

Electric Railway Journal

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The Policemen's Strike in Boston

THE action of the Governor of Massachusetts in the policemen's strike in Boston was the only one possible. The people of this country are not willing to intrust the security of their lives and property to the custody of any body of men who conspire to build up an *imperium in imperio* to which they propose to transfer their allegiance. The love in America for individual liberty is so great that the people in the past have many times been lenient with the transgressions of organized labor against order. But to give up all control of its law enforcing organization to an outside body, as was proposed in Boston, would be practically to give up the fundamental principle on which our government is based, or government by the people, in favor of irresponsible autocracy. We hope to see the time when a strike on a public utility will be as rare in this country as that of policemen now promises to be.

Look Into the Bus!

TO THE MAN brought up on the rail, a dispassionate view of the merits and demerits of the motor bus is rather difficult. Possibly a prime reason for this is that his first acquaintance with the bus was as an unfair competitor. Thus he came to despise the bus quite as much as he did the pirate who ran it.

It is high time, however, that railway operators should look at the bus in a purely business way, especially as regards the development of new traffic in suburban districts, where there is now no trolley line. In the old days, when an extension was under consideration, whether for an additional fare or for the same fare, there was no way to give the service except to put down rails. Conditions are different today because both better suburban pavements and self-propelled vehicles are available. A company need not now undertake a large initial investment which may or may not prove successful to test out the traffic. It is necessary only to buy as few buses as the business there warrants. Should the dreams of the realty operators fail to come true, the railway will not be out even the price of the buses, since the latter can be sold or transferred to other service. On the other hand, if the business does grow, then a 100 per cent railway extension is in order unless the people served are willing to continue paying the higher rate that bus operation calls for.

In considering the possibility of the bus as an auxiliary to electric railway service, the operator would do well to study the inter-operation of street railway and bus services in Great Britain. On more than one property in that country, the bus and the car cover precisely the same route up to a given point, and beyond that point only bus service is available. As the bus is ob-

viously intended for the extreme suburbanite, the short rider who ought to take the car is kept off of the bus by the application of an extra high short-distance fare! The electric railway man will be glad to hear that the most experienced operators of these joint services are well aware of the greater economy of the street railway, but they are equally aware of the greater flexibility of the bus which permits it to serve the fluctuating needs of the public in a way impossible to rail traction. Instead of considering these two popular-priced means of transportation as opponents, the British operators largely believe that they are complementary. Hence we see that in the electrification of the Edinburgh Municipal Tramways, for example, provision is also made for certain bus routes.

In America, a number of electric railways are operating buses through separate companies. The San Francisco Municipal Railway prefers small bus losses to large railway losses, and the Seattle system is planning to follow the same policy of developing new territory at minimum cost. As for entirely independent bus companies, the large properties of New York and Chicago and the proposed service in Detroit give ample warning that electric railways must seriously consider the logic of putting all popular-price transportation under one co-ordinating management to avoid wasteful competition which, in the end, must be paid for by the investor and the rider.

Keep the Supply Men in Mind in Dating Conventions

DISCUSSING the matter of convention dates with an experienced supply man, at the last convention of the American Railroad Association, mechanical section, the writer had impressed upon him the fact that the convenience of manufacturer representatives has not been considered as fully as it might be in selecting dates for conventions. This applies particularly to the sectional associations, although the same principle applies to the gathering of national bodies. The point is this: At present-day conventions the supply men are not only in considerable evidence but sometimes they form the majority of attendants. These men frequently are obliged to attend a great many conventions, traveling from section to section. Hence, when convention dates coincide, overlap or come in too close juxtaposition, the supply men are hard put to it to get around. The railway men have the advantage in that each does not attend the meetings of more than one or two associations, as a rule, whereas the supply man attends a very great number in the course of a year.

The manufacturers are receiving increasing recognition in all of the electric railway associations. It is in line with this tendency that they should be remembered when the convention dates are selected.

Get Better Acquainted With the Engineering Manual

THE past two or three years seem almost like a blank when considered from a standpoint of engineering progress. These years are now past, however, and the men who are responsible for the maintenance and development of the physical part of the electric railway plant must prepare themselves for strenuous days to come. One of the best ways of doing this is to study the past work of the American Electric Railway Engineering Association, particularly as epitomized in the Engineering Manual.

Realizing how difficult it is for a man who has not been in close touch with the Engineering Association work as it has progressed step by step fully to appreciate what has been done and what is the present status of the work, the ELECTRIC RAILWAY JOURNAL has arranged to have prepared a number of digests of the situation with respect to several salient aspects, basing these upon the Manual, the Proceedings of the Association and personal knowledge of the subject. Several of these digests are contained in the present issue and others will follow. There is time to study these abstracts carefully before the convention, and such study will furnish an excellent preparation for taking part in the discussions at Atlantic City; but even if the reader does not hope to get to the convention he should familiarize himself with the abstracts just the same so that he can follow the reports of the meeting intelligently.

As has been mentioned before, the standards committee is setting out on a campaign to popularize the association's standards, recommended practices and miscellaneous methods and practices. The publication of these abstracts by the JOURNAL should contribute to this end.

Maintaining Equipment On Small Roads

MOST of the information which we receive for publication regarding the maintenance of car equipment and shop practices comes from the larger railway properties. Much of it, however, has to do with methods and practices which can readily be adapted to any system, and it is published with the idea that it may suggest some beneficial procedure for railway properties that do not have the facilities for carrying out the suggestions in their entirety.

The problem confronting many small roads is not how to carry on the maintenance work on their equipment in the best manner, but rather how to keep the equipment in proper repair with the facilities which are available. It is comparatively easy to carry on work efficiently where the latest tools and equipment are provided, but the master mechanics of small railways are governed more by what they are able to do than by what they would like to do. The cost of any operation depends to a large extent on the frequency with which the operation is performed. In many cases where special equipment would enable the men to perform the operation more quickly or efficiently, if the use of these machines would be confined to but a few hours a month, the cost would not be warranted.

The removal of armatures from box-frame motors will serve as an example. A special machine will remove the armatures from these motors so that the

frames can be shifted clear of the armatures in a very few minutes and can readily be lifted out of place by a crane. But, consider a road having but twelve box-frame motors which would require such a special machine for removing the armatures. If these were overhauled once every year, this would mean that the armature-removing machine would be in use on an average of but once every month, and for such infrequent use the extra investment would not be warranted.

On the other hand, it is false economy for small roads not to use machine tools and other labor-saving devices, when these can really be employed to advantage, simply because it is difficult to find the money with which to buy them. What is wanted is "long-run" economy, and many a device will "buy itself" in the course of a few months or years if only given a chance.

In deciding on the most economical methods for maintaining the equipment of small properties, master mechanics find the "load factor" in the use of shop equipment an important consideration. A knowledge of the latest and most approved methods of carrying on the work on other systems will aid in the choice of the method best adapted to the local conditions, although direct imitation of the practice of others may not be desirable or practicable.

Two Important Meetings at Atlantic City

AMONG the many important papers and sessions scheduled for the coming Atlantic City convention, two that look toward an extension of the association should not be overlooked. These are the special meetings called for the assemblage of the publicity agents on the one hand and purchasing agents and storekeepers on the other. We are very glad to see this step taken. As far back as before the war an effort was considered by each of these two groups to form an organization, and some informal meetings have been held by the publicity agents, but the cessation of convention activities generally during the war made any more definite action in either case impracticable.

Now the special reasons which make such meetings especially desirable at this time are set forth in letters published elsewhere in this issue by Leake Carraway of Norfolk, Va., and E. E. Stigall of Kansas City, the chairmen appointed by President Pardee respectively for the publicity agents and for the purchasing agents and storekeepers to draft programs for the meetings at Atlantic City.

To these statements but little can be added. It might be said, however, that in the case of each group the conditions at the present time are such that greater good can be accomplished for the industry than ever before. So far as the publicity agents are concerned, it is recognized that the fare question is largely a question of public education, and with the wealth of material on electric railway conditions produced at the federal hearings at Washington, the publicity agent is of more importance to a company than ever before. In the same way, at no recent period, if at all, in the history of this country have manufacturing conditions and prices undergone so many changes. All this means that both the purchasing agent and the storekeeper must be more than ever in touch with both the market situation and railway operation, so as to obtain, on the one hand, the

lowest prices possible, consistent with quality, and on the other hand, to avoid carrying in stock apparatus which will become obsolete.

The form of permanent organization to be adopted at Atlantic City by both of these groups is yet to be determined, but after all is secondary to a definite plan by which the officials can get together each year. We hope for a large attendance of both classes of officials at the convention.

Should We Lessen First Cost and Increase Maintenance Cost of Track?

THERE has been a disposition in some quarters to reach what we consider an incorrect conception of J. B. Tinnon's suggestion, made at the recent meeting of the Illinois Electric Railways Association, to the effect that a cheaper form of track construction might be adopted at a saving of say \$5,000 per mile provided that the \$5,000 were set aside for expenditure in maintenance of the track in addition to the annual sums now allotted for maintenance.

In the first place Mr. Tinnon voices a very well known fact when he implies that an insufficient amount of money is now expended for maintenance. Electric railways have always accumulated more "deferred maintenance" than a proper maintenance standard would warrant.

This in turn has been due primarily to the fact that their incomes were never adequate to permit a maintenance standard of say 75 or 80 per cent new. In the second place, paved track maintenance is more costly than open track maintenance and about 60 per cent of our mileage is in paved streets. In the third place extraordinary maintenance or renewals charges have often been forced upon the companies by city paving projects which have tended to require an abandonment of track good for 2 or 3 or even 5 years before its time, because it would be unwise newly to pave a track with a 10 or 15 year pavement when the track would wear out long before the pavement. Extraordinary maintenance charges of this kind are very apt to force deferment of other badly needed expenditures.

We heartily agree with Mr. Tinnon's statement that the war has taught track engineers to conserve and that the maintenance engineers have done wonders in rehabilitating track which has often seemed fit only for the junk pile. But the fact that we have learned how to economize should not be an argument in favor of building something comparatively cheap with a view to spending the first saving in later efforts at patching it up. One may purchase a cheap suit of clothes and patch the holes from time to time, but the patches do not look neat and eventually more money will have been spent in patch costs than a first-class, durable suit would have cost.

We do not believe Mr. Tinnon meant that we should do this, because he is right when he says that expen-

sive types of construction have often been chosen by the blind method of following the leader without any consideration as to whether the expenditure could be afforded or whether the type of construction would meet the conditions under which it would be used. In other words, the smaller companies have often chosen the heaviest metropolitan type of track construction for use in a small city without much consideration of economic possibilities. This is merely a repetition of what has been going on since the first electric railways were built. It is high time that more real engineering study be applied to the design of electric street railway tracks, and the work calls for engineering talent of no mean order.

Mr. Tinnon has called attention to a problem which demands the closest attention and there is no question but that a type of track construction can be designed to meet present-day needs, as well as all of the numerous unforeseen contingencies of twenty to thirty years of life, which will show a lesser annual maintenance cost than we have been accustomed to even under deferred maintenance conditions. It does not follow that the cost per foot new will be any less than heretofore even though this cost be based on pre-war price averages.

Meanwhile, a pertinent question may be asked: Does anyone know the actual maintenance cost per foot per year for any particular type of track over a period of even five years? The so-called permanent way is a misnomer. There is no such thing, because permanency is a relative term. One of the objects of track design, therefore, should be to determine upon and try to meet a predetermined period of life or permanency. To do this properly may not lessen first cost. In the very nature of the thing a track is subject to wear, and because it is made up of so many variable elements subject to action of forces not under much control, it is inevitable that a certain amount of maintenance will be necessary.

The question of design resolves itself into one as to what type or types of track (for there must be some variations) will develop the least average annual maintenance cost per foot for a given set of conditions. At present we have nothing to set as a mark to reach as a reasonable minimum annual cost except the very high costs for track maintenance now obtaining. There is a crying need for such information, which neither the accountants nor the maintenance engineers seem able to supply.

To return to design for a moment, it may be said that the items of soils, their bearing power and drainage, are more and more coming into view as factors to be reckoned with not only in steam-road track design but also in the design of electric railway tracks, no matter where located. When track engineers begin to give more attention to the soil and its drainage we may expect to find better and more economical track construction on electric railway properties.

Look Out for Next Week's Issue!

It will be our annual "Convention Number" and will be devoted to the subject

"Selling Transportation"

Selection of Rails for Electric Railway Service

The Author Discusses Some Theoretical and Practical Matters Which Should Be Considered When Selecting Rails for Use Either in Private Right of Way or in Paved Streets

BY R. C. CRAM

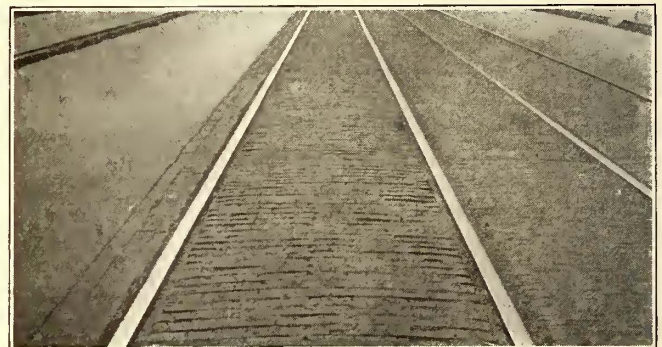
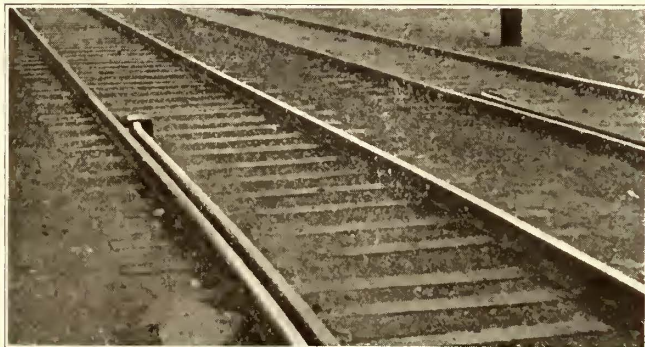
Engineer Surface Roadway, Brooklyn Rapid Transit System

WHEN new track or reconstruction of old track is under consideration, the selection of the rails to be used presents a problem which requires very careful study. At first thought it may seem that it is only necessary to turn to a rail catalog and pick at random one of several rails of a given weight or type. However simple it may seem, the matter is very complex and there are a large number of factors which must be considered before a decision is made.

In the first place there is the general question of location with respect to whether the rails are to be installed upon a private right of way or in a public thoroughfare. The answer to this question will determine whether a standard section (low T-rail) or some form of girder rail is to be used. The roads located

acter of the roadbed with respect to the bearing power of the soil and the kind of ballast and depth used to distribute the loads from the ties have a larger influence in determining rail selection than is usually supposed.

When the question of rail strength is under consideration, not only the stresses in the rail and the ability of the steel to resist them must be taken into account but the proportions of the rail must also be such that it will distribute the wheel load to the ties in a way which will not overstrain any part of the substructure. The mere fact that a rail will not break under a given load will not permit its use if, through not being stiff enough, it allows too great a portion of the load to come on a tie. Axle spacing in truck design enters into



THE SELECTION OF RAILS FOR OPEN TRACK IS SIMPLER THAN FOR PAVED TRACK

upon private right of way and subways and elevated roads, being in many ways similar, call for the standard T-rail. On the other hand, the location in a public thoroughfare (with the possible exception of comparatively small towns and cities and in occasional locations at the side of highways) will require some form of girder rail, principally to meet paving requirements. Sometimes franchises call for a definite form of girder rail.

SELECTION OF RAILS FOR USE IN PRIVATE RIGHT OF WAY

In selecting rails for use in private right of way, the principal factors are weight of loaded car, axle spacing, character of roadbed, kind of ballast, tie spacing and frequency and character of service. A frequent-service, high-speed, interurban line with 55 or 60 ton cars will require a heavier rail than a suburban line operating at moderate speed with 25 or 30 ton cars. An interurban line which handles regular steam road freight cars with 60 ton electric locomotives, will require rails sufficiently strong to support the heaviest freight car. These are reaching capacities of 80 tons, giving a total weight loaded, of 105 tons. The char-

acter of the roadbed with respect to the bearing power of the soil and the kind of ballast and depth used to distribute the loads from the ties have a larger influence in determining rail selection than is usually supposed. When the question of rail strength is under consideration, not only the stresses in the rail and the ability of the steel to resist them must be taken into account but the proportions of the rail must also be such that it will distribute the wheel load to the ties in a way which will not overstrain any part of the substructure. The mere fact that a rail will not break under a given load will not permit its use if, through not being stiff enough, it allows too great a portion of the load to come on a tie. Axle spacing in truck design enters into

the question also. Both computations and experiments have shown that for a given class of track structure the allowable wheel load increases with the axle spacing up to a certain point, beyond which as the spacing is still increased the allowable wheel load decreases. It is the failure to appreciate such fundamental principles of design that has created conditions leading to excessive maintenance charges for keeping track and bridges in proper condition. It is not enough to assume that, because equipment on the A.B.C. railway is nearly the same as that on the X.Y.Z. road, the rails used by the former will be suitable for the latter. An inspection of the conditions obtaining on the A.B.C. line with respect to track maintenance may show that the rails are really too light for the service. It may also be found that the costs of maintaining the roadway on the A.B.C. road exceed those which experience has shown to be reasonable for the type of equipment and general roadway construction. Again, the axle spacing, tie spacing and depth of ballast on the A.B.C. line may be such that the loads are well distributed to the subgrade with the particular rail in

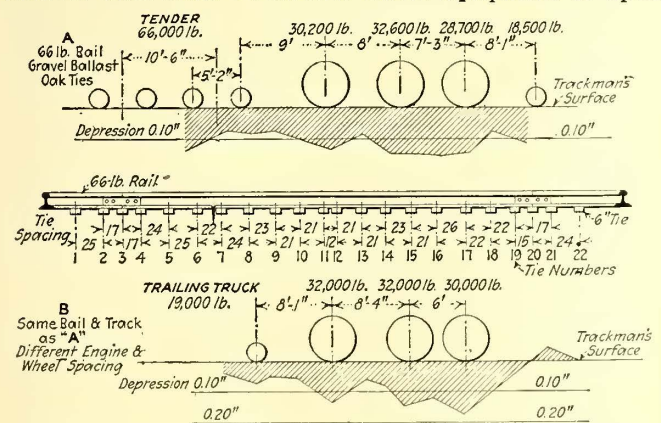
use. If the X.Y.Z. line has equipment with a different axle spacing or the tie spacing and ballast are different, the influence of these differences must be taken into account. Any one of these factors may call for a different rail or better support for the same rail.

The mathematical problems which are involved in the selection of suitable rails for railway use are extensive. The forces exerted by a motor car or an engine act in many ways and the rails are consequently subjected to all known forms of stresses. Tension, compression, torsion, shear and impact, all play their parts and it has been well said that rail steel is probably subjected to more forms of abuse than any other structural material.

There are two main considerations in determining the proper form for a rail. First, and most important, the duty required. Second, and of nearly equal importance, the influence of manufacturing details upon the character of the finished product. Of course all the stresses to which

it will be subjected should be considered, but its ability to resist them will depend largely upon the character of the metal, rather than upon the particular form or section. In considering the duty, first attention must be given to the external forces acting upon the rail, consisting of the pressure exerted by the wheels and the supporting forces represented by the ties. Knowing these, the stresses set up in the rail can be calculated approximately for different sections. The calculations involve many details and space will not permit their detailed discussion.

Practically all of the data upon this subject have been obtained from steam road experiments, with typical conditions produced by the various arrangements and loads of locomotive driving wheels. Many of the extreme conditions so produced are not found either with electric locomotives or with electric motor cars. The average axle loads on steam equipment are also heavier than those on electric motor equipment or upon



DEPRESSION OF RAILS UNDER ENGINE LOADS WITH EFFECTS OF AXLE SPACING

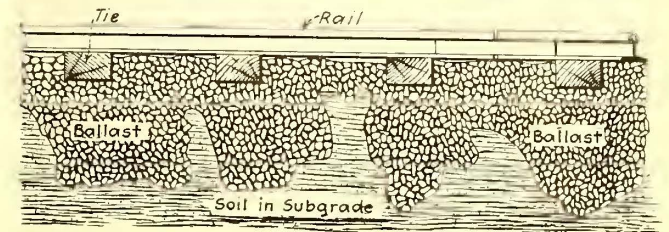
electric locomotives found upon most electric railways. However, electric locomotive equipment and some motor car equipment have a much lower center of gravity which tends to produce greater lateral thrust upon the rails and the stresses so produced must be considered, especially in curves.

The maximum pressure upon the rail can not be determined solely from the static load (a load acting by

mere weight at rest) of the wheel on the rail, even though the weight of the car can be accurately determined. The dynamic augment (added force or load due to movement) must be considered because the car does not always stand still. The forces created by irregularity in rolling stock or roadway, such as flat wheels, lack of rotundity of wheels, low joints, and poor surface which create impact and the rocking of the car upon springs and bolsters together with the effect of velocity of the loads must be provided for. These forces have been calculated for some electric railway conditions, covering city passenger cars and interurban passenger and freight cars. The typical dynamic loads for these electric railway cars are shown in the diagrams on page 558, and the dynamic augment for this class of equipment is substantially the same percentage of static load as that used for freight and passenger cars on steam roads. Usually the dynamic augment is considered to be 0.70 of the static load for wheel loads less than 15,000 lb. For wheel loads of 15,000 lb. or more, 10,000 lb. is taken as the dynamic augment to be added to the static load.

THE BALDWIN LOCOMOTIVE WORKS RULE FOR DETERMINING WEIGHT OF RAIL.

The general rule developed by the Baldwin Locomotive Works for determining the weight of rail is as follows: "Each 10 lb. per yard in weight of ordinary

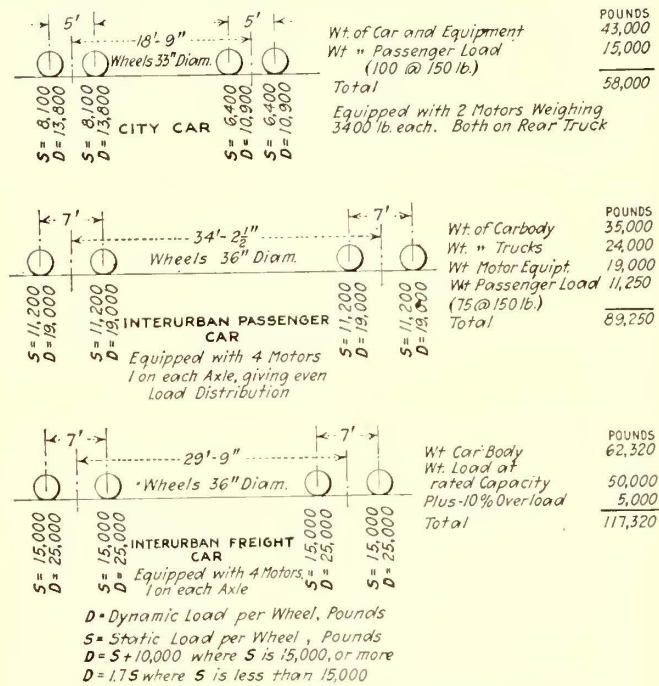


EFFECT OF OVERLOADING ON SUBGRADE

rail steel, properly supported by not less than fourteen ties per 30-ft. rail is capable of sustaining a safe load per wheel of 2240 lb. (1 gross ton)." On this basis, an axle load of 30,000 lb., or a wheel load of 15,000 lb. would require a 66-lb. rail. It is of interest to note that for this axle load the New York Municipal Railway Corporation has selected the 100-lb. A.R.A.-B. rail, or one of substantially one-third greater weight. There must be some reasons for this apparent overweight and these are governed by the desire for a greater stiffness, combined with a sufficient amount of head metal to allow a large proportion of wear before renewal becomes necessary. The greater stiffness should lessen the amount of maintenance labor, and requires a lesser amount of ballast to distribute the loads to the subgrade. Incidentally a far better joint section is secured. The high costs for labor in renewals, due to very frequent train service and locations in subways and on elevated structures where working conditions are much restricted, are very important considerations. Furthermore, one of the principles of design, calls for the addition of the dynamic augment to the static load. This was taken at 1.5 times the static load for wheel loads of 15,000 lb. or more and the dynamic augment added to the static load in this case gives a dynamic load of 22,500 lb. which, under the Baldwin Locomotive Works rule above mentioned, would call for a rail weighing 102 lb. per yard. Thus what (in the light of the Baldwin Locomotive rule) at first may appear

to be an uneconomic use of rail material, becomes a wise selection in respect to principles of design, ultimate economics in maintenance and lessened amount of ballast material required in construction.

Aside from the theoretical point of view, it is practice which furnishes the evidence necessary for check against theory. Here it may be said that as of 1914, five out of eight of our largest interurban and high-speed roads use the 80 lb. A.S.C.E. as standard for open tracks, one uses the 75 lb. and two use the 70 lb. A.S.C.E. sections. The very recent Buffalo-Niagara Falls high-speed line uses 85 lb. A.S.C.E. for cars with load giving an axle load of about 17,500 lb. with track laid on about 10 in. of granulated slag ballast.



SOME TYPICAL DYNAMIC LOAD DIAGRAMS FOR ELECTRIC RAILWAY CARS

Those who are interested in this subject will find it advantageous to consult the very able work of some 500 odd pages entitled "Steel Rails" by W. H. Sellow to which the writer is indebted for much of the foregoing matter.

SELECTION OF RAILS FOR PUBLIC THOROUGHFARES

Turning to the location in the public thoroughfare, we find a wide divergence in both theory and practice. At no time in recent years has there been much question as to the beam strength of girder rails. As girders they have been ample although some engineers still advocate a 9 in. depth in preference to 7 in. mostly because of the difference in beam strength, and because of claims regarding better mechanical joints and paving facilities. The day of the 9-in. rail seems to be rapidly passing. It is only necessary to point out that there are 7-in. girders today which are stronger in every way than the 9-in. girder of yesterday, while the modern joint and the modern 4 in. and 5 in. deep paving blocks have removed the deep joint and deep paving from consideration in rail selection. The general question of relative ability to withstand the direct loads does not enter to any great extent either, because a 70-in. 70-lb. plain girder rail on the usual 2 ft. tie spacing, will carry quite heavy dynamic loads.

The selection of rails for streets, therefore, is con-

trolled more by factors entirely foreign to the rails themselves. Among these are: street widths, number of tracks in the street, character of highway traffic, particular district or section of the city or town, franchise requirements, views of public officials, cleanliness of streets, design of wheel flanges and treads, requirements as to kind of pavement and maintenance thereof. Just these few items are almost enough to give one a headache in an attempt to reconcile them. The additional items of allowances for wear under car and vehicular traffic and for corrosion may thus appear to be secondary in importance but they are really of first importance in controlling selection of rails for street use.

There are three general types of girder rails from which the selection for use in highways can be made, viz.: The plain girder (high-T), groove girder and tram girder. The girder guard is considered as a form of groove girder and is used in but a comparatively small proportion of any system because of its confinement to special track work and curves. The recommendations of the committee on way matters of the American Electric Railway Engineering Association seem to express the general controlling factors very well in the Engineering Manual as follows:

THE USE OF PLAIN GIRDER RAIL IN PAVED STREETS

The use of plain girder rail for track construction in paved streets is recommended except where the vehicular traffic in congested sections of narrow city streets is largely confined to the pavement area maintained by the railway. This condition exists, as a rule, only in cities of the largest class, and for use in such cases the Committee on Way Matters is of the opinion that the American Electric Railway Association standard grooved girder rails are best adapted.

The selection of plain girder rails for use in paved streets requires the most careful consideration of the type of pavement to be installed and the vehicular traffic to be sustained. Particular care should be taken with respect to the use of the standard section rails in pavements, as it will often be found that the plain girder rails of equal weight are much better adapted to a greater range in types of pavement which may be selected for use therewith.

RECOMMENDED DESIGNS FOR PLAIN GIRDER RAIL

1. For general track construction in private right-of-way and for use in streets where the type of pavement will permit as in macadam or other shallow pavement, standard section rails weighing not less than 80 lb. per yard are to be preferred and three designs, weighing 80, 90 and 100 lb. per yard respectively, are recommended.

