon fair value. No allowances for these items could therefore be made. Throughout the valuation, the board said, it gave full consideration to the fact that the property valued was a going concern in successful operation.

The board concluded that the value of the property, for the purpose of fixing rates, did not exceed $3,212,000, as follows: Present value, Sept. 30, 1915, $2,685,500; overhead charges, $324,000; organization expenses, $62,500; contractor's profit, $140,000; total, $3,212,000.

Earnings and Expenses

The board found that the operating revenues had shown an increase each year from 1911 to 1914, the average for the four years being $736,840. The operating expenses had also increased each year, but not in the same proportion, the average for the four years being $389,923. Taxes had shown an increase each year, the average for the four years being $45,062. The net revenue had not shown the same increase as in the case of the gross revenue, the average net revenue being $301,855.

The commissioners said that the financial statements submitted by the company appeared to show a deficit, but in arriving at this deficit there had been included among the deductions the rentals which the Trenton & Mercer County Traction Corporation agreed to pay to the owners of the Trenton Street Railway. The board refused, therefore, to look upon these statements as showing the actual relation between net revenue and the value of the property, when the earnings of the last four years and the value of the property used in the production of these earnings were being considered.

Based upon the property value of $3,212,000, the average net revenue for the four years, $301,855, showed a net return of 9.4 per cent. The board said that it was quite clear that the value in each of the previous three years was less, so that if the average net revenue for the four years were set off against the average valuation for the same period, the net return would be higher than 9.4 per cent. If the company were allowed to earn upon its claim of value, including $1,139,952 of intangibles and making a total of $5,900,703, the average return would be 5.11 per cent.

It was asserted, stated the board, that the properties had not been maintained in a first-class manner, and it might be that a larger amount should be set aside for depreciation and expended upon the property each year. The amount expended in 1914 was approximately $70,000, and this included more than the average amount of replacement work. If, however, the allowance for depreciation were increased to $135,000, the amount said to be required, thus decreasing the average net revenue from $301,855 to $236,855, a net return of approximately 7.37 per cent would still be shown on the value allowed. For these reasons, therefore, the board maintained that the proposed withdrawal of the six-for-a-quarter tickets was unwarranted.

New Haven Tie-Up Not Due to Electric Equipment

Further information regarding the recent suspension of service on the electric zone of the New York, New Haven & Hartford Railroad which is now available shows that the interruption was due primarily to a complete failure of all means of communication along the lines and not to a breakdown of the catenary or feeder systems, as was originally reported. The storm that caused the trouble was an unusually severe one, alternate falls of rain and snow accompanied by a freezing temperature producing a coating of ice of unprecedented thickness on all overhead wires. In several places actual measurements showed that the coating of ice was 3¼ in. in diameter, and this, it may be said, is more than three times the load for which overhead construction is normally designed in the vicinity of New York City. Nevertheless, all of the feeder wires and contact system withstood the strain. The only power wires that did not stand up were the No. 3 gage control wires which, it may be said, do not affect electric operation directly, and the No. 3 gage signal lines. However, the entire telephone and telegraph pole line along the route between Woodlawn and New Haven was broken down, and these wires and others that parallel the tracks caused a number of grounds when they fell across the contact wires for sidings which branched off from the main line. This difficulty was easily remedied by opening the knife switches that are installed to separate the sidings from the main line, but the complete absence of communication between the various sections

of the line prevented the prompt location and isolation of the grounded sections. At the same time the failure of both the signal wires and the means of communication with the dispatcher practically prevented the movement of trains even by steam locomotives.

COMMUNICATION

Accounting for Rents

Chicago Elevated Railways

Chicago, Ill., Dec. 6, 1915.

To the Editors:

In the Electric Railway Journal of Nov. 13 appears an editorial entitled "Accounting for Rents." Statement is made therein that "for steam railroads, only office and minor equipment rents are included in operating expenses." The I. C. C. classification for steam railroads provides joint facility accounts for each subdivision of operating expenses, except "traffic," and to these joint facility accounts the lessee company charges its proportion of operating expenses: maintenance of way and structures to "maintenance of way and structures," maintenance of equipment to "equipment," transportation to "transportation," and general to "general." The I. C. C. classification for electric lines, ignoring, in the opinion of the present writer, the foundations of an operating classification, charges every expense for joint facilities, irrespective of the nature of the expense, to the sub-accounts under "general and miscellaneous."

I agree that "the purpose to be attained by an accounting classification should be the controlling factor in its construction," and that "a classification should be so made as to indicate in the clearest and quickest way whether or not a utility is securing a reasonable return on the fair value of the property." I must take issue, however, with the statement that the "gross income" is "the actual return upon the fair value of property," "gross income" being "used in its official technical sense according to the I. C. C. classification." Gross income is the measure of the return upon the property only in a limited sense and under exceptional conditions. In determining such return, interest on unfunded debt and other analagous items are as proper a deduction from "net revenue" as taxes.

The assumption, moreover, is diametrically opposed to that of railway officials, who assert that a fair return in a valuation rate case or otherwise must be a fair return upon the capital stock. All valuation proceedings have this for their purpose. A utility may and often does have a large gross income and at the same time not have sufficient income to meet its interest and other fixed charges. For the purpose of clearly showing the return upon the investment, many income statements show "balance for funded debt and capital stock." The rates then should be sufficiently high to enable a railway to finance its capital expenditures upon a reasonable valuation and to pay dividends upon a reasonable investment. In railroad accounting this return is indicated by the "net income and corporate surplus." For the purpose of ascertaining whether or not a fair return upon the investment has been made, the distinction between "operating expenses" and "deductions from income" is purely artificial and may be disregarded altogether.

It further appears to me that the editorial fails to appreciate the accounting distinction between operating revenue and income. By operating earnings is to be understood income derived directly from the operation of the property, and by operating expenses, the cost of maintaining and operating such property. By "income" is meant such income and deductions therefrom as represent a return upon the total capital invested in the property. If this distinction is kept in mind the accounting for rents becomes a simple proposition. That portion of the rental which represents maintenance or operation is a proper charge to operating expenses: that portion of the rental that represents a return upon the investment should be charged to income. The I. C. C. classification for steam roads follows this method entirely, but the electric classification only partially.

Leased property may be divided into two general classes: Property operated solely by the lessee and property operated jointly with another or others. In both cases the rental factors are the same—all operating expenses in the first case (usually), a proportion thereof in the second, and in both, an amount which represents a return to the lessor upon his investment. In both cases the lessee, instead of purchasing the property and paying interest thereon, elects, for purposes of economy, to pay the interest of the lessor. In the present writer's opinion that portion of the rental which represents a return to the lessor upon his investment should be charged where the interest on such property if owned would be charged, *viz:* income.

The electric classification recognizes this distinction as to property operated solely by the lessee. All operating expenses assumed by the lessee are charged to the proper operating accounts, but that portion of the rental which represents a return upon the investment to Account No. 216, "rent for leased roads." As the official text states, "this account shall include amounts payable as rent for road, tracks or bridges (including equipment and other railway property covered by the contract) of other companies, held under lease or other agreement by the terms of which exclusive use and control for operating purposes are secured. The amount of rent payable by the lessee in accordance with the agreement shall be included in this account, whether paid to the lessor in cash, or disbursed by the lessee on behalf of the lessor, as interest on funded debt, guaranteed dividends on stocks, or otherwise." The charges are made upon the condition that the property leased shall be operated solely by the lessee, and no mention is made as to a long or short term lease.

It is for jointly operated property that electric lines differ from the steam. The steam roads charge all operating expenses to the proper joint facility accounts, and rent proper (return on the investment) to income. All rentals paid for such facilities by electric roads, whether they represent actual operating expenses or a return to the lessor upon his investment, are charged, not to the proper division of the operating accounts, but to "general and miscellaneous" account No. 97, "rent of track and facilities," or account No. 98, "rent of equipment." In the judgment of the present writer, this is an inconsistency that must, sooner or later, be corrected by conforming to the methods employed by steam railroads.

The main purpose of the present writer is not to indulge in "hair splitting," but to emphasize the principle, lost sight of by the electric classification, that "deductions from income" should include that portion of rents paid by the lessee which represent a return to the lessor on his investment, and the further principle that "income" is intended to reflect the return upon the property investment, and that "net income" is the true measure of such return.

T. B. McRae, Auditor.

[Mr. McRae's letter raises some interesting points which we shall discuss editorially in an early issue of this paper.—Eds.]

MID-YEAR MEETING CHICAGO FEBRUARY 4, 1916

American Association News

MID-YEAR MEETING CHICAGO FEBRUARY 4, 1916

Senator Oscar W. Underwood Will Speak at Mid-Winter Meeting—Details of Executive Committee Session, Including Resolution Recommending Affiliation of Manufacturers' Association with Parent Body —Meeting of Joint Committee on Block Signals—Company Section Activities

MID-YEAR MEETING PLANS

Rapid progress has been made this week on the program for the dinner to be held in Chicago on Feb. 4, 1916. Senator Oscar W. Underwood of Alabama has been secured as one of the two speakers from outside the association. He has chosen for his topic "Government Regulation and Our Transportation Systems." It is understood that Senator Underwood will go at some length into the subject, taken up in President Wilson's message, of the appointment of a federal commission to study the transportation industry. This is a matter to which the senator has devoted much attention and it is hoped that he will give the association the results of his study.

The program for the meeting aside from the dinner is being formulated by Chairman L. S. Storrs, who now plans to center the discussion around the subjects "Valuation" and "Rate of Return." Three papers will probably form the basis for the discussion, which will be participated in by leaders in the industry.

The meeting and the dinner will be held in the Congress Hotel and Annex.

AMERICAN ASSOCIATION EXECUTIVE COMMITTEE

The executive committee of the American Association was in session as last week's issue of the ELECTRIC RAILWAY JOURNAL went to press so that it was possible to mention only a few of the items of business which were considered. The full minutes are now available and a summary of the most important actions is given below.

A decision was reached to formally close the work of the bureau of fare research on Dec. 31.

A report was received from the committee on arrangements for the mid-year meeting dinner as to hotel accommodations, speakers, etc. It was decided to have but four addresses, one each by the presidents of the American and Manufacturers' Associations, and two by outside speakers. As announced above, Senator Oscar W. Underwood will be one of the latter.

A resolution was passed authorizing a special meeting on Feb. 4, 1916, to act upon amendments to the constitution and by-laws incorporating the suggestions of the special committee appointed to consider the recommendations contained in the presidential address delivered at San Francisco. For this committee Chairman Arthur W. Brady reported as follows:

"We have carefully considered the recommendations favoring an affiliation of the American Electric Railway Manufacturers' Association with the American Electric Railway Association, as are the Engineering and other affiliated associations, and in that connection have conferred with representatives of the Manufacturers' Association as well as with officers and others of the American Electric Railway Association.

"In our judgment, it is very desirable that there be a closer relationship than has heretofore existed between those who manufacture and sell the apparatus and material necessary to electric railway operation and the American Electric Railway Association, for the purpose of creating a clearer recognition of and of advancing the common interests of both. We do not believe that such closer relationship can be secured in the fullest degree as long as the American Electric Railway Association and the American Electric Railway Manufacturers' Association continue to be as they now are, wholly separate and independent organizations, but we regard it as necessary that the two associations be brought together into a common organization.

"We therefore recommend that the constitution and by-laws of the American Electric Railway Association be so amended that the membership of the association be composed of companies, firms and individuals engaged in the manufacture or sale of electric railway material and apparatus, as well as of electric railway companies, the membership of both to be upon a basis of equality; that a scale of dues for manufacturers and dealers be established upon such an equitable basis as may be approved by the executive committee, and that there be formed an affiliated association consisting either of the present American Electric Railway Manufacturers' Association or of a new association, as may seem best, with which those connected with the manufacturing and selling interests of the industry may affiliate, if they so desire, without, however, diminishing the right of affiliation, if preferred, with any other of the affiliated associations as now."

W. J. Harvie, who represented the association in conferences with the National Bureau of Standards, reported regarding these conferences, which have been described in the ELECTRIC RAILWAY JOURNAL as they occurred.

The standards and recommendations approved at the 1915 convention together with the revisions were approved by the executive committee, which also approved changes in the interurban code of rules of the Transportation & Traffic Association.

The subject of safety organizations was then discussed and the president was directed to appoint a special committee on street traffic to make recommendations regarding the relation of the association to the several safety movements.

The board of accident prevention was abolished as being too cumbersome, as it was considered that the joint committee of the T. & T. and Claims Associations can now handle the work which the board was organized to accomplish.

The executive committee assigned for study to the committee on motor vehicles the topic "Handling Freight Business with Motor Trucks—the Proper Limits of Such Service."

The secretary was instructed to secure and compile for reference full information regarding costs, objects, methods of publication, etc., of company publications.

A special committee, consisting of H. A. Nicholl, president of the T. & T. Association, and John Lindall, president of the Engineering Association, was appointed to confer with the American Railway Association on the matter of block signal rules.

Appropriations were made to the affiliated associations as follows: Accountants', $1,500; Engineering, $4,000; Claims, $1,200, and T. & T., $2,750.

The special committee appointed to consider a recommendation originating with the T. & T. Association, to the effect that the number of vice-presidents in each association be reduced to one, reported adversely on the recommendation and the report was approved.

JOINT COMMITTEE ON BLOCK SIGNALS

A meeting of the joint Engineering and T. & T. Association committee on block signals was held on Dec. 17, 1915, at the offices of the Public Service Railway, Newark, N. J. The members present were as follows: J. M. Waldron, New York, N. Y., and J. W. Brown, Newark, N. J., co-chairmen; G. N. Brown, Syracuse, N. Y.; F. W. Coen, Sandusky, Ohio; J. J. Doyle, Baltimore, Md.; G. K. Jeffries, Indianapolis, Ind., and J. B. Stewart, Jr., Youngstown, Ohio. There were also present H. W. Griffin, Union Switch & Signal Company, S. M. Day, General Railway Signal Company, and H. H. Norris, Electric Railway Journal. Mr. Waldron presided over the meeting, and after discussion assigned the year's work to the following sub-committees:

Review of the Association's existing standards and recommendations, J. Leisenring, Springfield, Ill., and Mr. Coen. Consideration of A. I. E. E. standardization rules, G. N. Brown. Bibliography of block signal installations, Mr. Norris. Design of block signal apparatus, G. N. Brown and Messrs. Waldron, Griffin and Day. Clearance diagram for semaphore signals, Mr. Leisenring and G. N. Brown. Block signal rules, Messrs. Waldron, Jeffries, Coen, Doyle and Stewart. A special committee was also appointed on this subject, consisting of J. W. Brown and Mr. Coen, to confer with the president of the Transportation & Traffic Association on the matter of co-operation with the American Railway Association on the question of considering block signal rules jointly. Study of block signal operation, J. W. Brown, G. N. Brown and Mr. Jeffries. Highway crossing and drawbridge protection, Messrs. Leisenring, Jeffries, Coen, Day and Griffin. Light signals for interurban railways, Messrs. Leisrenring, Jeffries, Stewart, Day and Griffin. Tests for contactor-type recording signals, Messrs. Stewart and Collins, and H. R. Stadelman, Electric Service Supplies Company; C. P. Nachod, Nachod Signal Company, and W. M. Chapman, Electric Railway Signal Company. Consideration of the tentative code of safety rules of the National Bureau of Standards, G. N. Brown. Co-ordination of past work of the committee, Mr. Norris. Form of contract for signal installation, J. W. Brown and Messrs. Coen, Doyle, Jeffries, Day and Griffen.

After the appointment of the sub-committees there was a general discussion of the work of each so that the members of these sub-committees might have the benefit of the advice of the main committee. The subject of clearance diagrams is to be considered in conjunction with the committees on heavy electric traction and power distribution. Nothing will be done with the block signal rules until information is received as to the results of a conference between the American Electric Railway Association and the American Railway Association. The sub-committee on block signal operation will send out forms to secure data, in an effort to segregate the several causes of failure. In connection with highway crossing protection, G. N. Brown reported on a recent conference of automobile and railway interests held in New York State under the auspices of the Public Service Commission. The automobile people favored light and semaphore indications but not bells. Mr. Brown will supply full information regarding this conference to his sub-committee. After discussion on the placing of warning signs, the committee was instructed to look over available data and to express an opinion as to the best apparatus for protecting grade crossings. Recommendations for possible adoption later as standards will be prepared. In a discussion on light signals it was pointed out that the size of the lens is important not in determining the distance at which the light can be seen, but in distinguishing from other lights.

It was recommended that the next joint meeting of the committee be held in Chicago about the middle of March at the time of the convention of the Railway Signal Association, and that meetings of the sub-committees on rules, signal operation, highway crossing protection, light signals and signal contracts be held in Cleveland about Feb. 1.

CAPITAL TRACTION SECTION COMING

On Jan. 13, 1916, a new section will be organized by the Capital Traction Company in Washington. There are good prospects of an initial membership of from seventy-five to 100. The association will be fully represented at the inauguration by officers and members of the committee on company sections and individual membership.

PUBLIC SERVICE SECTION

As was announced last week the annual smoker of the section was held on Dec. 16. Vice-President R. H. Harrison presided and the amusement features were in charge of T. J. Manning, chairman of the entertainment committee. The entertainment was provided by the Knickerbocker Theatrical Enterprises of New York, and was excellent. Two hundred or more members were in attendance.

Thirty-three new members were taken in and the membership committee under P. F. Maguire, last year's president, expects during 1916 to double last year's membership. The secretary announced that a suggestion contest, open to all employees, will be inaugurated on Jan. 1. Each month, excepting July and August, the company will award a prize of $5 for the best suggestion received. At the end of the year $25 will be given for the best suggestion of the year, whether it is used or not and $50 will be awarded for the suggestion which, of those adopted, produces the best results. The committee in charge of the contest comprises J. J. Burleigh, vice-president; R. E. Danforth, general manager; Dudley Farrand, general manager Public Service Electric Company; H. C. Donecker, assistant general manager, and J. L. O'Toole, publicity agent.

DENVER TRAMWAY SECTION

The thirty-first regular monthly session of the section was held on Dec. 16 with an attendance of seventy-five.

R. W. Toll, chief engineer, spoke upon the subject, "Traction Travelogs, or Notes on the Street Railway Systems of San Francisco, Portland and Seattle." He had recently returned from an extended tour of inspection including these cities. A lively discussion on the future work of the section followed, some of the topics taken up being as follows: Verbatim printing of the monthly proceedings, open meetings, increase in attendance at meetings, nature of meeting programs, and general welfare of the section.

CHICAGO ELEVATED SECTION

There is space available here merely to state that the Christmas meeting of the Chicago Elevated section was held on Dec. 14 with a very large attendance. G. T. Seely, assistant general manager, was the principal speaker. The balance of the program consisted of entertainment features. A large Christmas tree furnished an appropriate decoration. Details of the meeting will be given in a later issue.

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.)

Anti-Friction Bearings on Main Car Journals

BY GAYLOR M. CAMERON, MASTER MECHANIC NEW YORK STATE RAILWAYS, ROCHESTER, N. Y.

The use of ball and roller bearings on the main car journals of electrically propelled cars has been investigated and tried out experimentally, at least, by a number of railways during the last four or five years. Some tests have proved fairly satisfactory and have shown an economy in the use of such bearings; others have failed. However, it is only fair to state that, during the time of these tests, the manufacturers of bearings have made wonderful improvements in both design and materials, and the bearings which are obtainable to-day are much more reliable than were those used in the earlier tests. Likewise, there has been a reduction in the price of anti-friction bearings. In view of these facts it is not surprising that at the present time railway men are taking a greater interest in these bearings than ever before, and it is becoming quite common to see them specified in connection with the purchase of new equipment.