For track construction for light service, in connection with deep block pavement, a 7-in. plain girder rail having a 6-in. base, 1 1/8-in. web, 2 1/2-in. x 1 3/8-in. head and weighing 80 lb. per yard has been adopted as a recommended design.

For track construction for heavy service in conjunction with deep block pavement, a 7-in. plain girder rail having a 6-in. base, 1 1/8-in. web, 2 3/4-in. x 1 1/2-in. head and weighing 91 lb. per yard is a recommended design.

For track construction for heavy service in connection with deep block pavement in the congested sections of narrow city streets where the vehicular traffic is largely confined to the pavement area to be maintained by the railway, which conditions exist, as a rule, only in cities of the largest class, your committee recommends the use of the Association standard grooved girder rails.

The designs referred to in the above paragraphs were illustrated in the ELECTRIC RAILWAY JOURNAL for July 19, 1919, pages 110 and 111.

It will be noted that the tram girder is not mentioned by the committee. This is because its use has been practically abandoned for new work in this country, there being but one notable exception where it has been continued in use for renewals on any large system. It is also worth noting that British practice has always been confined to the use of a groove girder in public

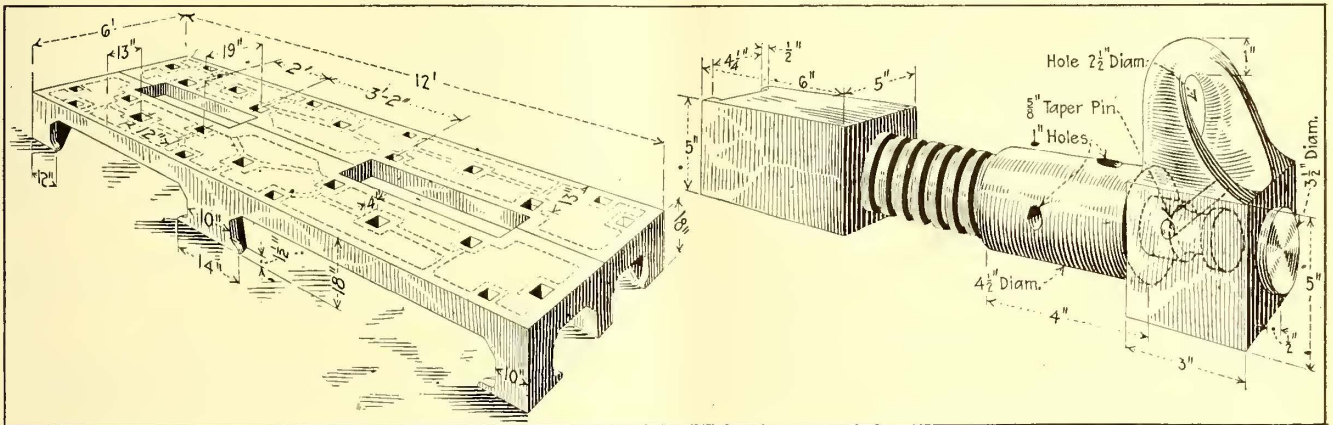
thoroughfares and their grooves are much narrower than those found in this country. Evidently flange wear does not worry the British engineers very much. There has always been a great amount of controversy over the question of comparative merits of the plain girder (high-T) and the groove girder rail for use in paved streets. As a matter of fact either can be used satisfactorily as far as car operation goes and pavement can be installed with plain girder rails in such a manner as to be unobjectionable to teamsters. Some engineers claim a lesser wheel flange wear obtains with plain girder rails, while others will say that this is more than offset by the lesser paving maintenance costs with groove girder rails. It will also be argued that a groove girder rail of proper design may weigh 122 lb. per yard where a plain girder of ample capacity for the same loads will not weigh over 91 lb. The price per ton is the same for both, hence the plain girder will cost less per foot of track. The writer is satisfied, from the results of a 5 year test of the two under equal conditions in the same street, that the groove girder rail is

19, 1919, and there is no question but that there should seldom be occasion for the adoption of a section other than some one of these. The principal exception would be in the case of need for a groove girder rail to provide for M.C.B. wheels. Even here, the Association rails will pass M.C.B. flanges but a reasonable amount of head wear is not provided for.

Face Plates Aid Straightening and Bending Work in the Shop

Twin City Company Makes Up Equipment Which Proves of Great Convenience On Work Not Easily Handled by Bulldozer

THE Twin City Rapid Transit Company, Minneapolis, has made up several so called "face plates" for use in its shops in straightening and bending materials. These are very large castings made in the company's shops and they incorporate various devices such



DETAILS OF FACE PLATE AND SCREW JACK FOR BENDING AND STRAIGHTENING SPECIAL WORK

the proper one for use in narrow streets of large cities under heavy steel-tired wagon traffic which is largely confined to the railroad pavement area. This opinion is based on wear of pavement alone, as found on the test section.

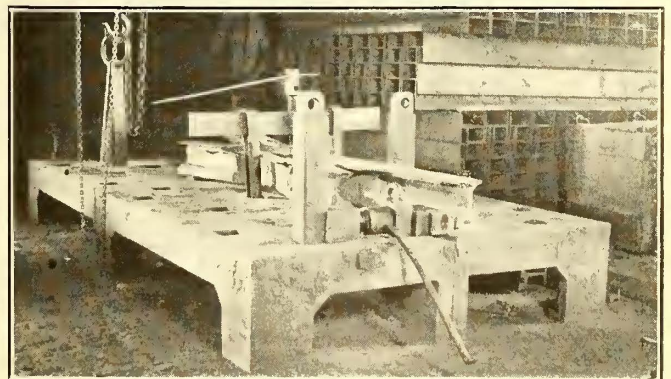
When the plain girder (high-T) rail can be used in small cities and towns or in localities where wide streets permit the wagon traffic to spread out and keep away from the tracks, there is an increasing tendency toward the use of standard section (low-T) rails weighing 100 lb. per yd. and of a depth of about 6 in. These rails can be purchased at prevailing prices for standard section rails which are much less than the prices for plain girders (high-T). This is an important point to be considered in rail selection, especially in these days of high cost. Incidentally the 6 in.-100 lb. low-T rail will admit the use of quite a number of pavements which are suitable for moderate traffic.

CONSULT ASSOCIATION STANDARDS WHEN SELECTING RAILS

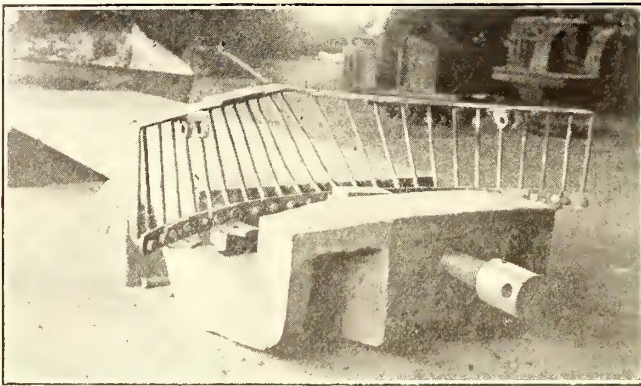
Having reached a decision as to general type and approximate weight of rail desired for some particular service, there remains the proper section to be selected. In this connection it should be the rule first to consult the standard rails approved as standard or recommended design by the American Electric Railway Engineering Association as found in the Engineering Manual. These rails were illustrated in the JOURNAL for July

that almost any materials which cannot be easily handled with the bulldozer can be speedily and conveniently straightened or bent.

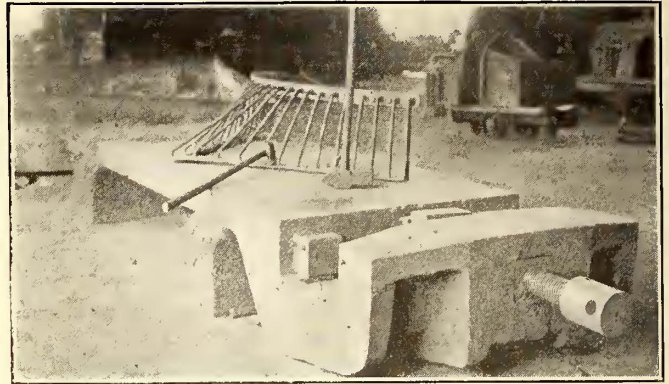
The largest of the plates measures on the top surface 6 ft. x 12 ft. and is made up of two matched castings each 3 ft. x 12 ft. The top surface of the plate is 18 in. above the floor. This plate is used especially for straightening special work, practically all of that used on the property being cast in the company shops. In cooling this will often get a little out of true and by properly locating dowel pins in the holes in the face plate and applying screw jacks to the bent parts the



TAKING OUT HORIZONTAL AND VERTICAL KINKS SIMULTANEOUSLY IN A PIECE OF SPECIAL WORK



FACE PLATE FOR BENDING AND STRAIGHTENING WITH OR WITHOUT FORMS



HAMMERING OUT SURFACE KINKS AND IRREGULARITIES ON THE FACE PLATE

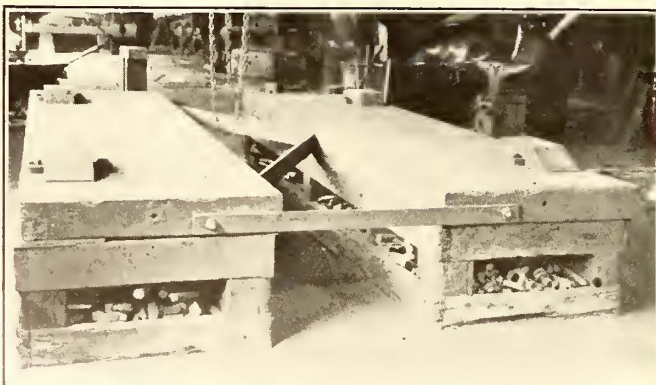
work can be made true. The accompanying drawing shows the dimensions of this plate, the location of the dowel pin holes, the dowel pins and the type of screw jack used.

Before bending, the portions of the special work which are out of true are heated over an oil furnace located beside the face plate. The piece of special work is then swung onto the plate by means of a Duplex 4-ton screw block crane, the dowel pins, jacks and other equipment are placed in the proper position and pressure is applied. Either horizontal or vertical bends can be made or, as in the illustration shown, both can be applied at once.

There is sometimes occasion for straightening parts of car bodies bent by accidents or for bending new work where templates are needed or otherwise, which cannot conveniently be handled by the bulldozer. For such purposes the face plate shown in another illustration has been made. This plate is 12 ft. 6 in. long, 3 ft. 4 in. wide and stands 18 in. from the floor. The gap is 16 in. wide and 8 in. deep and because of the location of the screw and end section has been made 19½ in. high at the center and 10 in. thick. The 3-in. diameter screw with three threads to the inch threaded into a 5-in. square block flanged on the gap side 6½-in. square.

The piece to be bent is placed in the gap in a similar position to the fender which is being straightened as shown. Pressure is applied by means of the screw and block. After the piece has been formed any surface kinks can be removed or other hammering done on the plate, as shown.

Another plate shown has been made for use in shaping and welding truck frames. The frames are first



SPECIAL DESIGN OF FACE PLATE FOR SHAPING AND WELDING TRUCK FRAMES

bent in the bulldozer but in cooling will become slightly untrue. The blocks on this plate are of such shape and so located that the frames can be brought true. The ends are then hammered out flat and the cross members are welded in place. The frame is complete when removed from the plate.

As indicated in the photograph this plate is composed of two castings 3 in. thick, increased to 4½ in. at the rims, 31 in. wide and of such length and so spaced from each other as to accommodate the truck frame. The plates are set up on a framework which forms lins for the tools. The blocks for shaping the frame can be changed in location to suit the different sizes of frames made by this company.

All of these plates have proved to be a great convenience in the Twin City shops.

Heat Treating Tools In the Tool Room Instead of In the Blacksmith Shop

THE heat treatment of tools came up for a prolonged discussion at the American Railway Tool Foremen's Association convention held in Chicago, Aug. 27, 28, and 29. All members appeared to be in accord as to the desirability of treating tools for service in strict accordance with the recommendation of the manufacturers of the material from which the tools were made. The members also considered that the control of the operation of heat treating tools should be vested in the foreman of the tool department rather than in the blacksmith shop, as has been the usual practice. The tool foreman is responsible for the behavior of these tools in his shop and it is natural that he should be most vitally interested in the result obtained. In modern tool rooms there is frequently available equipment which will greatly facilitate this work in the nature of electric furnaces and tempering baths with their accompanying pyrometers, so that results can be obtained with accuracy not available in the ordinary forging plant.

The steam railroads are preparing for a national railroad accident-prevention drive, from Oct. 18 to 31, under the auspices of the safety section, division of operation, United States Railroad Administration. The steam railroads are making excellent progress in the campaign for reducing the casualties in their field and safety supervisors all over the country are making elaborate preparations to make the most of the enthusiasm which will be engendered by this special drive.

Laying Out a Power Transmission Line

Among the Factors Considered Are Selection of Route, Clearances and Pole and Tower Spacing — All with Due Regard to Maintenance as Well as Construction Costs

BY CHARLES R. HARTE

Construction Engineer The Connecticut Company,
New Haven, Conn.

IN PRECEDING articles we have discussed the details of line construction, in an attempt to show how each has been developed to meet certain specific requirements. The present article takes up the story at the point where it was left at the end of the article in the June 21 issue, with special reference to the engineering design of the transmission line as a whole.

Distribution lines in general have their location fixed, those for trolleys usually keeping with the track while those for lighting and power circuits follow the streets, but the transmission line, while it frequently is carried on the same poles as the distribution circuits is as often free to take its own route, which will then be as nearly straight between the main controlling points as may be practicable.

SOME THINGS TO BE AVOIDED IN LAYING OUT THE LINE

Very abrupt breaks in grade are undesirable because of the mechanical difficulties of meeting the stresses, although the present-day strain insulator has helped this problem; and a line on a high open ridge is an invitation for lighting trouble; but otherwise the question of grade has little to do with the location. The really important features are distance, ease of access and low cost right-of-way. The ability of the engineer in charge is shown by the kind of a compromise he can make; for the three requirements are usually more or less opposed to each other. Obviously the straight line should be the cheapest, not only because it is shorter, but because there is a saving in cost due to the absence of angles, with special construction.

In wild country, where there are no highways, some kind of road has to be built over which to take the material for the line, and unless grades are too steep, the straight line is the desirable one from most points of view. In settled sections it is generally possible to parallel existing roads without too great increase in length of line; this makes possible the teaming of maintenance and repair material reasonably near to the spot where they are needed and facilitates inspection, since the men can readily get from section to section. Location on the highway itself is usually undesirable, as control by local authorities offers an opportunity for annoyances and restrictions, with the ever present possibility of an order to vacate. In addition the by no means uncommon presence of a border of shade trees involves continual trimming, if this is permitted, unending friction with abutters and frequent expense in raising the lines at points where trimming is restricted or is not permitted. Highway trees also, as a rule, compel a location sufficiently far from the highway line to make the placing of poles on the inside out of the question, the average property owner not taking at all kindly to supports in his yard or in his front fields.

The best place for the line, as regards first cost of location and later relations with the land owner, is close to a division line where the poles cause a minimum of interference, and where inspection and maintenance do not necessitate tramping down growing crops or walking over sowed fields. In this connection it is well to remember that the farmer has a strong dislike towards "short furrows" and obstacles of any kind to the mowing of a field, a dislike which is apt to be strongly reflected in the price demanded for pole rights. In many cases the transmission company has the right to condemn a right-of-way in case agreement can not be had with the owner, but this is a weapon to be used very carefully. Unless the price asked is out of all reason it will generally be found that, when to the court's award is added the cost of the proceedings and when the ill feeling that is usually stirred up is considered, it is cheaper to settle without recourse to the law.

The value of a friendly neighborhood for any utility is hard to measure, but it is always great. Tact in preliminary dealings, absolute fairness in all agreements and, even more than any thing else, scrupulous care that both in construction and maintenance unnecessary inconvenience is not caused either by the work or by material piled in driveways or across paths, etc., cost practically nothing at all, but the work of the friendliness they secure appear continually. The average man will cherish the memory of some such petty annoyance long after he has forgotten a much more serious wrong. From time to time every utility company must come before the local authorities for supplementary rights or privileges, and friends at court are very essential. Furthermore the presence along the line of people who are well disposed means quick reports of unusual conditions and a policing effect which could be secured otherwise only at very considerable expense.

FORESIGHT IS BETTER THAN "HINDSIGHT" IN PLACING THE LINE

Two other considerations of such importance are, so to speak, the over head and the under foot conditions. Trees are ever the enemy when near a line. Long limbs of near ones tend to whip into the wires, and dead limbs blow from a considerable distance, particularly from trees on hillsides above the line. From time to time an entire tree endeavors, sometimes with much success, to fall across the phases. It is highly desirable therefore to keep in the open or, failing that, to get such clearing and trimming rights as will insure protection. Moreover the line should not be dominated by the ground, for the temptation to "chuck" a stick or a piece of wire into wires conveniently below is often too strong for those old enough to know better, not to mention the effect on youngsters. On the other hand, flat open ground is always questionable terri-

tory. Real swamps show their character, but many a respectable appearing meadow is a "whited sepulchre" or more correctly, a greened one, with a firm surface which hides a very soft and deep layer of muck. When pole setting begins, the facts are quite likely to become known, but a shift of line at that stage of the game is expensive and takes valuable time. Also, if the ground is too open and flat the supports may put the line so above the surroundings as to make it particularly attractive to lightning. The matter of clearing around the butts of the poles is a detail of construction rather than of location, but it is well to have in mind the fact that wood poles burn, and that

and expense may be avoided if in the first instance the cause of dispute is avoided.

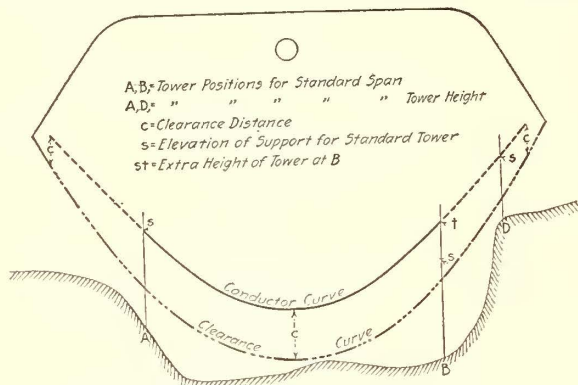
After the preliminary location has been decided upon, there *ought* to be a survey, although many a pole line and some tower lines have been "jackassed in," as one line foreman described it, on the ground. Not much detail is required; the center line should be "run," measuring continuously from one end the distances and angles both of the line itself and of the fences, roads and larger streams. Buildings or similar structures crossed or very close to the line should be accurately located, and facts as to the nature of the ground, whether wooded or cleared and in the latter case whether or not cultivated, comprise desirable information. It is well, too, to show the character of the roads closely paralleling the line and those crossed by it, with notes as to where they lead, and particularly including all facts regarding the routes to the various railroad sidings or wharves along the line with the available capacity for storage. Such information is absolutely essential for construction; it requires very little additional labor to make it a permanent record, and if kept up to date, the information is invaluable in case of an emergency.

It is well to bear firmly in mind the fact that there are always two, and possibly four, highly important events in the life of a transmission system: Construction and maintenance are necessities on every line, while not infrequently increased capacity or extensions are called for. Fortunately less frequently, storm or flood sometimes necessitate rebuilding of a section. Under any of these circumstances it is of the utmost importance to know how and where material can be handled in.

In addition to the line and the immediately adjacent features, a profile is needed. If the ground on each side of the center line has the same general character, no additional levels are needed, but if there is much difference profiles should also be made of the line of the outside phase wires, or the line of the footings in case towers are used. If this is not done it may be found, when the line is built, that although there is plenty of clearance along the center line, the outside wires are

dangerously close on the uphill side of a steep slope. In one case a 66,000-volt line had one phase within arm's reach of a man, while the corresponding wire on the other side had nearly 30 ft. clearance. So, too, it is essential that the center line profile be complete.

On the same line the support locations were made in the office, and profile levels were taken only at tower centers. The result was that in crossing a stretch of rolling ground the towers fell in the valleys, and the "rolls" came under the low points of the spans. How seriously this reduced the clearance was not realized until the line was strung. Luckily the original design had very generous factors of safety, and it was possible to "horse up" some of the spans sufficiently, but in a few cases the towers had to be raised at a very considerable expense.



TEMPLATE FOR USE IN FIXING LINE TOWER LOCATIONS

meadows on which there is likely to be long dry grass are not the best of locations.

The presence or absence of rock is an important consideration. Solid ledge often offers excellent footings for towers, but for poles it is a costly proposition at best. Loose rock is always a nuisance, being "neither one thing nor the other, but on the contrary a downright worse."

Finally, certain sections are cursed with highly unpleasant local conditions. If there are other wire lines in the vicinity their repair men can often give very valuable information as to sleet, lighting and heavy wind. Failing this, the oldest inhabitant is some help, although his stories are not always reliable; and in woodland the trees bear witness to the troubles they may have suffered, and so often show where not to go.

HERE IS THE IDEAL LOCATION

As a result of these considerations, the best location usually will be a series of long tangents, largely on gentle, open slopes. In settled sections to a very considerable extent it will follow interior property lines, not too far from fair highways, and keeping away from the property line itself a distance about equal to the height of a pole, to allow for guys. It is well too, to keep away from communication lines as far as practicable. A clearance between the nearest wires of the two lines equal to that between phases of the transmission line should be obtained, unless the communication line is higher. This is as good as the ridiculous specification that the lines shall be separated by the length of the tallest pole of either line, at least so far as mechanical and electrical factors are concerned. In many cases these are the only factors involved. Unfortunately, there are still some communication men who become hysterical over the thought of a transmission line in their vicinity, and while good construction can always be sustained if the matter is carried into the higher courts, much annoyance

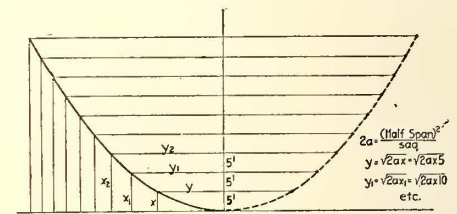
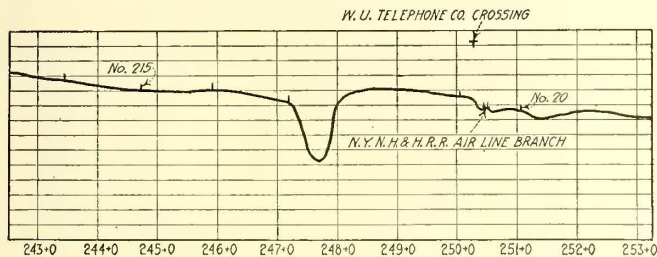


DIAGRAM SHOWING HOW THE TEMPLATE IS PLOTTED

In addition to the surface elevations, the profile should show the elevations at the point of crossing of any buildings, structures, other wire lines, or other facts which might affect the height or clearance of the line. At highway or railroad crossings it is particularly important to get full details of both ground and air conditions, as there is apt to be argument over the location. Full information in the office may save much time and expense later.



A TYPICAL PROFILE FOR A TRANSMISSION LINE LOCATION IN "EASY" COUNTRY
Horizontal scale, 1 space equals 100 ft., vertical scale, 1 space equals 5 ft.

With plan and profile in hand the support locations can now be made in the office. Until comparatively recently it has been customary to limit angles on poles to a maximum of about 15 deg., making heavy turns by a series of small angles, but as will be described in detail later, the development of the strain insulator has permitted a very effective treatment which, if anchorage is available, can handle as heavy an angle as may be necessary on one pole for each circuit.

In the case of a tower line the structures can be built to meet almost any requirement and the decision as to what to do will be controlled largely by local conditions. If the line is on flexible supports it is necessary in any case to have anchors and one of them can be used for the corner. If the line supports are self-sustaining it becomes a question whether to use these, dividing up the turn among enough towers to keep the pull at each within safe limits, in which case there is apt to be higher cost of locations, or to turn on one special tower which will cost materially more than the standard form. If right-of-way is costly, the single-angle tower will often save something over the cost of the curved line, and most line engineers prefer the former as less liable to insulator trouble. In case the curve is used it must be remembered that this shifts the location off the center line profile, and, unless the line is on level ground, a new set of levels must be taken to give the profile under the line itself.

GOVERNING CONDITIONS IN POLE AND TOWER SPACING

In the East the usual spacing for wood poles is 150 ft., for which span the sag even with the heaviest wires is comparatively small. Except in very broken country the ground profile is not vitally important. In the West, however, the tendency has been to go to much longer spans on wood, and here the heavier sags make the question of mid-span clearance almost as important as in the case of steel towers, with spans ranging from 300 to 750 or 800 ft.

The best standard height for the supports naturally will be determined largely by the clearance required. In very wild country this need be but little more than enough safely to clear the line patrol; in cities the man on a high team load must be safeguarded. The National Electrical Safety Code gives a table of "Road Crossing Clearances" which establishes for "crossings

above spaces 'accessible to pedestrians only,' a very good practice for open country, as follows:

	Height of Lines of from 300 Volts to Ground up to 15,000 Volts, Ft.	Height of Lines of from 15,000 Volts up to 50,000 Volts, Ft.	Height of Lines Above 50,000 Volts
Over trackrails on which are operated standard freight cars where brakemen are permitted on top.....	28	30	Increase value for 50,000 volt line by 1/2 in. for every 1,000 volts over 50,000
Over other tracks than above, and across streets, alleys and roads.....	20	22	
Along roads in rural districts	18	20	
Over spaces accessible to pedestrians only.....	15	17	

The above values are for the line conductors; if there is a telephone line on the same supports this will have to be at sufficient height safely to clear any passer-by. Such lines usually operate at voltages so low as to be harmless in themselves, but they may have induced charges of unpleasantly if not dangerously high potential, not to mention the possibility of leakage from the main circuit. They should be at least 2 ft. above the reach of a person under conditions reasonably to be anticipated.

The arrangement of circuits will determine whether they or the telephone wires are the controlling feature. If the middle conductors are far enough apart, the telephone wires can be kept well up, but it must be remembered that light wires sway very irregularly in strong winds, and for that reason should have more clearance than heavier conductors which under the same conditions tend to sway in unison.

The form taken by the hanging wire depends upon the relation between sag and span, this in turn is controlled by the stress which may be allowed in the wire. Usually this is fixed as not greater than the elastic limit (the stress below which the wire will return to its original length when the load is removed), under the most adverse conditions of loading, which, as we have seen, are considered, in the National Electrical Safety Code, as follows:

Heavy loading; That due to the weight of the conductor, plus a layer of ice increasing the conductor diameter by 1 in., with a horizontal wind pressure of 8 lb. per square foot at right angles to the line against the ice-covered wire, all at zero Fahrenheit.

Medium loading; That due to two-thirds of the heavy loading, taken at 15 deg. Fahr.

Light loading; That due to four-ninths of the heavy loading, taken at 30 deg. Fahr. (If the conductors themselves are so heavy that the "medium" or "light" loading as above is less than 1 1/4 times the weight of the conductor above the latter, that is, 1 1/4 times the wire weight, shall be used.)

THE PARABOLA AS A SUBSTITUTE FOR THE CATENARY

The uniformly loaded, freely hanging wire takes a curve known as the catenary—or if it does not exactly follow it, the coincidence is so close that the difference is unappreciable. The calculation of various relations of the catenary are somewhat complicated but, if the sag is not large in comparison with the span, the curve differs so little from a parabola that it can be treated as such, which is far simpler. However, while there have been published a good many methods in detail, notably in the *Transactions* of the American Institute of Electrical Engineers for 1911, sag tables and sag charts are also available, one of the best being in the same 1911 *Transactions*, from which the facts can be plucked forth with comparatively little effort.

Taking, then, our particular case from the chosen size and material of conductor and the proper loading for our region we can find, for any span, what

sag will be needed to insure that under the maximum load, the wire stress will not exceed the elastic limit. This sag, however, occurs when the conductor is blown out of the vertical plane, and is measured, not vertically but in the plane of the wire. The condition which gives the least clearance is that of the ice coated wire at 32 deg. Fahr. and no wind, so we must figure what happens under these circumstances to our conductor which has shortened up, due to the decreased load, but has now swung into the vertical plane.

MAKING AND USING THE SPAN TEMPLATE

Starting with a span of double the normal, so that the template will meet all reasonable cases we determine the sag for the iced wire at 32 deg. Fahr. and no wind, and then make a template on the same scale as our profile of this particular curve. In a parabola, if we draw a line midway between the two sides and another at right angles to it at the vertex, or sharpest point of the curve, the right-angled distance of any point in the curve from this last line is given by the expression $x = \frac{y^2}{2a}$. Where x is the distance wanted,

y is the distance from the point to the line between the sides, and $2a$ is a value constant for any given parabola. In our case, taking a point at one end of the curve, x is the sag and y is the half span, from which values we can get $2a$, since $2a = \frac{y^2}{x}$. By turning our equation around $y = 2ax$. If now we take x in turn as 5 ft., 10 ft., 15 ft. and so on we get corresponding values of y , and plotting these on a piece of celluloid, taking the y values right and left of the center line for the corresponding x values we can then draw through them our desired curve.

The length of the average span, and the height which the wires will be above ground at the towers depend upon whether high or low towers are used. The choice may depend upon one or more of a number of considerations; to a considerable extent, however, voltage seems to govern. Lines of 66,000 volts or over are apt to be on high towers, the long spans thus possible materially reducing the number of insulators per mile. On lines of lower voltage the insulator is, electrically speaking, nearer perfection, and the disadvantage of increased number of insulators due to short spans is more than offset by the lessened mechanical stresses.

The office location is made by first fixing the positions of towers at controlling points, such as breaks in grade, banks of streams or ponds, and the like, and then spotting in between the remainder, spaced approximately the length of the standard span apart, and at each of these points drawing vertical lines on which are marked the elevation above the ground of the lowest insulator of the standard tower. A second curve, identical with the sag curve, is drawn on the template so that the corresponding points of the two are separated by the clearance decided upon. The template is then laid on the profile with its vertical lines parallel to the vertical lines of the latter, and is shifted, keeping this relation, until the clearance line just touches the earth between two towers. The sag curve is then cutting the tower lines at the points of support necessary to secure such clearance. If these last points are above the normal, the span must be shortened or one or both of the towers raised. If the first is done the adjacent span is correspondingly increased; in the second case, the position of the low

points of the adjacent spans, and of the span itself if one of its towers is raised more than the other, is shifted towards the lower tower in each case. This at once brings up the question of supports at different elevations. So long as the curve is not changed, the horizontal stress in the wire is the same whether the supports are at the same or at different levels.

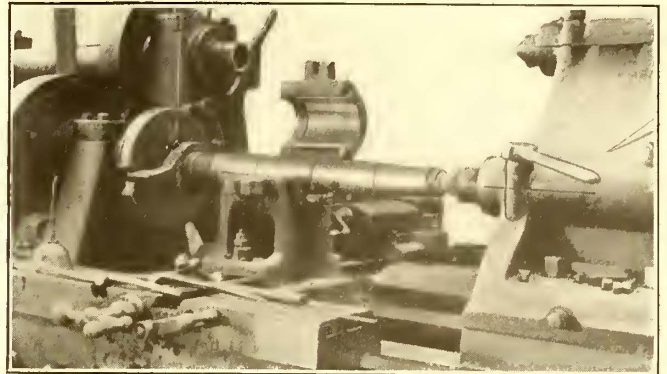
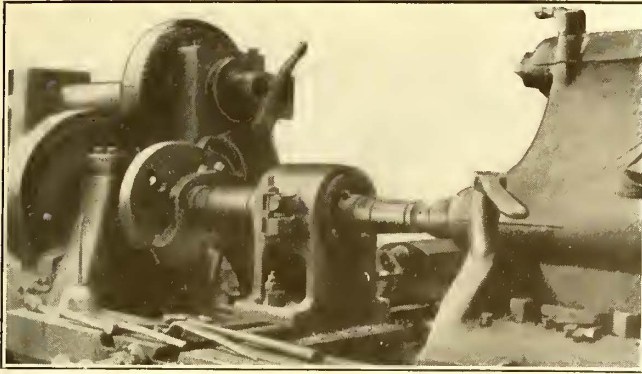
If the spans are of the same length, and the supports are at the same level, the pull at the supports of each span will be the same as, and balanced by, that of its neighbor. With variable spans, however, or unequal elevations of supports, while by adjustment of the sag-span relation the pulls can be balanced for any one set of conditions, they will be unbalanced when the conditions change. A span having supports at different levels is a part of a similar curve extended to meet the level of the higher support, and the stresses are those of the longer span. A load change on the long span changes the span itself throughout its length but the span with unequal height supports can change only between the supports. Its behavior and stresses are, therefore, somewhat different from those of the long span, and the low point is not only changed vertically, but also travels side ways. For this reason, if the ground is close to the clearance curve each side of the low point for the maximum load, the position of the span under other conditions should be determined to insure the proper clearance at all times.

HOW NATURE HELPS THE DESIGNER

It will usually be found that nature has divided the line into sections by reason of sharp humps which are obviously the places for supports. Working from these points, the most desirable conditions is that of spans of equal length, with top at levels differing but little, on standard towers. Whether in the situations where this cannot be realized it is better to change span lengths, relative levels, or tower heights can only be determined after careful study; indeed often all three "rathers" have to be used. Differences in adjacent span lengths and in relative levels of support mean unbalanced strains on the tower, which if considerable may necessitate special details. In any case the unbalanced pull remains through all time, a more or less serious threat against the safety of the line. Taller towers or special construction involves larger first cost and an addition to the fixed charges. If the taller tower is decided upon, the additional length can often be had at a minimum cost by using the standard extensions which some manufacturers furnish; if special extensions have to be made it is well to have them standard for the particular job, in lifts of 8 or 10 ft.

The necessity for very long spans is usually brought out by the preliminary survey; the office location not infrequently indicating points where a long span apparently can be employed to marked advantage. In either case the necessary tower height should be determined, first on the basis of the standard conductor, and then on the supposition that there can be employed a special conductor which can be strung much tighter than standard, and so permit the use of lower towers but of course under correspondingly heavier stresses.

Finally, with the office location complete, it is taken into the field, and tested on the ground. Here is where experience is particularly desirable properly to decide whether or not it takes best advantage of the ground, and if it does not, what is to be done. The alternatives are to change span length, tower height, tower location, or possibly a section of the line.



AT LEFT, JIG USED TO HOLD BEARINGS DURING BORING OPERATIONS; AT RIGHT, ANY SIZE BEARING CAN BE ACCOMMODATED BY THE USE OF BUSHINGS

Reclaiming Worn Motor Axle Bearings

Des Moines City Railway Has Developed Equipment to Rehabilitate Worn Bearings by Welding, Boring and Babbitting

BY THE DEVELOPMENT of several shop devices by which the work can be quickly and accurately accomplished the Des Moines, Iowa, City Railway is reclaiming worn-out brass motor axle bearings which otherwise would go to the scrap pile and is obtaining a length of life equal to that of new brasses.

When the motor axle bearings for the GE-258 motors are worn down until they ordinarily would be used for scrap, they are taken to the reclamation department. These bearings not only wear on the inside surface but wear along the edges of contact between the two halves so that the outside diameter is gradually reduced. The first step then is to determine the amount of this wear and this was formerly done by means of calipers. This was a tedious process so a form with an inside diameter exactly that which the outside diameter of the bearings should be was turned down from a wheel bushing. Now the bearings are gaged by inserting them in this bushing as indicated in one of the accompanying illustrations. If a loose fit shows wear the halves are mismated until a snug fit is obtained and the worn halves are laid aside to be built up along the edge by the acetylene welder.

The halves which mate up to the proper diameter are placed in the lathe jig as shown and $\frac{3}{16}$ in. of metal is taken out. This jig is made of two castings hinged on one side and clamped together on the other by a bolt. It is set in the center and doweled in position by a pin on each side. By use of bushings this machine can be used with any size of bearing. The boring bar

is equipped with two cutting tools, one ahead of the other and on opposite sides of the bar, but each set to cut the same diameter. About fourteen sets of bearings an hour can be bored out on this machine.

After boring the bearings are babbitted, this operation taking about fifteen minutes to a pair of bearings. The bearings then go back to the lathe boring jig and are bored out leaving about $\frac{1}{4}$ in. of babbitt. For this operation the boring bar is also equipped with two cutting tools, one to rough out and the second to finish.

About eighteen sets of bearings an hour can be turned out on this operation which also includes the making of the fillet.

Those bearings which had to be built up by the acetylene welder are faced in the jig shown. This is made from two 4-in. angles connected by a curved section, the inside diameter of which corresponds to the outside diameter of the bearing. These three pieces are welded together with the acetylene welder and blocked up on filler lugs on the

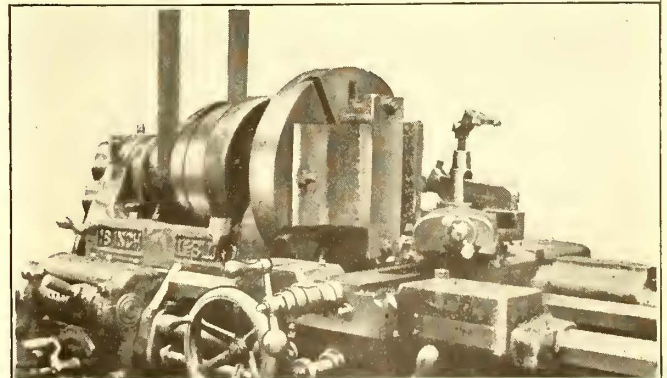
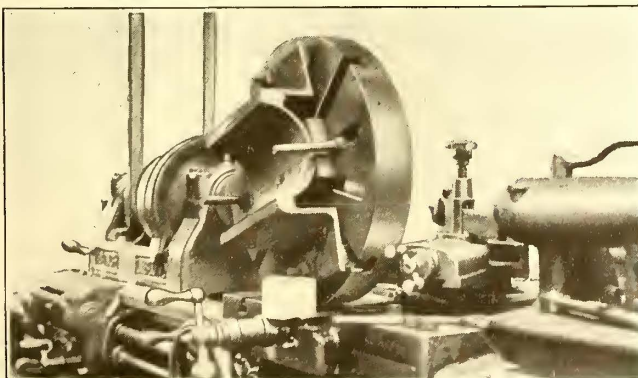


JIG FOR AXLE BEARINGS

lathe face plate so that when bolted tightly to the plate the face of the jig is just $4\frac{1}{2}$ in. from the plate.

The bearing is trued up in this jig and held firmly in position by a bar. The cutting tool is set $4\frac{1}{2}$ in. from the face plate and as the jig revolves the bearing is accurately faced off. This device does better work than the planer which ordinarily would be used. The bearings then pass through the same boring and babbitting operations as already described.

These few pieces of home-made equipment have made possible the saving of considerable money by the reclamation of bearings.

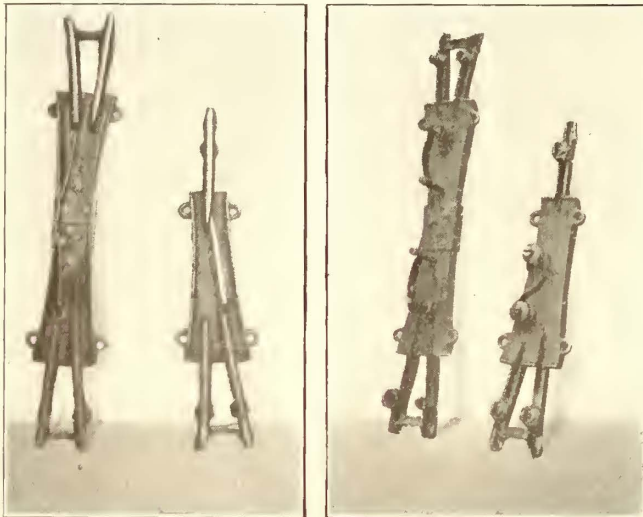


AT LEFT, JIG IN WHICH BEARINGS ARE PLACED FOR FACING OFF AFTER WELDING; AT RIGHT, BEARING BOLTED IN POSITION READY FOR FACING

Spring Switches and Crossovers Made From Standard Trolley Frogs

Twin City Rapid Transit Company Makes This Equipment for Special Locations and the Service Obtained Is Most Satisfactory

IT IS OFTEN the case that at crossings where the angle at which two lines cross is very small difficulty is experienced because the trolley wheel follows the wrong wire. This trouble also occurs in backing up at a wye. To overcome such difficulties at these two locations the Twin City Rapid Transit Company, Minne-



TOP AND UNDER SIDE VIEWS OF SPRING SWITCH AND SPRING CROSSOVER MADE FROM STANDARD TROLLEY FROGS

apolis, has developed a trolley frog spring switch and spring crossover, both of which have proved most successful during the past two years.

The spring switch is made from the company's standard switch by first cutting off about 3 in. of the lead to the curve. A hole is then drilled through each boss on the top of the casting, and in the hole nearest the single end a split post is set. The switch tongue is inserted through the other hole. The switch tongue consists of a piece of malleable iron bent at right angles, the tongue side slightly flattened and brought to a biased point, the post side remaining round and being split. A piece of spring steel is then fastened to the two posts in such a manner as to hold the tongue against the single line lead. This is clearly shown in the accompanying illustrations and drawing.

Suppose this switch in operation. A car desiring to wye and turn back will spring the switch when it enters on the tangent line from the double end. It then backs into the curve over the spring tongue which offers a continuous line.

The crossover is similarly made from two standard switches cut off at the single end just back of the pull-off rings and fastened together by a plate riveted over the joint. In this case the springs are so arranged as to keep the tongue points against the side of the switch. This cross-over would be used on a double track line or in any location where cars on a given track always operate in the same direction. As before, assuming this crossover to be in service, a wheel would enter over the spring tongue and be compelled by the second spring tongue, acting as a guard, to leave over the proper line.

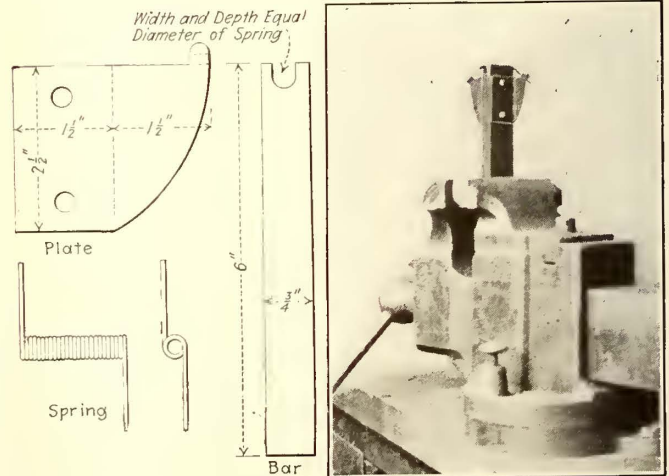
The company now has in service about fifty spring switches and two spring crossovers. These have always worked satisfactorily and no additional wear to the trolley wheel has been noticed. Malleable iron is now being used in the manufacture of all switches and is giving about double the life of bronze.

Handy Adjuster for Gear-Case Cover Springs

THE accompanying illustrations show a small device which has been constructed in the shops of the Des Moines City Railway to simplify the work of installing springs on the gear-case covers of G.E. 57 and G. E. 67 motors. The usual method of using a screw-driver to twist this spring and the hand to hold it in position is often very trying to the workman, and sometimes results in bruises to the hand, as it is frequently necessary to install the springs under the car where the space is limited and where the position that must be assumed by the workman is very awkward.

The device shown herewith for installing these springs consists of a piece of iron 6 in. long by 1½ in. wide and ¾ in. thick with two pieces of sheet iron attached. The iron bar grooved out on one end to accommodate the spring and the pieces of sheet iron are fastened to this bar about ½ in. from the end as indicated in the accompanying illustration. After assembling, these sheet-iron pieces are bent back at right angles and the finger at the end is doubled over to provide lips for holding the end of the spring.

To install a new spring on a gear-case cover the spring is laid in the grooved end of the tool. One end of the spring is then hooked under one of the side fingers and the spring is wound up two turns to provide tension. The other end of the spring is then hooked



DEVICE FOR QUICKLY AND EASILY INSERTING HINGE SPRING OF GEAR-CASE COVERS

under the opposite finger. The tool holds the spring so that it can be readily placed in the hinge and the hinge pin inserted without any trouble and without danger to the workman. After installation the ends of the spring are released and the job is completed.

The United States Bureau of Mines will dedicate its new experiment station in Pittsburgh, Pa., on Sept. 29 and 30, and Oct. 1. The buildings are located at 4800 Forbes Street. Mine and coal-dust explosions will form part of the program.

Present Status of Engineering Association Standards

A Partial Summary of the Progress Which Has Been Made in the Development of Standards, Recommended Practices and Miscellaneous Methods and Practices

A GREAT many electric railway men overlook a most important adjunct to their work when they neglect to consult the Engineering Manual of the American Electric Railway Association. As the convention approaches, it may not be out of place to present a brief outline of some of the more important subjects treated therein.

A knowledge of what has been done along the line of standardization should be helpful. A creditable amount of work has been done, but it is unfortunate that this has not been more fully appreciated. An active interest in it cannot be otherwise than helpful to engineers in their daily tasks.

The Manual presents the finished product, as it were. A broader view of any particular subject is to be found in the *Proceedings* of the association. Many data of value will there be found, which from their nature, cannot find a proper place in the Manual.

A few of the topics which are covered in the Manual are discussed this week. Others will be taken up later.

Buildings and Structures

BY R. C. CRAM

In the field covered by the Engineering Association committee on buildings and structures, the activity and resulting standards or recommendations are at a minimum. This is undoubtedly due mainly to the generality of the subjects, which will not admit of the very close restrictions implied by standards or recommended practices. There is only one recommendation which has reached the "approved" stage. This relates to "Rules for Instructions to Employees for Fire Protection." There are seven other subjects in the Manual under "Buildings and Structures" as a general heading, classed as "Miscellaneous Methods and Practices." These cover matters relating to building design, construction and maintenance, which are so variable in different parts of the country, or because of incidental location, that it would be almost impossible to bring them to close enough agreement to warrant even a standing in the Manual as "Recommended Practice."

Nevertheless, the "Miscellaneous Methods and Practices" which are included in the Manual under "Buildings and Structures," are found to represent very important subjects in connection with design and maintenance of electric railway buildings. For instance, the subject of oil houses and their equipment is one of considerable moment. It is well discussed and illustrated with several typical drawings. The matter of proper facilities for employees in car houses, shops and power houses is reaching greater weight yearly. The Manual treats of this with particular reference to space assignments for the administrative various offices, men's rooms, locker rooms, toilets and assembly rooms.

Not the least in value is the codification of "Under-

writer's Rules Relating to Car and Car House Wiring," which is an index of the subjects in the National Electrical Code which relate particularly to car wiring, equipment of cars and electrical work in car houses. These matters must be constantly referred to by electric railway mechanical, electrical and structural engineers. This index to the code is of great value.

The "Recommended Rules for Fire Protection" represent modern practice and cover organization of fire brigades, general fire rules, and form of inspector's report. These rules complete have been approved by the National Fire Protection Association.

The subject of economical maintenance of buildings and structures is treated in the Manual by outline reference to features of design which are of vital importance in reducing maintenance charges. Repairs, inspections, heating systems, roofing, floor construction, doors and painting are all considered in a way which should be of much interest and value to designers.

Under the head of "General Specifications and Form of Contract for Railway Structures" are found a proposal sheet, contract form, general conditions of contract and specifications for materials. This section embodies form and wording for contracts which are useful to engineers, and in general they will need but few changes to meet the opinions of legal talent and local conditions prevailing on most electric railways.

The subject of design of urban and interurban terminals is treated in all general controlling aspects, such as matters of location, real estate, track layout, and terminal building construction. When terminals are up for consideration in engineering and managerial offices, the Manual may be consulted for many valuable hints.

Facilities for fire protection in car houses and terminals, including open yards are discussed in a very illuminating manner in the section of the Manual under that heading. The several types of equipment and arrangement thereof, are set forth in considerable detail.

While the foregoing subjects are comparatively few in number, it will be seen that they represent items of much importance in connection with building and structure maintenance and construction. The *Proceedings* of the association, in reports of the committee on buildings and structures, contain a large amount of general information on the subjects in the Manual which, from its nature cannot well find a place in the Manual because of the necessity for brevity. For instance the Engineering Association *Proceedings* for 1915 contain a most informative report on the subject of expansion joints and waterproofing of concrete structures, which is of such general value that it could well be brought down to date and included in the Engineering Manual under "Miscellaneous Methods and Practices." The subjects of power-house and substation construction have also received attention at the hands of this committee in the *Proceedings* for 1915 and 1916.

Way Matters

BY R. C. CRAM

In the field covered by the committee on way matters, an examination of the Engineering Manual indicates that twenty-five subjects or items have reached the stage of "Standard" or "Recommended Practice." This is the greatest number reaching such grades in any of the seven general heads or classifications of work in the volume. As an indication of the care in preparation and the extended discussion some of the subjects have received, it may be noted that the standard 7-in. and 9-in. girder and girder guard rails were about seven years in the process of reaching the Manual as the goal. A brief outline of the several subjects follows:

The location of, and clearances for, third-rail working conductors, structures and rolling equipment are shown in the standard diagram which is thus available as a guide to electrified steam roads as well as strictly electric railways. Third-rail terminology and recommendations on method of protection for third-rails are also covered. These matters were the results of reports prepared by the committee on heavy electric traction, all of the members of which are representative steam road engineers.

The design of proper foundation for tracks in paved streets is indicated by a recommended design for a ballasted construction. The reports of the committee on way matters for 1914 and 1915 on this subject, in the association *Proceedings* have proved valuable contributions to the study of this subject. The *Proceedings* should be consulted in connection with any consideration of design of tracks for use in streets.

Among "Miscellaneous Methods and Practices" will be found an extended report on ballast for suburban and interurban lines, and one on classification and bearing power of soils, both of which are useful in connection with track design and maintenance. Here also are rules and regulations for the government of employees of the way department which will serve as a practical guide if occasion calls for the compilation of such rules. A uniform method of designating compromise joints is shown which, if followed, will tend to eliminate the confusion which often arises in connection with special track-work purchases.

Under the head of "Specifications," of interest to those concerned with way matters, the Manual contains seven which may be used in connection with purchase of rails, joints and special track-work. They cover girder rails, splice bars for girder rails, four distinct types of special track work and the materials entering into the manufacture of special track work. An important special track-work matter is also covered under the rules for determining the gage of track on curves, while the recommended layouts or dimensions of tongue switches and mates are recognized as the prevailing standards by both manufacturers and electric railway companies generally.

Perhaps the most important contribution to standardization work in the electric railway industry lies in the standard sections for 7-in. and 9-in. groove girder and girder guard rails.

These designs and particularly the 7-in. depth, are gaining constantly in popularity and use throughout the country. Of no less importance are the recommended designs for 7-in., 80 and 91-lb. plain girder rails which, by the way, have long been rolled and have

a wide use. The standard section (low-T) rails shown in the Manual should have more attention than they apparently have received. This is particularly true of the 100-lb. section which due to its weight and height (6 in.) is very serviceable for use in shallow pavements in small cities and towns.

Recommended designs of joint plates are shown for all of the girder rails above referred to and use of those for the 7-in. girder rail has shown that they are a big improvement over any previous designs.

It may not be generally known that the association has approved, as a recommended design, a uniform drilling for standard section (low-T) rails which agrees with the recommendation of the American Railway Engineering Association. A much needed improvement in practice calls for the use of this design to the fullest possible extent.

The recommendations on the use of plain girder rails in paved streets represent several years of study and they can well be used as a guide when this question is up for consideration.

The Wheel Situation

BY H. L. BROWN

With the sky cleared of the war cloud, at least, in a measure, there should be time now to take up the study of engineering standardization problems where they were dropped before the war. Of these problems, that pertaining to wheels is perhaps one of the more important. The situation in this connection as it stands today is about as follows:

The American Electric Railway Engineering Association in 1907 adopted a "standard design" for the tread and flange contour of cast wheels. This action involved two standard contours—type A, having a flange $\frac{7}{8}$ -in. high and type B, a flange $\frac{3}{4}$ -in. high, both being $1\frac{3}{16}$ -in. thick at the throat. For city service the type A tread is 3 in. wide and this is widened to $3\frac{1}{2}$ in. for interurban service. Type B wheel has a $2\frac{1}{2}$ -in. tread and it was evidently intended as a sort of alternative standard to be used where the type A contour could not be used on account of local conditions.

Since this action of the association the advent of the rolled-steel wheel and the fact that comparatively few companies found it desirable to use the standard contour, have given rise to much discussion but little definite action. For example, it was found that the flange $\frac{3}{4}$ in. high was distinctly more in favor than the higher flanges and the discussion at the several conventions has brought out that the use of the higher flanges, while perhaps more nearly ideal, is impracticable because of the existence of large amounts of old tram rail which is likely to remain in the streets and in use for some time to come. The thickness of the flange at the throat has also, more recently, been attacked as being too great, causing undue wear on the back of the flange. The $1\frac{3}{16}$ -in. thickness was determined upon in order to make it possible to get more of the gray metal up into the flange, and thus reduce the chipping. There has also been much discussion in regard to the taper of the tread.

These considerations led to the submission in 1916 by the committee on equipment of a new set of three contours which it first recommended for adoption as standard in revision of the 1907 standards. It then withdrew its recommendation after extended discussion at the convention. The committee's recommendations in-

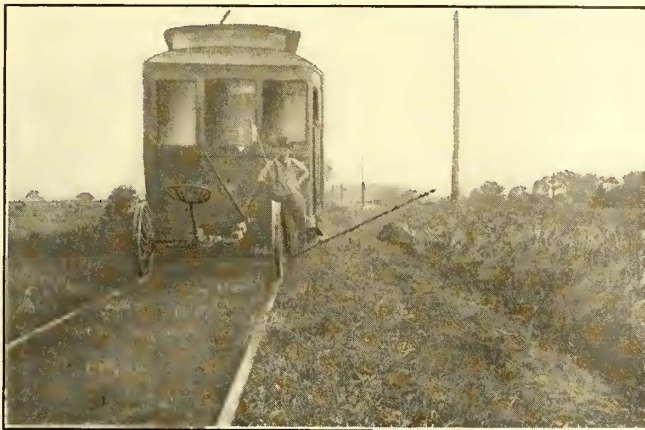
cluded three designs as follows: Wheel A was to have a 3-in. tread and a flange $\frac{7}{8}$ in. high and $1\frac{3}{16}$ in. thick; wheel B, a 2½-in. tread and a flange $\frac{3}{4}$ in. high and 1 in. thick, and wheel C, a 2½ in. tread and a flange $\frac{5}{8}$ in. high and 1 in. thick; this matter will undoubtedly be brought up again for further consideration at the convention this year and some change made from the 1907 standards, which still stand.

As to standard dimensions, other than contour, for the cast wheel, it appears that no standards or recommendations covering dimensions have been passed by the Engineering Association.

STEEL WHEELS LIKEWISE UNSTANDARDIZED

Strange to say, there has been no standard adopted for the contour of steel wheels and there have been no recommendations made in this connection. While the standard contours of 1907 have been applied to a certain extent, these were developed before the advent of steel wheels and to meet the characteristics of the cast wheels, and obviously cannot be considered as best suited to the newer, more ductile wheel.

In 1909 the committee on equipment recommended for adoption as standard, certain dimensions for rolled steel wheels. This subject passed through successive stages



ber could be reduced about 90 per cent, if the equipment engineers would establish satisfactory standards. This would seem to indicate a course of action to which early study might well be given.

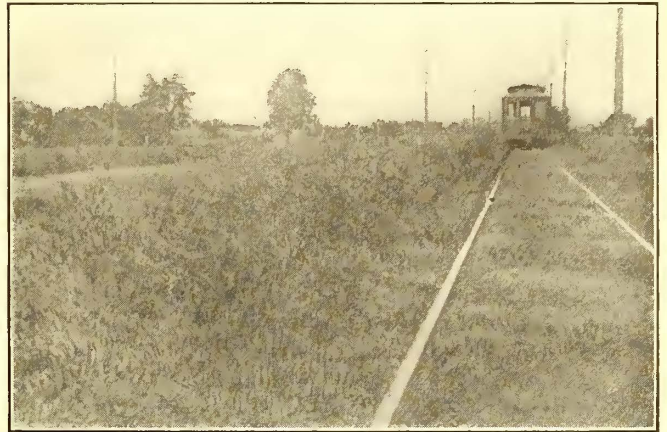
Mowing Weeds on Interurban Right-of-Way

BY EDWIN MAIN

Chief Engineer Rockford & Interurban Railway

WEEDS spring up profusely along a right-of-way, especially if through lack of both labor and finances it has been impossible to keep the roadbed properly worked over. It is a long, slow job to mow miles of right-of-way by hand, and to more expeditiously handle such a situation the Rockford & Interurban Railway has drafted into service a standard farm mowing machine and substituted a single-truck motor car for the customary pair of horses.