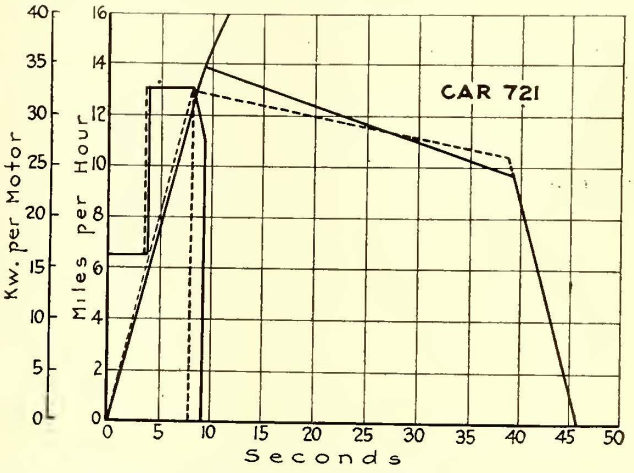
The economies to be obtained by the use of anti-friction bearings are dependent upon so many variables that a very careful analysis is necessary to determine the advisability of using them. Among the earlier tests widely divergent results were found. This was due, in part, to the difficulty of obtaining accurate power measurements on the car and the lack of sufficient data for making proper comparisons. By far the greater part of the difference was attributable to the varying service conditions under which the bearings were used. It is to be regretted that more accurate information is not obtainable regarding the different factors which make up the car resistance values which are so necessary in predetermining car performance. The ability to calculate accurately the total car resistance values for any particular set of conditions, and to separate therefrom that part which represents the friction on the main car journals, is necessary for making a proper investigation to predetermine whether or not sufficient economy can be obtained to justify the greater expenditure for anti-friction bearings.

On comparing the values of car resistance, for a given set of conditions, obtained by the use of several of the more common formulas, it is found that for the lower speeds, as in typical city runs, there is a considerable disagreement, but for the higher speeds, as in inter-urban runs, there is a very close agreement. We have, therefore, no reliable formula for use in making an investigation of the advisability of using anti-friction bearings on city cars. It would seem to be an opportune time for experimental work along this line, the experiments to be made in such a way that values can be obtained for the separate items such as journal friction, motor-bearing friction, windage, track resistance (based upon some standard condition), and especially flange friction, when running on grooved rail. With accurate data on these items one could predetermine, with a fair degree of accuracy, the results to be obtained from the use of anti-friction bearings.

The Rochester Lines of the New York State Railways have been experimenting with anti-friction bearings on car journals for the past four years. Early in the year 1911 city passenger car No. 721 was equipped with ball bearings. The following data were used for purchasing the bearings.

	Pounds
Weight of car complete without passengers	48,600
Weight of maximum passenger load (seating capacity, forty-two)	11,250
Weight of car with maximum passenger load	59,850
One-half weight of four motors, with gear cases	5,310
Weight of eight cast-iron wheels	3,200
Weight of four axles	1,400
Weight of four gears	928
Total weight not on journals	10,838
Maximum weight on journals	49,012
Total weight per journal	6,126
Total weight per bearing (two to a journal)	3,063

An attempt was made to predetermine the power saving to be obtained by using these bearings. The following data and graphs show the result.



ANTI-FRICTION BEARINGS — TIME-SPEED GRAPHS WITH PLAIN AND ANTI-FRICTION BEARINGS RESPECTIVELY

The car was to be used on a line having no appreciable grades and no sharp curves except at the terminal loops. The service conditions were:

Average line voltage	525
Schedule speed, miles per hour	8.62
Stops per mile	8
Duration of average stop, seconds	7

From these figures a typical run graph was plotted, using 1.5 m.p.h.p.s. for accelerating and braking rates. This is shown in full lines in the diagram together with the corresponding power graph. It will be noted in the shape of the graph that the car is over-equipped. This car is now used to draw a trailer having a seated capacity of sixty, as well as to carry its own passenger load. The preliminary calculations here shown, however, were based on its operation without trailer and all tests were made with the single motor car. The car resistance values were obtained by use of the following formula:

$$R = 12.67 + 0.03M + 0.0052M^2$$

Where R is the resistance in pounds per ton, M is the speed in miles per hour. This formula is the same as

the one given in the "Standard Handbook for Electrical Engineers" with the exception that the constant term of the second member is larger. This larger figure is believed by the writer to give more accurate results for the lower city speeds. Table I shows the calculated values of R.

In making up the typical run curve, the average car and passenger weight was obtained by adding to the car weight 75 per cent of 140 times the seating capacity. This made a total of 53,010 lb. or 6.63 tons per motor. Table II shows the figures from which the run and power graphs were plotted.

After these graphs had been plotted, an effort was made to determine the exact values of journal bearing friction. These values were expressed in terms of the tractive effort required to overcome them, that is, in pounds per ton. The car resistance was taken as uniform during the straight-line acceleration. The value obtained from the use of a formula for 12.75 m.p.h. was used. At this speed the acceleration rate begins to grow smaller. For a speed of 12.75 m.p.h. the corresponding journal speed was calculated and a coefficient of friction of 0.033 determined. The average weight per journal was taken as 5272 lb. As there are two journals per motor this would be twice 5272 or 10,544 lb. per motor. Applying the coefficient 0.033 to this figure, it is found that to overcome this journal friction requires a force of 348 lb., applied at the surface of the journal. As the journal is 3¾ in. in diameter and the car is equipped with 33-in. wheels, the force reduced to tractive effort is $3.75/33 \times 348$ or 39.6 lb., and dividing this by 6.63, the weight per motor (expressed in tons), we obtain 5.97 as the equivalent number of pounds per ton tractive effort to overcome journal friction. The coefficient of friction for the ball bearings was taken as 0.0012. The corresponding tractive effort value is $(0.0012/0.033) \times 5.97$ or 0.21 lb. per ton. Substituting this for the 5.97 value in the total car resistance of 13.89 lb. per ton, we obtain 8.13 as the value of car resistance for a speed of 12.75 m.p.h. with ball journal bearings. This brings the total car resistance up to 54 lb. per motor. In order to give every advantage possible to the showing to be made by anti-friction bearings in power saving, it was assumed that the entire reduction in car resistance was utilized in increasing the rate of acceleration. This rate was determined as follows: Tractive effort, 1087 lb.; car resistance, 54 lb.; net tractive effort, 1087 — 54 = 1033 lb.; 6.63 tons require 663 lb. to accelerate at the rate of 1 m.p.h.p.s. in addition to car resistance, 1033 ÷ 663 = 1.56 m.p.h.p.s. = new rate of acceleration. With this figure a new run graph was plotted, together with its corresponding power graph. These are shown as broken lines in the figure. The area of the power graph for plain bearings is 2.142 sq. in. and that for anti-friction bearings is 1.822 sq. in. This indicates a power saving of 14.9 per cent.

Before the ball bearings were installed, a watt-hour meter was placed in the car and a series of readings taken with the car in regular service. Table III shows the readings taken and results calculated therefrom for a typical day's run. A corresponding set of readings was taken with the car equipped with ball bearings. Table IV shows a recapitulation of both sets of readings and a comparison of the average results. It will be noted that the power saving as shown by the tests was 14.1 per cent while the predetermined figure was 14.9 per cent. This is an agreement much closer than could ordinarily be expected, considering the lack of exact knowledge of car resistance values. The method outlined will, undoubtedly, prove sufficiently accurate for any preliminary investigation.

It will be evident by studying the curves that the power saving to be obtained will vary with the service conditions and motor characteristics. For this reason, the results shown in this investigation are not general

Table I

M	$0.03M$	$0.0052M$	R
12	0.36	0.75	13.78
12.75	0.38	0.84	13.89
13	0.39	0.88	13.94
14	0.42	1.02	14.11

Table II

M.p.h.	Tractive Effort, Lb.	Car Resistance, Lb.	Net Tractive Effort, Lb.	Acceleration M.p.h.p.s.	ΔT, Sec.	Elapsed Time, Sec.	Amp. per Motor	Volts per Motor	Kw. per Motor	Kw. per Car
0-5.7	1087	92	995	1.5	..	3.8	62.0	262.5	16.27	65.10
5.7-12.75	1087	92	995	1.5	4.7	8.5	62.0	525.0	32.55	130.20
13.00	....	..	...	..	..	..	59.0	525.0	30.97	123.90
13.50	....	..	...	..	..	..	55.0	525.0	28.87	115.50
14.00	850	93	757	1.14	0.9	9.4	52.5	525.0	27.56	110.25

Table IV—Recapitulation of Energy Consumption Tests on Car 721

Date of Test	Type of Bearings	Average Kw.-Hr. per Car-Mile
May 11, 1911	Plain	3.40
Dec. 12, 1911	Plain	3.50
Dec. 15, 1911	Plain	3.16
Dec. 18, 1911	Plain	3.26
Average		3.33
May 25, 1911	Ball	2.80
Oct. 6, 1911	Ball	2.92
Nov. 27, 1911	Ball	2.84
Nov. 28, 1911	Ball	2.88
Average		2.86

Per cent energy saving in favor of ball bearings as compared with plain bearings = 14.1.

Rail conditions—Slippery until 11 a.m. } Good 11 a.m. to 6.55 p.m. }

Taken Dec. 12, 1911
Final reading...1,060,500
Initial reading.. 691,000
369,500

Table III—Power Tests on Car 721—Plain Bearings—Meter 123,726—Train 207

Trip	Trip Limits: Start	Trip Limits: Finish	Time: Start	Time: Finish	Psgrs. Carried	Stops	Miles	Energy Consumption, Watt-Hours	Watt-Hours per Car-Mile	Watt-Hours per Ton-Mile	Remarks
1	East Main Station	Lincoln Park	6.35 a.m.	7.10 a.m.	80	38	4.30	16,000	3,721	133	Motorman No. 376
2	Lincoln Park	East Main Loop	7.10 a.m.	7.44 a.m.	81	46	4.86	18,000	3,786	135	
3	East Main Loop	Lincoln Park	7.44 a.m.	8.23 a.m.	73	49	4.86	21,000	4,321	156	
4	Lincoln Park	Blossom Road	8.23 a.m.	9.05 a.m.	28	32	6.79	17,000	2,504	96	
5	Blossom Road	Lincoln Park	9.10 a.m.	9.55 a.m.	48	42	6.79	23,000	3,387	126	
6	Lincoln Park	East Main Loop	9.56 a.m.	10.30 a.m.	25	32	4.86	14,000	2,880	111	
7	East Main Loop	Lincoln Park	10.32 a.m.	11.07 a.m.	23	29	4.86	15,250	3,190	127	
8	Lincoln Park	Blossom Road	11.08 a.m.	11.51 a.m.	64	44	6.79	22,950	3.380	127	Motorman No. 948
9	Blossom Road	Lincoln Park	11.53 a.m.	12.37 p.m.	57	39	6.79	22,800	3,360	126	
10	Lincoln Park	Blossom Road	12.37 p.m.	1.20 p.m.	55	37	6.79	21,500	3,160	117	
11	Blossom Road	Lincoln Park	1.23 p.m.	2.07 p.m.	101	51	6.79	28,250	4,160	145	
12	Lincoln Park	Blossom Road	2.07 p.m.	2.52 p.m.	75	50	6.79	26,250	3,860	139	Motorman No. 376
13	Blossom Road	Lincoln Park	2.53 p.m.	3.37 p.m.	47	43	6.79	22,500	3,320	124	
14	Lincoln Park	Blossom Road	3.37 p.m.	4.22 p.m.	49	48	6.79	20,500	2,950	110	
15	Blossom Road	Lincoln Park	4.22 p.m.	5.06 p.m.	98	60	6.79	26,000	3,820	133	
16	Lincoln Park	East Main Loop	5.07 p.m.	5.45 p.m.	90	58	4.86	21,250	4,370	154	
17	East Main Loop	Lincoln Park	5.45 p.m.	6.23 p.m.	78	46	4.86	17,750	3,660	131	
18	Lincoln Park	East Main Station	6.23 p.m.	6.55 p.m.	28	34	4.30	15,500	3,190	122	
						778	105.66	369,500	3,501 Average	128 Average	

Average 7.37 stops per mile.

and each case should be investigated separately before any conclusions are drawn. After the probable power saving has been determined, calculations should be made to determine the economy, if any, which will result from the use of anti-friction bearings.

One very important item, as yet rather indeterminate, is the average life of the ball bearings. The following calculations were made to cover the previously described conditions.

ECONOMY CALCULATION, CAR 721

The average yearly mileage for cars of this type was checked and found to be 33,000 per car. The power consumption with plain bearings was 3.33 kw.-hr. per car-mile. Using the 14.1 per cent saving, determined by the tests, the saving per car-mile amounts to 0.47 kw.-hr. The yearly saving is 15,510 kw.-hr.

15,510 kw.-hr. at 1 cent = $155.10 annual power cost saving per car.	
Total cost of ball bearing equipment	$606.00
Annual Expense—Ball Bearings	
Based on an estimated life of five years	
Interest at 5 per cent	$30.30
Amortization at 5 per cent compounded	108.22
Lubrication (special lubricant used)	4.20
Maintenance	4.00
Total	$146.72
Total cost of plain bearing equipment	$42.24
Annual Expense—Plain Bearings	
Based on an estimated life of box of five years	
Interest at 5 per cent	$2.11
Amortization at 5 per cent compounded	7.54
Lubrication	6.00
Maintenance, including brass renewals	9.36
Total	$25.01

The total annual expense of ball-bearing equipment exceeds that for plain bearings by ($146.72 — $25.01) $121.71. As the annual power cost saving obtained from the use of ball bearings is $155.10, the net annual saving resulting from the use of ball bearings is $155.10 — $121.71 or $33.39.

The preceding figures were based upon the cost of a ball-bearing equipment nearly five years ago. Recent quotations received show that a similar and perhaps better equipment could be purchased and installed at the present time in a car of this type for $482. Substituting this for the $606 in the calculation for ball bearings, the result is as follows:

Interest at 5 per cent	$24.10
Amortization at 5 per cent compounded	86.07
Lubrication	4.20
Maintenance	4.00
Total	$118.37

Excess over corresponding plain bearing costs, $118.37 — $25.01 or $93.36. Net annual saving per car in favor of ball bearings is $155.10 — $93.36 or $61.74.

It is evident from the test that the serviceable life of the bearings, without heavy maintenance, will exceed five years. As the bearings now manufactured are improved over those used in the test, it is a safe estimate that with equipment properly adapted to the service, an average life of seven years can be obtained (33,000 miles per year). Allowing a seven-year life for the plain bearing journal boxes, the following calculations were made up:

Cost of ball bearing equipment	$482.00
Annual Expense—Ball Bearings	
Based on an estimated life of seven years	
Interest at 5 per cent	$24.10
Amortization at 5 per cent compounded	58.78
Lubrication	4.20
Maintenance	4.00
Total	$91.08
Cost of plain bearing equipment	$42.24
Annual Expense—Plain Bearings	
Based on an estimated life of seven years	
Interest at 5 per cent	$2.11
Amortization at 5 per cent compounded	5.14
Lubrication	6.00
Maintenance, including brass renewals	9.36
Total	$22.61

Excess annual expense of ball over plain bearing equipment = $91.08 — $22.61 or $68.47.

Annual power cost saving (as before) = $155.10.

Net annual saving, under these conditions, in favor of ball bearings is $155.10 — $68.47 or $86.63.

The tests described were made upon a comparatively heavy car for city service. It has been found, in the past, that the cost of anti-friction bearings does not vary directly with the weight of car. In fact, quotations on bearing equipment for a car nearly 6 tons lighter were found to be little lower than those for this car. The present trend toward lighter and more efficient cars makes it evident that with the same percentage of power saving the value of the annual saving would become less, and for the same net saving a lower initial investment will have to obtain. It is reasonable to believe that with proper standardization, so as to limit the number of sizes of bearings used, and with a more general application so as to increase the demand, the price would drop so that an annual saving on the lighter car can be obtained which will be equal to or even greater than the figures shown.

The general adoption of ball journal bearings will entail a greater investment where extra axles are kept for making necessary wheel and axle changes at operating carhouses. This is due to the fact that all such axles must be equipped with anti-friction bearings and boxes on account of the non-interchangeable feature of such bearings. Where standardization exists and a considerable number of similar cars are equipped with anti-friction bearings, the additional investment required for such extra parts can be kept very small.

Steel Tie Spacing Can Be Too Great

BY L. A. MITCHELL, SUPERINTENDENT OF ROADWAY UNION TRACTION COMPANY OF INDIANA, ANDERSON, IND.

The description of steel tie track construction at Circleville, Ohio, in the issue of Oct. 30, 1915, is of a type which for certain tonnage may prove satisfactory. It would seem, however, that the rail is expected to do more work as a beam than it has been the custom to require of it in other types of concrete track foundations, or in open track construction where a certain amount of flexibility is expected to exist. Some engineers have assumed that where steel ties were used on a concrete foundation the spacing could be increased because the concrete would carry a portion of the load and thus prevent deflection of the rail between ties. This probably is the reasoning which leads to the conclusion that greater space between ties warrants the use of the more expensive ties because the cost per foot of track is not increased proportionately.

Prior to the advent of the steel tie, so-called solid concrete construction was used quite extensively, but the spacing of the wooden ties was maintained the same as that adopted for ordinary ballasted track construction, or the ties were eliminated altogether. The latter is the concrete beam construction which is still being used in some localities. In the beam construction, anchor bolts were used to fasten down the rail, and tie rods, placed three or four to the rail length, were employed to hold the rail to gage. In making repairs to this type of construction, it was often found that the rail had loosened from the concrete beam and that the concrete beneath the rail was worn away by abrasion. This indicated that the bond between the concrete and the rail could not be maintained where the rail was supported directly on the concrete. Moreover, the area of distribution for track loads afforded by the rail base was insufficient to prevent the ultimate wearing away of the concrete under

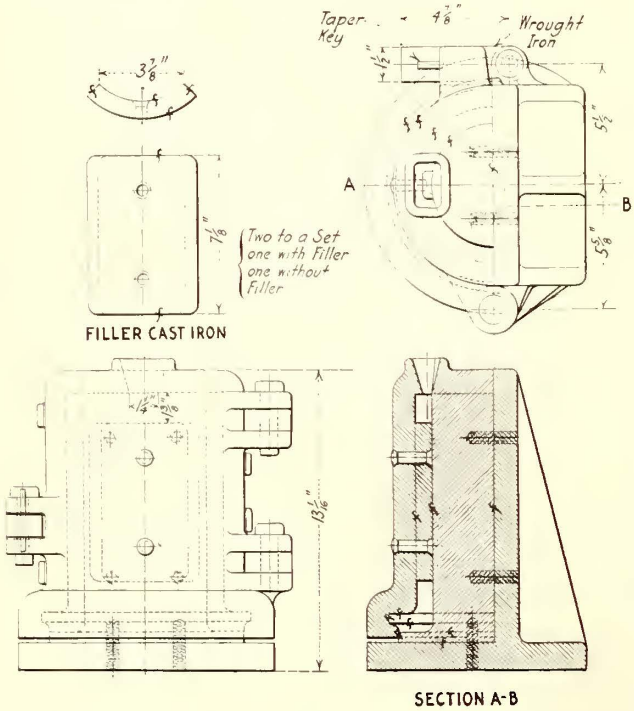
the vibration of passing car wheels. Concrete failures of this kind decrease with the number of rail supports, and particularly when these supports present a comparatively large area to transmit the vibration from the rail to the concrete and thence to the subgrade.

If the distance between supports is such that the rail deflection is appreciable, the concrete is certain to wear away where it comes in contact with the rail. This deflection in rail sections generally used in paved streets can only be obviated by making the steel tie spacing the same as that adopted for wooden ties. The experience of the last few years has shown, however, that the heavier rail sections will permit a greater distance between tie supports. This interval can also be increased when wood ties are used, but the limit of spacing would be somewhat less than that for steel ties due to the difference in the crushing strengths of the wood and steel. Where 7-in. rail is used the probable maximum clear span between ties is 3 ft. Many of the failures of steel-tie, solid-concrete construction can be attributed to a spacing greater than this. Engineers have tried to make the cost of steel-tie construction as near that of wooden ties as possible. This has been accomplished by increasing the tie spacing and thereby decreasing the number of ties necessary. In doing this they have neglected the consideration of other factors which may ultimately prove to be more costly than an additional number of ties.

Mandrel for Babbitting Motor Axle Bearings

BY F. G. LISTER, MECHANICAL ENGINEER SPOKANE, PORTLAND & SEATTLE RAILWAY, PORTLAND, ORE.

A mandrel for use in babbitting motor axle bearings which has saved a great amount of labor and material is being used by the Oregon Electric Railway in its Portland shops.



MANDREL FOR USE IN BABBITTING AXLE BEARINGS

It has always been the practice to babbitt the bearings a little below size and then to bore them out in a lathe or boring mill to the exact size of the bearing. This process took a great deal of time and additional material, and when the bearings were bored to the exact size the toughened surface or skin was necessarily removed. The bearings thus lost much of their wearing qualities. By the use of the mandrel of the type shown in the illustration, which gives details of one made for the GE-205 motor, it is possible to get along without doing any work on the bearing after taking it from the mandrel. It has a clean, smooth surface and is ready for service immediately. Similar mandrels are also used for the other types of motors on this system. Bearings babbitted in these mandrels have been in use for more than a year with very little wear. A hot axle bearing is unknown on the Oregon Electric Railway.

Economies with New Bedford & Onset Signals

The New Bedford & Onset Street Railway, New Bedford, Mass., has lately installed automatic block signals on 10 miles of its single-track line between Fairhaven and Wareham, and one set of signals between Onset and Ramsdell's, to facilitate handling traffic under the diversified conditions associated with the system. The signals are of the United States Electric Signal Company's K-2 type, and through their use not only has traffic been accelerated but the expense of dispatching has been reduced.

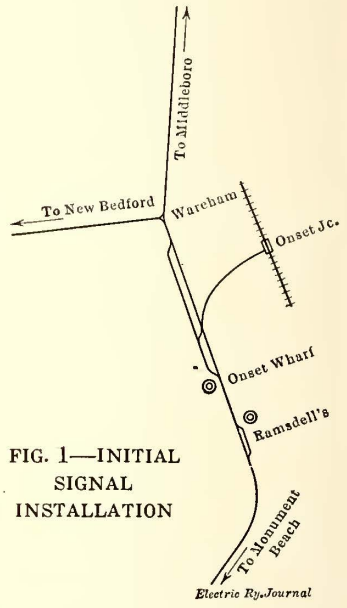


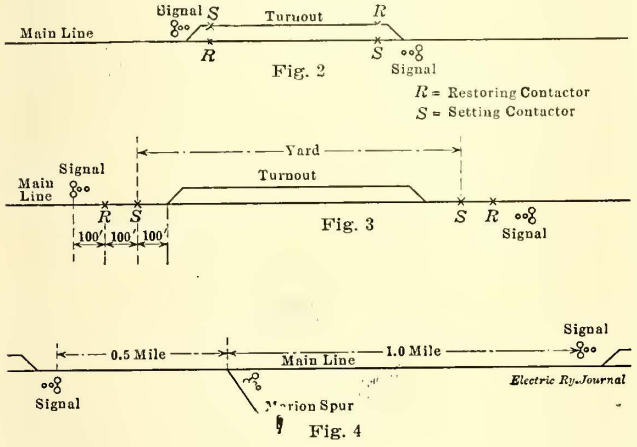
FIG. 1—INITIAL SIGNAL INSTALLATION

On the line between the Fairhaven - Mattapoisett boundary and Wareham there are ten sidings, including a spur for express cars at Marion; from Wareham to Onset Wharf 4 miles of double track are in service, and from Onset Wharf to Monument Beach the line is single track with three turnouts, including that at Ramsdell's. Through service is operated over this route between New Bedford and Monument Beach, the summer headway being thirty minutes. A single-track branch, not signaled, extends from Wareham to Middleboro, the headway being sixty minutes on weekdays and thirty minutes on Sundays for service between Middleboro and Ramsdell's. Between Wareham and Onset Wharf a short spur track branches from the main line to the Onset Junction station of the New York, New Haven & Hartford Railroad, and between this station and Ramsdell's a shuttle service varying in volume and headway is operated, the length of the one-way route being 3 miles. Wareham is 16 miles from New Bedford, Onset Wharf being 21 miles and Monument Beach 27 miles distant from this point.

The restrictions of topography between Onset and Ramsdell's, making the cost of double-tracking prohibitive and the location of the Onset Junction station out of sight of the main line, as well as the varying demands of local and through service, regular and extra cars, passenger and freight traffic, render the rapid movement of cars a problem of some complexity. Under the original method of operation, crews were required to report by telephone at each siding to receive orders from the dispatcher located at Wareham. This made it necessary to maintain an extra dispatcher to handle car movements on the section between Onset Junction and Ramsdell's during five hours every summer afternoon. The fluctua-

tions of traffic are considerable, and the necessity for making connections with the New Haven trains at all times at Onset Junction resulted in a puzzling operating problem, there being no check on the car movements except by memory and telephone. Four or five cars were frequently run in a group under ten-minute headway in either direction, the running time being about four minutes for the block between Onset Wharf and Ramsdell's. However, the installation of one pair of signals at this point, as shown in Fig. 1, dispensed with the need of the extra dispatcher, and this led to the equipment of the Fairhaven-Wareham line with seven two-point blocks and one three-point block.

The turnouts on the main line average about a quarter of a mile in length, the total length of the seven sidings between Fairhaven and Wareham being about 2 miles. Instead of placing the setting and restoring trolley contact switches as shown in Fig. 2, which is a common practice, the contacts are located in the main line, as shown in Fig. 3. In the New Bedford & Onset arrangement, the first or setting contactor is located 100 ft. from the switch, the restoring contactor being 100 ft. beyond the setting contactor and the signal 100 ft.



FIGS. 2 TO 4—DIAGRAM SHOWING SIGNAL ARRANGEMENT AND THAT USED ON NEW BEDFORD & ONSET RAILWAY, AND ARRANGEMENT OF THREE-POINT BLOCK

from the latter, making the signal 300 ft. from the switch at either end of the block. All signals carry a red semaphore in addition to the lamp indication, and are of the counting-in type. The three-point block on the road is installed in connection with an express car spur at Marion, as shown in Fig. 4, and protects car movements through the main line, also controlling the movement of cars on the spur upon the main line. The block is 1.5 miles long. A car clearing the main line also clears the signal at the spur, and an express car entering the main line from the spur sets the signals at the ends of the block; and conversely, when entering the spur from the main line, an express car clears the main line signals, provided no car is behind it on the main line. The signal at the spur is visible only from cars on the spur.

The local advantages of the contact arrangement employed, according to J. E. Marvelle, assistant superintendent New Bedford & Onset Street Railway, are that this plan provides for the operation of cars within the siding and for 100 ft. at either end with no relation to the signals, making this trackage in effect a railway yard. It allows operation in winter, when an hourly schedule instead of a thirty-minute schedule is maintained, without reference to sidings except those necessary for the cars to pass, which may be cleared of snow while the rest of the turnouts are left until convenient. The saving in snowplow work and in shoveling is thus a considerable item. With the line contacts placed outside the turnout, either track may be utilized, as convenient. Regular cars may pass extras on either side, without reference to right-handed operation, which is a marked advantage when cars on sidings are being loaded with logs or other heavy materials.

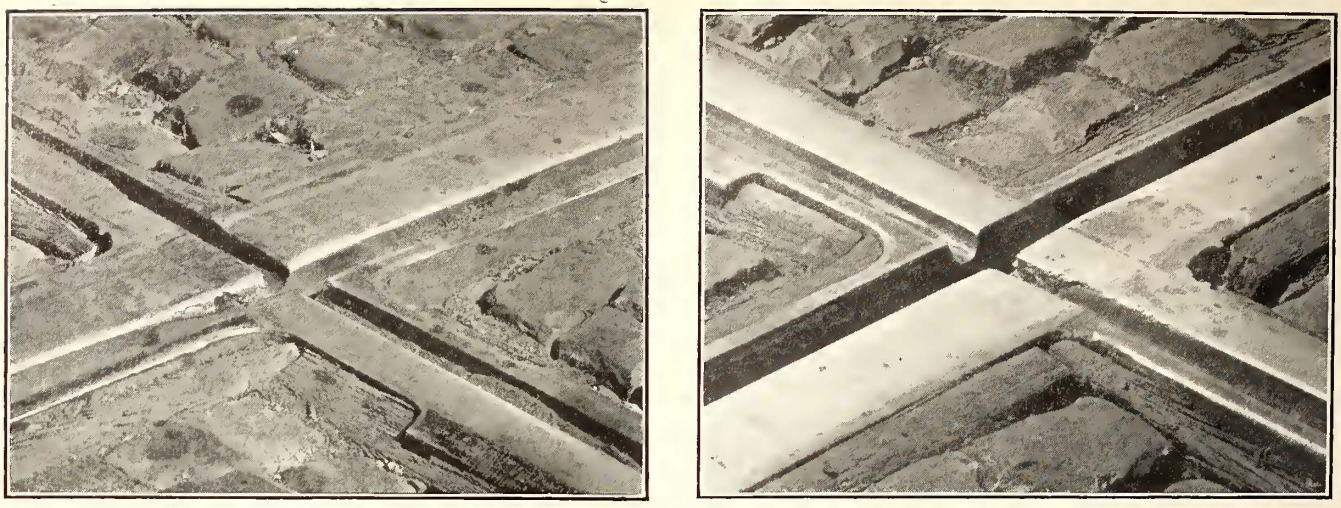
Only about half the snow-fighting equipment is needed, compared with the plan of using all the sidings. If a trip is terminated at a certain siding short of the usual destination, the location of the overhead trolley contact 100 ft. beyond the switch enables the trolley to be changed and the direction of travel reversed without interfering in any way with traffic or setting signals not intended. The usual arrangement of contacts in the trolley wire on the siding and in the main line is satisfactory if every car passes through every turnout at all times, without turning back at intermediate points, but the New Bedford & Onset arrangement, according to Mr. Marvelle, is more flexible. It saves slowing down and passing through all sidings; enables portions of sidings to be used, as in snowy weather; does away with the probability of setting signals unintentionally against opposing cars in turning back, and permits setting off crippled cars, construction trains, and cars to be loaded or unloaded without interfering with through traffic.

Severe tests have been given the signal system since its installation, but no failures that could conflict "rights of track" have resulted. On rare occasions a car has to go back upon the line a short distance after passing the siding switch because of receiving a stop signal at the entrance of the block, due to the opposing car's reaching the line contact first; but this is seldom experienced and simply requires that the car back a few feet to the siding, on account of the clearance between the switch points and the setting contact.

Sponge Impurities

Some railway companies have found that sponges bought by the bale sometimes contain as much as 50 per cent of impurities. Those familiar with the natural impurity-retaining qualities of the sponge state that this should not be more than 25 per cent. Tests for impurities are made by first weighing, then thoroughly washing the sponges, and after they are perfectly dry the weight is again determined. If the shrinkage is as much as 50 per cent it represents quite an item, especially when the average price for good sponges is about $3.50 per pound. One railway company, in order to obtain the maximum results with the sponges employed in washing cars, has prepared a specification under which the cost per pound is reduced in proportion to the increase in impurities over 25 per cent. The manner of testing the amount of impurities is also specified, and only sponges procured from certain waters are acceptable.

In the annual report of W. W. Hoy, general manager of the South African Railways & Harbors, it is stated that the administration had in contemplation the electrification of certain sections of the railway, and a decision had been arrived at to obtain the services of an eminent consulting engineer to study the local problems and conditions on the spot, and thereafter submit a comprehensive report. Unfortunately, the condition of affairs in Europe and in South Africa necessitated a postponement of the proposals, but the matter is one which should receive early attention after the cessation of hostilities.



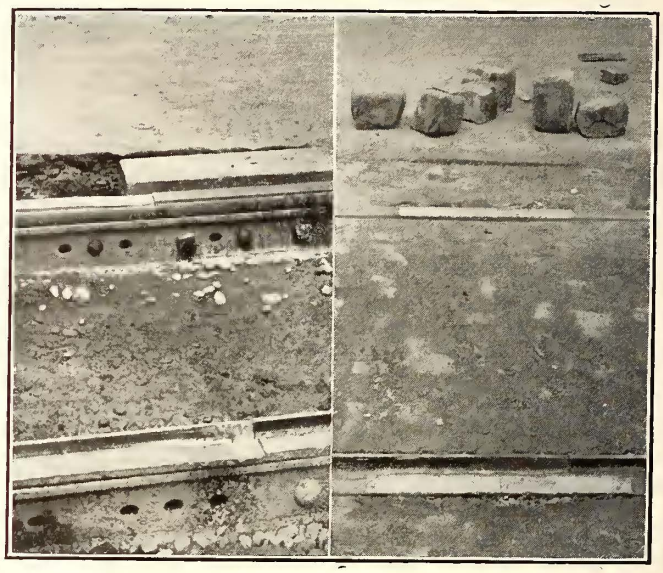
MANGANESE CROSSING REPAIRED WITH GAGE LINE SIDE LEFT UNGROUND

Electric Welded Special Work and Joints at Portland, Ore.

Through the courtesy of Thomas Pumfrey, engineer maintenance of way the Portland Railway, Light & Power Company, Portland, Ore., the accompanying interesting photographs of work done with an Indianapolis portable electric welder have been made available. Two pairs of the illustrations show the conditions before and after at a steam crossing of solid manganese steel. Here a point on the running rail had broken down. The pictures of the completed work do not show a very even finish on the gage line, but this is due to the fact that the Portland company does not consider it necessary to grind the gage line side of the rail. This practice, of course, does not diminish the usefulness of the crossing, while helping to produce an effective repair at very low cost.

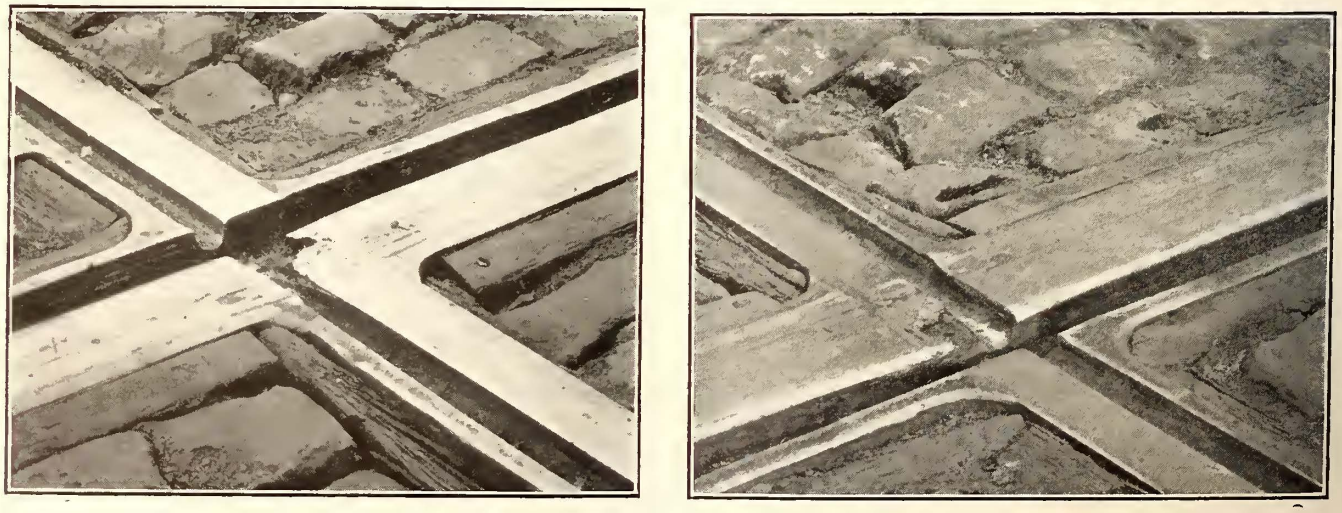
Another pair of illustrations shows the ability of the portable electric welder to build up a battered joint.

It is apparent from the work done at Portland that the success of the weld is not only a matter of careful workmanship, but also of employing the proper fluxated metal. Thus for welding manganese crossings, the company uses one kind of special fluxated steel, while for the building up of cups in joints, it employs a second grade of steel whose chemical properties resemble as closely as possible the chemical content of the rails. The steel used for manganese work must differ in melting point and other qualities because the greater resistance offered by manganese diminishes the effectiveness of the electric arc as compared with welding on steels of higher conductivity.



THE WELDING OF A BATTERED JOINT—BEFORE AND AFTER

Finally, all welding must be made on solid metal. Hence if the top of a broken piece of special work is to be welded, the structure should be carefully examined for traces of honeycombing.



MANGANESE CROSSINGS WITH BROKEN RAIL BEFORE ELECTRIC WELDING AT PORTLAND, ORE.

All-Steel Cars for Binghamton Railway

The Binghamton (N. Y.) Railway Company has recently placed in operation thirteen new all-steel cars for use in city service on the Binghamton lines. The general dimensions of the cars, which were built by the Cincinnati Car Company, are given in the following table:

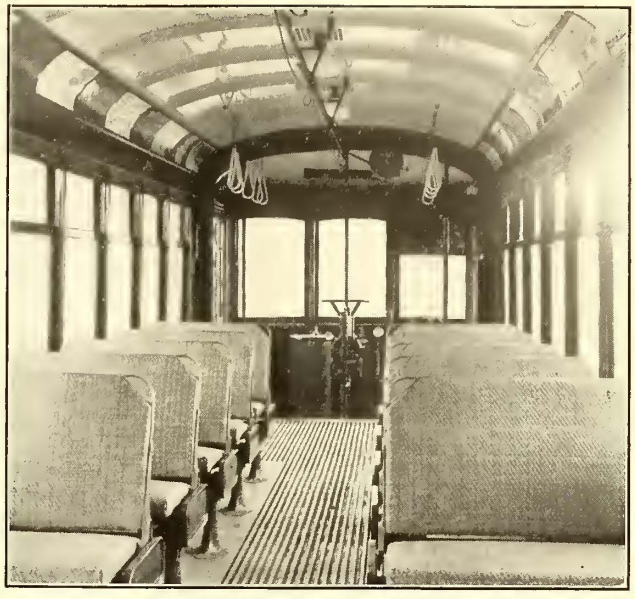
Length over all	37 ft.
Length of car body	25 ft.
Extreme width	8 ft. 6 in.
Rail to first step	15 in.
First step to platform floor	13 in.
Platform to car floor	11 in.
Post centers	30 in.
Width of aisle	24 in.
Truck centers	12 ft. 6 in.
Size of wheels	34 in.
Seating capacity	42

The entire bottom framing, the body and the roof are of steel construction, the body bolsters being of the steel-plate type with cast-iron spacing members. The underframing is covered with sheet steel, upon which are laid 13/16-in. yellow pine boards, forming the floor, and this is finished with tapered floor-mat strips screwed to the floor with bronze screws, which reach the entire length of the car floor except a space of 2 in. at each end to allow for sweeping. The floor strips are jointed 2 ft. from the end of the car so that they are easily renewable, and the side floors are raised flush with strips in the aisle.

The bumpers are formed of 5-in. steel channels, which are protected with No. 16 gage sheet steel to prevent anyone from riding on them. The vestibules are arranged for pay-within operation, and are provided with double folding doors operated in conjunction with the folding steps. The outside of the vestibule below the sash rest is sheathed with ⅛-in. steel, and there are three drop sash above this, the center sash having stops so that it can be lowered part way to give the motorman clear vision during stormy weather. The front sash is fitted with a sleet cleaner manufactured by the Standard Accessories Company, 505 Fifth Avenue, New York City.

The vestibule steps are of the folding type, the edges of which are covered with a 3-in. strip of safety tread, which is also provided on the platform edge over the steps. The roof is plain arch pattern. It is covered with No. 18 gage sheet steel and is insulated on the outside with 1-in. compressed cork, this being covered with No. 8 canvas.

The interior trim, including sash, moldings, etc., with the exception of the folding doors, is finished with Sherwin-Williams green. The wainscoting below the windows is formed of 1-in. compressed cork covered with No. 18 gage sheet steel. The side-post cappings

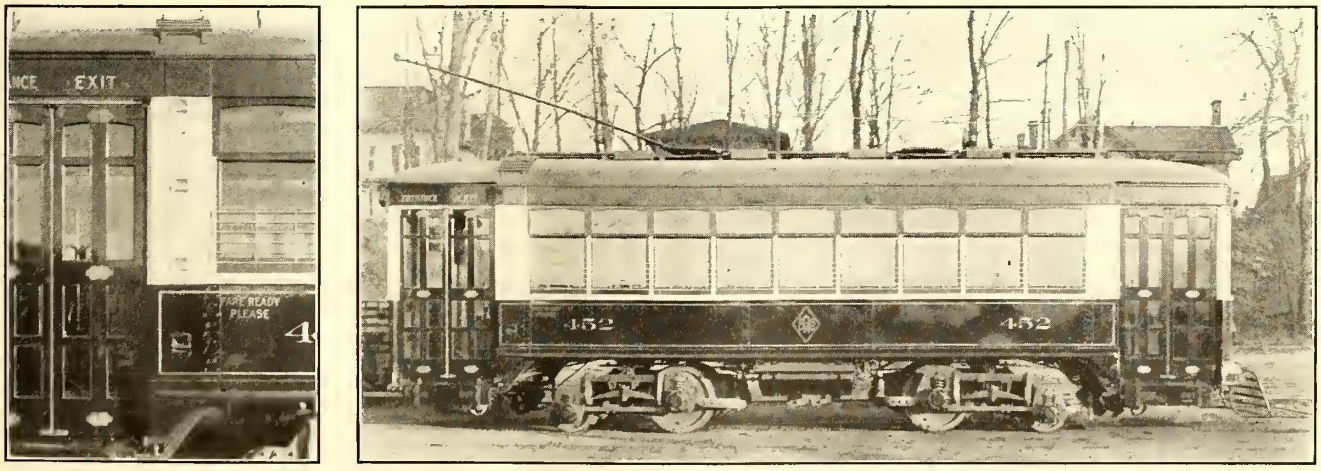


INTERIOR VIEW, BINGHAMTON CAR

are made of pressed steel and are readily removable. The ceiling is carline finish, except for that portion on either side which is provided with moldings to receive 11-in. advertising cards, and it is finished with Sherwin-Williams flat white enamel.