An Emerson Brantingham standard 7-ft. mower is used with the wheels replaced by city electric car wheels of the same diameter. In order to obtain standard gage it was also necessary to install a new axle. The sickle bar was a little too long to clear the poles of the two-



AT LEFT, MOWER COUPLED TO STREET CAR ON ROCKFORD INTERURBAN; AT RIGHT, WEEDS IN NEED OF CUTTING ON INTERURBAN RIGHT-OF-WAY

of development and the 1911 convention adopted as "recommended practice" a table of dimensions for steel wheels of 33, 34, 35, 36 and 37-in. diameters with tread faces 2½ in., 3½ in. wide, flange heights of $\frac{3}{4}$ in. and $\frac{7}{8}$ in. flange thickness of $1\frac{3}{16}$ in. Since then nothing further has reached the stage of printing in the Manual, although the subject has been brought up. For example, in 1916, the last convention, a revision of the dimensions was recommended for adoption as standard but the recommendation was withdrawn. It comprised two tables; one was for wheels of 2½-in. tread diameters from 21 in. to 34 in., and flanges $\frac{3}{4}$ in. or $\frac{5}{8}$ in. high and 1 in. thick; the other for 3-in. and 3½-in. tread wheels of 34-in. and 36-in. diameters and flanges $\frac{7}{8}$ in. high and $1\frac{3}{16}$ in. thick. This subject will come up for consideration again at the coming convention.

So the situation now is that there is a standard contour for cast wheels and a set of recommended dimensions for steel wheels, both in unsatisfactory standing. There exists no standard dimensions for the cast wheel and no standard contour for the steel wheel. The result is an absurd multiplication of the number of styles of wheels which the manufacturers must supply to meet the individual fancies of each road, and no doubt this num-

ber could be reduced about 90 per cent, if the equipment engineers would establish satisfactory standards. This would seem to indicate a course of action to which early study might well be given.

The tongue of the mower acts as a safety valve and is therefore constructed of a grade of oak which will break should the sickle bar hit a stump or pole. The tongue is made of 4-in. x 4-in. oak about 7 ft. long, and extra tongues are carried for emergency use.

The mower is coupled behind a single-truck two-motor car with plenty of resistance temporarily built into the interior of the car so that the equipment may be operated on two or three points. This gives a speed of about 5 m.p.h. The crew is composed of three men including a motorman, a mower operator and a man to raise the sickle when necessary.

On the divisions equipped with double-pole construction, 12 miles per day is the average mowed. About 7 miles per day is accomplished on the divisions equipped with single-pole construction.

On July 1 the Glasgow (Scotland) Tramways Department celebrated the completion of twenty-five years of municipal operation of the local system.

The Net Result of the 5-Cent Fare*

History of Its Effect on a Large Company Carried Through Three Generations —The Lesson From This Pointed Out

By JAMES R. BIBBINS
The Arnold Company, Chicago

IT IS ONLY the happy medium between radicalism and the baneful influence of the reactionaries that will perpetuate stability. This sane viewpoint can best be encouraged by the study of what may be termed the "Three Generations," past, present and future, of the street railway.

This may be illustrated by the investment history of a large railway property operating in one of the large cities of the United States, showing in cold figures the result, on the one hand, of the corporation's policy of rapid electric development (possibly too rapid), and, on the other, of the city's determined adherence at all costs to the letter of the franchise law—the 5-cent fare. In other words, this case shows clearly the net result of the 5-cent fare carried back through nearly six decades, starting with the Civil War and ending just before the war-price boom of 1917-18 began.

This company started with a few horse-car lines and extended very gradually until the period of electrification began, about 1890, when the property had an investment less than one-third of that of today. The lines were then all electrified; a very large proportion of the horse-car investment was abandoned during reconstruction; ill-considered competitive construction was permitted by the city, and extensions did not settle down to a normal rate until 1900, ten years later. Thereafter normal expansion continued at a moderate rate, especially in the later years.

THE DOUBLE CYCLE OF UPS AND DOWNS

The earning capacity of the property provided liberal operating funds and during the middle of the horse-car period the net earnings were gratifying, as seen in the accompanying chart. Then maintenance, renewals and depreciation began to mount, and net earnings finally vanished altogether in 1894, when the maximum renewal and replacement expenses occurred. After 1900 favorable net earnings again appeared and (excepting during the 1908-9 panic) continued up to the time of the war, but at a much lower rate. To-day, due partially to mounting renewal expenditures, the result is a duplication of the deficit in 1894, thus showing practically two complete economic cycles during the period of nearly two generations. For the entire period, the weighted average net earned on net plant investment was as follows:

Horse-car period, slightly over 8 per cent (on an average investment about one-seventh of to-day's). Electric period, about 6½ per cent.

By all rights and economic laws, we are justified in considering such a property as a permanent or continuing operating investment for the same reason that service is a perpetual necessity. Therefore, it is proper to consider the financial result throughout the entire period, referring all results to what may be termed a

fair standard money rate for the funds infested. This rate will always be reflected by the money market, which is sensitized to public opinion perhaps more than any other factor in business and finance. It is a known fact that the money rate of the earlier years, when horse-car traction was installed, was higher than to-day, due to the uncertainty regarding the future of the business and the corresponding risk to the investor. Moreover, in those days the words "depreciation" and "amortization" were practically unknown, and the future was admittedly obscured in undue optimism (on which basis fixed fare franchises were generally negotiated). Therefore, the prevailing money rate, while apparently representing net return on investment, actually represented that return minus a proper depreciation reserve. We know to-day, to our sorrow, that such a reserve should have been established to absorb the unavoidable permanent shrinkage in assets or plant value due to age, obsolescence, change in the art, trend of public opinion toward socialization of industry, etc.

But the public to-day wants to pay only "depreciated value" for utility properties, likewise rates based upon that value. Obviously, the corporation cannot return to the original investors the principal of their investment without having in fund a sufficient accumulation to absorb this permanent shrinkage in principal, which amounts to 20 or 30 per cent in a normal growing property and possibly over 40 per cent in a stationary property, both of which have been operating for a sufficiently long term of years to exceed one complete average life cycle of its principal depreciable parts. Therefore, the supposed return indicated above really means a net return on investment at least 1 per cent lower or about 7 per cent and 5½ per cent., respectively. Both rates are manifestly below the standard money market rate for new money invested in such enterprises during those periods.

PUTTING THE RESULTS IN TERMS OF DEFERRED EARNINGS

Now let us assume a definite money rate (for example, 1860 to 1875, 9 per cent, 1876 to 1890 8 per cent, 1891 to 1917, 7 per cent), and observe the final result to-day. In other words, assume that the property should have earned these rates of net return, applicable to interest only, and carrying forward each year the resulting surplus and deficit, as the case might be, to a cumulative total as of to-day. At these rates, this property actually showed in 1917 an aggregate deficit or deferred earnings amounting to nearly one-half (45.9 per cent) of the existing plant investment. The horse-car period practically sustained itself at par up to the year 1890, based upon the above assumptions, but during the succeeding electric period, a continually increasing recession in earning power and accumulated deficit occurred, with no hope of ever catching up, on a 7 per cent net basis.

*Abstract of paper presented at meeting of Western Society of Engineers, Chicago, Sept. 8, 1919.

If the electric period be considered alone, an assumed rate of 7 per cent net return resulted in an accumulated deficit of over 50 per cent of the plant value, and a rate of 8 per cent, in the enormous deficit of 123 per cent of the plant value.

In fact, only with an assumed rate of 6 per cent did the electric property finally emerge from the long period of deficits, with a small surplus (6.28 per cent of the plant value), which has since been entirely wiped out and the recession continued. And the above results do not take cognizance of the necessity of a continued depreciation reserve, but only of the renewals spent or actual depreciation which had matured; that is, unless we assume that the net returns to the investors were about 1 per cent lower than stated above, i.e., 6 per cent for the electric period, 7 and 8 per cent for the horse-car period.

Corporate deficits have to be financed somehow. In this study it is assumed that the deficits were financed during the slumps on borrowed money at the rate indicated. Similarly, annual surpluses, when they occurred in the mid-periods, when the properties were comparatively new, were assumed to be put immediately at interest and credited at the same rate. Thus the zero-line of surplus-deficit indicates what may be termed "par" on the money market with respect to true operation and without reference to stocks and bonds.

THE 5-CENT FARE HAS PRODUCED INSTABILITY

Admittedly, the results are not encouraging. In fact, they point a menacing finger toward the condition of a losing venture, as one expressing normality rather than abnormality. But the basis of a losing venture entirely upsets the normal equilibrium of values, cost of money, and operating efficiency. In the long run, adherence to unstable conditions of revenue, maintenance, or cost of money inevitably leads to dissipation of investment and ultimate reorganization.

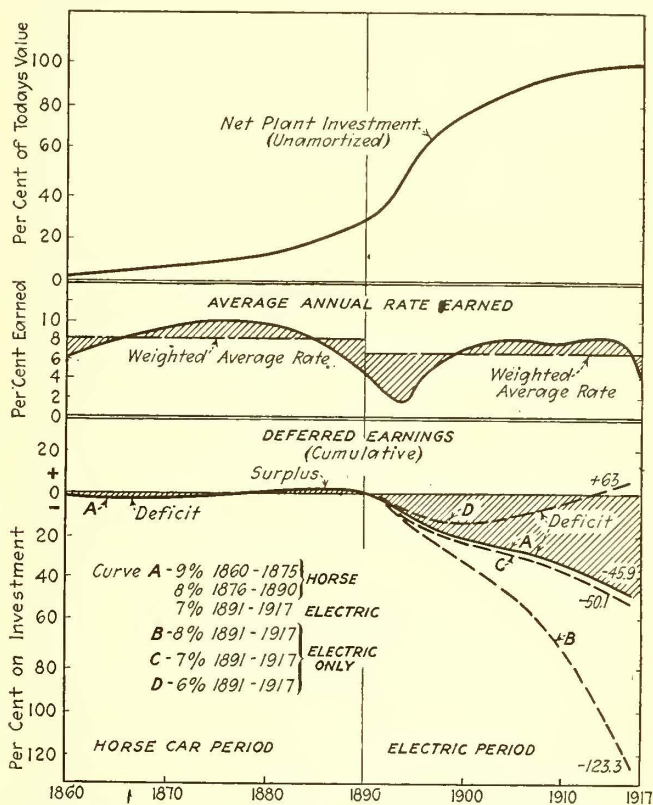
The net result of this study is clear—that the 5-cent fare has not here produced stability, due largely to its gradually decreasing purchasing power.

It is idle to say that the company should have established depreciation funds long ago, for such knowledge as we have gained today by bitter experiments is not retroactive and it is quite pertinent to raise the question whether in this property even the municipality itself could have taken over the old horse-car properties, electrified them and operated them up to the present time at "par," with a 5-cent fare limit.

The problem for the future therefore is one which involves the re-establishment of stability in the industry. To jump at mere expedients, such as scaling down plant investment or lightly assuming low money rates clearly below the market rate, or fancied savings through public operation, is to ignore the plain facts of history and the unmistakable trend of the present. The real solution will require more intelligent and fair-minded treatment, and it seems to the writer incumbent upon the engineering profession to lend its weight in rectifying the obvious mistakes of the banker and the lawyer in handling these technical problems of utility development, and particularly to educate the public through all possible channels to a more thorough appreciation of the fundamentals upon which sound and stable utility operation must be conducted, whether by corporation or municipality.

The results are one and the same. We cannot escape the consequences of violating economic any more than

normal laws. To the writer, these historical valuations have been more illuminating and convincing than all the volumes of opinion evidence which have been spread upon the public records. But they must be made with judgment and understanding of the conditions of the growth of the industry in adjusting physical accounting standards to present-day precision. In this respect, corporate records are invaluable, and it is the writer's belief that if every utility could have opened its corporate history to public inspection, much of the prevailing misconception and lack of co-operation could have been avoided. In this particular case, the final investment determined independently and entirely from corporate records properly adjusted as above noted, came within less than 1 per cent of the appraised cost to reproduce new as of the same date, using normal



INVESTMENT HISTORY OF A LARGE RAILWAY PROPERTY OPERATING ON A 5-CENT FARE THROUGHOUT THE TWO PERIODS CONSIDERED

prices, approximately those actually paid for constructing and renewing the property.

The problem of the future or the third generation requires another discussion too involved to be attempted here. Suffice it to say that it seems hardly reasonable or equitable to present to the future generations a property quite free from the burdens of past development while this same future generation is reaping enormous benefits in appreciation of values which have been brought about as a result of this rapid development largely through the agency of the utilities. In other words, each generation ought to stand on its own feet. If errors have been made, they should be reasonably allocated or distributed, which can be done as an actuarial problem without unduly burdening any period or party to the common misfortune. This policy seems to hold the maximum of fairness and equity in dealings with the co-partners of the business—public, investor and labor.

Program

For the October Convention

THE convention for 1919 to be held at Atlantic City is expected to be the largest and the best ever held by the industry. To date approximately 57,000 sq.ft. of space has been allotted to exhibitors and the association expects that several more thousand feet will be taken before the opening.

The subjects to be considered at the American Association meetings, which open in the Greek Temple at 9:30 a.m. on Tuesday morning have already been announced by Secretary Burritt and should prove of much interest to all those who are at this time concerned in the welfare of the industry. Among the committee reports which will be of the greatest interest, will be that of the Committee of One Hundred giving a complete review of its work at Washington in connection with the hearings before the Federal Electric Railways Commission. The question of direct affiliation of the manufacturing companies in an affiliated association will be decided and already a proposed form of constitution and by-laws has been drawn along lines somewhat similar to the other affiliated associations except that it provides for two members in addition to the president on the executive committees of the parent association to be elected on the floor of the convention.

Changes are also proposed in the constitution and by-laws of the American Association so as to provide for the legal representation of manufacturer companies on its executive committee as proposed in the new constitution and by-laws of the Manufacturers' Association.

A preliminary program of the subjects selected for the American Association convention follows:

Some Features of Service-at-cost Plans — Cincinnati; Youngstown; Cleveland; Montreal.

The Public Service Railway Company's Zone System.

What Must be Done with the Electric Railways Before They Can Again Find a Market for Their Securities?

Labor and the Electric Railway Industry.

The Relationship of Items of Cost under Pre-war Conditions and To-day.—, Can These be Collected from the Traveling Public?—, Are They Likely to Develop Permanent Competition?

Report of the Committee on Valuation.

Report of the Committee on Zone Systems.

Report of the Committee of One Hundred.

The Association itself has an exhibit this year showing the benefits to be derived from membership. It will display some of the work actually performed by the information bureau for member companies.

In the Transportation & Traffic Association meetings only four committee reports will be presented, and it is planned to complete the discussion of these reports in the allotted time. Different phases of each subject have already been assigned to various members for discussion and, it is hoped that the points brought out by the committee will be further amplified by the discussions.

In addition to the regular reports there will be presented a complete review of the safety car situation supplemented by a movie film covering all the fundamentals of safety car operation, both from the public and operators' standpoint. This film has been prepared at the expense of certain manufacturers interested in this subject and is to be presented to the Association. In this way, companies which are considering the installation of such cars can secure it for showing in their territory and thus be better able to secure a more favorable reception from their patrons when the safety cars are introduced.

The Accountants' Association, in addition to its regular committee, reports a plan to have several addresses pertinent to its work.

On the program the Engineering Association, in addition to its regular committee reports, there will be several addresses. N. W. Storer of the Westinghouse Electric & Manufacturing Company will speak on "Electric Motors vs. Gasoline Motors in Street Railway Service" and Maj-Gen. Wm. J. Snow, chief of Field Artillery, U. S. A., will give an address on "Field Artillery." Col. Henry Hodges of New York is also expected to address Tuesday's meeting on "Construction Work in France."

The Claims Association plans four papers by its members with written discussions covering "Experience with One-Man Cars," "Advisability of Fixed Schedules for Injuries to Persons Other Than Employees," "Organization for Public Accident Prevention Campaigns" and "Speed in Its Relation to Accidents." Supplementing these papers and discussions will be shown the safety educational picture of the Public Service Railway Company—"Comrades of Success."

Secretary Burritt has also announced that the executive committees of the various associations will all hold meetings in Atlantic City prior to the opening of the convention.

The entertainment features of the convention will be of an attractive nature. The grand reception is to be held on Monday night at the Million-Dollar Pier. Rolling chairs which have heretofore been provided for delegates in traveling to and from their hotels will not be provided by the Association.

Federal Commission Questionnaire

The Federal Electric Railways Commission Has Issued a List of 168 Questions on Electric Railway Topics

THE Federal Electric Railways Commission in its study of electric railway financial conditions has issued a questionnaire to be mailed to every city in this country where there is an electric railway. A copy of the letter of transmission, signed by Mr. Ogburn, executive secretary, and questionnaire, follow:

DEAR SIRS:

The Federal Electric Railways Commission, appointed by the President of the United States to investigate the condition of the electric railway industry of America, asks you to aid it in obtaining the data necessary for compiling a report to the President.

The Commission is conducting this investigation with an appropriation of only \$10,000 and the commissioners are serving without compensation, and in order to perform its work it must seek the aid of those who are interested. Already a fine public spirit has actuated many leading citizens of America to come to Washington and testify before the Commission, giving it the benefit of their views. We believe that this same public spirit can be appealed to in order to obtain more detailed information relative to the transportation questions in each community. The Commission is not making a study of any local traction problem *per se*, and of course makes no recommendation relative to any locality; but it does wish to make a study of each electric railway, urban and interurban, in the United States and its relation to the communities served because of the bearing each local situation has on the problem and because a report to the President would not be complete without a study of each local situation.

This is a matter in which every citizen must co-operate if the public is to continue to receive the urban and suburban transportation service to which it is entitled.

May we not ask, therefore, that you supply us with as much information as possible concerning the street railways in your city and vicinity? We have asked a number of questions in order to direct your attention to the lines of inquiry we are making, and we should appreciate very greatly your answering *categorically* each question, and adding to your answers any information dealing with any phase of the subject which you think ought to be brought to the attention of the Commission.

It will be observed that a few of the questions can be answered only by the electric railway company itself.

Will you try to have your answer mailed to us within a week after the receipt of this questionnaire?

(NOTE: The following questions are based upon the assumption that there is one unified transportation system in your city. If there are two or more such systems separate and distinct, will you treat each system separately in your answers?)

I. ORGANIZATION AND CAPITALIZATION

1. What is the name of the electric railway serving your community? If more than one, give names of all, including surface lines, elevated lines and subway lines.

2. Is the system made up of several companies consolidated into one?

3. Will you state briefly

- (a) The development of the street railway system in your community, giving the names of the companies going to make it up, when organized and when electrified (if originally steam or horse cars).
- (b) How any consolidations were effected and by whom and the dates of such consolidations.
- (c) The securities outstanding on the underlying companies.
- (d) The securities outstanding on the holding companies.
- (e) Whether underlying companies were sold to present companies and at what purchase price or whether leased and at what annual rental.
- (f) The original cost of the separate and combined systems.

4. Was the construction work of any of this system done by separate contracting companies? If so, were the owners of the street railway financially interested in such contracting company?

5. In whom does the stock control of the system rest?

6. Has the public utility commission of your state or the municipality ever made an appraisal of the value of the transportation system of your city? Has there been an agreed valuation, as in Cleveland, Seattle, etc.? What was the appraised value of each integral part of the system? What was the total valuation? What relation does that total valuation bear to the total securities outstanding?

7. What is the amount, if any, of watered stock in your system? How can this be shown?

8. At what discount, if any, were the bonds sold? At what discount was the stock sold? What stock, if any, was given as a bonus with the bonds?

9. If a holding company, as lessee, leased the lines which are owned by other companies, what is the basis of the rentals paid? What income on the appraised value of the lines is represented by these rentals?

II. OPERATION

10. Will you give the last annual statement of the total operating expenses, gross revenue, and the net income, showing allowances for depreciation, taxes, interest, dividends and surplus? Will you give same figures for past ten years?

11. What is the total mileage of the system? What is the number of revenue passengers per car-mile? What is the total population served? What is the total area of the city?

12. Does the company sell electric power? If so, what proportion of its income is derived therefrom, and what proportion of its total expenditures is incurred therein?

13. Does the company sell gas? If so, what proportion of its income is derived therefrom, and what proportion of its total expenditures is incurred therein?

14. If the company has a power department, at what rate per kilowatt-hour is power furnished its transportation department?

15. What sums annually have been set aside and expended for past ten years for maintenance, depreciation and obsolescence?

16. Is the service regulated by a state commission or by the municipality? Are there complaints about overcrowding of cars, infrequency of headway, etc., or is the service generally satisfactory?

17. What economies of operation have been installed within the past several years?

III. FARES

18. What is the present rate of fare?

19. Is the fare fixed by franchise?

20. Has the State Commission authority to establish maximum fares?

21. What changes, if any, have occurred in the rate of fare, and when?

22. Has the company sought to increase its fare since the beginning of the European War in 1914?

23. What reasons were given for making the request for an increased fare?

24. Were these reasons accepted by the community as sufficient, or did the community treat them as insufficient?

25. If the fare has been increased, what has been the effect on the traffic?

26. If there has been a fare increase, by what authority was it allowed? (If by the decision of a state commission or of a court, please give exact reference, and if possible an abstract of the decision.)

27. Was the increase in fare based upon a valuation of the property?

28. What effect has an increased fare had upon the operating revenues of the company?

29. What methods must be pursued in your state to effect a change of fare?

30. Has there been a case where either the court or the state public utility commission has upheld it or has set aside a franchise or a legislative enactment under which

the rate of fare was fixed? If so, please give reference or copy of decision.

31. Is a zone fare charged either within the city or on suburban or interurban lines? If so, what is the zone fare and the length of the zones?

32. If there has been a change in the rate of zone fare, please give the present rate and the former rate, the present length of zone and the former length of zone.

33. What is the method of collecting and auditing zone fares?

34. If a zone fare plan has been recently inaugurated, has such a system had any noticeable effect on suburban development?

35. In your opinion, should the car rider pay the same fare regardless of the distance he rides, or should there be a different fare for the man who rides one mile and one who rides ten miles? Please give reasons for your answer.

36. In your opinion, should fares be fixed by franchise for the duration of the franchise or should fares be subject to adjustment to meet changing needs and conditions?

37. Do you favor control and regulation of fares by a state commission or by the municipality itself?

38. Does the company issue universal transfers free? If not, what charge is made for transfers?

39. Does it issue a transfer on a transfer?

40. If there is more than one company, are free transfers issued from the lines of one company to those of another?

IV. WAGES

41. What is the rate of wage per hour now paid to the motormen and conductors?

42. What is the average daily wage?

43. What was the hourly rate of wage paid to motormen and conductors in 1914?

44. What is the total annual payroll of the company?

45. What percentage of the fare paid goes to labor? What was it in 1914?

46. Was the present wage scale fixed by the National War Labor Board?

47. What wage is paid for overtime? What is the percentage of overtime worked?

48. Has the increase in wages kept pace with or exceeded the increase in the cost of living? (NOTE: Increase in cost of living is estimated by the Bureau of Labor Statistics, Department of Labor, at about 80 per cent since Jan. 1, 1915.)

49. What is the hourly wage rate paid all machinists, blacksmiths, painters, carpenters, etc., in the company's shops? What is the union scale for this same classification?

50. Are the employees organized into a Local of the Amalgamated Association of Street & Electric Railway Employees of America?

51. Does the company recognize and deal with its organized employees?

52. If the company has a contract with its employees, do both sides live up to the contract?

53. Is there a proper spirit of co-operation between the company and its employees?

V. TAXES

54. Give annual state tax paid by the system for the past ten years. On what basis was the tax estimated?

55. Give the annual taxes paid to the city for the past ten years. Separate into various kinds.

56. What Federal taxes are paid?

57. Please list the other state, county or municipal requirements for

(a) Paving and extent of this requirement—whether between tracks only, or outside of tracks also, and if the latter, state number of feet of paving required,

(b) Bridge assessments or tolls,

(c) Cleaning streets,

(d) Snow and ice removal from surface other than tracks,

(e) Free transportation of public employees.

58. How do the total taxes paid by the company compare with the total taxes paid by other business and by owners of real estate?

59. Is the street railway taxed on the basis on which other interests are taxed?

60. Is the taxation of the street railway based upon income or money invested, or both?

61. What should be the basis, in your opinion, on which the street railway is taxed by the municipality?

62. To what extent should the state tax the street railway?

63. To what extent should a company, not earning anything at all upon the investment, be taxed?

64. To what extent should a company, not earning anything on the investment above interest on bonds, be taxed?

65. Would you favor remitting company's taxes to make up an operating deficit?

VI. FRANCHISES

66. Can you furnish us with a copy of the franchise under which the street railway operates? If not, will you give the substance of such franchise?

67. Where is the power to grant franchises lodged?

68. What are the requirements as to approval of franchise by the people?

(a) When the present grants were made?

(b) At the present time?

69. What is the duration of the present franchise or franchises, and when granted?

70. What are the provisions regarding forfeiture?

71. What are the provisions for renewal?

72. Is the right to purchase reserved by the municipality? At what intervals? At what valuation?

73. What basis of value should be used where the franchise has expired?

74. Is the exclusive right of operation within prescribed territory conferred?

75. Is the company under this franchise protected from competition?

76. Are there any restrictions upon the acquisitions of competing companies?

77. How may routes and lines be changed?

78. If adjacent territory is annexed by the city, is the franchise automatically extended to cover this territory?

79. Can extensions of lines be compelled by the city or State Commission? Is a new franchise required?

80. If the fare is fixed by the franchise, does such fare provision extend to new lines built in territory annexed by the city after franchise was granted?

81. Are there any restrictions in the franchise upon the rate of return on the company's investment?

82. What control, if any, is exercised over issuance of securities?

83. What provisions, if any, are there relative to the sharing of profits with the municipality?

84. Is a franchise tax required?

85. If the rate of fare is not fixed by franchise, how is it fixed?

86. If the franchise provides for what is known as the service-at-cost plan, please give details, what charges are allowed in making up items of cost, the order thereof and a statement as full as possible of the plan of such service-at-cost franchise.

87. How may fares be changed under such service-at-cost plan?

88. Should the contract establish a maximum charge? Should it establish a certain return on investment or value which is not subject to change during life of contract, or should the question be opened at stated periods?

89. Do you favor a service-at-cost plan? Give reasons for your answer.

90. Do you favor a franchise for a term of years, or an indeterminate franchise? If you favor an indeterminate franchise, what general conditions should be incorporated as to rates, regulations, purchase, amendments, etc.?

VII. ECONOMIES OF OPERATION

91. Is the "skip-stop" plan in force on any part of the system?

92. What was the average distance on a typical route between stops before the change to the skip-stop plan? What is it now?

93. What per centage of stops has been eliminated?

94. Why was the skip-stop plan inaugurated and when?

95. Is the public content with the skip-stop plan?

96. Has the company abandoned the skip-stop plan after once putting it into effect?

97. What benefits were obtained from the skip-stop plan?

98. What economies in shop operations have been put into effect?

99. Has the company one-man cars in operation? If so, how many?

100. What is the total number of cars operated?

101. What is the average weight of the cars on the system?

102. What is the average weight of the one-man cars?

103. Were the one-man cars converted from the former type or are they of the Birney or other safety type?

104. What benefits have been derived from the operation of one-man cars and has the public been satisfied with their use? Have the trainmen been satisfied with their use?

105. Does the operator of a one-man car receive a higher

wage than the regular motorman and conductor, and if so, how much?

106. What is the consumption of power per car-mile with the Birney car as compared with other types?

107. Have schedules been increased on lines using one-man cars? If so, to what extent?

108. How have earnings been affected by the use of one-man cars?

109. What is the life of the light-one-man car?

110. How have accidents been affected by the use of one-man cars?

111. How are fares collected and audited on one-man cars?

112. Do you favor an extension of the use of one-man cars?

113. What other economies of operation have been put into effect or are being considered? Have damages for accidents been reduced in recent years?