There are nine windows on each side of the car which have double AA quality glass set in rubber and held in place by moldings screwed in position. The lower sash raise, and are fitted with flush barrel sash locks engaging with holes in T-bar posts to hold the sash at various heights. The upper sash are stationary with arched heads. The side windows are provided with Fabrikoid curtains, Curtain Supply Company's ring-type fixtures and Rex rollers. Curtains are also provided back of the motorman for his protection. Consolidated Car Company's heaters with deflectors are used, ten coils being connected in series with the switch on the trolley side. The heater manufacturer's thermostatic control has been installed. There are also ten Hale & Kilburn 37-in. cross-type seats having 19-in. backs and bronze grab handles on the aisle side. Longitudinal seats are provided in each corner of the car, these occupying the space of two windows. All seats are upholstered with canvas-backed rattan.

Each end of the car is equipped with a Peacock staffless brake manufactured by the National Brake Company. Consolidated buzzers connected with push buttons in each side post are provided, these being operated



VIEWS OF VESTIBULE DOORS AND SIDE, BINGHAMTON CAR

from the trolley circuit, and the Ohio Brass Company's Style D signal system is installed. A 14-in. gong is provided under each platform.

The steel window guards are of the five-bar, ¼-in. hard-drawn removable type, spaced 2½-in. centers. One sand box operated by a Westinghouse air sander is located under the longitudinal seat at each end of the car, this being provided with Johns-Manville sand hose and Ohio Brass Company's air traps. The trolley boards are formed of two 6-in. x 1¼-in. oak planks extending the full length of the car, and arranged to receive two Nuttall No. 14 trolley bases. Earll trolley catchers are provided. Each end of the car is equipped with one cast-steel drawhead, and in addition a pull bar 4 ft. long is hung on hooks under the side of the car. Each end of the car also has one Golden Glow headlight with a 23-watt lamps, one Dayton Model DB fare box and one Sterling single register, arranged so that it can be operated from either end and from any part of the car, are also provided, as well as a sheet-steel transfer box, having a glass face and door with staple and padlock. A hand-strap pole is installed over each corner longitudinal seat, this being fitted with five Rico sanitary straps, 5 ft. 10 in. from the floor.

Each end of the car is equipped with a Berg fender and Root air-operated track scrapers, and a Hunter route and destination sign is provided in each right-hand vestibule wing sash. Ventilation and illumination are provided by four Utility, honeycomb, combination ventilators and registers, and light fixtures of the Dayton Manufacturing Company's type, complete with Alba shades and 94-watt lamps. The light circuit is supplied with one extra lamp fixture, controlled by a Nichols-Lintern selector switch. The sign lights, headlights, platform lights and extra light are wired for 23-watt lamps.

The mechanism to operate the folding doors and steps is of the car builder's standard design, and the doors are connected to the main switch through the contactor line relay so that the car cannot start when the doors are open. To protect the car against side-swiping by vehicles an angle iron fastened to the side sill on each side projects 1½-in. from the side sheathing.

The car is equipped with a Westinghouse A-3 compressor, having a displacement of 1½ cu. ft. of air at 90 lb. pressure, a Westinghouse S-6-A governor, ½-in. PV motorman's valve, Type C sander valves and Type S brake cylinders. Type E American Automatic slack adjusters are provided. There is a 25-ft. cooling coil between the compressor and the main reservoir, and the necessary splash guards are provided to protect the slack adjuster, compressor and resistance from wheel wash.

Two Westinghouse 323 V motors, rated at 33 hp. at 500 volts and 40 hp. at 600 volts, are installed, together with double-end K-36-K control. The car is mounted on one pair of Baldwin maximum traction trucks with 21-in. steel trail wheels and 34-in. steel drive wheels, 54-in. centers. American Brake Shoe & Foundry brakeshoes and brakeshoe heads are installed, and S. K. F. ball bearings are used on both driver and trailer axles.

All wiring is installed in conduit, and special junction boxes and condulets at motor leads and resistance leads are provided. Light, heat and air brake compressor switches are placed on an enamel slate base, installed in a cabinet that has a swing door and is lined with asbestos lumber or transite. This switch cabinet is located on the inside of the car body at the corner post.

One of the especially interesting features is found in the novel form of motorman's steps which are installed. Heretofore the steps used by the motorman to reach the roof have projected beyond the side of the car, and if the car was side-swiped by a wagon or otherwise these steps were broken off and were a continual source of annoyance. The form of depressed step shown in the accompanying illustration was therefore devised by C. S. Banghart, vice-president Binghamton Railway, as an improvement over the old method.

Convenient Portable Grinder

The Stow Manufacturing Company, inventor and builder of the well-known Stow flexible shaft, has placed on the market an application of the device that is especially advantageous for use in connection with the grinding of cumbersome, inaccessible or irregularly shaped pieces which cannot conveniently be brought to an emery wheel or set in a machine tool in the customary manner. The apparatus consists of an emery wheel mounted on a length of flexible shafting, which in turn is supported by an arm attached to a small motor. The motor is mounted upon a truck, thus making it easily transportable to any part of the shop and eliminating the necessity for taking work to the tool, with a resultant saving in time and cost of cutting.

PORTABLE GRINDING MACHINE

The motor is ruggedly built, being totally inclosed and having the starting equipment incorporated within the motor frame, to give a compact construction. Variation in motor speed is secured by means of a plunger in the pole piece which changes the reluctance of the magnetic circuit. No power is lost through this operation, as is the case in most variable speed motors, and the full-load efficiency remains practically the same at all speeds. The speed variation is provided so that worn emery wheels may be consumed down to the minimum size, a proper cutting speed being insured regardless of size, and the maximum grinding efficiency being obtained in all cases. A motor for alternating current is also furnished if required, but this does not have a variable speed, although it may be used with power of any frequency, single or polyphase.

The tool is built in several sizes, according to the capacity of the emery wheel desired. The motor is so balanced on the truck that it may be adjusted to the proper angle for all purposes and to meet all grinding conditions, the extended arm taking the weight of the flexible shaft from the operator. If desired, the emery wheel at the driven end of the shaft may be interchanged with a scratch brush in case the work demands this.

News of Electric Railways

CINCINNATI RAPID TRANSIT ROUTE ADOPTED

Rapid Transit Commission Decides on Construction of Line to Cost $6,000,000.

What is known as modified plan No. 4 for a rapid transit loop about Cincinnati, Ohio, has been adopted by the rapid transit commission recently appointed by Mayor Spiegel. The commission, however, has reserved the right to make such further modifications as may be found advisable before the question of issuing $6,000,000 of bonds for the construction of the road is submitted to a vote of the electors at the presidential primaries in April. This is the plan favored by the former commission, after an examination of several others submitted by different engineers.

The route as proposed begins as an elevated structure at Third and Walnut Streets in the business section of the city. It enters a subway between Fourth and Fifth Streets and continues as such until it reaches the canal, in the bed of which it runs as a subway to Brighton, stations being located at convenient intervals along the subway route. With the exception of occasional short distances the route is located in an open cut from Brighton to Carthage Pike in St. Bernard. From Carthage Pike to Smith Road and Duck Creek, in Oakley, the route lies along the surface. In the original plan this section was to be in an open cut, but because of excessive cost the plan was modified. Until the road is on a paying basis this section will be operated as a fast surface line. At Duck Creek the route becomes a subway and, after passing under Walnut Hills and Owl's Nest Park, it comes to the surface at Columbia Avenue and runs on an elevated structure to the point of starting at Third and Walnut Streets.

The proposed West End Rapid Transit Company, which will build an extension to the Cincinnati, Lawrenceburg & Aurora Electric Street Railway, has planned to connect with the municipal route at its terminal at Third and Walnut Streets. The Indianapolis & Cincinnati Traction Company, if built to the city, will connect with the rapid transit line at Brighton station.

The Ohio Electric Railway line between Cincinnati and Dayton will enter the subway at Crawford station and the Millcreek Valley line will form a connection at Carthage Pike in St. Bernard. All the lines of the Interurban Railway & Terminal Company except the Georgetown division will intersect the rapid transit line at Smith Road and Montgomery Pike. This latter division and the Cincinnati, Georgetown & Portsmouth Railroad will connect at Elmhurst viaduct and Madison Road.

E. W. Edwards, president of the rapid transit commission, insists that the cost of the road must be kept within $6,000,000. He said, however, that this amount of money will not provide for a generating plant and rolling stock nor pay for interurban connections. The leasing company will have to furnish its own plant or purchase power from the proposed new station of the Union Gas & Electric Company. Mr. Edwards regards it as out of the question to attempt to advance money to the interurban companies with which to build connections with the amount at the committee's disposal. He believes that with the advantages the rapid transit entrance to the city will offer to the interurban roads, the banks will furnish funds for making these connections.

The regular sessions of the commission will be held on the afternoons of the first and third Fridays of each month. Frank Krug, city engineer, has been authorized to confer with the interurban railways with a view to estimating the cost and planning connections with the rapid transit line.

Delegations from Price Hill and Hyde Park appeared before the rapid transit commission at Cincinnati at its first regular meeting on Dec. 17 and urged that the route accepted by the commission be so modified as to bring the line closer to these two suburbs or that route No. 5, as suggested by Engineer Bion J. Arnold, be substituted. Mr. Edwards, chairman, explained that either suggestion would mean the expenditure of more money than is allowed the commission under the law for the purpose of constructing the loop. He said the first thing to be considered is a line that will bring the interurban roads to the heart of the city.

DES MOINES REHABILITATION PLANS UNDER WAY

Plans for forty new street cars, to cost approximately $240,000, have been submited to the City Council by the Des Moines (Ia.) City Railway. The Council has approved the plans and the company is asking for bids. The cars will be all steel, center entrance, with a seating capacity of fifty-four, and there will be no smoking compartment or platform on which smoking will be permitted. Emil G. Schmidt, president of the company, told the Council that he expects the new cars will begin to arrive within four months. More new cars will be added later. The new equipment is a part of the general scheme of rehabilitation which will be carried out in accordance with the conditions of the new franchise to the company. Mr. Schmidt has also announced that the building of a network of interurban lines will follow the rehabilitation of the city lines. The Des Moines City Railway controls and operates interurban lines to Perry and Colfax. The Colfax line is to be extended 11 miles to Newton, and new interurban lines are planned to Indianola, Winterest, Red Oak, and eventually to Omaha through a territory not now served by any railroad.

PLANS PRESENTED FOR SUBWAY APPROACHES TO NEW CLEVELAND BRIDGE

Engineer Frederick Law Olmsted on Dec. 9 presented to Director of Public Service Sidlo of Cleveland, Ohio, two plans for subway approaches to the new bridge across the Cuyahoga River at Superior Avenue. For the east side he suggested that the subway extend under Superior Avenue to West Sixth Street where the cars could be brought to the surface, with subway wells at some point between the bridge and West Sixth Street. He said that the tube could be extended from West Sixth Street to the Public Square. An easy grade connection between the bridge and the old viaduct is also provided in his plan, although Mr. Olmstead suggested that the approach to the viaduct be moved to St. Clair Avenue.

On the west side of the river he suggested that the West Twenty-fifth Street cars be brought to the surface at a point between Church Avenue and Franklin Avenue and that the Detroit Avenue cars be brought to the surface at West Twenty-eighth Street. His second plan for this side would place the subways under West Twenty-fifth Street, and the Detroit Avenue cars would reach the surface at the junction of this street and Detroit Avenue. The Twenty-fifth Street cars would emerge from the surface at the same point as suggested in the first plan. Mr. Olmsted believes these plans would obviate congestion at the approaches. Under his second plan an extension of the Detroit Avenue subway beyond Twenty-fifth Street could be built if it becomes necessary. County Engineer Stinchcomb feels that the plan of having cars on the Detroit Avenue line come to the surface at West Twenty-fifth Street will result in congestion.

The city plan commission at Cleveland, on Dec. 15, approved the plans of County Engineer Stinchcomb for subway approaches to the high-level bridge across the Cuyahoga River in preference to those of Frederick Law Olmsted. The vote was informal.

Peter Witt, street railway commissioner of Cleveland, did not make a report on the status of the various funds of the Cleveland Railway at the meeting of the City Council on the evening of Dec. 13, as directed by the Woods resolution adopted a week previously. Councilman Wood made no comment on Mr. Witt's failure to comply with Council's orders.

Under a resolution introduced by Councilman E. A. Meyers, a committee of five members was appointed to study traffic conditions in the congested business district of the city and at other points where trouble is frequent.

Councilman J. J. McGinty has introduced an amendment to the franchise of the Cleveland & Youngstown Railway. Under the amendment the electrification clause agreed upon some time ago will be inserted in the franchise.

W. F. M. GOSS DISCUSSES CHICAGO ELECTRIFICATION REPORT

That phase of the smoke abatement and electrification of railway terminals report dealing with the problem of electrifying Chicago's terminals was discussed at a meeting of the Western Society of Engineers Dec. 20, by W. F. M. Goss, chief engineer of the committee of the Association of Commerce which made this investigation. His address consisted largely of an abstract of the report which he divided into six subjects, namely, existing installations of electrified steam railroads, the Chicago problem, the electric load requirements, the cost, the operating results and the benefits to be derived. Dean Goss made the interesting statement in connection with the question of utilizing the electrified railroad right-of-way for building purposes, that property obtained by the right of eminent domain could not legally be used for commercial purposes. He also said that it was conceivable that the Chicago terminal situation could be unscrambled and the problem of electrification greatly simplified, but that was not within the province of the committee. Dean Goss illustrated his talk with lantern slides, and in the brief discussion which followed, it was suggested that the benefits to be derived from electrification would principally accrue to the city, therefore, it should contribute to the cost of electrification. In response to this question, Dean Goss stated that electrification undertaken as a public improvement could not be financed under the present State constitution, which specifically prohibits city aid in this respect.

MOTION TO DISMISS SEATTLE CASE DENIED

Outline of Contention of Counsel in Case in Which Company Seeks Relief from Franchise Burdens

The Public Service Commission of the State of Washington has denied the motion to dismiss the case of the Public Service Commission on the relation of the Puget Sound Traction, Light & Power Company against the city of Seattle. The action is the one in which the company asks that the city of Seattle be restrained from enforcing certain franchise provisions.

Ralph Pierce, assistant corporation counsel for the city of Seattle, appeared for the city. He contended that the commission must necessarily dismiss the case on the grounds, first, that the law gives no authority for filing such complaint, and, second, that the commission is without power to grant the relief sought. He said that the company seeks relief from all of the terms and conditions the city imposes, but offers to give up none of the rights. Mr. Pierce insisted that the franchise is a contract, and that the only way to break it or to get relief from any of its provisions, is for the court to grant a writ of mandate, stating that when the city seeks to make the company live up to any part of the franchise, the matter goes into the courts. He contended that so far as paving is concerned, the only jurisdiction the commission has is to say that the pavement between the tracks shall be safe, but that it cannot specify the kind of paving under the franchise agreement. He referred to the fact that acting upon the advice of Attorney General Von Tanner, the commission had ruled it had no jurisdiction over streets, having announced in a previous case that it could not force the company to make certain extensions.

Mr. Pierce, in his argument before the commission, stated that instead of trying to avoid the requirements imposed in the franchise, the company should seek relief by raising its passenger rates. He contended that the city, by 1934, the date of expiration of company's franchises, would lose $1,500,000 if the 2 per cent gross earnings tax provision of the franchise should be eliminated.

J. B. Howe, attorney for the company, contended that the commission has jurisdiction to supersede franchise provisions laid down by a city if the commission finds the provisions are unjust. Mr. Howe cited as evidence that certain provisions of the franchise of the company are unjust, the requirement to pave between the tracks and to a width 18 in. beyond the tracks, to pay part of the maintenance of the paving, and the clause under which the City Council can arbitrarily map out an extensive improvement district. He said further that the franchise provision which stipulates that 2 per cent of the gross earnings be paid to the city is unjust. He also cited several court rulings which he contended gave the State authorities power to abrogate or supersede franchise provisions originally laid down by a city.

Charles C. Reynolds, chairman of the commission, following the conclusion of the arguments, announced that the commission would deny the motion of the city with the proviso, however, that the motion may be renewed when the case comes up for a hearing on its merits. The city of Seattle has five days to file an answer to the complaint. The date of hearing on this petition has been set by the commission for Feb. 16, 1916. James E. Bradford, corporation counsel of the city, recently asked the Council for an appropriation of $10,000 in order to prepare for the hearing before the commission.

MR. HARRIS EXPLAINS TORONTO TRANSIT PLANS

R. C. Harris, Works Commission of Toronto, Ont., who, with E. L. Cousins, engineer of the Toronto Harbor Board, and F. A. Gaby, chief engineer of the Hydro-Electric Power Commission of Ontario, prepared for the city the comprehensive report recommending a system of semi-rapid transit with radial entrances, explained the plans to the Board of Trade at a meeting on Dec. 18.

Mr. Harris said that rapid transit in the strict sense of the word had never been adopted in cities of less than 1,000,000 people, except, perhaps, in the case of Boston, where conditions were peculiar. The city of Toronto was not ripe for rapid transit, but semi-rapid transit could be attained by the construction of radial lines, east, west and northeast, provided they were controlled by the city within the city limts.

The commissioner said further that in so far as the city itself as at present constituted was concerned, when the city in 1921 acquired the Toronto Railway franchise, with its consequent rehabilitation and the building of new civic lines, the proper placing of new surface lines in the interim would bring about a passage from the remotest limit to King and Queen Streets in thirty-five minutes. The commissioner then dealt with the radial entrances. He dwelt on the recommendation for a transportation commission that would control all the electric transportation within the city, assume control of the civic car lines, lay out and build new lines and arrange for the acquisition of the Toronto Railway in 1921, the city to control the railways within the city limits.

The City Council will at its next meeting declare its policy in reference to taking over the Toronto Railway at the expiration of its franchise. The Mayor said: "The present Board of Control has tacitly declared in favor of the policy, but at the next meeting we will send on a resolution in favor of taking it over."

EFFORTS TO SETTLE WILKES-BARRE STRIKE FAIL

Efforts of Federal and State mediators and the pleas of the united business men have gone for naught in the attempt to settle the strike of the carmen on the system of the Wilkes-Barre (Pa.) Railway. The merchants of the city have made the most substantial and practical endeavor to end the strike by appealing to the striking employees in a declaration that business is paralyzed and that unless the strike is ended at once several hundred clerks and other store employees will be thrown out of work. All admitted that business is the poorest ever known for the Christmas season and that to save themselves it will be necessary to cut down expenses by discharging clerks and other help. The carmen rejected the offer of a peace proposal made by the merchants of the city, declaring that it contained nothing new.

It has been announced by the company that night service will be started in a few days. Since the strike started cars have only been run until dusk on account of the possibility of riots, but an adequate police force has now been provided and the militant temper of the mobs has materially subsided. Considerably more traveling is being done by the general public, especially since the recent inclement weather, and it is expected conditions will be restored to normal in a short time.

MANY WITNESSES EXAMINED IN NEW YORK INQUIRY

The inquiry by the legislative committee into the workings of the Public Service Commission for the First District of New York was continued during the week. Four witnesses were before the Grand Jury on Dec. 17. They were Sidney G. Johnson of the General Railway Signal Company; Walter D. Uptegraff, president of the Union Switch & Signal Company; S. O. Levinson, general counsel of the Union Switch & Signal Company, and John R. McCune, a director of that company. On Dec. 21 the Grand Jury had before it Col. H. G. Prout, formerly president of the Union Switch & Signal Company. The proceedings before this body are secret, but the opinion seems to prevail that no action will be taken by the jury until the committee from the Legislature has exhausted its inquiry.

Col. Prout was the principal witness before the committee on Dec. 17. Col. Prout said that he could not tell of any specific occasion when he talked with Mr. Johnson, who was formerly vice-president in charge of sales of the Union Switch & Signal Company, with respect to the Center Street loop signal contract. He did say, however, that Mr. Johnson had come to him more than once with the subject of his (Mr. Johnson) being approached by Commissioner Wood. Col. Prout said that he advised Mr. Johnson that it was the duty of the company to keep a watch on the commissioner, to "tow" him along, but to make no promises. He had then spoken about the matter to various members of his board of directors and it was formally put before the board. They rejected the idea of making any propositions of payment to Mr. Wood.

On Dec. 18 Alfred Renshaw, president of the Federal Signal Company, Albany, N. Y., said that Vice-President Cade of that company had told him that Commissioner Wood had invited him (Cade) to his (Wood's) office and Mr. Renshaw got the impression that Mr. Cade said that Mr. Wood gave Mr. Cade an opportunity to make a proposition in connection with the signal contract for the Fourth Avenue line. Mr. Renshaw also testified on Dec. 21. Another witness was Clifton W. Wilder, electrical engineer for the commission.

William G. Banks, a former associate of Commissioner Wood, was examined on Dec. 21. He went over meetings which he said he had with both Mr. Cade and Mr. Wood. The only influence he brought to bear on Mr. Wood was to try to get some of the signal equipment business. The witness was excused by Senator Thompson, chairman of the legislative committee, with the advice that he "come back here in the morning and tell us everything you have forgotten to tell us."

OSCAR S. STRAUS ON HIS IDEALS

Oscar S. Straus, who was appointed on Dec. 9 by Governor Whitman of New York to succeed Edward E. McCall, removed by the Governor as chairman and member of the Public Service Commission for the First District, said in an interview prior to his being sworn in as a member of the commission:

"I have not given any attention to transportation problems or the regulation of corporations. I make no claim to be an expert. But I was head of the Department of Commerce and Labor, a great department which has since been divided into two, and I shall use the advice of experts with common sense and a fearless determination to serve the public interest. I may go in as a student at first, but I am determined to give the city a square deal. I shall not be afraid to do the unpopular thing if I believe it to be right.

"The decisions of the commission in the railroad arbitration of 1912, of which I was chairman, did not quite satisfy either side, but worked out well. I suppose the same may be the result of my work in the Public Service Commission. Then there was another reason why I hesitated to accept: the hostile criticism I must expect. That is one of the most difficult things in public affairs, especially municipal affairs, even if one be as pure as ice and chaste as snow. So, for a man of my time of life, with a fair record behind him, it is taking quite a chance to accept office with no object but to serve the public. Only recently I have become a member of a committee in that great beneficent neutral work of feeding and clothing the Belgians and the French within the German lines. I must stay on that, and if the commission work conflicted with it, I should have to drop the commission. So the public must not be surprised to see me get out. My controlling idea is that I believe in the efficacy of commissions as a development of the highest value to municipal government. I believe that value would be lost and the commission system discredited unless public-spirited men were willing to devote themselves to the work. As the Governor put it to me, I regard this as a call for public service. I regret that I have been selected. It takes from me the leisure that I have earned in twenty-eight years of public service, off and on, but I could not refuse the summons when it came to me."

CHICAGO TRACTION COMMISSION ORDINANCE PASSED

The employment of three engineers to study the entire local transportation problem of Chicago, Ill., was authorized by the passage of an ordinance at the meeting of the Chicago City Council on Dec. 20. A number of amendments were submitted, but after two hours' debate the ordinance was approved essentially as it was recommended by the local transportation committee. The ordinance authorizes the employment of three engineers, one from Chicago and two who have had experience in connection with the efforts to solve the transportation problems of New York, Philadelphia or Boston. The local transportation committee now has full authority to negotiate for the employment of the engineers, but their appointment must be confirmed by the City Council. Henry B. Capitain, the chairman of the committee, has been asked by the committee, to submit the names of qualified engineers with their records and his recommendations.

New Rules of Procedure for District Commission.—The Public Utilities Commission of the District of Columbia has adopted new rules of procedure to facilitate the transaction of matters coming before the commission. The new rules went into effect on Dec. 1.

Cincinnati Officials Appointed.—Mayor-Elect George Puchta of Cincinnati, Ohio, announced on Dec. 16 that he had selected Charles F. Hornberger as director of public service and Walter J. Friedlander as director of public safety. Charles Groom will succeed Walter M. Schoenle as city solicitor and Harry Barnes will be his first assistant.

Plea to Dismiss New Haven Case.—Judge Hunt listened all of Dec. 20 in the Federal District Court at New York while counsel for the eleven ex-directors of the New York, New Haven & Hartford Railroad tried to show that he should dismiss the complaint of the government against them for alleged conspiracy to monopolize trade in New England.

Acquisition of Part of Toronto Line Recommended.—The City Council of Toronto, Ont., at a special meeting on Dec. 17 unanimously adopted the recommendation of the Board of Control that the Hydro-Electric Power Commission of Ontario be requested to enter into negotiations with the Toronto & York Radial Railway for the acquisition of the Metropolitan line on Yonge Street. The question of taking over that portion of the line within the city limits to make it part of the civic system will be arranged with the Hydro-Electric Commission after it has secured possession of the line.

Interborough Men as Entertainers.—At the annual smoker and entertainment of the New York Railroad Club, held at the Waldorf-Astoria on Dec. 17, all of the entertainment was provided by talent from the force of the Interborough Rapid Transit Company, New York. The features on the program included instrumental music from the Subway Orchestra, songs from the Interborough Quartette, a ventriloquist, monologues, etc. The entertainment was fully up to those given by professionals in past years, and the members of the club present were greatly appreciative of the opportunity of learning what the Interborough force could do.

Plea for Retention of Transit Experts in Philadelphia.—A. Merritt Taylor, director of the department of city transit of Philadelphia, Pa., appeared before the Council-

manic finance committee recently and urged that an appropriation of $60,000 for consulting engineers be included in the amount made available for 1916. Director Taylor, in urging that Councils make the same provision regarding consulting engineers for 1916 as was made in 1914 and the present year, declared that it would be a great misfortune to do away with the services of valuable experts who have been stationed almost constantly in his office since the development of the transit plan was begun.

Resolution for Congressional Inquiry Into Railroads.—Senator Newlands has introduced a resolution for a Congressional investigation of the railroad situation along the lines advocated by President Wilson in his message. The Senator is chairman of the committee on interstate commerce, and his resolution has been referred to that committee. He has expressed the view that the Interstate Commerce Commission should be enlarged, that there should be a section for the Eastern roads, another for the Middle Western roads, and a third for the Far Western roads. He has also raised the question of incorporating the railroads under a federal charter.

Action on Philadelphia Transit Loan Put Over.—Action on the $95,000,000 loan for Philadelphia, which is to include $45,000,000 for rapid transit work, has been halted at the request of Mayor-elect Thomas B. Smith. The Mayor-elect says that no steps on the project will be taken until after the first of the year. He was quoted recently in part as follows: "The loan was held up at my request. I want it to come up under the new Councils. The city solicitor called my attention to several legal points that are involved, and I asked Mr. Connelly to sidetrack the loan until these matters are straightened out. I went to be sure of my ground. The loan will go through, however, and all of the improvements planned will be amply provided for." It was expected that on Dec. 16 the loan bill would pass both chambers of Councils, that Mayor Blankenburg would sign it promptly and that the thirty-day period for advertising would be ended in time to hold a special election on Feb. 8.

Lehigh Valley Transit Company Increases Wages.—Announcement has been made that the board of directors of the Lehigh Valley Transit Company, Allentown, Pa., has granted an increase of wages to the trainmen in the employ of the company, effective on Jan. 1, 1916. The new schedule rate of wages will be as follows: Twenty-four cents an hour for first year men, 25 cents and hour for second year men, 26 cents an hour for third year men, 27 cents and hour for fourth year men, 28 cents an hour for the fifth year and thereafter to the fifteenth year and 29 cents an hour for the fifteenth year and thereafter. The old rate of pay ranged from 23 cents to 27 cents an hour, so that under the new schedule the men receive an increase of 1 cent an hour up to the fifteen year men, who are advanced 2 cents an hour. The increase also applies to the men on the Easton, Pa., and Phillipsburg, N. J., branches of the company, as well as on the Philadelphia division and the lines directly connecting these points. More than 300 men will share in the advance.

Charleston Arbitration Findings.—The board of arbitration selected to settle differences existing between the Charleston Consolidated Railway & Lighting Company, Charleston, S. C., and its trainmen relative to a new contract and increased wages has reached a decision. The old contract expired on Nov. 16. Representatives of the company and men were unable to agree on the terms of a new contract and the matter was submitted to a board of arbitrators consisting of B. F. McLeod, representing the company, and Frank Simmons, representing the carmen. R. G. Rhett was chosen as the third arbiter. By the terms of the new contract, some forty men in the employ of the company four or more years receive an increase of 3 cents an hour, getting 24 cents. Another forty men, who have been employed more than two years and less than four years, get an increase of 2 cents an hour, their pay being 22 cents. The men who have been with the company less than two years, are granted an increase of 1 cent an hour, their pay being 20 cents an hour. They number about sixty. Some thirty extra men employed as motormen and conductors also get an increase of 1 cent an hour, or 18 cents an hour. All are employed on a contract based on a nine-hour day. The decision of the board was unanimous.

PROGRAMS OF ASSOCIATION MEETINGS

Railway Business Association

The annual meeting of the Railway Business Association will be held at the Waldorf-Astoria Hotel, New York, N. Y., on Jan. 27, 1916. The sessions will be a business meeting at 11 a. m., election of officers 1.30 p. m. and dinner at 7 p. m. The program of speakers will be announced later.

American Economic Association

The twenty-eighth annual meeting of the American Economic Association to be held at Washington, D. C., Dec. 27-30. Among the many papers to be presented, the following are perhaps of greatest interest to readers of the Electric Railway Journal:

"Probable Changes in Foreign Trade of the United States Resulting from the European War," by Emory R. Johnson of the University of Pennsylvania.

"The Requisites for the Encouragement of the Investment of Foreign Capital," by William Straight, New York.

At the session on the afternoon of Dec. 29, Balthasar H. Mayer of the Interstate Commerce Commission will preside. The subject will be "Some Recent Tendencies in Economic Theory."

National Civic Federation

The annual meeting of the National Civic Federation will be held in Washington, D. C., on Jan. 17, 18 and 19, 1916. The annual dinner will take place at Hotel New Willard on Jan. 18. The general topics for discussion will be:

"The legal and moral obligations resting upon foreign-born citizens of the United States—those who have become naturalized citizens, and those who have taken steps to become citizens, as well as those engaged in labor or business here, but not intending to take out citizen's papers."

"The present and prospective effects of the war upon immigration to the United States, as it relates (1) to the wage-earner, (2) to industry, and (3) to the body politic; and what, if any, new legislation is required to deal with this problem."

Among the reports which will be made by special committees will be one giving an analysis of more than 100 profit-sharing plans now in operation in this country, as well as a description of many abandoned ones and the causes of their failure. A plan will be presented for the organization of a commission to study the question, "How far shall government in this country enter into private industry?" The industrial economics department will make a preliminary report on its survey of the social and industrial changes that have taken place in the United States during the last generation.

Pan-American Scientific Congress

The program of Section V, or that on engineering, of the Second Pan-American Scientific Congress, has just been published by the government. This congress will begin on Monday, Dec. 27, 1915, and will continue until Saturday, Jan. 8, 1916, and will be held in Washington, D. C. The engineering section is divided into six subsections, namely: civil engineering; marine engineering; electrical engineering; reclamation, sewage, and municipal water supply; mechanical engineering; standard surveys, parks, building, nomenclature. Among the papers of electric railway interest already announced are the following, all of which will be presented on Jan. 3:

"Electric Power Transmission and Distribution Systems," by Percy H. Thomas.

"Aluminum Conductors for Electric Transmission Lines," by Theodore Varney.

"Underground Cables," by H. W. Fisher.

"Electrification of Transportation Lines," by N. W. Storer.

On Jan. 4, Dr. E. B. Rosa, of the National Bureau of Standards, will present a paper on "Electrical Codes and Standards." On the evening of Jan. 6 it is expected that the president of the United States will address the members of the congress, and on the following evening there will be a reception to the members at the White House. On the evening of Jan. 8 a banquet will be extended to the members of the congress by the Secretary of State and by the United States delegates.

Financial and Corporate

ANNUAL REPORT

New York, New Haven & Hartford Railroad

The annual report of the New York, New Haven & Hartford Railroad for the year ended June 30, 1915, contains comparative statements of income, profit and loss for the various affiliated electric railways, as shown in the accompanying table. In the New York, Westchester & Boston Railway, which is held directly through the ownership of 98.4 per cent of the capital stock, the New York, New Haven & Hartford Railroad has an investment of $13,910,703, book value. The operating expenses and taxes of this electric line for the year ended June 30, 1915, were 109.93 per cent of the total operating revenues, a decrease of 29.80 per cent. The deficit in the profit and loss account as of June 30, 1915, was $4,257,874. The volume of business handled by this company is said to be increasing steadily, and it is expected that the earnings for the current fiscal year will be sufficient to pay operating expenses and taxes.

Other electric lines which are held directly through ownership of the entire capital stock by the railroad, but which under decree of the federal court must be disposed of on or before July 1, 1919, include the following: The Berkshire Street Railway, with a New Haven investment of $9,936,156; the Rhode Island Company, with a New Haven investment of $27,582,337; the New York & Stamford Railway, with a New Haven investment of $1,420,395, and the Westchester Street Railroad, with a New Haven investment of $1,237,426. The operating expenses and taxes of the Berkshire Street Railway for the last fiscal year were 90.88 per cent of the total operating revenues, an increase of 3.94 per cent. The deficit in the profit and loss account as of June 30, 1915, was $364,050. In the case of the Rhode Island company the operating expenses and taxes were 76.93 per cent of the total operating revenues, an increase of 4.49 per cent, and the credit to the profit and loss account was $1,360,932. For the New York & Stamford Railway the operating expenses and taxes were 80.71 per cent of the total operating revenues, an increase of 4.12 per cent, and the deficit in the profit and loss account amounted to $67,839. The operating expenses and taxes of the remaining company directly held, the Westchester Street Railroad, were 102.86 per cent of the total operating revenues, an increase of 10.07 per cent. The deficit in the profit and loss account totaled $56,798.

The New York, New Haven & Hartford Railroad also controls, though indirectly, the Connecticut Company, the entire capital stock being held by the New England Navigation Company. The entire investment of the railroad in this property amounts to $42,025,000. The company is likewise to be disposed of before July 1, 1919. The operating expenses and taxes of this railway during the year were 71.94 per cent of the total operating revenues, an increase of 0.61 per cent, and the credit to the profit and loss account as of June 30, 1915, was $1,016,886.

The report states that it will be necessary for the railroad to spend in the next few years $1,500,000 for electric equipment and facilities to get full benefit of the electrification between New York and New Haven.

TABLE SHOWING COMPARATIVE STATEMENTS OF INCOME, PROFIT AND LOSS FOR AFFILIATED ELECTRIC RAILWAYS OF NEW YORK, NEW HAVEN & HARTFORD RAILROAD FOR YEAR ENDED JUNE 30, 1915

	New York, Westchester & Boston Railway		Berkshire Street Railway		Rhode Island Company		New York & Stamford Railway		Westchester Street Railroad		Connecticut Company	
	1915	Change	1915	Change	1915	Change	1915	Change	1915	Change	1915	Change
Total operating revenues	$449,879	+$49,199	$951,196	−$43,269	$5,084,137	−$295,011	$376,083	+$4,621	$258,151	+$5,964	$7,960,820	−$124,578
Total operating expenses	379,034	−51,800	802,759	−8,683	3,438,274	−985	286,919	+19,630	254,387	+31,800	5,204,654	+18,774
Net operating revenue	$70,845	+$100,999	$148,437	−$34,586	$1,645,863	−$294,025	$89,164	−$15,009	$3,763	−$25,835	$2,756,166	−$143,352
Taxes	115,528	−13,523	61,679	+8,544	472,709	+15,171	16,616	−610	11,153	−272	522,228	−59,280
Operating income	†$44,683	+$114,522	$86,758	−$43,130	$1,173,153	−$309,196	$72,548	−$14,399	†$7,389	−$25,562	$2,233,937	−$84,072
Non-operating income	19,348	—10,808	1,671	−677	121,755	−22,903	460	+3	152	−53	275,503	+14,980
Gross income	†$25,335	+$103,714	$88,430	−$43,808	$1,294,909	−$332,099	$73,009	−$14,395	†$7,237	−$25,615	$2,509,441	−$69,091
Deductions from income	*1,424,362	+55,307	*206,520	+1,774	*1,410,337	+130,971	*95,051	+1,823	*16,106	+2,611	1,185,984	+108,524
Net income	†$1,449,697	+$48,407	†$118,090	−$45,583	†$115,428	−$463,071	†$22,042	−$16,218	†$23,343	−$28,227	‡$1,323,457	−$177,615

*1915 deductions from gross income include $1,368,065 and the 1914 figures include $1,298,396 for interest accruing to the New York, New Haven & Hartford Railroad, which was not included in the income account of that company. Similar items included for the other companies are as follows: Berkshire Street Railway, $118,000; Rhode Island Company, $199,617; New York & Stamford Railway, $22,000; and Westchester Street Railroad, $14,855.

†Deficit.

‡The Connecticut Company paid dividends of $400,000, a decrease of $1,100,000, and had a surplus of $923,457 for the year, an increase of $922,384.

CONNECTICUT COMMISSION REPORT

$416,418 Decrease in Electric Railway Operating Revenues for Year Ended June 30—Only One Operating Company Paid Dividend

According to the report of the Connecticut Public Utilities Commission for the year ended June 30, 1915, the total operating revenue of all street railways was $15,240,174, a decrease of $416,418. Every source of revenue showed a decrease for the year. Passenger revenue decreased $33,166, owing, it is thought, largely to the introduction of the jitney. While operating expenses increased $60,618, there was a decrease in expenses of conducting transportation of $111,113. The results of operation showed a decrease of $477,037 in operating income. These figures cover all companies reporting to the commission, including the Rhode Island Company, which operates largely outside the State. Of the total decrease in passenger revenue of $333,166 the decrease of the Rhode Island Company was $266,793, and of the total decrease of $416,418 in all operating revenue, that of the Rhode Island Company was $295,011.

By eliminating from the calculations the operating expense and revenue of the Rhode Island Company, there was a decrease in operating revenue of $121,407, an increase in operating expense of $59,632 and a net decrease in operating income of $181,039, applicable to the companies in Connecticut. There were 7,788,863 fewer fare passengers carried during the year than the previous year. Of these 5,222,029 passengers represent the decrease in those carried by the Rhode Island Company.

The total amount paid in dividends was $740,804, a decrease from the amount paid the year previous of $1,507,500. With the exception of the Bristol & Plainville Tramway the only companies that paid dividends were the ones that leased their lines and did not engage in street railway operation. Without the addition to its net earnings of $50,486 operating profit from its electric light and gas departments, this company would not have been able to pay a dividend from the result of its railway operation.

There was during the year a net addition to the investment in road and equipment, by all street railways, of $805,526, and a total addition on leased properties of $813,841. Of this latter amount $296,328 was expended by the Connecticut Company and the Shore Line Electric Railway, the balance being expended by the Rhode Island Company on its properties outside of Connecticut. At June 30, 1915, the total amount of capital stock issued and outstanding was $73,270,985, an increase of $137,600 for the year. The funded debt was $22,033,113, an increase of $980,034 for the year.

On June 30, 1915, the total mileage of single track operated in Connecticut was 828.18, and outside of Connecticut, 341.6. The total amount paid in salaries and wages to employees of street railways for the year was $6,403,696, and of this amount $4,099,463 was paid to employees of companies in Connecticut. For the same period the total number of employees was 5,390.

There are twenty-two street railways in Connecticut, nine of which are non-operating companies. During the year the Lordship Park Association, which operates a short line in Bridgeport, began service operation. On Nov. 11, 1914,

The Danbury & Bethel Street Railway voted to acquire all the property, rights and contracts of the Bridgeport & Danbury Electric Railway, which was operating 5 miles of single track. Since that date this line has been operated by the former company.