VIII. INTERURBAN LINES

114. If any interurban lines enter your city, will you give the name of such lines, give the schedules they maintain, compare the service rendered by such lines with service rendered by steam lines?

115. Compare the service of such an interurban line with the service rendered by automobiles and auto trucks.

116. Does such an interurban line have to meet automobile competition? If so, to what extent, both in passenger and freight?

117. What is the fare charged on the interurban line?

118. What is the total mileage of the interurban line and the total population served?

119. What size and type of car is used?

120. Are trains with more than one car operated?

121. Are sleeping cars carried?

122. What wages are paid the trainmen?

123. How do these wages compare with the wages paid on steam lines?

124. Are these interurban lines owned or affiliated with any steam lines?

125. Are they used as a feeder for any steam lines?

126. Do they carry baggage, express and freight on city streets?

127. Are any of these interurban lines interstate lines?

IX. GENERAL

128. What is the financial condition of the street railway system in your city?

129. How has this been shown?

130. Is the financial condition of this system such that an impairment of service is threatened? How would such impairment of service affect the social and business life of the community?

131. Is the financial condition such that the owners are receiving no return upon the money actually invested?

132. If, by reason of the financial condition of the street railway system, in your city, the public is threatened with an impairment of service and the owners with a loss of earnings upon the investment, what solution of the problem do you advise?

133. What shrinkage, if any, has there been in the market value of the stocks of the company since the maximum market value was reached? Of the bonds of the company?

134. Is the company in the hands of a receiver?

135. If so, what occasioned the appointment of a receiver?

136. What is the total mileage being operated by the receiver?

137. Has the operation of any lines been abandoned? If so, what mileage?

138. What are the annual capital requirements of the company?

139. Where does the company obtain the funds for these requirements?

140. What interest does the company have to pay for borrowed money

(a) On bonds?

(b) On short-term notes?

141. Develop kind and extent of competition, where it exists, and whether it is growing or decreasing. What effect did increase of fare have upon it?

142. Can jitney or other form of conveyance be a real substitute for street car?

143. Is the loss of earnings by the company attributable to automobile or "jitney" competition? If so, are jitneys subject to the same regulation that is imposed upon the street railway companies? If not, to what extent are jitneys regulated and by what authority?

144. Has the system unprofitable lines and extensions?

145. Should such lines be discontinued or the service thereon reduced?

146. Should car riders pay an increased fare on profitable lines to help support unprofitable lines?

147. Do the company and its employees co-operate sufficiently, in your opinion, in the prevention of strikes and disruption of service to the public?

148. Is the attitude of the public toward the company antagonistic? If so, for what reason?

149. Is it due to a belief that the public has been accorded unfair treatment through poor service, overcrowding of cars, etc., or is it due to a belief that the company is earning large amounts of money to which it is not entitled?

150. Has it been due to any participation which the company has taken in the politics of the community?

151. Is it due to a belief that the company has paid dividends on large amounts of watered stock?

152. Is there a trend of sentiment in your community toward municipal ownership?

154. How strong is this sentiment?

155. Do you favor municipal ownership and operation of the transportation system in your city?

156. Give reasons for your answer.

157. If you favor municipal ownership and operation, do you think it should be extended to suburban lines outside the corporate limits?

158. What should be the relationship of the community to the street railway and of the street railway to the community?

159. To what extent should the state regulate the service, operation, extensions, abandonments, rates, accounting and expenditure of municipally or privately owned lines? Give reasons for your answer.

160. To what extent should the Federal Government regulate the service, operation, extension, abandonment, rates, accounting and expenditures of street railway companies? Give reasons for your answer.

161. What do you consider to be an ideal system for the regulation of the companies? Should it be:

(a) Exclusively by the municipality?

(b) Exclusively by the State?

(c) Co-operation between the municipality and the State?

Example: City to control service, operation, extensions, abandonment, rates, accounting and expenditure, subject to an appeal taken by interested parties to the State Commission, either party reserving the right to appeal from the Commission to a court.

Example: City and State to have precisely the same jurisdiction to investigate and determine question upon complaint or upon their own motion, but with the knowledge that an appeal can be taken from such an ordinance of the municipality to the State Commission.

162. To what extent and under what conditions should the State Commission fix the value of the property?

163. Where a street railway company operates between two or more municipalities, should the State Commission have any different power than over a company which operates exclusively within a municipality?

164. To what extent should the municipality control the lines which extend beyond its domain?

165. To what extent should the State control the lines which extend beyond its domain?

166. Is it good policy to have several municipalities and the State Commission exercising jurisdiction over one company?

Example: In New Jersey a single company operates in and between 146 municipalities.

167. Do you believe that the cost of securing expert service over question of operation, rates and accounting is so large that small municipalities should be able to secure better and more intelligent regulation by the State Commission?

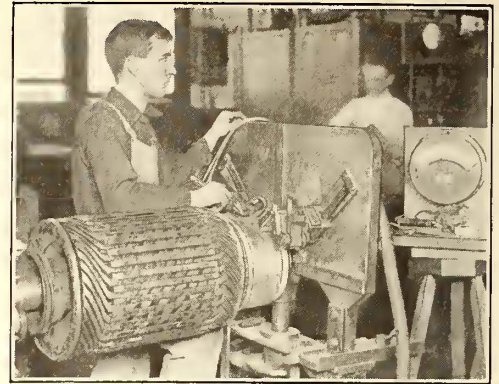
168. If the street railway company is operating under difficulties in your municipality, please give the cause and suggest the remedy. Go into detail.

In preparing the questionnaire, it was attempted to make it comprehensive of all relevant matter in order whatever angle of the problem seemed to them most important. The Commission hopes to receive the aid of Chambers of Commerce and similar organizations, central labor unions, the mayors and the railways themselves in obtaining answers.

Some Mysterious Car Ailments

Little but Important Troubles That Tend to
Keep Equipment Men Interested
in Their Work

CONTRIBUTIONS ARE INVITED FROM THE FIELD



Far-reaching Investigation Results From a Controller That Could Not Be Shut Off

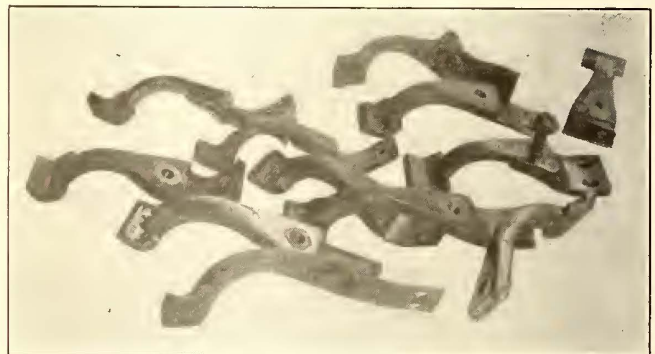
THE motorman of a car was following close behind a loaded truck by throwing his controller handle to the first position and then off again, so as to regulate the speed of the car to that of the moving vehicle. After throwing his controller handle on he suddenly found that it could not be shut off again, and before he had time to knock out the circuit breaker overhead the car collided with the truck and this resulted in serious damage and a general shaking up of the passengers. Investigation as to the cause of the sticking of the controller cylinder showed that one of the contact finger springs was broken. This finger had fallen down and become wedged in such a position as to prevent the cylinder from revolving to its off position.

This occurrence led to an investigation by the railway company's engineers as to the cause of the breaking of controller finger springs. The scrap pile of fingers and springs removed from controllers at each shop was carefully inspected, and a record was made as to the various defects that had caused their removal, and the number of each defect that was found. From this record it was seen that the breaking of finger springs was taking place almost entirely on fingers of one particular make which were not provided with shunts. The springs broke just at the edge of the fingers, and the breaking was evidently due to the use of material of unsuitable quality. A careful examination of the broken springs indicated that they were punched out of sheet phosphor bronze, and the grain of the metal in most cases ran crosswise of the spring; that is, in the same direction as that in which the crack occurred. The shunts on the fingers apparently not only increased the electrical conductivity, but also acted as cushions between the springs and the edges of the finger. Thus the bending of the spring was distributed over a greater surface and cracking was prevented.

Another type of finger which had been removed in large quantities on account of insufficiency of tension of finger springs was a type provided with shunts soldered to the springs. The soldering operation had apparently taken some of the temper out of the springs, due to the necessary heating, so that their resiliency was destroyed, as a certain amount of the phosphorus was lost due to the heating.

Investigation was also made as to the methods used by the shop men in installing fingers. At some shops it was found that in installing new fingers the men

sometimes straightened the fingers slightly. This was done by turning the controller drum around so that the finger would bear on its contact, and then striking the finger a sharp blow with a hammer. Inquiry as to reasons why the men considered this necessary elicited the information that they could not line up the fingers properly, as some were longer than others. By straightening the fingers which appeared short, adjustment was provided so that the fingers installed would break contact at the same time as others. Some of the controller men also seemed to think that by straightening the fingers there was less liability of their "sticking." This, however, was not so, as the sticking of the fingers depended upon the location of the point of support and not upon the shape of the finger. It was also found that the shopmen sometimes bent the end of the contacts down slightly, so that the fingers would ride up on them



FINGERS AND SPRINGS TAKEN FROM A SCRAP PILE

more easily. All of these practices had their effect upon the ultimate life of the fingers and springs, as the bending of the fingers sometimes injured the springs and caused a fracture later. Also, where contacts were bent down, the tension of the finger at the point of contact was less, so that arcing was produced and the heat from the arc reduced the tension in the finger springs.

In order to decrease the number of troubles caused by broken springs, it was decided that in purchasing fingers it should be specified that the springs be made of phosphor bronze drawn to the right width and thickness, and not punched from sheet metal, also, that all fingers should have copper shunts but that these shunts should not be soldered to the spring. It was also recommended as desirable that the manufacturer change his dies so that the edge of the finger bearing against the

shunt should be slightly rounded. This change would cause the bending action of the spring to be distributed over a larger surface and so would give a longer life to the spring.

Printed instructions were given to the shopmen regarding the proper method of installing fingers. The men were cautioned that the practice of bending contacts and straightening fingers must be discontinued, as there was not only the liability that the springs might bend or break but also, as the clearance provided for breaking the arc on the heel of the finger was decreased, the arc would follow down to the lower part of the finger and spring, producing burning at that point and frequently taking the temper out of the finger spring.

A Car With a Fondness for Stripped Gearing

ON AN EASTERN railway operating cars in city service, one of the cars was turned into the shop on account of a stripped pinion. All parts were given a general overhauling and several new pinions, gears and axle bearings were installed. The car was again returned to service, but imagine the surprise of all the shop employees to have this car again turned in for having stripped gearing. All hand hole covers were opened and the pinion tried. The bottom gear case covers were also removed and bars were used to try and force the pinions and gears to start, but there was no indication of anything out of the ordinary. The car was then operated up and down the shop track and appeared to be in satisfactory condition. The bottom gear case covers were replaced and the car again returned to service. This time the car scarcely got a block away from the shop before the trouble occurred again. The motorman was asked to describe what had happened and he said there was a terrible noise and grinding and the motors flashed over. The car was again operated up and down on the shop track and everything operated satisfactorily. It appeared strange that the trouble could happen on the line and did not happen at the shop so one of the shopmen took the car out on the line, and on his return reported that the trouble happened twice and from the noise it appeared like a stripped gear. The brushes were found all shattered to pieces. These were replaced and another trip made over the road with men stationed to watch the performance closely. The motors were of the interpole type and it appeared strange that the brushes should break, or that the motor should flash over.

In watching the operation it was noted that the truck nosed somewhat, and immediately after that there was a sound like a stripped gear. The motor "bucked" so that the car was suddenly stopped. The brushes in the brushholder were again broken. It was apparent that the nosing of the truck had caused the trouble. The motor was tried for excessive end play on the axle. This end play was found to be $1\frac{1}{2}$ in., which was excessive. A closer examination showed that this end play had caused the gear to strike the lip on the gear case. The car was again returned to the shop and the parts dismantled. It was found that the thrust collar on the axle had been left in its original position when new axle bearings were installed. This had resulted in the excessive end play, and had caused the trouble. The thrust collar was set in its proper position, repairs were made, the car returned to service, and it continued to operate satisfactorily.

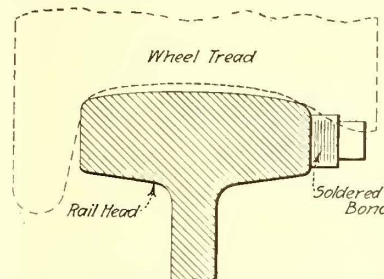
Unusual Cause for Motor Flashing

ONE of the lines of a Western railway company had both city and interurban cars operating over it. Considerable trouble was experienced on the city cars from the flashing over of their motors. As this same type of equipment operated satisfactorily on other lines of the system, it was assumed that there must be some condition peculiar to that line which was causing the trouble. While an investigation was being made as to the cause instructions were given to the motormen to operate these cars with the controllers in series position only. This operation proved unsatisfactory, as the men found they could not make the desired schedule speed.

Investigation and tests showed that whenever an interurban car came into the section its large demands for current caused heavy voltage surges on the line, and that the flashing over of the motors on the city cars resulted from these voltage surges. As increased capacity for this section could not be provided at once, it was decided to resort to the temporary expedient of connecting resistance in the trolley circuit of the city cars ahead of the controller. This resistance was made of sufficient capacity so that it would carry the car current continuously without overheating. This remedied the trouble of flashing over of the motors, but of course the operation was somewhat inefficient.

Worn Wheel Causes Bond Trouble

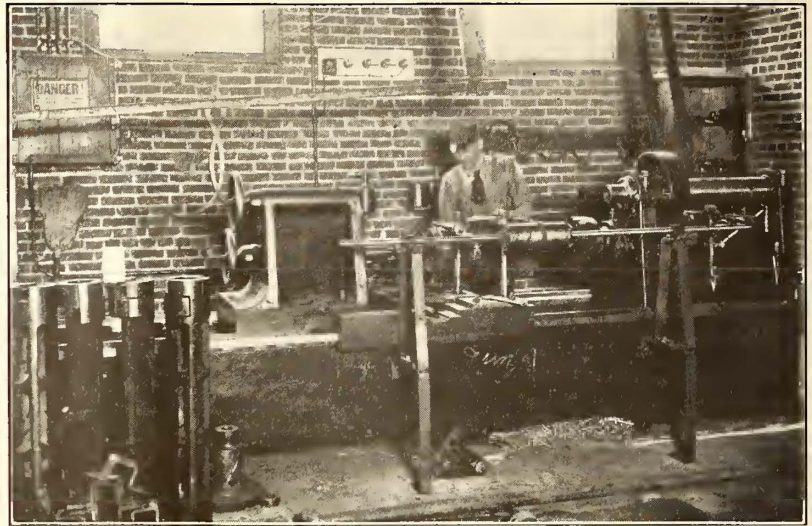
THE operation of a car with a defective wheel recently resulted in an illuminating but sad experience for a prominent railway company which operates a number of city, suburban and interurban lines. The rails of one of the interurban lines were rebonded not long ago with laminated bonds soldered to the rail heads. The line is a double-track one and is laid with



INTERFERENCE OF WORN WHEEL WITH BOND

60-lb. T-rails 60 ft. in length. It extends some 25 miles into the country, passing through several small towns. About one-half of the track is of open-type construction, the balance being on paved streets. Shortly after the rebonding was completed, track men noticed that practically all of the bonds on the open track were either lying along the track or had been partially loosened. After some little investigation the cause was discovered as a wheel which was worn grooved, as indicated in the accompanying sketch. A combination of soft wheel tread and defective brakeshoe had caused the tread to wear so rapidly that the damage to the bonding was done before the mechanical department noticed the defective wheel. As the cars were turned at one end of the run but not at the other, the defective tread came into contact with one rail on one trip and the other rail on the next trip, with the result that the bonds on both rails of the 25 miles of open track were knocked off. From the standpoint of way maintenance expense, this wheel broke all existing company records and emphasizes the fact that economical operation is secured only at the price of eternal vigilance.

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AT LEFT, SLOTTING A COMMUTATOR IN A DOUBLE-SPINDLE LATHE; AT RIGHT, REAR VIEW OF THE APPARATUS USED FOR COMMUTATOR SLOTTING

Commutator Slotting Device for Use with Double-Spindle Lathe

THE practice of slotting or grooving commutators of railway motors is now universal. The accompanying illustration shows a device which has been developed by William Mohr, master mechanic, Pennsylvania-New Jersey Railway, Trenton, N. J., for slotting the commutators of motors used by this system. As shown, it is arranged for application to a McCabe double spindle lathe.

The slotting saw is mounted on the end of a spindle which has a long bearing in a fixture mounted on an upright steel post. The base of this post is mounted on the carriage of the lathe so that the slotting saw will be moved backward and forward as the carriage is operated. A vertical adjustment is provided, so that commutators of different diameters can be slotted. This adjustment is effected by moving the upper casting up or down on the post and clamping with a set screw at the desired location.

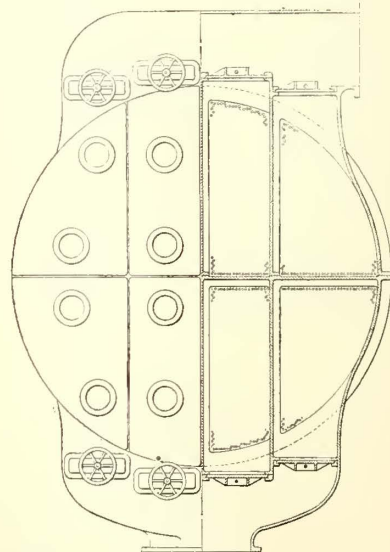
On the opposite end of the saw spindle is a pulley for driving it. This pulley is connected by a belt, which passes around an intermediate, idler pulley, with the main driving pulley located at the back of the lathe. The intermediate pulley is also mounted on an upright post fastened to the carriage of the lathe and is provided with a vertical adjustment similar to that used for the slotting spindle.

The driving pulley is made of sufficient length so that as the carriage is moved backward and forward to slot the commutator of the motor, the belt can slide along it without danger of coming off. This driving pulley is mounted on a spindle with two bracket supports at the back of the lathe. The end of the spindle is provided with a pulley for attaching a belt, the other end of which passes around the cone pulley on the lathe, so that the entire mechanism is driven through the lathe pulley. The entire apparatus can be assembled and taken apart in very few minutes, so that the lathe may be cleared for other purposes when it is not in use for commutator slotting.

Such an arrangement is of great convenience in a small shop when commutator slotting is carried out only at infrequent intervals and where lathes are used for many operations.

A New Type of Steam Condenser Construction

THE "compartment condenser" is a new type of condenser developed by the Wheeler Condenser & Engineering Company for the purpose of permitting one section to be cleaned without putting the entire apparatus out of commission. As shown in the accompanying illustration, the water space in the shell is divided into four compartments, each of which is equipped with a set of valves which control the circulating water. The condenser may be cleaned while the turbine, to which it is connected, is delivering full power, the operation consisting in shutting off the water from one



SURFACE CONDENSER ARRANGED IN COMPARTMENTS TO PERMIT CLEANING WHILE IN OPERATION

compartment, removing the cover, cleaning the tubes and restoring the compartment to its original condition. During this operation the steam space, of course, remains full of steam, the only difference being that the bank of tubes which is being cleaned is not water cooled. While none of the new condensers is as yet in actual operation, a number are on order and will be installed soon. The improvement should encourage frequent cleaning without interruption to service.

Blue Lights and Their Significance in the New York Subways

Emergency Precautions That Have Been Taken to Provide for the Cutting Off of Power, the Turning in of Alarms and the Automatic Changing Over to an Emergency Source of Power for Lighting Are Described

BY EDWARD A. PORR.

Assistant Electrical Engineer New York Public Service
Commission First District

AS A RESULT of the subway accident which occurred Jan. 6, 1915, when a cable blow-out produced smoke and fire which resulted in the tying up of the subway system in New York City and the injuring of a number of passengers, a great number of safety precautions have been put into effect in the newly arranged systems. These are designed to afford the maximum amount of safety for passengers, combined with the greatest assurance of continuity of operation.

During maximum load hours the headway is from one minute to one and one-half minutes between ten-car trains, which are usually jammed to the doors with passengers. In case of an accident or a protracted delay between stations it has been found almost impossible to prevent passengers from leaving the trains and making their way along the tracks to the nearest station. In order to safeguard passengers when they are walking on the tracks in such a case, pro-

vision has been made for turning off the power at numerous points along the line. Blue lights, which indicate the location of these emergency stations, have been installed on the same circuit as the tunnel lighting, which is independent of the third-rail power circuit. A special alternating-current feeder has been installed for tunnel and station lighting with provision, by means of an automatic changeover switch, to connect this circuit to the third rail in case the alternating-current feeder breaks down. The blue lights are so arranged and located that at least one is always visible from any point in the tunnel. The heads of all train crews are

instructed that in case of an accident or fire they are immediately to get off their trains and look for one of these blue lights. They are then to proceed to this location, where they will find a small red box which is called the "Emergency Alarm Pull Box." By the opening of this box and the releasing of a lever, cur-

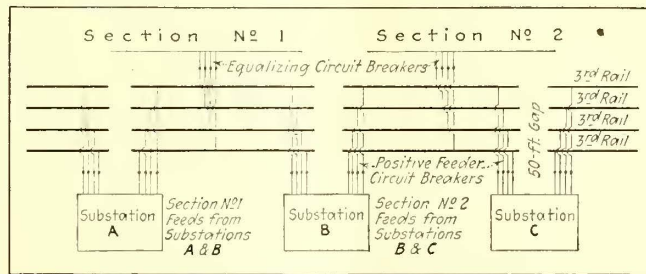
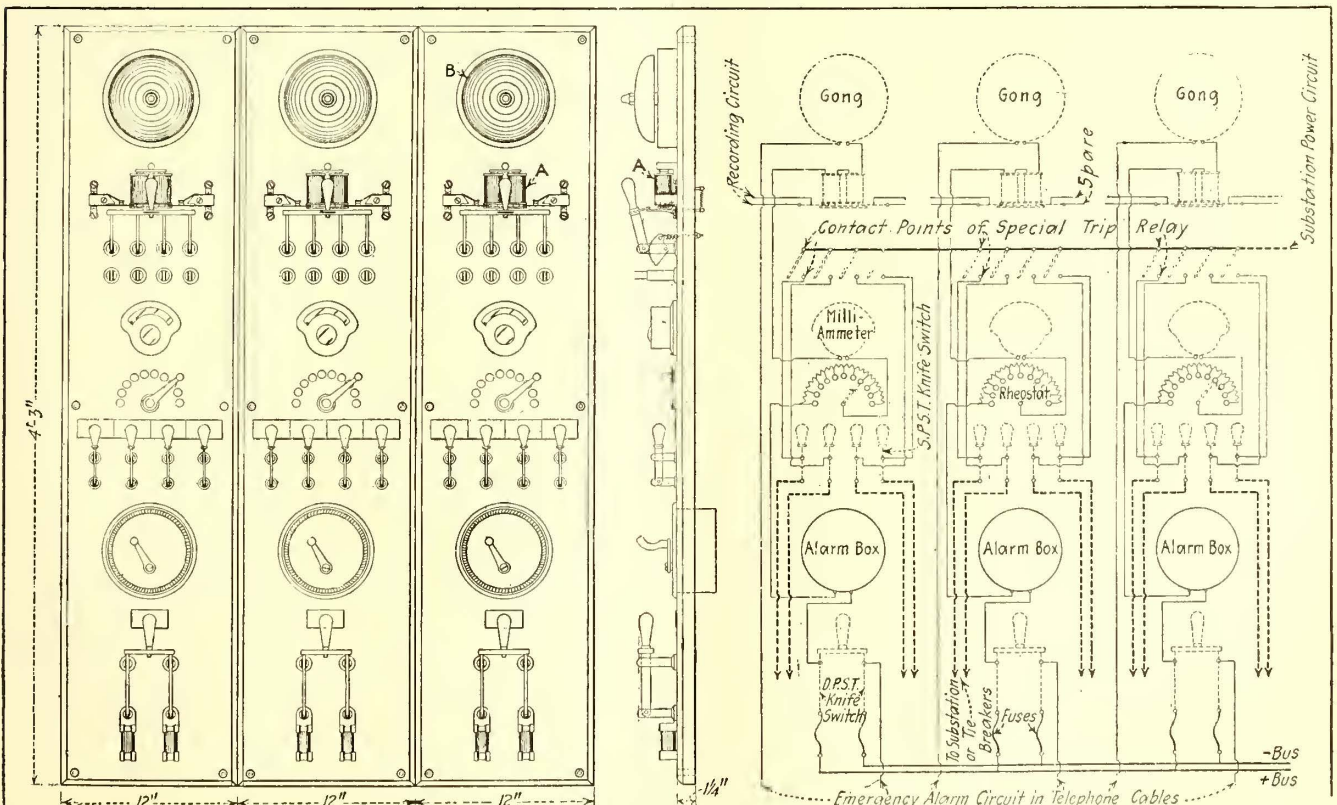
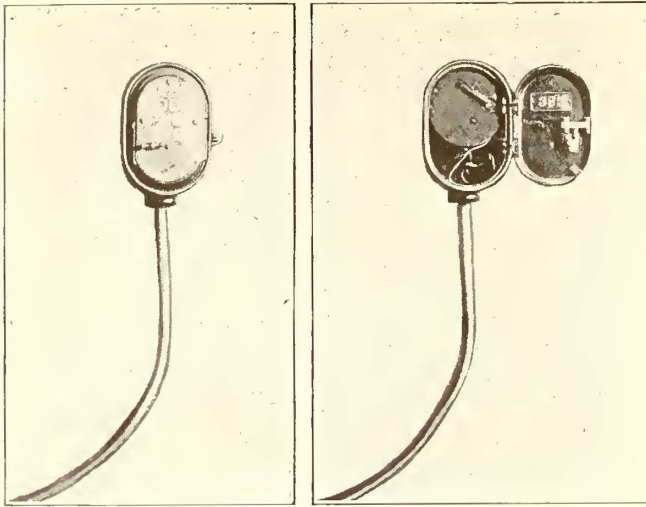


DIAGRAM OF THE SECTIONALIZING OF THE THIRD-RAIL SYSTEM



EMERGENCY ALARM PANELS LOCATED IN SUBSTATIONS

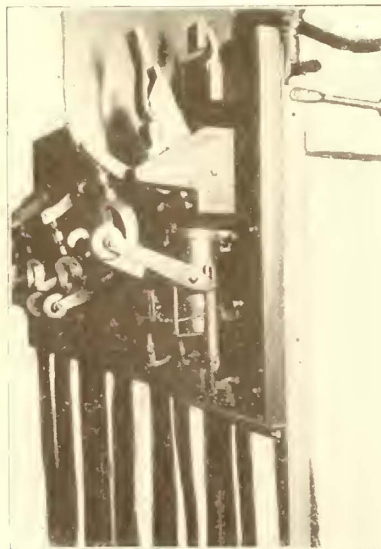


EMERGENCY ALARM PULL BOX

rent is automatically shut off from the third rail and other emergency precautions are provided for automatically. The shutting-off of power in the section where the alarm is turned in immediately stops all train movements in this section and eliminates any danger from moving trains and live rails, thus making it perfectly safe for the passengers to enter upon the tracks and proceed to the nearest exit or end of a passenger station.

TURNING IN AN EMERGENCY ALARM

By releasing the handle in the emergency alarm pull box a mechanism rotates a slotted disk. At the first break or slot in this disk the controlling current is interrupted, which opens the circuit breakers feeding this section and all equalizer circuit breakers. All of the emergency boxes in a particular section are connected on a closed circuit so that any one box can be operated to break the circuit for that section. An accompanying illustration shows the type of emergency alarm panel which is installed in the various substations. When the circuit is broken by the rotating disk in the emergency alarm pull box the coil "A" on the emergency alarm panel is de-energized. This releases the four-point switch shown immediately underneath the coil, which



EQUALIZING CIRCUIT BREAKERS OF FEEDER CIRCUIT BREAKERS

is held closed under spring tension. The closing of this four-point switch automatically closes the tripping circuit for every circuit breaker feeding this section.