UNITED RAILROADS NEW FINANCING

Commission Authorizes New Secured Notes to Redeem Bonds, but Company Must Produce Missing Books or Satisfy the Commission With Its Efforts

The California Railroad Commission has issued an order authorizing the United Railroads of San Francisco to issue $1,800,000 of 6 per cent promissory notes, and the subsidiary Market Street Railway to issue $1,800,000 of 5 per cent first mortgage bonds as security for the notes. The notes mature two years from date and may be sold any time before Oct. 15, 1916. The bonds are secured by a deed of trust, dated July 12, 1894, from the Market Street Railway to the Union Trust Company of San Francisco. The application to the commission was noted in the Electric Railway Journal of Dec. 18.

The proceeds from the notes may be used only to buy and cancel not more than $1,800,000 of the remaining outstanding bonds of the Market Street Cable Railway. The original issue of the first mortgage 6 per cent gold bonds of this company in 1882 was $3,000,000, maturing in 1913. All but $1,800,000 of the issue has been paid, and the owners of the bonds to the latter amount have been demanding payment. The United Railroads of San Francisco said that it could postpone this payment until Oct. 15, 1916, by the promissory notes asked for, secured as above.

Neither bonds nor notes now authorized, however, may be issued until the United Railroads of San Francisco has produced the missing books of that company for 1907, 1908, 1909, 1910 and 1911, or has taken the necessary legal and other steps to secure the books to the satisfaction of the commission. Moreover, a stipulation must be filed with the commission that the net income of the company shall be applied or held to pay off the notes, as directed by the commission, and the commission will fix the selling price of the notes before the bonds are issued.

Authority was asked to issue bonds for $2,250,000, but the commission said that in view of the financial condition of the company insofar as it could be determined in the absence of the original books of account, it could not authorize an issue of bonds of the Market Street Railway in excess of the face of the notes. The commission drew attention to the fact that a number of additional obligations will shortly be payable. On Feb. 1, 1916, ten-year gold notes of the United Railroads of San Francisco of the face value of $1,000,000 will become due. On Dec. 31, 1916, $400,000 of bonds of the Ferries & Cliff House Railway are payable. The United Railroads of San Francisco owes the United Railway Investment Company $740,000, of which $555,000 was due in 1913. It was stated at the hearing before the commission that no arrangement had been made to pay these obligations or to pay the notes now authorized by the commission. B. S. Guiness, a New York banker representing the controlling interest in the properties, stated that he assumed a reorganization would be necessary to take care of the maturing obligations.

Referring to the absence of the books of the United Railroads of San Francisco, Mr. Guiness said that he had been for years a director of the United Railroads of San Francisco and allied companies and a partner of Ladenberg, Thalmann & Company, New York. He testified that he and those interested with him were unable to get the books from Patrick Calhoun. The commission stated, however, that these books were the property of the United Railroads of San Francisco and not Mr. Calhoun, and that it was not satisfied that the eastern owners of the company had made reasonable efforts to secure them. While it was not the function of the commission to indicate the precise means to secure these books, it expected the stockholders to use every effort in their power, both legal and otherwise, to procure the books and return them to California.

It is reported that as a result of later action the commission changed the order that the United Railroads of San Francisco take "necessary" steps to secure the missing books to an order that it make a "reasonable" effort to produce these books. Thereupon a syndicate composed of E. H. Rollins & Sons, Boston, the Anglo & London Paris National Bank, San Francisco, and Ladenburg, Thalmann & Company, New York, gave out that a satisfactory arrangement had been made with the company for the payment of $1,800,000 of bonds due on Dec. 15 or for a ten months' extension of the bonds, optional with the bondholder. The changed wording, it is reported, will make possible the issuance of notes totaling $1,800,000 at any time within the next ten months. Within that time, it is presumed, the company will make a "reasonable" effort to produce the missing books. In view of the short time intervening between the issuance of the commission's order and the maturity of the bonds now due, it was decided by the syndicate to extend the time for payment to Oct. 15, 1916, semi-annual interest at the coupon rate to be paid meanwhile.

POLICY OF EMPIRE UNITED RECEIVERS

Will Run Line at Lowest Cost Consistent with Safety—Announcements by Bondholders' Committee Regarding Deposits and Reorganization Plan

H. S. Holden and C. Loomis Allen, receivers of the Empire United Railways, Inc., Syracuse, N. Y., have issued a formal statement in response to requests concerning their policy and the future of the property after receivership. This follows in part:

"With reference to the operation we desire to say that it will be the policy of the receivers to operate the property for the lowest cost possible, consistent with safe and convenient service to the people who are dependent upon the company for transportation.

"It is not possible to answer the second query at this time. Information has been asked and is being prepared in reference to the last five years' history of operation. This includes a statement of earnings and payments from earnings for salaries, labor and materials used in operating the railways, taxes and interest upon bonds, notes and other obligations. As soon as we have received this information, a careful study of this history will be made, and with this history in mind, as a guide, a conservative estimate of the earnings as well as the cost of operating the property in the future will be formed.

"Until this study has been made the receivers ask the traveling public and the owners of all securities to suspend their judgment and withhold action, with the assurance on the part of the receivers that there is but one motive actuating them in the management of the property, namely, to render the necessary service as economically as possible and to conserve to the utmost degree the interests of all parties who put cash into the enterprise and make the enterprise possible."

The committee for first mortgage 5 per cent. bonds of the Rochester, Syracuse & Eastern Railroad has announced that more than a majority of the outstanding bonds have been deposited, and that after Dec. 31 bonds will be received only upon compliance with such additional conditions as may be imposed by the committee. Arthur W. Loasby, president Trust & Deposit Company of Onondaga, Syracuse, a depositary, is chairman of the committee.

It has also been announced that the committee is not inclined to favor any plan of reorganization or of readjustment which contemplates, as the proposed plan does, not only a sacrifice of the interests of the first mortgage bondholders, but a continuance of the present management of the property. It is said that the committee has been and is of the opinion that no plan which would in any way change the status or obligation of the Rochester, Syracuse & Eastern Railroad bonds can be intelligently considered until definite information as to the receipts and disbursements of the property covered by the mortgage has been secured. The committee says that it has requested C. Loomis Allen as co-receiver to institute a system of bookkeeping which will show exactly the earning capacity of the Rochester, Syracuse & Eastern property, and that he has agreed. When this information is furnished, the preparation of plans of readjustment may be considered, if readjustment is shown to be necessary. The proposed plan above referred to was published in the Electric Railway Journal of Dec. 11.

American Cities Company, New York, N. Y.—Francis T. Homer and T. H. Tutwiler have been elected directors of the American Cities Company.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—George D. Crofts, Buffalo, N. Y., has been appointed referee in the foreclosure action brought by the New York Trust Company, New York, against the Buffalo & Lake Erie Traction Company and its leased lines. The appointment of a receiver for the company was noted in the ELECTRIC RAILWAY JOURNAL of July 17. Referee Crofts has been directed to compute the amount due on the mortgage sought to be foreclosed, together with the amount of interest unpaid; to take proof of all property covered by the mortgage and subject to its lien and to take proof whether the property should be sold in one parcel or in separate parcels. The company defaulted the Nov. 1, 1912, interest payment on the $7,066,000 of first and refunding mortgage twenty-year 5 per cent bonds outstanding under its $12,000,000 mortgage to the New York Trust Company, dated Nov. 1, 1906, and it has continued to default up to and including Nov. 1, 1915. The present proceedings and the appointment of the referee to take testimony are said to mark the beginning of the end of the foreclosure action.

Choctaw Railway & Lighting Company, McAlester, Okla.—C. N. Mason, chairman of the bondholders' committee of the Choctaw Railway & Lighting Company, has announced that 90 per cent of the bondholders are prepared to begin foreclosure of the mortgage securing the first mortgage bonds and that the same percentage of bonds has been deposited with the Guaranty Trust Company, New York. The appointment of receivers for this company was mentioned in the ELECTRIC RAILWAY JOURNAL of Oct. 30.

Detroit (Mich.) United Railway.—William A. Read & Company, New York, has sold at 100 and accrued interest the $3,500,000 of collateral trust 5 per cent gold notes of the Detroit United Railway recently authorized by the Michigan Railroad Commission, as noted in the ELECTRIC RAILWAY JOURNAL of Dec. 18.

Northampton Traction Company, Easton, Pa.—The Pennsylvania Public Service Commission has approved the merger of the Northampton Traction Company and the Bangor & Portland Traction Company, Bangor, Pa., under the name of the former. The Northampton Traction Company operates 25 miles of single track between Easton and Bangor, with direct connection for the Delaware Water Gap and Stroudsburg, while the Bangor & Portland Traction Company has 8.75 miles of single track between Bangor and Portland. As a result of the present merger a new line will be run from Wind Gap to the Delaware Water Gap, and Saylor's Lake will be purchased and turned into a summer resort, the sum of $500,000 being involved. The new line will connect at Stroudsburg with the Stroudsburg Passenger Railway, which, it is said, will be absorbed, and will be built through Kellersville to Saylor's Lake, thence to Saylorsburg and over to Wind Gap. It is hoped to begin work by June 1.

Portland & Oregon City Railway, Portland, Ore.—The Portland & Oregon City Railway recently received permission from the City Council to give a mortgage to the Security Savings & Trust Company for $350,000 to cover the 16-mile line being built between Oregon City and Portland. This permission was required by the terms of the company's franchise. As noted in the ELECTRIC RAILWAY JOURNAL of Dec. 18, this company has begun operations between Milwaukee and Carver, and it is expected that the line will be completed to Portland by Jan. 10.

Public Service Corporation of New Jersey, Newark, N. J.—The directors of the Public Service Corporation of New Jersey have voted to put the stock of the corporation on a 7 per cent basis instead of 6 per cent as it has been for several years. A dividend of 1¾ per cent for the quarter ending Dec. 31 was declared, this action having been taken after it was shown that the amounts set aside for amortization were very liberal, and the surplus account was in a very satisfactory condition.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The California Railroad Commission has authorized the San Francisco-Oakland Terminal Railways to issue one-day six per cent promissory notes for not more than $218,459, and general lien bonds of a face value of $337,000 as collateral security therefor.

Second Avenue Railroad, New York, N. Y.—Justice Whitaker of the Supreme Court on Dec. 21 signed an order permitting settlement of the claims of the Second Avenue Railroad against the old Metropolitan Street Railway on the basis of an agreement reached between the late George W. Linch, receiver of the former company, and the New York Railways, successor to the latter company. The agreement has been concurred in by John Beaver, the new receiver, and the New York Railways. The agreement provides for the payment of $548,352 to the Second Avenue Railroad, the money to be turned over to the court and used in paying off the company's indebtedness. The payments cover three claims: damages of $111,737 for a breach of lease, the amount being fixed by the federal courts; a similar claim for $594,727, which was compromised for $267,627 or 45 per cent of the claim, and a claim of $168,988, based on an inter-receivership accounting. It was said that the money to be paid would enable the Second Avenue Railroad to clear off all indebtedness and assist it in developing the property. Individual damage claims against the corporation have been settled for a total of $66,000.

Springfield & Xenia Railway, Springfield, Ohio.—The Springfield & Xenia Railway has declared a dividend of 3 per cent on common stock, payable on Dec. 20 to holders of record on Dec. 15. This payment is the same as that made in 1914, but is an increase of 1 per cent over the 1913 payment.

Toronto (Ont.) Railway.—William A. Read & Company, New York, recently purchased and sold on a 4.875 basis $500,000 of 6 per cent gold notes of 1914 of the Toronto Railway, due on Dec. 1, 1916, and on a 5.5 basis $250,000 of the notes due on Dec. 1, 1917. These $750,000 of notes are redeemable at 102½ and interest on any interest date on thirty days' notice. They are part of an authorized issue limited to $2,000,000, and are issued for refunding a like amount due on Dec. 1, 1915, which, together with $750,000 due in 1916, were originally issued in 1914 for financing extensions and improvements of the business and properties of the Toronto Power Company, Ltd., which indorses them. The Toronto Railway covenants not to issue any bonds or other funded debt while any of these notes remain unpaid, without applying the proceeds to their redemption.

York (Pa.) Railways.—The Philadelphia Stock Exchange has listed $546,000 of additional first mortgage thirty-year 5 per cent gold bonds, due in 1937, of the York Railways, making the total $4,271,000. The added bonds cover the following: $94,000 for railway extensions, improvements and equipment; $137,000 for acquiring or building a power plant, and $315,000 for purchasing $124,500 out of $150,000 bonds and the entire 100 shares of stock of the Merchants' Electric Light, Heat & Power Company. This company last July was consolidated with the Edison Light & Power Company, which had previously been formed to take over the lighting and power subsidiaries of the York Railways and several other similar properties. Of the $1,301,000 of capital stock of the Edison Light & Power Company, $1,300,950 is owned by the York Railways and deposited as collateral under its mortgage.

DIVIDENDS DECLARED

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

Bangor Railway & Electric Company, Bangor, Me., quarterly, 1¾ per cent, preferred.

California Railway & Power Company, San Francisco, Cal., quarterly, 1¾ per cent, prior preferred.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.

Charlottesville & Albermarle Railway, Charlottesville, Va., semi-annual, 3½ per cent, preferred.

Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

Columbia Railway, Gas & Electric Company, Columbia, S. C., quarterly, 1½ per cent, preferred.

Columbus (Ga.) Electric Company, 3 per cent, preferred.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1 per cent, prior preference; quarterly, 1½ per cent, preferred, Series A.

Consolidated Traction Company of New Jersey, Newark, N. J., 2 per cent.

Eastern Texas Electric Company, Beaumont, Tex., 3 per cent, preferred.

Germantown Passenger Railway, Philadelphia, Pa., quarterly, $1.31¾.

Illinois Traction System, Peoria, Ill., quarterly, 1½ per cent, preferred.

Monongahela Valley Traction Company, Fairmont, W. Va., 1 per cent, common.

New England Investment & Security Company, Springfield, Mass., $2, preferred.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1½ per cent, preferred.

Philadelphia Company, Pittsburgh, Pa., quarterly, 1½ per cent, common.

Reading (Pa.) Traction Company, 1½ per cent.

Ridge Avenue Passenger Railway, Philadelphia, Pa., quarterly, $3.

Springfield & Xenia Railway, Springfield, Ohio, 3 per cent, common.

Stark Electric Railroad, Alliance, Ohio, quarterly, three-fourths of 1 per cent.

Union Passenger Railway, Philadelphia, Pa., $4.75.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., quarterly, 1½ per cent, preferred.

Washington Water Power Company, Spokane, Wash., quarterly, 1¼ per cent.

West Philadelphia (Pa.) Passenger Railway, $5.

Youngstown & Ohio River Railroad, Leetonia, Ohio, quarterly, 1¼ per cent, preferred; extra, one-fourth of 1 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE (LA.) ELECTRIC COMPANY

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct.,		'15	$18,097	*$9,670	$8,426	$2,204	$6,222
1 "	"	'14	15,609	*9,066	6,543	2,058	4,485
12 "	"	'15	187,957	*109,873	78,084	25,674	52,410
12 "	"	'14	177,859	*114,230	63,629	25,115	38,514

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1m., Oct.,		'15	$9,406	*$7,856	$1,520	$1,106	$444
1 "	"	'14	9,825	*9,074	751	1,143	†392
12 "	"	'15	115,317	*97,163	18,154	13,563	4,591
12 "	"	'14	120,990	*101,274	19,716	12,963	6,753

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

1m., Oct.,		'15	$34,152	*$16,891	$17,261	$6,505	$10,656
1 "	"	'14	30,751	*18,524	12,227	6,513	5 714
12 "	"	'15	347,773	*205,637	142,136	79,289	62,847
12 "	"	'14	361,073	*210,207	150,866	76,649	74,217

COLUMBUS (GA.) ELECTRIC COMPANY

1m., Oct.,		'15	$67,215	*$28,136	$39,079	$28,730	$10,349
1 "	"	'14	63,890	*27,901	35,989	28,849	7,140
12 "	"	'15	706,911	*324,245	382,666	344,769	37,897
12 "	"	'14	674,156	*285,260	388,896	317,111	71,785

DALLAS (TEX.) ELECTRIC COMPANY

1m., Oct.,		'15	$185,200	*$104,825	$80,375	$33,923	$46,452
1 "	"	'14	200,503	*105,502	95,001	33,355	61,646
12 "	"	'15	1,865,517	*1,112,210	753,307	401,412	351,895
12 "	"	'14	2,244,336	*1,330,124	914,212	357,555	556,657

EASTERN TEXAS TRACTION COMPANY, DALLAS, TEX.

1m., Oct.,		'15	$71,665	*$35,193	$36,472	$8,716	$27,756
1 "	"	'14	56,351	*34,272	22,079	8,601	13.478
12 "	"	'15	694,754	*380,106	314,648	105,055	209,593
12 "	"	'14	660,661	*401,919	258,742	100,747	‡166,198

EL PASO (TEX.) ELECTRIC COMPANY

1m., Oct.,		'15	$84,808	*$43,932	$40,876	$4,202	$36,674
1 "	"	'14	88,976	*49,184	39,792	4,186	35,606
12 "	"	'15	967,036	*515,683	451,353	50,371	400.982
12 "	"	'14	1,030,175	*578,331	451,844	51,492	400,352

GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.

1m., Oct.,		'15	$174,259	*$103,652	$70,607	$36,124	$34.483
1 "	"	'14	189,702	*106,339	83,363	36,208	47,155
12 "	"	'15	1,992,280	*1,199,804	792,476	432,962	359,514
12 "	"	'14	2,451,767	*1,342,982	1,108,785	441,278	667,507

JACKSONVILLE (FLA.) TRACTION COMPANY

1m., Oct.,		'15	$51,338	*$35,895	$15,443	$14,735	$708
1 "	"	'14	56,745	*39,062	17,683	12,561	5,122
12 "	"	'15	617,723	*431,913	185,810	174,676	11,134
12 "	"	'14	728,952	*476,284	252,668	152,498	100,170

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

MR. BRUSH ON BOSTON TRANSFER ABUSES

He Discusses the Transfer Problem in Its More Important Phases for the Massachusetts Commission

Matthew C. Brush, second vice-president of the Boston (Mass.) Elevated Railway, addressed the Massachusetts Public Service Commission at a hearing on Dec. 20, upon transfer abuses in Boston. Mr. Brush was before the board relative to the petition of the Roxbury Board of Trade for the institution of transfer checks at Dudley Street station. The company opposed the extension of the paper transfer system now in use on the ground that it is subject to enormous abuses, and pointed out that contemplated changes at Egleston Square station should be given a trial before changing the practice at Dudley Street.

Mr. Brush's discussion of the general transfer situation at Boston resulted from a request by Commissioner Meany that the larger phases of the question be set forth. Mr. Brush said that the company had 109 free transfer points where checks were used; that about 100,000,000 free transfers were issued annually, and that the number issued was growing at the rate of 10 per cent a year. Many transfers were issued improperly and used fraudulently daily. The company held that it had no more right to accept these transfers as fares than it had to honor lead nickels, but that it is absolutely helpless before the mass of transfers received. Mr. Brush considered it impossible to design a satisfactory transfer check for a large city system. An immense additional staff of employees would be required merely to examine the checks issued daily to see if they were correctly used. All the company could do was to take the checks and pocket the loss.

Describing the prevailing transfer abuses, Mr. Brush said that in one recent case it was found that a transfer was issued in a saloon with every drink, and in another case a passenger on the station platform at Northampton Street mingled with the crowd and secured five checks which he sold to confederates on the street below at 1 cent apiece. Faults in issuing and punching checks and many other evils in their train were outlined. One hundred and thirty boys have been arrested recently at the Dover Street elevated station for the fraudulent use of transfers. It had been impossible to tabulate the losses, but in a recent study of transfers issued and received in one day 64 per cent were found to be incorrect as to destination. On Nov. 29 the company received 340,000 checks. At Central Square, Cambridge, 4808 outward checks were received from surface cars to subway trains. Only 36 per cent of these were correctly punched as to destination. There were 11,554 free transfers accepted that day at the same station for transportation in the opposite direction, and of these only 9564 would legally entitle the holders to ride on toward Boston, had they been carefully inspected. On this date 5049 of the Central Square transfers were not properly acceptable as fare on account of the destination punched, and how many were fraudulent or otherwise inaccurate the company had not determined. How many were improper as to hour of usage, with the possibility of being accepted on the homeward trip at night though issued in the morning could never be determined. Some conductors were issuing transfers to persons not entitled to receive them; some issued for illegal trips, but whether they were issuing them in ignorance, carelessness or with intent the company could not attempt to prove in all cases. Conductors who accepted the slips did not have sufficient time to determine their legality.