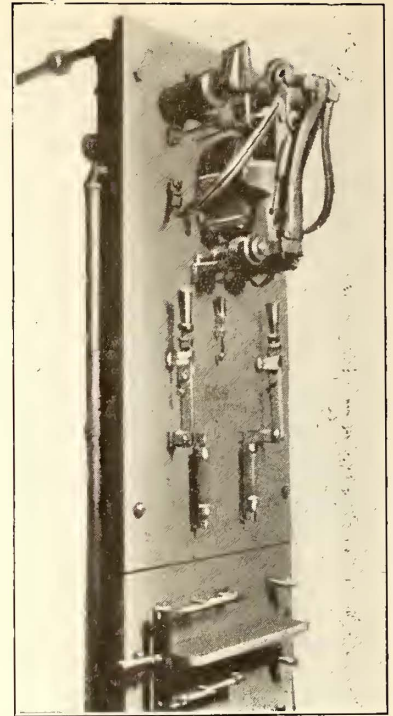
The disk in the alarm box continues to rotate until a complete revolution has been made. In addition to the de-energizing of the coils upon the emergency alarm panel, the first breaking of the alarm circuit sets a mechanism in operation which produces strokes on a large gong. This gong is indicated at "B" on the emer-

gency alarm panel. The gong rings as many times as there are notches in the emergency alarm disk. This enables the substation operator to determine the exact location of the box in the subway, substation operator as each box is provided with a different arrangement of notches on the disk.

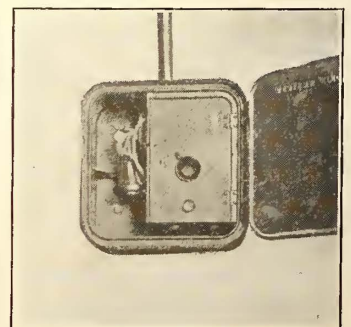
In addition to the emergency-alarm panels installed in the various substations, there is a special recording type of emergency alarm panel installed in the chief dispatcher's office, so that the chief dispatcher as well as the substation operators know at once that trouble has occurred and the location of the trouble.

An emergency telephone set is also located alongside the emergency-alarm pull box and the head of the train crew is instructed immediately to report the trouble to the proper authority as soon as an alarm has been turned in. Passengers can then proceed along the tracks with safety and can obtain exit to the street at various emergency exits. These are indicated by banks of five lights. The lights of each group are arranged on different circuits so that some of them are sure to be burning, even though another circuit due to some defect, should be open. The emergency exit doors are counter-balanced so that they operate easily from the inside of the subway but they cannot be operated by unauthorized persons from the outside.

The pulling of an emergency-alarm pull box kills the third rails on all tracks in that section, so that service is interrupted in both directions. Current is turned on again only when the maintainer of the particular section personally reports on the emergency telephone located at the alarm box which has been pulled, that either all or some of the tracks are cleared and that operation can be resumed. Upon the receipt of such a report, instructions are given to the substation operators to put power on the particular tracks designated. This is accomplished by the substation operator manip-



AUTOMATIC CHANGE-OVER SWITCH



EMERGENCY TELEPHONE SET

ulating a small switch on the emergency alarm panel which energizes the closing coil of each circuit breaker individually. These circuit breakers are located in a special compartment in the subway.

EACH SECTION IS FED FROM TWO SUBSTATIONS

An accompanying diagram shows the method of sectionalizing the various third-rail divisions and the location of the substation and circuit breakers. From this it will be seen that the third-rail distribution sections are arranged so as to be fed from two substations, and each substation feeds two sections so that if one substation should fail another source of power is provided. These sections vary in length from one to two miles. The third rails are also arranged with a gap of 50 ft. at each section break. This is done to prevent a single car from bridging a live section to a dead section, as might happen if the two shoes on the opposite ends of a car were to be in contact at the same time. It is the usual practice to install equalizing circuit breakers along the route of a section so as to equalize the load. The breakers connect the third rail to a common bus, and they are operated in conjunction with the emergency alarm like the feeder breakers. There are no parallel positive feeders used, as the electrical conductivity of the third rail is made great enough and the section short enough so that the drop in voltage is negligible.

Welding Wrought Iron and Steel

Some Practical Instructions as to Procedure Which Experience Has Shown to Be Necessary for the Best Results

BY H. L. UNLAND

Power and Mining Engineering Department,
General Electric Company

IN ADDITION to the generating and welding equipment necessary for electric welding it is often desirable to have on hand some miscellaneous pieces of equipment. For example, odd pieces of carbon, or copper blocks, make excellent dams for holding the molten metal in place, and in making a weld which must be smooth on one side, a piece of copper or carbon held against it will give the desired result. Iron or steel can be used for this purpose if care is taken not to weld to it. In filling in a hole the bottom may be closed with a plate of carbon or copper until sufficient metal has been added to hold. In using such pieces, care must be taken not to allow the arc to play directly on them, otherwise the weld will probably be contaminated with the material, or else the guide piece may be welded in solidly so that it cannot be removed. For cleaning the parts to be welded a steel wire scratch brush is valuable.

In making contact with the piece to be welded, if the lead is bolted to an iron plate which forms the top of a work bench the work may be welded by simply laying it on this top, the contact being sufficient to carry the current. Where the work is too large for the table it may be set beside it, and a bar laid across will provide sufficient current-carrying capacity. In some cases a vise mounted on the table will be found desirable for holding the work.

A convenient terminal for the positive lead consists of a copper hook with the cable bolted to it. This may be laid on the work or hooked on a projecting part. Where welding is to be done in a room where there are

other employees screens should be provided around the welding operator. These should be high enough to prevent light from striking the ceiling, as the flickering light from welding might prove objectionable. A receptacle containing water is desirable for cooling the electrode holders. Also gas burners for preheating and fire brick, sand or sheet asbestos for covering are useful, especially for cast-iron work, which in many cases should be preheated uniformly to a red heat, and welded while at this temperature. Some operators feel that gloves are necessary, others find gloves to be in the way. The arms, neck and face, however, should be covered, since exposure of these parts will probably result in burns similar to sunburn.

FLUX CONSIDERED UNNECESSARY

Many experienced welders consider that flux is unnecessary. If the work is kept clean by brushing at frequent intervals, and ordinary care is taken in the operation, an experienced welder can make a good weld without flux. Clean metal is the most likely to make a good, strong weld. Any foreign matter will contaminate and weaken it, or else make it hard. Impurities may also make the metal porous and spongy, due to liberation of gas. Pieces of foreign material may prevent the molten metal from filling all parts of the weld and cause cavities.

Methods of cleaning consist of pickling, washing with gasoline or lye, boiling with lye, sand blasting, chiseling, scratch brushing, etc. In welding heavy sections where it is necessary to deposit several layers of metal the surface of the preceding layer should always be clean before the next one is started. Each section should have its edges beveled to give a total angle of approximately 60 deg. and should be separated by $\frac{1}{8}$ in. space. Sections less than $\frac{1}{8}$ in. thick need not be beveled, but should be separated slightly. In some special cases angles as low as 30 deg., and as high as 90 deg. may be used, but the average safe angle is 60 deg. In welding extremely heavy sections it may be necessary to have these beveled on both sides. In making such welds the layers should be applied first to one side and then the other to prevent warping. In welding long seams the edges should be $\frac{1}{8}$ in. apart at the end where the weld is started, and the distance should be increased 1½ per cent of the length at the extreme end. This takes care of the expansion and contraction of the metal.

In welding cracks in plates, forgings or castings the cracks should be chiseled out to get a good bevel, with $\frac{1}{8}$ in. to $\frac{3}{16}$ in. clear opening on the back or to the bottom of the crack.

WELDING WITH METALLIC ELECTRODES

To make a satisfactory weld using the metallic electrode, the arc should be kept short, not over $\frac{1}{8}$ in. in length. The current should not be great, as excessive current causes burnt or porous metal. The arc should also be kept constant in length to insure uniformity in the metal deposited. In welding a seam the electrode should be moved in a zigzag or circular path, advancing along the seam. The metal will adhere only to the surface of the work actually played on by the arc, so care must be taken to bring the arc in contact with the whole surface to be welded. The electrode should be connected to the negative terminal. If the polarity is reversed, the arc will be more difficult to maintain and the deposited metal will not be as good as otherwise.

The operation of welding overhead is the same as in normal welding, but difficulty may be experienced in holding the electrode steady, especially if the position is cramped. The appearance of an overhead weld is sometimes marred by drops of metal projecting or by uneven thicknesses of deposited metal. This can be overcome by proper manipulation of the electrodes. A rest for the arm will sometimes assist the operator in holding the electrode steady.

USING CARBON ELECTRODES

With the carbon electrode, the holder should grip the electrode from 4 in. to 5 in. from the end. Ordinarily the electrode should be tapered to a blunt point at the working end to keep the arc from wandering. As the electrode burns away with use the holder should be moved back to keep the length of the working carbon constant. The arc should not be too short when welding or depositing metal, as there is danger of depositing carbon in the weld which results in a hard weld. In cutting or melting off metal the arc should be kept short, about $\frac{1}{2}$ in. being an average length. For cutting, the arc is operated like a gas torch, being held in one position long enough to fuse the metal and allow it to run off. In cutting thin plates the arc is held in one spot until a hole is melted through the metal, then the electrode is slowly advanced along the desired line. For thick pieces such as shafts, castings, etc., it is desirable to start at the top on one edge and work down, allowing the molten metal to run down through the cut. It is often necessary to follow the molten metal down with the arc, to keep it melted until it runs off. The width of the cut will depend on the size of the electrode used and the skill of the operator in keeping a straight line.

To deposit metal with the carbon electrode the arc is not held in one place long enough to melt through. A pool of molten metal is established and a rod of metal is fed into the arc and melted down on to the work. All should be heated thoroughly to insure a complete union before more metal is added. Since heavier current can be used with the carbon electrode than with the metallic, faster work can be done in depositing metal. Due to the high temperature and large amounts of heat liberated when using the carbon electrode, the electrode holder is apt to become very hot, and under some conditions to melt away at the end.

CAST-IRON WELDING

Cast iron, due to its properties is unsatisfactory for welding by any method. Its low strength and considerable brittleness cause it to break from expansion and contraction strains unless precautions are taken, and even then a successful weld cannot be assured. Pieces of simple cross section and heavy pieces present much less difficulty than complicated shapes, but due to the undependable nature of cast iron, care should be used with these. The experience and skill of the operator are large factors in producing a successful weld. By experimenting a number of operators have learned to weld copper to copper, copper to brass, and steel and bronze to bronze, as well as Monel metal, high-speed steel and Stellite. The special uses are rather limited in their application and the methods vary, so it is recommended that each operator experiment along the lines suggested by his experience and with which he is most familiar.

Saving Oil in the Shop

Oil Purchased on a Car Mileage Basis Necessitates More Care in Handling—Covered Cans Prevent Collection of Dust and Dirt

THE former method of handling oil for journal boxes and motor armature bearings at the Anderson shops of the Union Traction Company of Indiana was to take the oil from the storage house in open buckets and dip it out with small measures. Oil is purchased on a car mileage guarantee contract and it was believed that this method of handling the oil was permitting a needless waste and allowing the oil to collect dust and dirt which, of course, was a decided obstacle in the way of efficient lubrication.

Two-gallon oil cans such as shown in the accompanying illustration are now being made from galvanized



CANS DESIGNED TO SAVE OIL AND KEEP IT CLEAN BEFORE USE

iron in the company's tin shop. An additional strip of metal near the base of the handle on the can forms a receptacle for the measuring cup, which has to be lifted up before it can be removed. The can is filled through the nozzle by means of a funnel and the oil is poured out again for use into the small measuring cup. These cans are being made up for all the shops of the company, and it is believed that a noticeable quantity of oil will be saved through their use and that the oil will be kept much cleaner.

Massachusetts Tech Endowment

The Massachusetts Institute of Technology is launching a \$10,000,000 campaign for an endowment fund, to cope with the high cost of living. "Mr. Smith," a friend of the Institute who prefers to remain unknown, has already given \$7,000,000 to the school and now comes forward with a promise of \$4,000,000 provided another \$4,000,000 is raised for this endowment. "Mr. Smith" is not a Tech man, but is a firm believer in the Tech type of education and its vital importance for American industry. The sum of \$8,000,000 is required to meet the pressing needs of the Institute.

The endowment fund committee is headed by Coleman du Pont, and the other members are Theodore N. Vail, Charles A. Stone, Otto H. Kahn, and Charles Hayden of New York, Everett Morss of Boston, Edmund Hayes of Buffalo, and Richard C. Maclaurin, president of the Institute.

It is hoped that subscriptions will be received not only from Tech men but from those who have profited from the services of the Institute's graduates.

Pneumatic Tools for Breaking Up Pavement

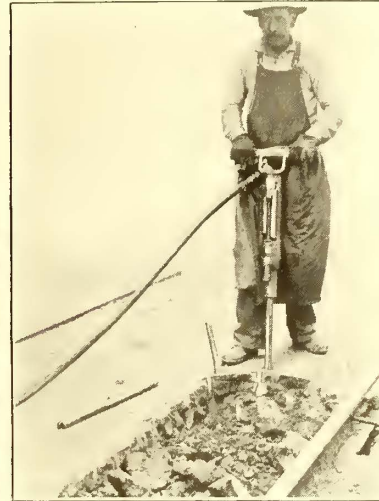
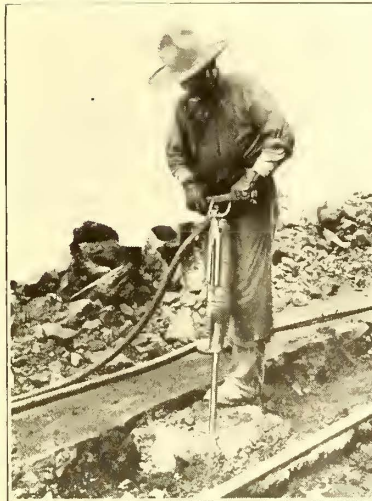
By Using Special Points a Tie-Tamping Machine May Be Used for Cutting Asphalt, Tothing Out Paving Blocks and Breaking Up Pavement

By WALTER P. BURN, M. E.
Ingersoll-Rand Company

BREAKING up the pavement overlay in order to uncover the track in city streets for the purpose of making repairs or renewals has always been a very tedious job. The common method of removing pavement by hand is by using a "bull-point" on concrete or paving blocks and a chisel on asphalt or other bituminous pavement.

Numerous devices have been invented for the purpose of removing pavement, and the one described herewith is the pneumatic tool, the principal of which is the tie-tamping machine. This machine is in effect a small hammer drill and when fitted with the proper point is very efficient in removing pavement. For removing asphalt or similar pavement the machine is fitted with a special chisel held at an angle of about 60 deg. to the horizontal by the operator. It cuts the pavement into squares which can then be removed with a shovel. The operator will soon find out the correct angle at which to hold the machine and this is practically the whole secret of successful cutting. He should be cautioned not to bear hard upon the two handles, merely using them to guide the tamper along the line which it is desired to cut. Bearing down will drive the chisel into the underlay and cause wedging.

Paving blocks are very quickly removed by the use of the tamper fitted with a "bull-point." In this operation the workman places the "bull-point" in the joint between the blocks, opens the throttle and as the



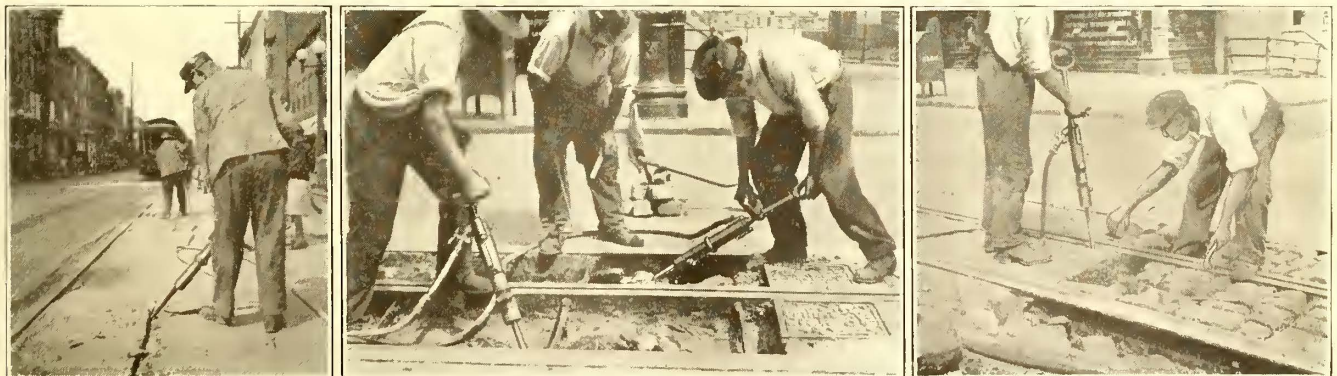
BREAKING OUT ASPHALT AND CONCRETE PAVING WITH TIE-TAMPER

machine drills into the bond, bears back easily, wedging the block out. The rapid vibration of the hammer is sufficient to loosen up all the mortar between the blocks so that they come out easily.

The foregoing does not apply to the removal of brick pavement. In this case when ordinary mortar has been used for the bonding, the tie tamper may be successfully applied and should be fitted with a small flat chisel

instead of a "bull-point" and used in exactly the same manner as when removing pavement blocks. Too much must not be expected of the machine, however, and it will not remove in the most satisfactory manner bricks which have been bonded in cement mixture, as this is practically solid pavement and must be broken up in much the same manner as concrete. Some of the bricks may be saved, however, by breaking them out in groups. The bricks around the edge of the group will be partly destroyed, but those in the center may be broken out with a hammer.

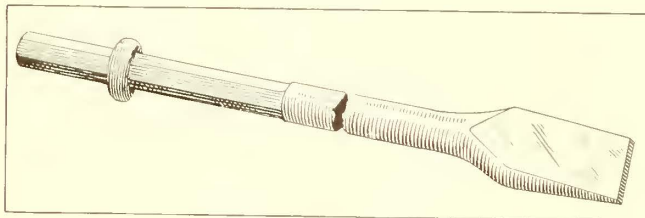
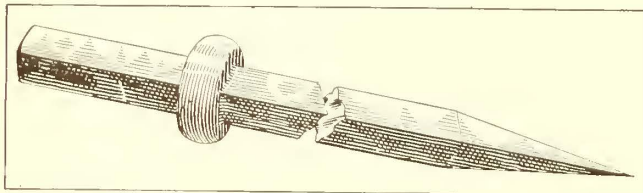
Concrete has proved to be an ideal means of protecting the tie rods, fuse boxes, etc., and for keeping the track from spreading or warping so that its use would undoubtedly be more general if it were not for the fact that it has been very difficult to remove when it was desired to make repairs or renewals. The tie tamper provides a means for removing concrete from tracks in a most efficient and rapid manner. In this process



CUTTING ASPHALT PAVEMENT AND REMOVING PAVING BLOCKS ALONG THE LINES OF THE THIRD AVENUE RAILWAY, NEW YORK

the machine is fitted with a "bull-point." Two men are usually employed, one to operate the tamper and one to shovel out the broken concrete. They can alternate their work in order to prevent undue fatigue. The tie tamper operator when starting a break, holds the tool in a vertical position but without bearing on it and opens the throttle, gradually easing off the tool to an angle. This results in the formation of a hole whose diameter is roughly three times that of the tamper, the concrete being broken up into small pieces, which are then raked out by the assistant with any sort of a small bent bar or scoop. This process is repeated until the concrete overlay is completely broken through. From this time on the process becomes easier and more rapid as the method usually employed in breaking down a face is used. The operator holds the tool 3-in. to 4-in. back of the face, and in a vertical position, easing off as the tool begins to drive into the concrete. This results in breaking up the concrete not only by means of the vibratory hammer action, but by a wedging action which breaks the concrete out in fairly large chunks.

This operation can be successfully performed by any class of labor which would be able to take out the material by hand, and yet some difficulty has been experienced. Probably the main source of trouble in this respect has been a tendency to try to do too much.



BULL POINT AND CHISEL FOR USE WITH TIE TAMPER

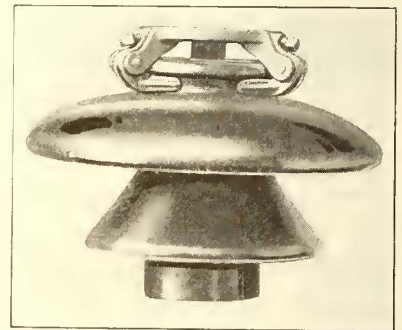
The Third Avenue Railway in New York City and the Chicago Surface Lines have used the tie tamper very successfully in breaking out concrete both outside the rails and inside around the tie rods and fuse boxes, using the "bull-point" as described in the foregoing. The New York Company's foreman in charge of this work claims that one man can easily take out about 20 cu.ft. of concrete per day by this method. The same process has also been used on a number of street railways in the past two years, and in the few cases where success has not been obtained it is the belief of the tool manufacturer that the failure was due first to the use of the wrong kind of point and second to the attempt to try to do too much and work too fast.

The tie tamper used as a tool in breaking concrete has its limits. No attempt should be made to use it on concrete more than 8 in. thick, as it is not powerful enough for this work. For concrete 8 in. or more thick better results by far will be obtained from the use of the tool known as the drift-bolt driver. On the Western coast, the drift-bolt driver is being used to

take out "asphalt concrete" consisting of asphalt, sand and broken stone. The material is broken out easily, sometimes as much as 2 ft. at one cutting. When the asphalt concrete is soft as in warm weather, or in the heat of the day, cutting is more difficult, so that best results are obtainable in the early morning and late afternoon. In ordinary concrete, the drift-bolt driver will cut out material faster than the tie tamper. However, the principal advantage in using the latter, is its adaptability to other work. The tie tamper will tamp ballast, cut asphalt paving, and tooth out paving blocks, work for which the drift-bolt driver is too heavy.

Cap for Mounting Apparatus on Line Insulators

THE problem of mounting hardware and other apparatus on line insulators has occupied the attention of transmission engineers and designers of outdoor high-tension switchgear for a number of years. Many solutions have been tried, and one of the latest is a cap for mounting on a high-voltage insulator just placed on the market by Hickey & Schneider, Inc., Elizabeth, N. J. The cap consists of a top disk from which extend three pairs of ears, between which three clamp legs are pivotally mounted. The lower part of each leg is shaped into two fingers, which grip around the insulator head in the tie-wire groove. To prevent fracture of the porcelain, fiber or copper cushions are used between the metal of the cap and the porcelain. Each clamp leg may be adjusted separately so as to provide



INSULATOR CAP MOUNTED ON A 35,000-VOLT LINE INSULATOR

an accurate grip on slightly oval or irregular shaped insulators. The upper part of the clamp fingers is threaded and a set screw is used to bring the fingers into contact with the insulator head. The insulator caps are made to fit all standard types of insulators.

New York Executives Meet at Syracuse

As this issue goes to press, Sept. 18, officials of the electric railways of New York State were in session at Hotel Onondaga, Syracuse, to consider the present condition of the industry in the State. The meeting was held under the auspices of the New York Electric Railway Association, and was called by President E. A. Maher, Jr., at the request of the committee on ways and means to produce additional revenue, J. K. Choate, chairman. It will be remembered that the committee reported to the association at the Lake George meeting held on June 7 to the effect that the governor had been petitioned to appoint a committee to make a study of the traction situation, but that the governor had stated that such a committee is constituted by the Public Service Commission. The committee then appealed for the relief for the railways to the Commission.

Automatic Cleaning Feature for Underfeed Stoker

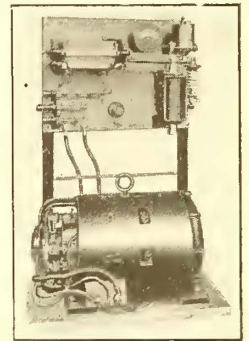
A NEW form of stoker, known as the automatic cleaning type, has been placed on the market by the Underfeed Stoker Company of America and already stokers are under construction for the equipment of 50,000 hp. of boilers. The feature of the new stokers which gives it its name is the dump plate at the rear, as shown in one of the accompanying illustrations.

Fundamentally the stoker is the same as the Jones stoker which has been marketed by this company for twenty-five years, but in the new form several improvements have been incorporated. In the older stoker the coal piled up on dead plates on either side of the retorts and was there permitted to form a clinker. At periodic intervals it was removed through front door openings. With some coals this proved to be

provided in the front wall over each row of tuyeres. (5) Regulation of the coal supply by the Cole automatic valve, which the company has used for years. By means of this valve the amount of coal supplied to the furnace is always in direct proportion to the air supplied by the fan. (6) Large coal capacity of retorts, which are very deep, permitting heavy reserve capacity and slow distillation of the gases.

New Arc Welding Set Developed

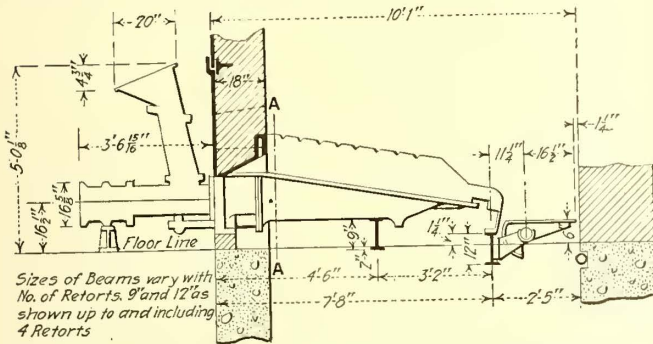
A NEW plastic-arc welding unit has just been brought out by the Wilson Welder & Metals Company, New York City. It is composed of a dynamotor and current control panel. The generator is flat-compound wound, and maintains the normal voltage of 35 on either no load or full load. The control panel has been designed to provide a constant-current controlling panel, small in size, light in weight, simple in operation and high in efficiency. The panel is of slate 20 in. x 27 in. and on it are mounted a small carbon pile, a compression spring, and a solenoid working in opposition to the spring. The solenoid is in series with the arc so that any variation in current will cause the solenoid to vary the pressure on the carbon pile, thereby keeping the current constant, at the value it is adjusted for.



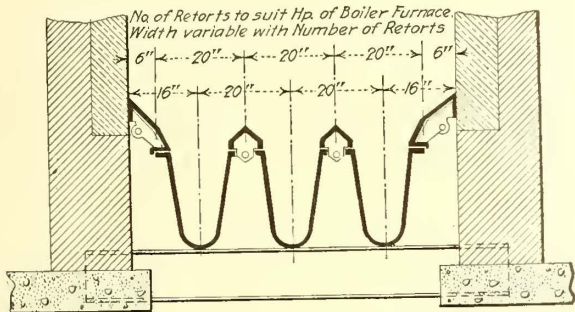
DYNAMOTOR AND CONTROL PANEL

Three switches on the panel provide a means of current adjustment, between 25 and 175 amp. The arrangement of the welding circuit is such that 25 amp. always flow through the solenoid, when the main switch is closed, whether the welding current is at the minimum of 25 amp. or the maximum of 175 amp. The balance of the welding current is taken care of in bypass resistances shunted around the solenoid.

This outfit can be furnished as a dynamotor unit, with standard motor characteristics as follows, 110 volts, 220 volts, direct-current, or 220-440 volts, 60 cycle, two or three-phase alternating current, also as a gasoline-driven unit, or it can be furnished without a motor, to be belt-driven. The normal generator speed is 1800 r.p.m. The net weight of this new outfit in standard characteristics is 800 lb. with d.c. motor, 807 lb. with a.c. motor, 1200 lb. with gasoline engine, and 550 lb. as a belted outfit without motor. These new dynamotor sets can be mounted on a truck for portability, if desired.



UNDERFEED STOKER WITH AUTOMATIC CLEANING FEATURE, SHOWING DUMP PLATE



Section A-A

DIAGRAMMATIC CROSS SECTION OF FURNACE

a difficult proposition as very heavy clinkers were formed and, of course, during the cleaning period the efficiency was reduced if much time was consumed.