At Central Square, in Cambridge, 14,000,000 transfers were made yearly; at Northampton Street station, 7,400,000; at Dover Street, 7,000,000; at Brookline Village, 5,082,000; at Massachusetts Avenue, Boston, 4,800,000; at Kendall Square, 4,800,000; at Dorchester Avenue, 4,703,000, and at Dudley Street, 57,000,000. To get away from the transfer difficulty the company has established a considerable number of prepayment areas where checks were not required, and where transfers could be effected with far greater safety than in congested streets. In conclusion, Mr. Brush said that if twenty such areas could be established the company could do away with about 70,000,000 of

the checks at present annually used, and the remaining 30,000,000 could be handled with fair accuracy. Larger checks could be issued, with less reading matter, thus facilitating checking.

Chairman McLeod closed the hearing with the statement that while the commission in general favored the system of transferring without checks, each case must be considered on its merits.

MASSACHUSETTS COMMISSION DECLARES ITS JURISDICTION IN BAY STATE FARE CASE

The full board of the Massachusetts Public Service Commission has ruled that it has jurisdiction in the Bay State Street Railway fare case and has decided to admit the testimony of the company's witness, Robert M. Feustel, of Sloan, Huddle, Feustel & Freeman, Madison, Wis., relative to the valuation of the company's property, presented at recent hearings. Mayor William M. Blakeley, of Walden, Mass., president of the Massachusetts Municipal Officers' Association, had asked the commission to dismiss the Feustel testimony. He raised the point that the board had no jurisdiction in view of the interstate service performed on certain of the company's lines. The commission points out that it would not be in the public interest at this time to restrict the scope of the inquiry by prescribing narrow and arbitrary rules regulating the methods of valuation, as a basis for the presentation of evidence. It states that the proposed changes in passenger fares and fare limits are intended, with certain possible and unimportant exceptions, to apply to transportation services to be performed by the carrier exclusively within the State, and that the board therefore considers it has jurisdiction in the case.

REMOVAL OF STANDING VEHICLES URGED

In an advertisement appearing in all the local newspapers on Dec. 9, 1915, the Chicago (Ill.) Surface Lines urged the discontinuance of the storage of vehicles along the streets in the loop district. The advertisement was published under the title, "For Storage or for Service?" The text of the advertisement was as follows:

"A large part of the area of the loop streets is now used for the storage of automobiles. This practice is a survival of the old 'hitching post' days. It forces heavy trucks and other vehicles to use the car tracks, and causes congestion and confusion. The entire width of narrow streets should be used for traffic purposes. This would be of special benefit to the hundreds of thousands who use the street cars every day. These hundreds of thousands are delayed and often seriously inconvenienced by the congestion caused by the storing of vehicles in narrow streets. Present conditions are out of date and should be corrected. This problem can best be solved by those who drive automobiles. Their slight personal convenience causes the serious inconvenience of the great majority who do not drive automobiles. The narrow loop streets should be reserved for service, not for storage."

DECISION IN COVINGTON OVERCROWDING CASE

Judge Harbeson in the Kenton Circuit Court at Covington has upheld the ordinance authorizing the chief of police of the city to "arrest" street cars which are overcrowded. The ordinance was enacted in 1910 and has been in litigation since. The course of the case has taken the measure through the Kentucky courts and on to the Supreme Court and back again to the Kenton Court for final judgment. The ordinance provides that each overcrowded car constitutes an offense, punishable by a fine of not less than $50 nor more than $100, each day's overcrowding to constitute a separate offense. The entrance and exit platforms must be kept free and open so that passengers can pass in or out without crowding, while persons refusing to vacate these spaces may be found guilty of misdemeanors and fined from $5 to $50.

The City Commission has instructed the safety commissioner to enforce all the valid provisions of the ordinance and calls on citizens to assist in assembling data for use in prosecutions. It is provided that any police officer guilty of ignoring violations of the ordinance, or who is reported to the safety commissioner for having done so, shall be suspended for thirty days on the first offense and dismissed from the service for the second. Four plain clothes men were immediately detailed by Chief of Police Schuler and the result of the first day's observations was eight cases of alleged overcrowding of cars of the South Covington & Cincinnati Traction Company.

These eight cases, however, were continued when the company stated that it would immediately comply with the terms of the ordinance and that it had not been advised of the final step in the case in time to get ready before proceedings were begun. Extra cars will be put on during rush hours and other provisions made to live up to the letter of the ordinance.

One-Man Cars and Near Side Stops in Pine Bluff.—The Pine Bluff (Ark.) Company has increased the number of cars in operation and has gone over to the one-man system. Stops are now made on the near side.

Passaic Fare Hearing on Jan. 19.—The Board of Public Utility Commissioners of New Jersey had set Jan. 19, at Newark, as the time for hearing the appeal of the city of Passaic against the Public Service Railway. The city wants a 5-cent fare from the Garfield bridge to the Essex County line.

Crusade Against Spitters.—An extra force of inspectors of the Louisville health office, armed with pink cards which contain statements as to the penalty for spitting in public places, has been assigned to duty and is paying special attention to the evil on the street cars. Volunteer inspectors have been supplied with the cards. The pink cards are in the way of warning. It is believed that they are accomplishing results.

Supreme Court Upholds Wichita Jitney Ordinance.—The Supreme Court of Kansas has upheld the ordinance of Wichita taxing jitneys. This measure contains a section which assesses an excess license of $300 to $400 a year on motor buses that operate on designated streets. The streets designated were those on which there are street railway lines. The court said that the requirement of an additional license from motor buses using specified streets was a valid exercise of municipal control, and that conferring a benefit on the street railway by such regulations did not constitute a reason against such right.

Trial Before County Court for Failure to Meet Commission Requirement.—John J. Dempsey, superintendent of transportation of the elevated lines of the Brooklyn (N. Y.) Rapid Transit Company, will be tried in the County Court on the charge of failing to obey an order issued by the Public Service Commission. Justice Aspinall denied his motion to have the case removed to the Supreme Court for trial. The court said: "The offense charged is a simple misdemeanor, and while the questions of law which will undoubtedly be raised at the trial by counsel for the defendant may be new and novel, I have been unable to find any sufficient reason to magnify the importance of this case so as to justify its removal."

Increase in Fare Denied in New Jersey.—The Board of Public Utility Commissioners of New Jersey has refused the request of the New Jersey & Pennsylvania Traction Company for permission to substitute a 25-cent fare for the present rate of 15 cents between Trenton and Princeton. About two years ago the board permitted the company to increase the fare from 10 to 15 cents between the terminals with corresponding increases for travel between intervening points. About a year ago the company inaugurated an improved service which, while increasing platform expense, has resulted in an increase of revenue. The board said it had not yet been demonstrated whether this added revenue will not afford the company the additional returns to which it is reasonably entitled.

Municipal Railway Exposition Service Withdrawn.—Fifty crews have been taken from service on the San Francisco (Cal.) Municipal Railway as a result of the closing of the exposition, and the running schedules of six of the eight lines have been cut down to comply with reduced traffic demands. The only line actually discontinued is the "D" blue line route, turning from Van Ness Avenue west in Chestnut Street. The "D" red line cars will continue to run from Van Ness Avenue in Vallejo, Franklin, Union, Steiner,, Green-

wich and Scott Streets, returning over the same route. A. J. Cashin, superintendent of the railway, has announced that the "J" line, running from the Ferry out Columbus Avenue to Van Ness Avenue and thence along Chestnut Street to Scott Street, will be continued so long as it will pay operating expenses.

Decrease in Fatal Accidents in New York.—The Public Service Commission for the First District of New York has prepared a summary of the reports of accidents on railroads and street railroads for the month of November, 1915. It shows a total of 5046 accidents against 4726 in November, 1914. The number of serious accidents, however, decreased from 184 in November, 1914, to 134. The fatalities were twenty-two in November of this year against eighteen in November of last year. The total number of passengers injured was 2087 against 1954 in November last year; employees, 896 against 757; all other persons, 374 against 442—a total of persons injured of 3357 against 3153 in the same month last year. Of the total number of accidents, namely, 5046, 3430 took place on surface lines; 1011 on subway and elevated lines; 582 on railroad trunk lines; eighteen on railroad terminal lines, and five on omnibus lines.

Illinois Traction Makes New Agreement.—Negotiations leading to a new two-year contract with its trainmen have been consummated by the Illinois Traction System, Peoria, Ill. Effective on Dec. 1, 1915, a nine-hour minimum day, or 200 miles was fixed for passenger crews. Runs in excess of 200 miles are to be figured at the rate of 22.2 miles per hour, for which 1¼ cents per mile of excess will be paid the first year of the contract and 1½ cents per mile of excess will be paid the second year of the contract. Trainmen in order to obtain any excess pay or be paid on a mileage basis, must run at a speed to exceed 22.2 miles per hour while on duty. In other words, a train crew running 250 miles in ten hours will be paid for ten hours at 33 cents, or 222 miles, and in addition will receive 1¼ cents per mile for the additional 28 miles. In reality, under the new agreement, this gives an increase in the rates paid.

Near-Side Stops in Atlanta.—The traffic ordinance recently passed by the City Council of Atlanta, Ga., prohibits street cars from stopping on the far side of street crossings. This means that in the downtown section, where cars heretofore have been stopping on both the near and far sides of the street, they will hereafter stop only on the near side. The only exception which the ordinance makes to this general rule is that north-bound cars on Peachtree Street shall stop at the northeast corner of Peachtree Street and Edgewood Avenue, and shall not stop on Peachtree Street between Decatur Street and Edgewood Avenue. The ordinance further provides that the north-bound cars on Peachtree Street shall not stop at Walton Street. Where cars turn from one street into another, they will stop at the beginning of the curve, but not at the end of the curve, as they have been accustomed to do in some instances heretofore. The changes are being explained to its patrons by the Georgia Railway & Power Company in advertisements displayed prominently in the local papers in Atlanta.

Report to Commission on Storm Service.—The Public Service Commission for the Second District of New York on Dec. 16 made public the report of Charles R. Barnes, its electric railway inspector, on the manner in which some of the electric railways in Albany and vicinity met the storm of Dec. 13 and 14. The report is complimentary to most of the companies, especially to the United Traction Company, Albany, where the heavier plows and sweepers, ordered by the commission last year, kept the lines open throughout the storm with one or two slight exceptions. Mr. Barnes said that the Schenectady Railway lines, both urban and interurban, were all open to traffic by 9 a. m. on Dec. 14, though some of the service was very irregular. Some of the lines were closed from 4 a. m. to 9 by the drifts. The Albany Southern Railway got its last car through on the night of Dec. 13, but the first car from Hudson on the morning of Dec. 14 did not arrive at Albany until 10 a. m. Mr. Barnes says the Albany Southern Railway used modern and efficient snow-fighting apparatus in reasonable amount. The Hudson Valley Railway kept all its lines open. All of the lines of the Syracuse-Utica division of the New York State Railways were kept open.

Personal Mention

Mr. Bion J. Arnold, Chicago, has been decided upon by the Syracuse Grade Crossing Commission as an expert to examine, criticise and report on the plans adopted by the commission for the elimination of grade crossings in Syracuse, N. Y.

Mr. Clinton L. Rossiter, formerly president of the Brooklyn (N. Y.) Rapid Transit Company, has been elected a director and vice-president of the Underwood Typewriter Company to succeed the late Charles W. Hand. Mr. Rossiter, who has been vice-president of the Brooklyn Trust Company, has resigned as an official of that company, but will continue to serve as a trustee.

Mr. Oliver H. Hughes has resigned as a member of the Public Utilities Commission of Ohio. Mr. Hughes has been a member of the Utilities Commission, or the Railroad Commission, its predecessor, for ten years. He was appointed on the Railroad Commission by Governor Harris in 1905, after he had served about six months as adjutant general as an appointee of Governor Pattison.

Mr. G. B. Powell, superintendent of the employment department of the Louisville (Ky.) Railway, who attended the Panama-Pacific Exposition at San Francisco and visited other cities of the West, is relating his experiences in a continued story in *Trolley Topics*, which is published by the company. Of special interest is his reference frequently to electric railway conditions in the cities he visited and his presentation of the handicaps under which trainmen in these cities work.

Mr. A. W. Brohman has been appointed division superintendent to handle both the Kentucky and the Twenty-fourth and Utah divisions of the United Railroads, San Francisco, Cal., succeeding the late A. J. Reglin on the Twenty-fourth and Utah Division. Mr. Brohman entered street railway work in 1891. His first service was with the North Jersey Street Railway, now included in the system of the Public Service Railway, Newark, N. J., but his main activity has been in San Francisco, where he has risen from the platform to the position that he now holds.

Mr. Thomas Allen Wright, who was elected president of the Pennsylvania Street Railway Association at the recent meeting in Scranton, has been general manager of the Wilkes-Barre & Wyoming Valley Traction Company since 1899 and of the Wilkes-Barre Railway since its lease of the former. Mr. Wright was born in 1863 in Quakertown, Pa., of Quaker parentage. His mother died when Mr. Wright was three years of age. In 1869 he went to Wilkes-Barre with his father. Later he returned to Quakertown and lived on a farm. In 1880 he entered Wyoming Seminary and Business College to study engineering. After he completed his schooling Mr. Wright turned his attention to railroad work and assisted in the survey of the Harvey's Lake Branch Railway at Wilkes-Barre. In 1892 he entered upon the survey of the present street railway system of Wilkes-Barre. In 1897 he was made manager of the maintenance of way department, and two years later was appointed general manager of the entire street railway system at Wilkes-Barre, consisting of nearly 100 miles of track, all of which was surveyed, constructed and brought to its present high standard of excellence under his immediate direction. When local interests in Wilkes-Barre took over the Wilkes-Barre & Wyoming Valley Traction Company in 1910 under the name of the Wilkes-Barre Railway, Mr. Wright was elected vice-president in addition to general manager. In all he has been identified with the upbuilding and development of the Wyoming Valley for more than thirty years.

T. A. WRIGHT

Mr. O. H. Simonds, the new president of the Mississippi Electric Association, is the manager of the Vicksburg Light & Traction Company. Mr. Simonds was graduated from Cornell University in 1908, and was connected with the Duluth office of the General Electric Company on construction work, and later with the Great Northern Power Company, Duluth. He then went to the Chicago office of the General Electric Company and made a special study of central station design and operation, and later entered the engineering department of Elston, Clifford & Company, Chicago. In April of this year he was appointed general manager of the Vicksburg Light & Traction Company. While in Vicksburg he has devoted considerable interest to work along local civic lines, and last summer he was elected president of the Young Men's Business Clb of Vicksburg.

OBITUARY

Jacob Mandelbaum, of the firm of Mandelbaum, Wolf & Lang, Cleveland, Ohio, died in Cleveland on Dec. 16. Through this firm Mr. Mandelbaum was interested in the Western Ohio Railway and a number of other electric railways. He was well known in Cleveland for his philanthropic work. Mr. Mandelbaum was born in Bavaria more than eighty years ago. He had been a resident of Cleveland more than sixty-two years. His family consists of one son, M. J. Mandelbaum, and two daughters.

William C. Andrews, advertising manager of the Edison Storage Battery Company, Orange, N. J., died suddenly in New York on Dec. 21 from an overdose of strychnine taken by mistake. Mr. Andrews was forty-two years old. He was graduated from Columbia University and was an instructor there for a time. He was subsequently connected with the editorial staff of the ELECTRIC RAILWAY JOURNAL and later was with the Stanley Electrical Instrument Company, first at Schenectady, N. Y., and then at Harrison, N. J. He is survived by his widow and two children.

Charles D. McKelvey, chief inspector of the railroad division of the Board of Public Utilities Commissioners of New Jersey and for many years superintendent of the New York, Susquehanna & Western Railroad, is dead. Mr. McKelvey was born in Orange County, N. Y., seventy years ago. He entered railroad service as a brakeman. After his retirement from the New York, Susquehanna & Western Railroad he became a member of the finance committee of Paterson, N. J., and still later a member of the Board of Public Works for that city. In 1910 he became connected with the Public Utilities Commission.

Robert Coddington Brewster, connected for many years with the street railways of Philadelphia, Pa., died on Nov. 13, 1915, in his eighty-first year. Mr. Brewster was born in Rahway, N. J., and was prominent in banking and other business circles there for many years. In 1885 he became connected with the banking firm of L. H. Taylor & Company, Philadelphia, Pa., and soon after that was made secretary and treasurer of the Frankford & Southwark Passenger Railway, known as the Fifth and Sixth Streets line. As the Fifth and Sixth Streets line and the other lines with which he was associated were absorbed by the Philadelphia Electric Traction Company, the Union Traction Company and the Philadelphia Rapid Transit Company, Mr. Brewster's services and intimate knowledge of the early history of railroading in Philadelphia continued to be in demand until his voluntary withdrawal from the companies three years ago on account of advancing age.

Calvin G. Goodrich, president of the Twin City Rapid Transit Company, Minneapolis, Minn., and the Duluth-Superior Traction Company and the Duluth (Minn.) Street Railway, died on Dec. 21. He had been connected with the Minneapolis system for thirty-eight years. Mr. Goodrich was born in Oxford, Ohio, on March 12, 1856. When twenty-one years of age, on the invitation of the late Thomas Lowry, long president of the Twin City Rapid Transit Company, Mr. Goodrich entered the service of the Minneapolis Street Railway as auditor, and for a long time he was the only man in the accounting offices. On July 2, 1878, he was elected secretary of the company, and on July 10, 1880, a director. On Aug. 14, 1883, Mr. Goodrich was appointed superintendent of the company, and shortly afterward, general manager. On June 12, 1886, he was elected vice-president and general manager of the company, resigning the office of secretary. Later, with Mr. Lowry and Mr. Clinton Morrison, he secured control of the St. Paul City Railway, and assumed the management of the property. When the Minneapolis and the St. Paul systems were merged as the Twin City Rapid Transit Company, on June 5, 1891, Mr. Goodrich retained the title of vice-president and general manager of the consolidated company. Later he was elected vice-president and managing director of the company. In March, 1909, after the death of Mr. Lowry he was elected president of the company to succeed Mr. Lowry. Mr. Goodrich was elected president of the American Street & Interurban Railway Association, now the American Electric Railway Association, in 1908, and previously had served as first and second vice-president.

John Graham, formerly connected with the electric railways in Wilkes-Barre, Pa., Bloomington, Ill., and Huntington, W. Va., died at the Johns Hopkins Hospital in Baltimore, Md., on Dec. 15. Mr. Graham was born near Newville, Pa., on Aug. 4, 1843. He was educated in the country schools and at the Eastman Business College at Poughkeepsie, N. Y. He served as a bookkeeper in the First National Bank, Newville, from 1870 to 1876, when he resigned to engage in the tanning business in Newville. In 1882 he was elected to the Pennsylvania Legislature by the Democrats and was re-elected in 1884. Later he became interested in the street railways at Bloomington, Ill. In the fall of 1890 Mr. Graham organized a syndicate which consolidated the electric railways in Wilkes-Barre as the Wilkes-Barre & Wyoming Valley Traction Company. He was manager of this company until the sale of the property in 1899 to the United Power & Transportation Company. He again became interested in the properties at Bloomington, but disposed of his interests there in 1902 and secured control of the Camden Interstate Railway at Huntington, W. Va. He disposed of this road to the Ohio Valley Electric Railway in 1906. In 1908 and 1909 Mr. Graham assisted in organizing the Cumberland Railway, Carlisle, Pa. He was the first president of this company and at the time of his death was a director of the company.

W. W. Cole, of Cole, Ives & Davison, New York, died suddenly on Dec. 20 at Poughkeepsie, N. Y., after conferring with Mr. H. M. Beugler, operating manager of the Central Hudson Gas & Electric Company. Mr. Cole was widely known in electric railway and electric lighting circles as an engineer and operator. He was born in Medford, Mass., and was graduated from the Worcester Polytechnic Institute in 1887. He began his career as construction engineer for George H. Norman, Boston, and the New England Construction Company. Subsequently Mr. Cole became connected with the Toledo, St. Louis & Kansas City Railroad as construction engineer. Mr. Cole next entered the expert course of the Thomson-Houston Company at Lynn, Mass., and was superintendent of electrical installation of the Allston division of the West End Street Railway, Boston, Mass. After completing this work Mr. Cole became manager of the Utica (N. Y.) Belt Line. From Utica he went to Elmira in 1893 and constructed the West Side Railroad there. He was personally interested in the consolidation of all the utilities in Elmira and became vice-president and general manager of the Elmira Water, Light & Railroad Company. On account of the increase in his consulting practice Mr. Cole resigned from the company at Elmira in 1908 to become general manager of the public utilities department of Dodge & Day, Philadelphia. For a long while Mr. Cole was located at Oil City, Pa., for Dodge & Day, with the Oil City Traction Company. In March, 1914, he resigned from Dodge & Day to open an office for himself in New York as an independent consulting engineer. In February of this year the firm of Cole, Ives & Davidson was formed to give special attention to public utility problems of all kinds. Mr. Cole was the first president of the Empire State Gas & Electric Association, being elected in 1905. He was also second vice-president of the New York Street Railway Association in 1894 and was first vice-president of the association in 1895 and 1896. He was treasurer of the association for three years from 1903 and was secretary and treasurer of the association for two years from 1903. Mr. Cole was forty-eight years old. He is survived by his widow and two sons.