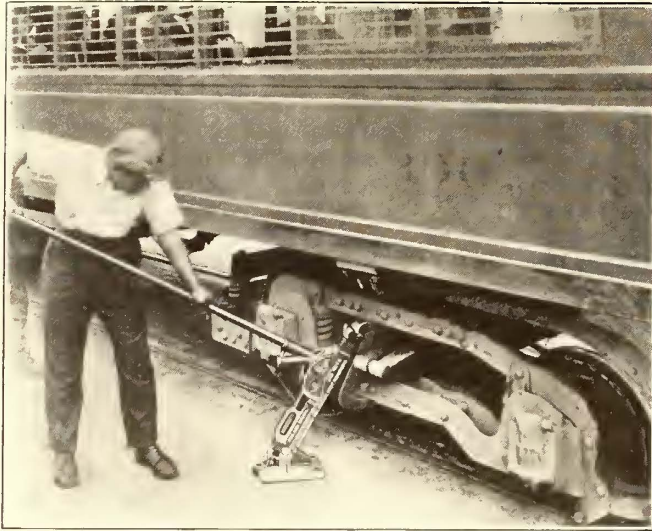
In the new stoker the tuyeres slope at about 11 deg. and there is a progressive backward movement of the entire fuel bed toward the dump plate at the rear. By the time the dump plate is reached the combustible in the coal has been quite well consumed, and only dead ash is deposited on the dump plate. The dump plate is balanced and is easily operated by hand, the weight of the clinker itself tending to assist in the operation.

The novel features in the design of this stoker are said to be these: (1) The very small inclination of the tuyeres which prevents "avalanching," and clinker formation on the bridge wall. (2) Special design of side tuyeres, which are air cooled, to prevent clinker formation on the side wall. (3) Protection of the front wall by front wind boxes. (4) Accessibility of the stoker throughout the entire front through openings

Amalgamated Association Continues in Session

THE meetings of the Amalgamated Association of Street & Electric Railway Employees in Chicago, began Sept. 8, continued all of that week, and carried over into the present week. The sessions on the final three days of last week were devoted principally to the discussion of resolutions presented before the body.

On Thursday afternoon the association listened to an address by Mrs. Tom Mooney of San Francisco and on Saturday morning to one by Secretary Morrison of the American Federation of Labor. Mr. Morrison spoke in place of President Gompers who was unable to attend.



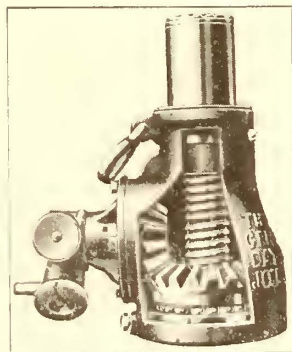
EMERGENCY USE OF A JACK ON A TRUCK



LIFTING A POLE BY MEANS OF A JACK

New Jacks for Handling Railway Equipment

THE accompanying illustrations show three new types of jacks which have been developed by the Joyce Cridland Company, Dayton, Ohio, with special reference to their use by electric railways. The No. 89 jack is single-acting and operates on the downward stroke of the lever. This is a combination of a jack with a detachable ground lift which may be used in emergency cases where a chain cannot be used. The jack pivots on its base from a vertical position to within 20 deg. of the horizontal and lifts, lowers or pulls at any angle. The base is ribbed to prevent slipping when the jack is operated at an angle and to provide additional strength. The construction allows the ground lift foot of the rack to drop down into the base, thus permitting the placing of the foot under low loads. The cap is provided with a corrugated surface arranged to grip the links of a chain and hold them firmly in position. These corrugations also provide for the use of a detachable ground lift so the load may be taken at any angle. The change from a raising to a lowering action is accomplished by shifting a small lever on the outside of the flange. This jack has a capacity of 15 tons, a height of 24 in., a rise of 12½ in. and weighs 75 lb.



SMALL ONE-MAN JACK

The No. 96 jack, especially designed for pulling and straightening telephone, trolley or lighting poles, also pivots on its base with a similar construction to that just described. The head is especially forged so that the links of the chain are held securely as the load is lifted. To use the jack for lifting a pole an I-beam base is placed beside the pole and the jack set upon

it. The chains can then be hooked around the pole and placed over the forged recess in the head, and the jack is ready for operation. This jack has a capacity of 15 tons, a height of 37 in., a rise of 27 in., and weighs 91 lb.

The No. 153 ball-bearing jack is especially designed for one-man operation, and for use under low loads.

Three heights are provided, of 9, 10 and 11 in., respectively, and the rise varies from 3½ to 5½ in.

Useful Chart Showing Cost of Evaporating Water in the Steam Boiler

THE engineering department of the Westinghouse Electric & Manufacturing Company has prepared the accompanying straight-line chart to simplify calculation of evaporating costs.

The inclined lines represent the relation of costs of coal per ton and corresponding costs of evaporating 1000 lb. of water from and at a temperature of 212°

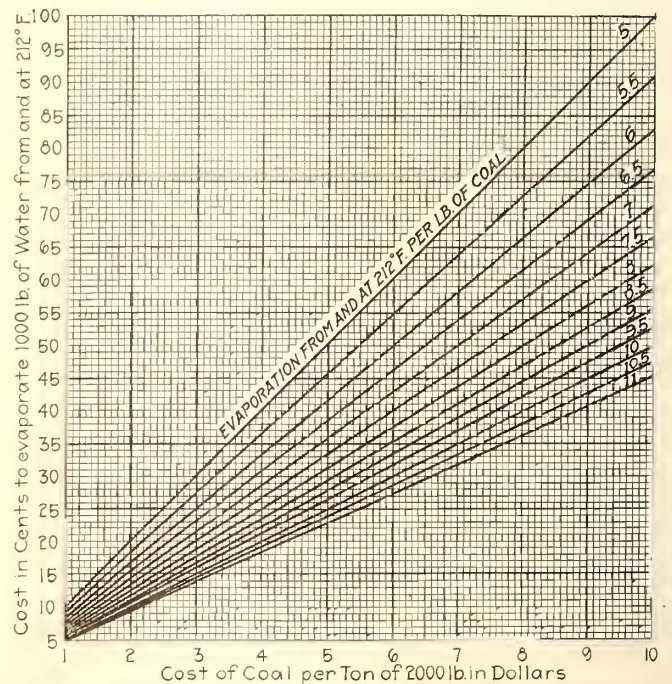


CHART SHOWING THE RELATION OF WATER EVAPORATION AND COAL COSTS IN STEAM BOILERS

deg. Fahr. for rates of evaporation between 5 and 11 lb. of water per pound of coal. Enough lines have been drawn to cover the range of ordinary practice. The chart can be used not only to determine the cost of evaporating any quantity of water at any price of coal but it can be used to determine the evaporation required to generate steam at a certain cost.

Iowa Operating Men in Session

Midyear Inspection Meeting, Separate From Lighting Association, Proved Great Stimulus

THE midyear meeting of the operating men of the Iowa Electric Railway Association, in session at Davenport, Iowa, as this issue goes to press, promises to be a most successful experiment. There were more than sixty delegates present on Wednesday, and in spite of a stormy day the interest and congeniality were not dampened. Four papers were presented at the morning session which convened at the Blackhawk Hotel at 10:30

R. H. Findley, superintendent of track and roadway Omaha & Council Bluffs Street Railway, speaking for the interest of the way and structure delegates, outlined the most up-to-date and efficient methods of track construction and maintenance. For the benefit of the shop and equipment delegates, John Sutherland, master mechanic Tri-City Railway, Davenport, discussed the developments in rolling stock and equipment parts which permit great economy in maintenance and operation and placed particular emphasis on proper inspection. J. H. Seisseger, general superintendent Mason City & Clear Lake Railroad, speaking for the benefit of the transportation delegates, discussed the service and methods of this city and interurban property. For the interest of the power and distribution delegates, John M. Drabelle, electrical engineer Iowa Railway & Light Company, Cedar Rapids, discussed the most approved methods and equipment of power distribution for electric railways.

In the afternoon, the party split up into three divisions and conducted on special cars under the direction of the respective head of that department of the Tri-City Railway, inspected the shops, track and power house of the Tri-City system. In the late afternoon all delegates assembled at the car shops at Rock Island and proceeded on special cars to Watch Tower Inn for dinner. The evening was spent at a theatre in Davenport.

Plans at Next Federal Hearings

As announced last week, the Federal Electric Railways Commission will resume its hearings on Sept. 29 at Washington. During these sessions it is expected that the labor men will present their case, and also that a number of managers, experts and consulting engineers who could not arrange to attend the earlier meetings will testify. Among the witnesses in this latter group who have been invited to be in attendance are: Milo R. Maltbie, New York; Walter Jackson, New York; Morris L. Cooke, Philadelphia; Homer Loring, Boston; Henry Ford, Detroit; R. S. Bauer, Lynn, Mass.; John A. Van Allen, Buffalo; John A. Beeler, New York; Joseph B. Eastman, Interstate Commerce Commission; T. E. Mitten, Philadelphia, Pa. With evening sittings it is expected to conclude the hearings in one week.

Figures compiled by the actuarial department of the Bureau of War Risk Insurance in Washington, show that more than \$107,758,200 of government insurance was carried by railroad men engaged in the transportation service of the Engineer Corps, American Expeditionary Force, and upon railroads in the United States. The engineer corps suffered in battle, deaths numbering fifty-nine officers and 1207 enlisted men.

Letters to the Editors

Railways Must Sell Their Transportation

NOTTINGHAM CORPORATION TRAMWAYS, ENGLAND

NOTTINGHAM, Sept. 1, 1919.

To the Editors:

I have read with interest the editorials and articles which have appeared in recent issues of the *ELECTRIC RAILWAY JOURNAL* advocating the merchandising phase of the street railway industry; I have also noticed that this idea will receive much attention in the Convention Number with its theme "Selling Transportation."

It seems to me that, whilst as a general rule the street railway industry is similar to other concerns in this respect, there are, however, essential differences. In the first place, the wholesale merchant will allow a lower average price on a large order than on a small one, and similarly street railway companies grant concessions by selling tickets at a reduced rate for a wholesale quantity. On the other hand, whereas one class of industries supplies us with the necessities of life (food, clothing, etc.), another class supplies the luxuries; but the street railways have perforce to provide for both the business and pleasure riding. With the universal rate of fare, a business man will not ride past his destination although his companion of the journey may be travelling a considerable distance further for the same original cost. If other industries were to offer their products on the same basis, it is reasonable to suppose the greatest advantage would be taken by the customers. If, for example, a tobacconist were to offer packets of ten, twenty, twenty-five, fifty and one hundred cigarettes at one standard price, say the value of a packet of fifty, I doubt very much whether his balance sheet would show a profit. The zone system of fares, which has so long held sway in England, undoubtedly places the street railways in a better position with regard to the "selling" aspect.

Again, electric railway concerns are making further concessions which do not enter into the merchandising of other commodities: I refer to the reduced rates for workmen before a certain time and the cheaper rates at which children are carried, in most towns, throughout the day, I cannot think of any parallel to the former, but it is true that amusement houses offer children the privilege of seeing their performances at reduced rates.

I have just perused the editorial in your issue of Aug. 2, relating to the greater interest which the public is taking in the wage disputes of the Chicago trainmen. To my mind, the street railway industry is practically unique in its main function of providing comfortable and adequate transportation for the public because, unfortunately, to nearly every person, transportation has no real tangible value. It would seem apparent from a psychological point of view that the public does not look so unfavorably upon the price of luxuries as compared with the price of necessities. In exchange for cash, the grocer, butcher, etc., sells comestibles necessary for life; the tailor, hatter, draper, etc., provide the wearing apparel; the ironmonger,

furniture dealer, etc., supplies the goods and chattels for the household; and in each case the buyer receives something which he or she can see, grasp or touch. As already mentioned, there are many shops, merchants, etc., from which we obtain luxuries in the form of candy, music, tobacco, etc., something tangible being obtained in most instances. There are, of course, others who provide luxuries such as picture shows, sports (baseball), etc. which although possessing no tangible value, nevertheless provide enjoyment for the public, as indeed a luxury should.

But when we review the street car ride, there appears to be no such consolation for the patron. The average business man will board a car, pay his fare, take a seat if possible, and then either smoke, read his paper or enter into conversation. What interest does he find in the streets, houses, shops, factories, stations, or the city's celebrated examples of architecture which he passes every day? Until he changes his business destination or his place of abode, he has still the same monotonous daily ride or rides, and when he has returned home for the night, he has great difficulty in ascertaining what he has received in exchange for his car fare. In a very much less degree, pleasure riding also presents the same difficulty.

At the present time it seems that the public does not realize the vital necessity for city transportation, both for their own advantage, and for the good and development of the community in general, until street car service is suspended or abandoned.

In conclusion I would say that I believe the public should, first and foremost, be convinced that street car transportation is a vital necessity for their welfare, and when this object has been achieved, steps should be taken to show the various costs which enter into the price of providing service, finally proving that this cannot be provided at less than cost. The intangible element of the street car ride offers much scope for the psychologist.

A. A. JACKSON.

Repairs to Wood-Block Paving

THE TOLEDO RAILWAYS & LIGHT COMPANY,
TOLEDO, OHIO, Sept. 10, 1919.

To the Editors:

The article in your Aug. 16 issue, by J. S. Crandell, regarding repairs to wood-block paving has been noted with interest. From the photographs it would seem that the wood blocks had originally been laid on a very deep cushion of sand if the concrete which is shown as being placed is taking the place of a sand cushion.

It is natural to expect such results as those described if a cushion deeper than about $\frac{1}{2}$ in. of sand is used. In my opinion, also, there was too much crown on the paving originally and there is too much crown in the paving as repaired, for best results. I believe in a level paving.

I also note that the web of the rail is filled either with a wood strip or with sand, and that the paving block is laid without being nosed under the rail head. I think also that this is the cause of some of the bulging. I do not like to "throw cold water" upon the process described, but am very skeptical as to the results of laying wood block directly on solid concrete except for the tar coating. I am not able to tell just exactly why, as yet, this method is not a success, but will say that last year and this year we have been laying

blocks directly upon a pitch-covered concrete base and I must say that the results are anything but satisfactory. My opinion of a wood-block paving is that it requires about a half-inch cushion of sand, with the blocks laid level across the track and with the blocks laid next to the rail so as to nose under the rail head, the joints to be properly filled with a mastic (and not a pure pitch filler).

I notice that the author takes great pride in having invented a separating strip or spacer. This separating spacer, in my opinion, is inferior to the lug wood block which automatically provides proper joint spacing. We are using lug blocks entirely in this city and believe they are worth while, although feel that the lugs should be about three-eighths inch deep instead of one-fourth inch as we are at present having them made.

I am writing this more as a letter of warning than as a letter of criticism, for if others lay the blocks direct on a solid foundation I am inclined to believe they will experience the same trouble as we have had.

It would give me pleasure to hear from other engineers who have tried this method of paving, to show whether they have had the same trouble as we have had, for originally this method of paving was suggested by our city engineering department and was agreed upon by this company against my judgment.

A. SWARTZ,
Assistant Manager of Railways.

All Electric Railway Publicity Agents Should Be at Atlantic City

NORFOLK, VA., Sept. 16, 1919.

To the Editors:

Publicity men associated with the street railway industry in the United States will doubtless be deeply gratified that President Pardee of the American Electric Railway Association has directed that Tuesday afternoon, Oct. 7, be devoted to a consideration of their problems and for a general discussion of ways and means for co-ordinating the work of the various individual companies with the general publicity plan of the association. There is much work of a most excellent nature that would be of great value to the industry at large that now is used in a restricted territory, simply through lack of a plan whereby the entire industry could profit.

Several attempts have been made to put into operation some plan whereby this great mass of endeavor could be directed to the general good, but without the indorsement of the association little or nothing could be done. Now that President Pardee has directed that a special program be provided for this all-important subject it is certain that the desired end will be accomplished. A program will be prepared and issued within a very few days, and it is the desire of the officers of the association that every man engaged in street railway publicity in the United States and every executive also arrange now to be present and take an active part in the discussions which affect his particular work.

Several meetings of a few publicity men have been held since the 1916 convention and from each has resulted many benefits to those attending, and with the support of the association all that we have been striving for all these years is possible of achievement.

The value of publicity to the industry has been so clearly demonstrated during the trying times of the

great conflict and its increasing worth in the more perilous times which have followed, that there are few companies that do not fully recognize it, and the Atlantic City convention will be an inspiration to these few.

The work of the association can best be forwarded through this agency, and every publicity man should be present. There will now be no trouble in securing leave of absence for the day of the convention. Every executive will gladly arrange for the trip and in the judgment of the officers of the association should immediately direct their publicity representative to be on hand, not only for what he may learn from his fellows, but for the benefit his experience will be to those who are engaged in the same line of endeavor.

Therefore, let us of the craft adopt the slogan "On to Atlantic City!" and meet there on Monday, Oct. 6, prepared to enter the publicity meeting Tuesday afternoon ready to teach and to be taught.

It is needless to urge executives to be present. They have learned within the past few years the absolute necessity of properly directed publicity, and they know that if this great force can be made nation-wide, under the efficient direction of the American Electric Railway Association, a great stride forward will have been taken. Those charged with the proper conduct of the industry will be there to plan with and for us a yet wider field of usefulness.

LEAKE CARRAWAY,
Chairman Program Committee.

Purchasing Agents and Storekeepers Urged to Attend the Atlantic City Convention

KANSAS CITY, Mo., Sept. 16, 1919.

To the Editors:

Every purchasing agent and storekeeper for an electric railway system who can possibly attend the Atlantic City convention should do so. There has never been a time when the question of the materials to be used by street railway companies is so important as at the present. This of course, results from the necessity of obtaining equipment and materials at the lowest price possible, in order to meet the present increased operating costs of railway properties. The manufacturers realize this situation and are offering many new ideas and materials to assist in cost reduction.

The question of service and source of supply has changed during the past three years, and it is important that the purchasing agents and storekeepers should be familiar with present conditions in order to obtain the proper materials at lowest price and avoid either carrying too heavy a stock or permitting some stocks to become exhausted on account of the difficulty in receiving prompt shipments. There are new manufacturers of street railway supplies, and some who were previously in the supply business have discontinued their lines or consolidated with other companies. It is a recognized fact the question of holding the cost of equipment and materials purchased to a minimum is next in importance to the amount of gross revenue received. This not only involves the original cost and of course the quality of the materials purchased, but care must be taken to avoid tying up too much money in stock accounts and also to avoid carrying obsolete materials or permitting the deterioration of some materials.

There are so many advantages to be obtained by attendance at the convention this year that it would seem practically every company should send either its purchasing agent or its storekeeper, in view of the benefits which will result from a careful examination of the exhibits and the information received from the manufacturers' representatives, as well as the daily sessions of different convention sections during the week.

E. E. STIGALL, Purchasing Agent
and Chairman of Program Committee.

Association News

ATLANTIC CITY CONVENTION, OCT. 6 TO 10

Publicity Men to Meet

SUPPLEMENTING the brief note in the Sept. 13 issue of this paper, it is now possible to give more details regarding the meeting of publicity men which is to be held in connection with the Atlantic City convention. This gathering will be in charge of a committee consisting of Leake Carraway, Virginia Railway & Power Company, Norfolk, Va., chairman; J. W. Colton, the Connecticut Company, New Haven, Conn., and Luke Grant, Chicago (Ill.), Elevated Railways.

The date of the meeting will be Tuesday, Oct. 7, and it is scheduled for the afternoon. It is proposed at this session to have two or three papers or short addresses and devote the remainder of the session, and other sessions, if such are required, to a discussion of ways and means for co-ordinating the work of various companies in accordance with the general plan of publicity which the association has undertaken in connection with the hearings before the Federal Electric Railways Commission.

Exhibit Committee Holds Important Meeting

A MEETING of the convention exhibit committee of the American Association, C. R. Ellicott, chairman was held at association headquarters on Sept. 17. The report of Director of Exhibit Wells indicated that practically 57,000 sq.ft. of exhibit space has been assigned to 137 prospective exhibitors. Plans were made for pushing the campaign still further for the rental of space because, while at the present the totals of space and number of exhibitors are as great as in 1916, there is still some very desirable space to be disposed of.

Arrangements are being made for the showing of "movie" films for such exhibitors as desire to show pictures, for the distribution of pay telephones in different parts of the pier, etc. Mr. Wells will move his headquarters to Atlantic City on Sept. 24 and members of the committee will be on hand there during the week preceding the convention.

The fifteenth Annual Convention of the International Railway General Foreman's Association was held in Chicago, Sept. 2-5. The three principal topics considered were safety first, the welding of locomotive cylinders and other autogenous welding, and the functions and proper design of draft gears.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

New Interurban Inspected

Engineers Go Over the New Cleveland-Youngstown High-Speed Line Now Nearing Completion

One of the special features of the "get-together" meeting of the Cleveland Engineering Society with local sections of the National Societies on Sept. 9 was an inspection trip over the new rapid transit line of the Cleveland & Youngstown Railroad. This line connects the retail business center of the city of Cleveland, Ohio, with the Heights residence section. The party was taken over the route on a special train of flat cars. It was the first train to pass over the new road.

ENGINEER DESCRIBES SYSTEM

During the forenoon session at the Hotel Cleveland, W. E. Pease, engineer of the Cleveland & Youngstown Railroad, delivered a brief illustrated talk on the engineering problems involved in the construction of the road. The rapid transit idea originated in a big real estate development in the Heights section in 1911. The Van Sweringen interests, which control an immense section of land there, promoted the new road and have brought it to its present state of completion.

Many changes have been made since the original plans were drawn, Mr. Pease said, all of them being due to problems that arose in connection with obstacles of one kind and another that were met in the course of developing the route.

Mr. Pease also showed illustrations of the proposed new union station, now in course of development, with the long line of warehouses that form a part of the big undertaking. An immense freight terminal is also under way.

During the trip over the road, many favorable comments were heard in regard to the heavy construction of bridges and culverts. The road was really built on a steam road basis. The grades are not excessive at any point, although the railway reaches rather a high level at the east end.

FOUR-TRACK BRIDGES

The bridges for carrying the streets over a long cut are built to accommodate four tracks. In fact, this plan has been carried through the entire construction work. One track is completed and ballasted the entire distance and the second one is progressing well to that end. Plans have been made to have the double track in operation some time in October.

The new tracks will be used as far as East Thirty-fourth street, where a con-

nection will be made with the tracks of the Cleveland Railway to carry the cars to the postoffice loop. This will give the road access to the heart of the city.

Side-door cars, similar to the 1100 series of the Cleveland Railway, will be used in the beginning. They will have special motor equipment for a speed of 50 m.p.h. The interior will be much the same as the local cars and they will be furnished with cross seats. Later on a type of cars for permanent use will be adopted.

The rate of fare between the Heights and the city will be 10 cents. It is not expected that much local city business will be done, as the road is built upon its own right-of-way, and in places beside other railroad tracks. In the Heights section the stops will be one-third of a mile apart. The streets are so laid out that they reach common points at the railway stops. Under the plans used in laying out the streets, the walk to these points is only a short distance for any of the residents.

Jackson Franchise Satisfactory

The American Public Utilities Company, operating the Jackson Light & Traction Company, Jackson, Miss., is reported to have wired Green & Green, its local attorneys in Jackson, that the franchise agreed upon with the city administration under which the local company in Jackson will be operated had been accepted by his principals. It is expected the City Council will now pass an ordinance submitting the proposed franchise to a vote and that it will be submitted to the electorate at an early date. Once in the history of the company, which is in the hands of a receiver, service was suspended.

Scranton Wage Increase Accepted

A voluntary increase of 4 cents an hour, dating from Sept. 1, and the offer of an additional cent an hour after Jan. 1, have been accepted by conductors and motormen of the Scranton (Pa.) Railway. Pitmen and helpers also share in this increase. In a recent award handed down by an arbitration board increases were granted car-housemen, trackmen, etc., but none was granted the conductors, motormen, pitmen and helpers.

The new scale for the conductors and motormen is as follows: First three months, 45 cents; next nine months, 47 cents, and thereafter 49 cents. After Jan. 1 the scale will be 46 cents, 48 cents and 50 cents. Pitmen are advanced from 50 to 54 cents an hour and their helpers are advanced from 47 to 51 cents an hour.

Company Accepts Franchise

Minneapolis Service-at-Cost Grant Will Go Before Voters at the Election on Dec. 9

The Minneapolis (Minn.) Street Railway, included in the system of the Twin City Rapid Transit Company, has accepted the cost-at-service franchise adopted by the City Council at a previous meeting. It is planned to submit the franchise to the voters on Dec. 9.

The company recognized heavy obligations in the proposed ordinance, but does not wish to make further delay in the negotiations, notwithstanding the agreed valuation of \$24,000,000 for the property is lower than as appraised by engineers.

The Mayor regards the valuation as too high and the maximum return of 7 per cent as too large.

Horace Lowry, president of the railway, wrote to the Council as follows:

The board of directors has instructed me to advise your honorable body that in adopting the resolution authorizing the acceptance of this ordinance, the company recognizes the heavy obligations it is undertaking but believes that with the closest co-operation between the City Council, the street railway supervisor and the officers of the company, the undertakings imposed by the ordinance can be successfully carried out.

But for the fact that a refusal to accept the ordinance might completely destroy the credit of the company and inflict irreparable injury upon the growth and development of the city, the directors feel that their duty to the company's stockholders and the public would make it necessary to ask for certain modifications in the ordinance. The directors believe, however, that such action on their part might and probably would result in prolonged delay, with serious depreciation in the physical value of the property, demoralization of service, and great loss to the public.

In accepting, therefore, the company does so with full realization of the fact that the ordinance provides all the benefits of municipal ownership without the city assuming any of the obligations incident to financing and operating the property, or burdening itself with the heavy investment incident thereto, and the city still preserves the opportunity to undertake absolute municipal ownership whenever it sees fit.

The only advantage which the company gains is the opportunity to re-establish its credit and preserve the present investment, and the right to operate the property at a stipulated minimum rate of return, provided the operation of the property can be made to earn that return.

The agreed value of the present investment as fixed by the ordinance is lower than that found by any of the engineering experts who have appraised it, much below the value the company itself places on the property and fully one-third less than it would cost to reproduce the property at the present time.

However, we believe this ordinance provides the basis which makes possible the service and development of the property necessary to meet the city's requirements; and the best efforts of this company will be devoted to financing the large development program provided for and to carrying out the terms of the ordinance in letter and spirit and in every way promoting the welfare of the city.

The principal terms of the new grant were reviewed in the **ELECTRIC RAILWAY JOURNAL** for Sept. 13, page 536.

Former Commissioner Testifies

Mr. Eastman Paints a Dark Picture and Points Out Evils Which Have Followed Neglect of Depreciation

J. B. Eastman, of the Interstate Commerce Commission, recently addressed the electric railway investigating commission at Boston, Mass., upon the economic problems of the electric railway, and has furnished Chairman Washburn with a written statement of his views. Mr. Eastman holds that high fares are tending to cause congestion of population in urban centers, limiting the usefulness of electric railway systems, but does not see public ownership as a panacea. Notwithstanding high fares, credit is unsatisfactory and the uncertainty of future automobile competition and of labor conditions tends to impair borrowing power.

MUCH UNCERTAINTY

The special street railway commission which reported in Massachusetts in 1918 apparently believed that the answer to the problem was a means of raising fares more rapidly and with less agitation, and the general service-at-cost bill was the result. No company, however, has availed itself of this measure, which appears of doubtful value at present. The only courses in sight appear to be the alternatives of either permitting present conditions to continue, with reasonable certainty in most cases of high fares and poor service, or to resort to some form of public ownership.

Mr. Eastman believes that no matter how low a price should be paid for the properties in the event of public ownership, it is a question whether any of them can be operated under the old 5-cent fare at the present level of wages and prices without a substantial deficit. A 10-cent fare is not inconsistent with the prices now being paid for most commodities in common use. Any such deficit under public operation could only be made good through taxation.

Mr. Eastman hesitated to advise public ownership, stating that it would bring the State into what is at present probably the most difficult of all fields of public utility operation, trying the public ownership experiment under most unfavorable conditions. Public acquisition should not be undertaken, Mr. Eastman said, unless approved by a referendum vote. He does not fear that public operation cannot be made efficient. The more serious question is how far the cost of service should be covered by taxation.

AUTO A FACTOR

While it is impossible to be sure of the future effect of the automobile upon railway lines, it will probably be a long time before any other means of transportation is able to take the place of surface railways in the thickly-settled districts, and this is even more certain of rapid transit elevated and subway lines. Should public ownership come, Mr. Eastman favors a state director-

general of street railways, aided by advisory committees representing business and labor, with decentralized administration giving local managers a large degree of discretion in operation. Supervision by the Public Service Commission over capitalization, accounts, safety of operation and service, should be retained. Possibly the commission itself might be placed in charge of the administration of the properties. Accounts should be so kept that the results of operation in various districts would be separately determined. With respect to fares, it would probably be desirable to set a definite limit to the amount to be contributed through taxation and adjust the fares accordingly, making it clear to the public that a reasonably low level could only be assured by increasing the use of the facilities

with consequent growth of traffic, and by co-operation in reducing expenses.