Construction News

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

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

FRANCHISES

Mattoon, Ill.—The Decatur, Sullivan & Mattoon Traction Company has asked the Council for a new franchise to extend from Dec. 3, 1915, to Dec. 3, 1920, the old one having expired. This is a proposed line to connect Sullivan, Decatur and Mattoon. The project has been suspended until the close of the European war. [Nov. 28, '14.]

Peoria, Ill.—The Peoria & Chillicothe Electric Railway has asked the Council for a franchise in Peoria.

Chicopee Falls, Mass.—The Springfield Street Railway has received a franchise from the Council to construct tracks on Church Street and Broadway.

Tonawanda, N. Y.—The Council of Tonawanda has granted the Frontier Electric Railway a number of amendments to its franchise. Under the changes the company will not have to pay 2½ per cent on the revenue derived from switching charges in Tonawanda, nor will it have to maintain more than one station should it have a passenger service through Tonawanda. The Aldermen granted the company an extension of time in which to begin the construction of the new road to Dec. 31, 1916, and for the completion of the line until Dec. 31, 1919.

Cincinnati, Ohio.—The Cincinnati, Newport & Covington Street Railway will again ask the Council for a franchise for its loop in Cincinnati some time next spring, according to an announcement recently made. It has been operating for some time without a franchise.

Pittsburgh, Pa.—Twenty-one ordinances granting new franchises to the Pittsburgh Railways and looking to the establishment of a system of transfers from all lines to a loop between North Avenue and the Court House have been introduced in City Council.

Dallas, Tex.—The Dallas Standard Traction Company has asked the Council for a franchise to construct a line through Mount Auburn to Parkview Place, both additions recently opened to Dallas.

San Angelo, Tex.—The City Commissioners of San Angelo have declared the franchise of the San Angelo Power & Street Railway void because of the company's failure to construct extensions as called for.

TRACK AND ROADWAY

Edmonton (Alta.) Power Company, Ltd.—This company is planning to build a solid concrete dam, 1500 ft. long and 100 ft. high, on the Saskatchewan River, above Rocky Rapids, making an artificial lake about 60 square miles in area. This development will cost approximately $6,000,000, not including an electric railway, which, as a separate scheme, will be built from Edmonton to the proposed power site.

Municipal Railways of San Francisco, San Francisco, Cal.—The contract for the construction of a section of the Church Street municipal railway between Eighteenth and Twenty-second Streets has been awarded by the Board of Public Works to the Contra Costa Construction Company for $120,500. Bids are being received for the construction of two more units of the Church Street line, one extending from Sixteenth to Eighteenth Street and one from Twenty-second to Thirtieth Street.

Connecticut Company, New Haven, Conn.—Plans are being made by the North End Improvement Association of Waterbury to petition the Connecticut Company to extend its line to Pearsallville.

Wilmington & Philadelphia Traction Company, Wilmington, Del.—Many changes in the track of the Wilmington & Philadelphia Traction Company in various parts of Wilmington are now being made by the company, either to connect the tracks of the old Peoples Railway with the Wilmington & Philadelphia Traction Company system or to provide a means of maintaining the schedule in a more effective manner.

Clearwater, Fla.—Surveys have been made for an electric railway from Tampa to Clearwater on the west coast, about 30 miles. A bridge consisting of 160-ft. steel draw span and about 2 miles of wood approaches will be built in connection with the line. E. W. Parker, Curry Building, Clearwater, is interested. [July 31, '15.]

Fairburn & Atlanta Railway & Electric Company, Fairburn, Ga.—At a recent meeting of the stockholders of this company it was decided that electric cars be substituted for the present motor cars, the change to be made at the earliest possible moment.

Hawkinsville & Florida Southern Railway, Macon, Ga.—Operation has been begun with a gasoline-electric car on this company's line between Hawkinsville and Camilla. The steam train will continue for the present without change.

Illinois Traction System, Peoria, Ill.—This company has recently placed in service four small cabin type mechanical interlocking plants on the division between Springfield, Ill., and St. Louis, Mo. These plants vary in size from eight to twelve levers and are for the control of traffic at crossings of the main line of the Illinois Traction System, with switch tracks leading from the Wabash and Chicago & Northwestern Railroads to coal mines. The contract for the material and installation was let to the Union Switch & Signal Company.

Springfield (Ill.) Consolidated Railway.—It is reported that this company is considering the extension of its line east to Bergen Park.

Kankakee & Urbana Traction Company, Urbana, Ill.—The contract for the construction of a 90-ft. span north of Ludlow on this company's line has been awarded to the Central State Bridge Company of Indianapolis.

Des Moines (Iowa) City Railway.—In connection with the rehabilitation of its city lines, this company has announced that it will construct an 11-mile extension of its Colfax line to Newton. New interurban lines are also planned to Indianola, Winterest, Red Oak and eventually to Omaha through a territory not now served by any railroad.

Cumberland & Manchester Railroad, Barbourville, Ky.—It is reported that A. B. Furnish, Mount Vernon, has received a contract to complete the grading on a section of this company's line which is being built between Barbourville and Manchester. The Read Construction Company, Philadelphia and Hazelton, has the general contract. [Dec. 11, '15.]

Rockland, South Thomaston & St. George Railway, St. George, Me.—This company states that it will build 1 mile of new track during 1916.

Springfield (Mass.) Street Railway.—Operation has been begun by this company on its new East Street line into Chicopee Falls.

Albion-Charlotte Northern Railway, Lansing, Mich.—Construction will be begun in the spring on this company's line from Albion to Lansing. The company will use a roadbed made twenty years ago for a railroad between Albion and Charlotte. The proposed route will pass through some of the richest farming country in Michigan, most of which is not served by any railway. Among the places through which it will pass are Brookfield, Charlotte, Potterville and Grand Ledge. It will also be tributary to the region around Duck Lake, a summer resort 10 miles north of Albion. Arthur B. Wood, Coruna, president. [Dec. 12, '14.]

Duluth (Minn.) Street Railway.—This company reports that during 1916 it expects to build 4 miles of new track.

Meridian Light & Railway Company, Meridian, Miss.—This company expects to build about 1¾ miles of new track during 1916.

Kansas City & Tiffany Springs Railway, Kansas City, Mo.—A report from this company, which was incorporated in November, states that surveys are being made and rights-of-way being secured for its proposed line between Kansas City and Tiffany Springs. Construction will be begun early in the spring of 1916 and it is expected that about 2½ miles will be in operation by summer. An amusement park will be established by the company at Tiffany Springs. The company may build a power plant at Tiffany Springs later, and the repair shops will be located at North Kansas City,

Mo. Willard E. Winner, Kansas City, will receive the contract for constructing the line. The officers are as follows: H. G. Pert, president; J. N. Baird, secretary; Charles J. Smith, treasurer, and W. M. Spratt, chief engineer. The offices of the company are located at 310 Dwight Building, Kansas City, Mo. [Nov. 13, '15.]

Municipal Railway, Brooklyn, N. Y.—Information has been received by the Queens Chamber of Commerce from the Public Service Commission for the First District of New York that the engineering plans for the construction of the subway under the East River at Sixtieth Street are practically completed, and it is expected that the advertising for bids will be started shortly after Jan. 1.

Buffalo & Depew Railway, Buffalo, N. Y.—This company reports that during 1916 it expects to build 2 miles or 2½ miles of new line.

International Railway, Buffalo, N. Y.—New double tracks have been laid on Bailey Avenue between Winspear and Kensington Avenues, Buffalo, by this company, and the Kensington car line is now routed through this street. A one-car stub line was formerly operated in this section to handle the traffic during the morning and late afternoon. A new steel bridge has been placed over Ellicott Creek in Tonawanda, by the company, replacing the wooden structure that has been used for years. During the few days the bridge was being moved into place, passengers on the Buffalo & Niagara Falls and Buffalo, Tonawanda and Gratwick interurban lines were transferred from car to car over the waterway by automobiles over the regular vehicle bridge. The bridge connects Tonawanda and North Tonawanda.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has approved this company's plans for the construction of an extension of its Third Avenue elevated line from near its terminus to Gun Hill Road. The extension will leave the existing line a little south of its present terminus at Bronx Park, and will turn up Webster Avenue to Gun Hill Road, about 1½ miles south of Yonkers, where it will effect a junction with the new White Plains Road elevated line which extends almost to Mount Vernon. It is expected that the line will be in operation by the end of 1917.

Goldsboro (N. C.) Street Railway.—This company expects to build 1 mile of new track during 1916.

***Kansas-Oklahoma Electric Company, Caney, Okla.**—Plans are being considered by this company to build a line between Caney and Dewey, where connection would be made with the Bartlesville Interurban Railway. Col. S. M. Porter, Caney, is interested.

Sarnia (Ont.) Street Railway.—This company expects to build ½ mile of new line during 1916.

Northampton Traction Company, Easton, Pa.—This company, which has been merged with the Bangor & Portland Traction Company, as noted elsewhere in this issue, plans to construct a new line from Wind Gap to the Delaware Water Gap. The new line will connect at Stroudsburg with the Stroudsburg Passenger Railway, which it is said will be absorbed, and will be built through Kellersville to Saylor's Lake, thence to Saylorsburg and Wind Gap. Saylor's Lake will be purchased and turned into a summer resort. It is expected that construction of the line will be begun by June 1.

Philadelphia, Pa.—The contract for the structural steel to be used in the extension of the elevated railway on Frankford Avenue between Unity and Dyre Streets, will be awarded to the American Bridge Company, the lowest bidder, for $249,000.

West Penn Traction Company, Pittsburgh, Pa.—Surveys are being made by this company for the extension of its lines in the Butler district. It is expected that the lines will be extended to the McFetridge coal mines, 7 miles north of Butler.

Scranton & Binghamton Railroad, Scranton, Pa.—This company reports that its 10-mile extension to Montrose will be completed and placed in operation about July 1, 1916. During the next year the company expects to build about 20 miles of track between Heart Lake, New Milford and Hallstead.

Montreal (Que.) Tramways.—This company will begin work at once on the construction of an extension of its line on Park Avenue from Van Horne Avenue to Atlantic Avenue.

Three Rivers (Que.) Traction Company.—Operation has been begun by the Three Rivers Traction Company, a subsidiary of the Shawinigan Water & Power Company, on its new 3-mile line in Three Rivers. Plans are being made to construct a 5-mile extension to Cap de la Madeleine in the spring. Thomas McDougall, president. [Oct. 9, '15.]

Dallas (Tex.) Consolidated Electric Street Railway.—Paving and reconstruction of tracks and roadbed on Commerce Street from Houston & Texas Railroad to Exposition Avenue, will be begun by Jan. 1, involving an outlay of $70,000.

Northern Texas Traction Company, Fort Worth, Tex.—In accordance with requirements made by the city of Polytechnic, the Northern Texas Traction Company is moving its tracks on Nashville Street from Vickery Boulevard to Avenue E and on Avenue E to Annis Street from the side to the middle of the street. Much double track also will be installed on Nashville Street. The line already has been double-tracked on Vickery Boulevard.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—A report from this company states that during 1916 it expects to build 10 miles of line between Provo, Springville and Spanish Fork.

***Leavenworth, Wash.**—It is reported that preliminary surveys have been made and a part of the right-of-way secured for a railway from Leavenworth to Icicle, 25 miles. A. Van Eppes, Leavenworth, is interested.

Grafton Light & Power Company, Grafton, W. Va.—This company reports that during 1916 it will construct 1 mile of new line.

Charleston-Dunbar Traction Company, Charleston, W. Va.—During 1916 this company expects to build 20 miles of new line.

Morgantown & Wheeling Railway, Morgantown, W. Va.—This company reports that it expects to build 7.45 miles of new interurban line from Price to Blacksville during 1916.

Green Bay & Eastern Railway, Manitowoc, Wis.—This company reports that the engineering work for the construction of its line from Green Bay to Sheboygan via Manitowoc is now being arranged and it is expected that work will be begun early in the spring. The following officers have been elected: William M. Willinger, Manitowoc, president; George Frosch, Wayside, vice-president; Rude Stockinger, Manitowoc, secretary, and Charles Frazier, Manitowoc, treasurer. [Dec. 11, '15.]

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—This company's station on Santa Monica Boulevard, near Sixth Street, Sawtelle, is being moved to make way for the new McClellan brick business block upon which construction has begun. The old station will occupy a site at the northwest corner of the grounds. The railway offices will have space in a building just east of the postoffice until the new business block is completed, when new quarters will be found for it in the McClellan structure.

Boston, Mass.—The contract for laying 1760 sq. yd. of terrazzo finish on walls of South Station of the Dorchester Tunnel has been awarded by the Boston Transit Commission to Galassi Mosaic & Tile Company, Boston, at $8,160.

Metropolitan Street Railway, Kansas City, Mo.—Bids will be received by this company until Jan. 1 for the construction of a shelter station at Twenty-third and Main Streets. The structure will be 12 ft. x 44 ft., of Bedford limestone and tile roof.

Lincoln (Neb.) Traction Company.—The contract for the construction of this company's ten-story terminal building at Lincoln has been awarded to the Selden Breck Construction Company, St. Louis, at $500,000.

Brantford & Hamilton Electric Railway, Hamilton, Ont.—Arrangements are practically completed for the erection of a union radial station in Brantford, to be used jointly by the Brantford & Hamilton Electric Railway and the Lake Erie & Northern Railway. It will be a brick structure, costing approximately $30,000.

Manufactures and Supplies

ROLLING STOCK

Central Railroad of Oregon, Union, Ore., expects to purchase during 1916 one closed motor car.

Chattanooga (Tenn.) Traction Company expects to purchase during 1916 two double end combination express and passenger cars, also one work car.

London & Port Stanley Railway, London, Ont., expects to purchase during 1916 three trail cars and one motor car, equipped with four 125-hp., 1500-volt motors, for its new electrified line.

Des Moines (Iowa) City Railway, which was mentioned last week as being in the market for forty cars, has not yet placed its order for these cars, but will probably do so in the near future.

Pittsburgh (Pa.) Railways, noted in the Electric Railway Journal of Nov. 21 as having ordered seventy-five steel city cars from the Cincinnati Car Company, has increased this order to 100 cars.

Inter-Urban Railway, Des Moines, Iowa, has purchased a 60-ton electric locomotive, the mechanical equipment and construction of which will be done by the McGuire-Cummings Manufacturing Company. The electrical equipment, which includes 165-hp., 600-1200-volt motors and control, will be furnished by the Westinghouse Electric & Manufacturing Company.

Louisville (Ky.) Railway is rebuilding one of its old open cars in its shops into a closed car, with exit door at the front and entrance and exit doors at the rear, the bulkheads at the ends being removed altogether. There will be no platforms front or back and the conductor will stand in the car at the rear and the motorman in a railed-off portion at the front. It is stated that if the experiment proves a success, probably the remainder of these old cars will be similarly remodeled.

TRADE NOTES

Hensley Trolley & Manufacturing Company, Detroit, Mich., has recently doubled the capacity of its factory and office accommodations. This company reports that several large companies have recently adopted as standard the Hensley hollow-hub type of wheel.

Root Spring Scraper Company, Kalamazoo, Mich., has just finished delivering to the Michigan Railways its No. 3 air-operated snow scraper equipment for eighteen large high-speed cars. These are being mounted directly on the trucks. When this installation is completed every car on the Michigan United Railway and the Michigan Railway will be equipped with Root snow scrapers.

Barney & Smith Car Company, Dayton, Ohio, on December 15 lifted its receivership. Through the issuance of debenture notes to the amount of $600,000 the company was able to straighten out its affairs in a manner satisfactory to the court. In his application for discharge Receiver H. M. Estabrook stated that 67½ per cent of the claims of unsecured creditors had been paid. It is stated that there are sufficient orders on hand and work under way to meet all debts and obligations. The organization will remain as it was before the receiver took charge in June, 1913. The plan of reorganization announced some months ago has been abandoned.

St. Louis Railway Supply Company, St. Louis, Mo., will be reorganized at once into a new company under Joseph C. Reed as president. Mr. Reed was formerly a director of the Shapleigh Hardware Company. W. D. Achuff, vice-president, and Ephron Catlin, Jr., secretary and treasurer of the Southern Company, will have similar positions with the new company. The new company, the name of which has not yet been determined, in addition to carrying in stock a full line of miscellaneous supplies for railroads, mines, mills and industrial corporations, will specialize and represent exclusively in the Southwestern territory such well-known firms as the Buda Company, the E. F. Houghton Company, and the Verona Tool Works. It also has the exclusive sales agency in the United States for the Saunders corrugated car stopper.

ADVERTISING LITERATURE

Salomon Brothers & Hutzler, New York, N. Y., have issued a 64-page pamphlet showing a number of short term securities, of various classes, arranged according to maturities and indexed alphabetically. A detailed description is published for each issue.

Lisbon Falls Manufacturing Company, Boston, Mass., has issued a folder illustrating the "Economy" snow remover, a horse-driven device said to be used by some of the largest street railways in the New England States, for removing snow from city or town streets.

George H. Davis of Ford, Bacon & Davis, engineers, New York, N. Y., has issued a reprint of an address entitled "Economic Advantages Resulting from Port Development," delivered before the League of American Municipalities on Sept. 28, 1915, and an address entitled "Business Opportunities of Louisiana and Adjacent States" delivered before the College of Commerce and Business Administration of the Tulane University of Louisiana on Oct. 29, 1915.

Ohmer Fare Register Company, Dayton, Ohio, has issued a bulletin entitled "An Element of Success," describing its fare register system, which quotes statements of commendation from the Inter-Urban Railway, Des Moines, Iowa, and the Southern Public Utilities Company, Charlotte, N. C., in regard to its system. The bulletin also reproduces some figures taken from the merit record grades of conductors on the Denver Tramways and the Chicago & West Towns Railway, illustrating the consistent improvement in efficiency shown.

NEW PUBLICATIONS

Thirty-Third Annual Report of the New York Electric Railway Association.—Published by the Association from the Office of the Secretary, Schenectady, N. Y.; 246 pages.

The thirty-third annual report of the New York Electric Railway Association, or that for the fiscal year ending June 30, 1915, is issued in the same attractive form and regard for typographical appearance which have characterized previous reports of the association during recent years. The association meets twice during the year, one its annual convention, which was held this year at Manhattan Beach, on June 29-30, and the "quarterly" meeting which was held this year at Lake George on March 3. The reports of both meetings are published, and both will warrant reading, even by those who were in attendance at the convention, because the questions considered were all live topics of the day, and the New York association has the ability to attract to its meetings men who have something worth while to say.

Railway Maintenance Engineering. By William H. Sellew, A.S.M.E. D. Van Nostrand Company, New York. 360 pages. $2.50.

This book presents the subject from the viewpoint of the student, but is of a sufficiently advanced character to be of reference value to steam and, to some extent, to electric interurban railway engineers. The contents were prepared from notes used by the author in his classroom lectures at the University of Michigan. Information concerning major bridges, yards and terminals is not included because the author believed these subjects were so important as to require special treatment. As indicated by the title, the subject matter is treated largely from a maintenance standpoint with a view to studying improvement of existing lines of railways. The scope of the work is shown by the following chapter headings: Engineering; land; grading; bridges, trestles and culverts; ties; rails; other track material; ballast; maintaining track and right-of-way; station and roadway buildings; water stations; fuel stations; shops and engine houses; icing stations; signals and interlockers. Each chapter is followed by a bibliography of the author's references.

The traffic department records of the Puget Sound Traction, Light & Power Company, Seattle, Wash., show that at the present time there are 130 traimen on the payrolls of the company who have been in this company's service for ten years or longer. This is exclusive of the employees in other lines of work who have been ten years or more with the company.