DEPRECIATION NEGLECTED

In discussing the Boston Elevated Railway, Mr. Eastman says:

Public operation already exists here and the situation is complicated by the contract with the private owners of the property which was made last year. Direct public ownership would improve credit and make possible a greater flexibility in the adjustment of fares, and might decrease the capital charge if the owners were willing to sell at something like the present market value of their securities.

If the present arrangement is continued, new capital can be obtained from public acquisition of the Cambridge subway, but I am not prepared to suggest any other way in which it can be secured so long as the stock of the company is selling below par.

Your commission should, I think, investigate carefully the appropriations for depreciation and maintenance, and I have no doubt that the trustees will be glad to aid you in such an investigation. It should not be assumed too hastily that the present charges are excessive, for one of the causes of our troubles with electric railways has been the failure in the past to appreciate the necessity of caring for depreciation. There is no way in which a company can keep its property in first-class modern condition except by building up an adequate depreciation fund.

Tennessee and Michigan Expand Laws

Provide for Regulatory Commissions With Control Over All Public Utilities as Well as Steam Railroads

Two regulatory laws recently passed have added Tennessee and Michigan to the States which have made comprehensive provisions for supervising their public utilities. Regulation is not a new thing in either Tennessee or Michigan, for each State has had a steam railroad commission. Under the new law, however, the functions of this commission in each case have been so increased as to permit the regulation of utilities in general.

RATE-MAKING CLAUSES REVIEWED

The new Tennessee Railroad and Public Utilities Commission and the new Michigan Public Utilities Commission have the usual powers of making appraisals, regulating rates, fixing service standards, authorizing security issues and the like, and details will not be given here. In regard to extensions, depreciation and rate-making, however, it seems worth while to show exactly how Tennessee and Michigan plan to handle such matters, which now are of more than usual importance. The clauses relative to such items in the Tennessee law follow:

The commission shall have power to require a utility to establish, construct, maintain and operate any reasonable extension of its existing facilities where in the judgment of said commission such extension is reasonable and practicable and will furnish sufficient business to justify the construction, operation and maintenance of the same, and when the financial condition of the public utility affected reasonably warrants the original expenditure required in making such extension, or to abandon any service when in the judgment of the commission the public welfare no longer requires the same.

The commission shall have power to require a utility to carry for the protection of stockholders, bondholders or securities a proper and adequate depreciation account in accordance with such rules, regulations and forms of account as the commission may prescribe. The commission shall have power to determine, and by

order in writing after hearing, fix proper and adequate rates of depreciation of the property of each public utility, and each public utility shall conform its depreciation accounts to the rates so fixed, and shall set aside the moneys so provided for out of earnings and carry the same in a depreciation fund. The income from investments of moneys in such fund shall likewise be carried in such fund. This depreciation fund shall not be expended otherwise than for depreciation, improvements, new constructions, extensions or additions to the property of such public utility, unless the commission shall by order in writing give permission to the public utility to divert the fund to purposes other than those herein named.

When any public utility as herein defined shall increase any existing individual rates, joint rates, tolls, fares, charges or schedules thereof, or change or alter any existing classification, the commission shall have power either upon written complaint, or upon its own initiative, to hear and determine whether the said increase, change or alteration is just and reasonable. The burden of proof to show that the said increase, change or alteration is just and reasonable shall be upon the public utility making the same. The commission shall have power upon such hearing and determination to order the suspension, not exceeding three months, of said increase, change or alteration until the said commission shall have approved said increase, change or alteration. Provided, however, that if the investigation cannot be completed within three months, the commission shall have power to extend the period of suspension for such further time as will reasonably enable it to complete its investigation of any such increase, change or alteration. It shall be the duty of the commission to approve any such increase, change or alteration upon being satisfied after full hearing that the same is just and reasonable.

EXISTING CONTRACTS STAND

Where any existing contract between any public utility and any municipality specifies that particular things (other than charging certain rates, tolls or fares), shall continue to be done by such public utility, or the nature, kind and quality of any particular service to be rendered by the public utility to the municipality or its people, nothing in this section or in this entire act shall be construed to authorize the commission to excuse such public utility from continuing to do such specified things or from continuing to render and perform the service of at least the nature, kind and quality specified in any such existing contract, but, all these things involving the cost of the service shall be

taken into consideration by the commission in exercising its power to pass upon the reasonableness of any rate, fare or charge hereafter to be made by such public utility.

This act shall not be construed as being in derogation of the common law but shall be given a liberal construction, and any doubt as to the existence or extent of a power conferred by this act shall be resolved in favor of the existence of the power, to the end that the commission may effectively govern and control the public utility placed under its jurisdiction.

Under the new Michigan law, however, franchise rates cannot be altered by the commission without city consent. Pertinent provisions follow:

In no case shall the commission have power to change or alter the rates or charges fixed in, or regulated by, any franchise or agreement heretofore or hereafter granted or made by any city, village or township.

It shall be competent for any municipality and any public utility operating within the limits of said municipality, whether such utility is operating under the terms of a franchise or otherwise, to join in submitting to the commission any question involving the fixing or determination of rates or charges, or the making of rules or conditions of service, and the commission shall thereupon be empowered, and it shall be its duty to make full investigation as to all matters so submitted and to fix and establish such reasonable maximum rates and charges, and prescribe such rules and conditions of service and make such determination and order relative thereto as shall be just and reasonable. Such order when so made shall have like force and effect as other orders made under the provisions of this act.

In any case where a franchise under which a utility including street railways is, or has been, operated, shall have heretofore expired or shall hereafter expire, the municipality shall have the right to petition the commission to fix the rates and charges of said utility in accordance with the provisions of this act, or to make complaint as herein provided with reference to any practice, service or regulation of such utility, and thereupon said commission shall have full jurisdiction in the premises.

It should be noticed that in Michigan the commission will not have unlimited power to fix rates for all electric railways. The power given by the regulatory act covers urban rates, but control over suburban and interurban rates is effected by a special legislative act passed about the same time. This special act provides as follows:

It shall hereafter be lawful for any railroad to charge for transporting within Michigan any passenger and his or her ordinary baggage, not exceeding in weight 150 lb., not exceeding the following rate of fare, namely: A minimum fare of 5 cents; for a distance of not exceeding 5 miles, 3 cents per mile; for all other distances, 2½ cents per mile: Provided, That any railroad may charge or receive for transportation of children of the age of twelve years and over the age of five years a minimum fare of 5 cents; for a distance of not exceeding 5 miles, not more than 1½ cents per mile; for all other distances, not more than 1½ cents per mile: Provided, That children of the age of five years or under shall be transported free of charge.

This act shall apply to all railroads, including the so-called steam railroads, electric railroads, suburban railroads and interurban railroads: Provided, That this act shall not apply to the rates of street or interurban railroads charged in the transportation of passengers within the limits of cities, or within a distance of 5 miles of the boundaries thereof: Provided further, That these rates shall not apply to electric, suburban or interurban railroads whose gross passenger earnings, as reported to the Railroad Commission for 1918, equaled or exceeded \$8,000 per mile for each mile of road operated by said company, including all branch roads owned, leased, controlled or occupied by such company: And provided, That in the future whenever the passenger earnings of any electric, suburban or interurban railroad, as reported to the commission at the close of any year, shall increase so as to equal or exceed the sum of \$10,000 per

mile per annum for each mile of road so operated by such company, then in such case said company shall thereafter, upon the notification of the commission, be required to charge not exceeding 2 cents per mile for the transportation of any passenger and his or her ordinary baggage as herein provided.

Bay State Men Remain at Work

As a result of advices from the headquarters of the Amalgamated Association urging the men to live up to their agreement to abide by the finding of the War Labor Board, the men are remaining at work in all the divisions of the Eastern Massachusetts Street Railway, Boston, Mass. No formal acceptance of the War Labor Board's award has yet been voted by the men, but for the present there seems little likelihood of a walkout. Indeed, at meetings of the local unions held within a few days, although the previous intimation that the men might strike rather than accept the War Labor Board's award has not been formally rescinded, a distinct feeling of dissatisfaction with the policy of the joint conference board in forecasting strikes on stated dates made itself felt.

Guy W. Currier, counsel for the company, recently addressed a letter to the unions through their counsel, pointing out that the trustees state that they cannot pay further increases in wages and continue to operate the properly. If the public, through public ownership or otherwise, does not take care of the financial requirements of the road the company will have to suspend operations. The War Labor Board awarded a maximum of 51 cents an hour.

Service Still Suspended in Olean

Platform men and other employees of the Western New York & Pennsylvania Traction Company, Olean, N. Y., who have been on strike since Aug. 12, refuse to return to work until their newly organized local of the Amalgamated is recognized by Wilson R. Page, president of the railway. No cars have been operated over the company's local or interurban lines since the riot of Aug. 18 which resulted in the shooting of more than a score of persons. There has been no disorder since the riot and the two units of the New York state constabulary which patrolled the streets of Olean for two weeks have been withdrawn from the city by the Governor.

All efforts on the part of the Mayor and the Chamber of Commerce to bring about a settlement of the strike have resulted in failure. The company flatly refuses to recognize the union, although James P. Quigley, secretary and counsel for the company, assured a correspondent for the ELECTRIC RAILWAY JOURNAL that all other questions in dispute would be submitted to arbitration.

The grand jury of Cattaraugus County is investigating the riots. Some strikebreakers brought to Olean from Philadelphia are being held by the district attorney in jail pending the outcome of the grand jury inquiry.

Conditions in Connecticut

Commission There Sees No Hope in Further Fare Increases Under Present Competitive Conditions

The seventh annual report for the fiscal year ended Sept. 30, 1918, and including the financial reports of all public service corporations for the calendar year ending Dec. 31, 1917, to the Governor has just been issued by the Connecticut Public Utilities Commission. The report refers to the electric railway situation by saying in part:

No class of public service presents more serious and difficult problems for solution than these railways which during the past quarter century have extended into every city and county in the State, there now being 828.71 miles of track operated with a capital investment of approximately \$100,000,000.

An examination of their financial standing shows them to be in unsound condition and with the high cost of operation and steadily declining net income it is no longer possible to attract new capital for efficient operation, and further the assumed charter obligations of many companies to operate every portion of the system under changed conditions, whether profitable or otherwise, involves an unsound business principle. The remedy to be administered must depend to a large extent upon the public or legislative policy of the State.

Among the numerous contributing causes for the present railway condition the report mentions high and constantly increasing cost of labor and materials due to war conditions, the increase in taxation, municipal paving requirements, loss of patronage incident to privately-owned automobiles and the more or less unrestricted competition of public service automobiles and "jitneys" so-called, operated at the option of the owner, during favorable weather conditions on improved highways in the most profitable sections of the territory served by the railway companies. The failure of the electric railways adequately to meet the service demands gave the occasion if not the necessity for the development and apparent permanency of public service automobile transportation.

ELECTRIC RAILWAYS ARE NECESSARY

The commission is of the opinion that the best interests of the State still require electric railway service as an essential transportation agency, but if both the competent forms of transportation are to survive and render proper service protective legislation should be enacted more equitably apportioning the necessary burdens and defining their competitive rights. The commission feels that it is questionable if any material increase in net revenue would accrue from any further increases in rates on electric railways under existing competitive conditions, as any rate established which is in excess of what traffic will bear is an unprofitable as well as an unsatisfactory rate.

The commission finds in the annual inspection that, all things considered, the track was in better riding condition than in the previous year. Comment is also made on the increasing mileage of open track on highway side locations where practicable, also the fact that cattle guards, wire fences, pole bands for curves and switches, etc., are not in

as good condition as heretofore. "End of Track" signs and telephone markers to avoid derailments at such points have not yet been submitted to the commission for approval and standardization, as suggested in last year's report.

The report also contains the usual tables showing mileage, gross revenue, expenses and traffic statistics for all companies within its jurisdiction.

New Canadian High-Speed Line

At a meeting of the board of commissioners of the London & Port Stanley Electric Railway, Sir Adam Beck, the chairman, announced that a new hydro-radial high-speed line to connect London and Hamilton, a distance of 80 miles, via Ingersoll, Woodstock and Brantford, was projected by the Hydro-Electric Power Commission.

It is intended that this new line shall connect with the London & Port Stanley Railway between London and St. Thomas at a point south of the Thames River. It will run directly east, passing through Dorchester village on the south side of the river and continue to Ingersoll and Woodstock; from the latter city it will run via Burford to Brantford, at which latter point it will likely be united with the existing Brantford-Hamilton and Hamilton-Oakville radial lines owned by the Dominion Power & Transmission Company, Hamilton.

Sir Adam stated that the Brantford and Oakville lines should be and he believed they would be acquired on behalf of the municipalities. The new line then would be shorter, have a better gradient and will give a faster and better service than any of the existing steam roads.

Ontario Hydro-Electric Radial News

The annual meeting of the Ontario Hydro-Electric Railway Association was held in Toronto, Ont., on Sept. 4. Sir Adam Beck stated that the line from London to Toronto could not be constructed at present owing to the fact that the city of Guelph had not yet joined with the other municipalities in assuming responsibility for the share of the four municipalities which had not passed by-laws in connection with the undertaking. Therefore, the whole system from Toronto to Port Credit and London was held up until Guelph took this step, or the other four municipalities passed the necessary by-laws indorsing the construction of this part of the system.

It was for this reason that the section from Toronto to St. Catharines was delayed, as no by-laws had yet been submitted, although he had advised the various municipalities concerned to request the Ontario government for permission to proceed with this line.

The construction of the Port Colborne section and Bridgburg division depended on the acquisition from the Dominion government of the existing Niagara, St. Catharines & Toronto

Railway. The purchase of this line was held up pending the outcome of the negotiations now going on between the Dominion government and the officials of the Grand Trunk Railway for the purchase by the government of the G. T. R. local and paralleling lines and their electrification as part of the hydro-radial undertaking.

The total investment of the Province of Ontario in the Hydro, Sir Adam stated, amounted to about \$10,000,000, while that of the municipalities was \$73,000,000. A resolution was passed by the meeting asking the government for an order-in-council authorizing construction to be proceeded with on the lines passing through such municipalities as had already passed the by-laws providing for the assumption of the necessary liability by the municipalities.

The negotiations between Sir Adam Beck and the City Council of Guelph with respect to the hydro-electric railway have been reviewed.

Statement of Demands of Columbus Men

Under the terms of the settlement of the strike of the trainmen of the Columbus Railway, Power & Light Company, Columbus, Ohio, to which reference was made in the *ELECTRIC RAILWAY JOURNAL* of Sept. 13, page 535, the questions of increased wages and an allowance of seven hours a day or the equivalent in pay for extra men will come up. In their demands on the company the men asked 55 cents an hour for the first three months, 60 cents for the next nine months, and 65 cents thereafter. The present wages are 41 cents, 43 cents, and 45 cents.

Officers of the company had announced several times that they were willing to submit the matter to arbitration, although they were unwilling to grant the closed shop or pay an increased wage, while the rate of fare remained where it is. The voters defeated an ordinance providing for an increased rate of fare a few weeks ago and the company is still operating at eight tickets for a quarter.

Houston Valuation \$4,000,000

The summary of Lamar, Lyndon's report on the valuation of the property of the Houston (Tex.) Electric Company is on its way to Houston, according to a telegram received on Sept. 9 by Mayor A. E. Amerman from New York. The telegram follows:

Report completed. Present property valuation \$4,000,000. Fare required 5.8 cents. You can charge 6 cents straight or 7 cents as regular fare, but sell nine tickets for 50 cents. An alternative is 6 cents regular fare, eight tickets for 45 cents, transfers 1 cent additional. Summary mailed to-day; complete report Saturday.

Mayor Amerman said the report would be turned over to B. F. Louis for examination in preparing for the trial of the case now pending in the Federal Court in which the Houston Electric Company is fighting the city of Houston's 5-cent fare ordinance.

Declares War on Jitneys

Bay State Trustees Threaten to Suspend Service if Jitneys Remain Unregulated

War to the finish against unregulated jitney competition has been declared by the trustees of the Eastern Massachusetts Street Railway, formerly the Bay State Street Railway. Chairman Homer Loring of the board of trustees appeared on Sept. 16 before the street railway investigating commission at Boston and declared that cities and towns on the system which are doing little or nothing to check unfair jitney competition cannot expect to obtain lower car fares.

Further than this Mr. Loring pointed out that if the unregulated competition was allowed to continue, the time would come when the continuance of service even in cities of the size of Salem would be threatened. The public must decide which of these two services it prefers, and the present unregulated jitney traffic cannot be permitted by the municipal authorities if street railway facilities are to continue.

ABANDONMENTS THREATENED

In several places where jitneys are allowed to run wild, Mr. Loring declared, it will be absolutely necessary for the people to decide in the immediate future whether they want the railway or the jitney. In Lynn and Lawrence, Mass., two cities where jitney competition is at its worst, Mr. Loring stated that the railway company pays taxes of \$650 and \$600 respectively on every car operated, while jitneys operate with practically no tax.

At the hearing Mr. Loring touched upon various economies which the trustees are seeking to put into effect. By the purchase of 200 one-man safety cars, which, it is believed, will be in operation before March 1, 1920, it is expected that an immediate substantial saving will result. One hundred of these cars have already been contracted for, and the trustees have voted to purchase another hundred. By the removal of the Boston offices of the Bay State system from 245 State Street to 1 Beacon Street, Boston, Mr. Loring said there will be a saving of \$11,000 in annual rental. Reduction in the clerical force of the Eastern Massachusetts Street Railway, resulting from the decentralization of operation, cut down the payroll about \$150,000 annually.

HOME RULE PLAN POPULAR

The system is now divided into twelve operating or "home-rule" districts, in every one of which the local manager is given general charge instead of being responsible in the minutest details to the central office in Boston. A better feeling between the public and the company can be traced to this policy of decentralization.

By the erection of a car repair shop in some community north of Boston the trustees hope to save \$200,000 a year in the construction and repair of roll-

ing stock. It is the intention of the trustees to enlarge the present shops at Campello, near Brockton, in order to better serve the district south of Boston.

Mr. Loring said that one of the chief difficulties with which the trustees have to contend is the rapidly increasing cost of labor. In December, 1918, the men received an increase which added \$750,000 to the expenses, and recently were awarded another raise which exceeds \$850,000 more annually.

In discussing the 10-cent fare, Mr. Loring said that while it does not as yet fully meet the expectations of the trustees, a serious mistake has been made by those who claim it to be a failure. Net receipts in July, 1919, were 14 per cent more than in July, 1918; and in August, 1919, they were 18 per cent in excess of the report for the same month a year ago. The August, 1919, receipts were the largest in the history of the system.

During the hearing Chairman Macleod of the Public Service Commission indorsed the use of one-man cars. The commission has investigated its service on many roads, and in every case success has resulted.

Elsewhere in this issue details are given of the experimental reduced-rate tickets initiated in Lowell, Fall River and Taunton after most cordial conferences with business interests to meet traffic needs of regular riders and also in a measure to combat the jitneys.

News Notes

Strike in Marion.—The Coal Belt Electric Railway, Marion, Ill., suffered a strike which lasted seven days, the men demanding 75 cents an hour. A report was circulated that the company had offered 60 cents an hour.

M. O. Vote Planned in Spokane.—Municipal ownership of the railway system of Spokane, Wash., is to be placed before the voters of the city at the coming city election on Nov. 4, according to statements made by Mayor C. M. Fassett.

Wage Increase in Boulder.—The trainmen in the employ of the Western Light & Power Company, Boulder, Col., have been granted an increase in wages. The men have been receiving a wage of 33 cents and 35 cents an hour. According to the new scale the wages will be 35, 38 and 40 cents an hour.

Five-Cent Advance for Wilmington Carhouse Men.—Striking carhouse men of the Wilmington & Philadelphia Traction Company, Wilmington, Del., returned to work, on Sept. 10, after they had been granted an increase of

5 cents an hour. The new wage scale ranges around 50 cents an hour, the amount most of the men will receive.

Higher Pay for Chester Carmen.—The Southern Pennsylvania Traction Company, Chester, Pa., has averted a threatened strike of its employees by granting their demands for a wage increase of 10 cents an hour. The wage advance will cost the company \$110,000 a year. The company is planning to ask for an increase in fare.

Jitney Control Lodged in Street Commissioners.—The City Council of Boston, Mass., has passed an amendment to the jitney ordinance by which the supervision of jitneys is to be put under the board of street commissioners. The ordinance originally put this supervision under the direction of the police commissioner, who declined jurisdiction.

Revere Beach Wages Adjusted.—The Boston, Revere Beach & Lynn Railroad, Boston, Mass., has announced that as the result of conferences with the representatives of the employees seeking increases in wages, concessions have been made by the management as well as by the committee from the employees and a satisfactory adjustment reached on a basis of compromise, carrying substantial increases.

Wage Conference at Urbana.—Officials of the Illinois Traction System conferred at Urbana, Ill., on Sept. 11 with trainmen who have made wage demands. About a month ago the trainmen asked for an increase from 50 cents an hour to 75 cents an hour for conductors and motormen and from 37 cents to 62½ cents for brakemen. The men are said to have reduced their demands 5 cents an hour, but the company has said it could not meet the increase.

Austin Men Want More.—Conductors and motormen in the employ of the Austin (Tex.) Street Railway have presented demands to the company for an increase in wages amounting to 5 cents an hour. The company recently refused to grant a wage increase of \$1 a day demanded by firemen and power-house employees. In refusing these demands the company declared it could not increase wages because the city had declined its petition for fare increase from 5 cents to 6 cents as sought recently.

Agree on Concord Wages.—The management and the employees of the Concord (N. H.) Street Railway have agreed on the wage scale which has been under discussion since June 10, when the men demanded an increase. The new scale gives the men 45 cents an hour for the first three months, 50 cents the next nine months, and 55 cents thereafter. The old scale ranged from 36 cents to 43 cents an hour. Shopmen receive 50 cents and 52 cents an hour, an increase of 2 cents. The increase is retroactive to June 14.

Short Toronto Strike.—In view of the grave situation caused by the

strike of the substation employees of the Toronto (Ont.) Railway, to which reference was made in the *ELECTRIC RAILWAY JOURNAL* for Sept. 13, page 538, a conference was quickly held between representatives of the company and the men, and a letter was sent by Mr. Fleming, general manager, agreeing to accept the terms of the award. The men then went back to work, and the operation of the cars was resumed at 9:30 p. m., on Sept. 3, the men having been out since 3 p. m. that day.

Request Delay in Cincinnati Loop Work.—W. W. Freeman, president of the Union Gas & Electric Company, has requested the Cincinnati Rapid Transit Commission to delay the draining of the Miami & Erie Canal until Oct. 15, so that the Plum Street generating plant can be used as an emergency station, while the installation of electrical machinery at the new generating plant is being completed. The Plum Street plant uses the canal water in its condensers, and it will be needed until the new plant is in full operation. The original date set by the commission for draining the canal was Sept. 15.

Municipal Ownership Recommended at Los Angeles.—The finance committee of the Council of Los Angeles, Cal., has recommended to that body that negotiations be entered into with the Los Angeles Railway with a view to learning the basis on which the city might acquire the property. Mayor Meredith P. Snyder has indicated he does not favor the taking over of the Los Angeles Railway at this time. The Mayor has stated there are more important municipal ownership plans that should be given consideration before the railway is purchased by the city. He is quoted as follows: "I am in favor of municipal ownership, but I wish to see our present projects on a paying basis before we turn to others of even greater expense. We need a municipal ice plant more than municipal railways, and I do not believe the project will be seriously considered by the Council."

Strike Still on at Louisville.—Following failure of an attempt to submit the differences at issue to arbitration, Mayor Smith of Louisville, Ky., on Sept. 8 called upon the Louisville Railway to accede to the demands of its striking employees and to resume full service, which had been curtailed since Aug. 18. The Mayor demanded that a contract be signed with the union guaranteeing "reasonable and just working conditions." T. J. Minary, president of the railway, rejected the Mayor's demand and declared that, given adequate police protection, the company could resume full service at once. He declined to treat with the strikers owing to the fact that the strike had been called in violation of contract and after representatives of the union had expressed themselves as satisfied with company's attitude. The strikers, who had walked out to compel the company to prefer charges before discharging an employee, later demanded increased wages.

Financial and Corporate

Reorganization Planned

Key Route System Spurred Into Action by Recent Pronouncement of Railroad Commission

According to H. H. MacDonald, writing in the San Francisco *Chronicle*, another attempt is to be made to reorganize the San Francisco-Oakland Terminal Railways, Oakland, Cal., and to that end a carefully chosen committee has been named. The committee, which will at once set to work upon the reorganization, comprises the following leading citizens representing the interests of bondholders on both sides of the bay:

J. F. Carlston, president of the Central National Bank, Oakland; W. W. Garthwaite, president of the Oakland Bank of Savings; P. E. Bowles, president of the First National Bank, Oakland, and chairman of the board of the American National Bank, San Francisco; John S. Drum, president of the Savings Union & Trust Company, San Francisco; George Tourney, president of the San Francisco Savings & Loan Society; Gavin McNab, San Francisco; George K. Weeks, vice-president of the National City Company of California; George A. Batchelder of E. H. Rollins & Sons, San Francisco; Paul Sinsheimer, vice-president of the Union Trust Company, San Francisco, and Herbert Fleishhacker, president of the Anglo & London-Paris National Bank, San Francisco.

John S. Drum, president of the Savings Bank & Trust Company, on behalf of the committee, is quoted in part as follows:

The system has been virtually managed by the trustees of F. M. Smith since May 5, 1913. For a year or two prior to that time the company could borrow money and it has run along since 1913 without new capital. Such earnings as were made, over and above interest requirements, were devoted, and solely devoted, to absolutely necessary repairs. In 1915 an effort was made to work out a plan of reorganization and a committee was then appointed, which, after numerous sessions found it impossible to formulate such a plan as would be acceptable to the bondholders. It would then have amounted only to an exchange of old securities for new, which it would be impossible to market.

CLEAN HOUSE FINANCIALLY, SAYS COMMISSION

In November of 1916 an enabling act was passed by the Legislature for proposed settlement of the franchise question and the various bay cities, through their Mayors and Councils, appointed representative committees to work out details for new franchises. Finally a plan was agreed upon and the Railroad Commission was asked to value the properties. That valuation proceeding is now pending.

Meanwhile the Railroad Commission rendered two decisions. The first of Sept. 19, 1918, increased fares on the east side of the bay to 6 cents and the second of Aug. 11, 1919, increased ferry fares to 15 cents. In rendering the latter decision the commission said:

"It has been repeatedly pointed out by this commission that the only permanent remedy for the financial difficulties of this company is a thorough-going reorganization of its finances. As long as the Key system rests

on the present unsound financial structure, it is bound to continue in financial difficulties in the future, as it has in the past. The rate increases will not affect a complete or permanent remedy of this situation. "It is our opinion, as repeatedly expressed, that a financial reorganization of the company is necessary and that no permanent, satisfactory operating and financial result can be obtained until such a reorganization has been made."

These two increases gave an additional amount of between \$700,000 and \$800,000 to the system, but the cost of operating, including that of labor and supplies, fully absorbed this amount. Since December, 1917, or less than two years ago, the cost of labor alone on this system has increased over \$500,000. There are now about 2000 employees, about 1200 of whom are platform men.

Now acting under the imperative directions of the Railroad Commission, it has been felt that, as a community problem, the effort should be made to propose a plan of reorganization. This is to be done even before resettlement of the franchises will be considered by the people.

Even to-day it is a serious question whether moneys can be obtained through the sale of new securities to enable the company to keep pace with the growth and development of these communities and furnish adequate service.

This is something more than a reorganization committee. It is of so thoroughly representative a character that it will be able from time to time to give authoritative statements as to the true condition of the company. Before the problem is finally solved the question of municipal ownership will come to the front.

This matter has been seriously argued before a commission sitting at Washington.

The present status means bankruptcy of all traction companies, the strong as well as the weak. There has seemed but one of two things open. First, private ownership with willingness of the community from time to time to pay increased fares, adoption of the zone system or a limit on transfers, or all three methods; second, municipal ownership with a fixed 5-cent fare and deficits on operation made up in tax rates. This implies that all would pay for the upkeep of the transportation systems as a common benefit of such magnitude as to make it worth while to do it.

Higher Operating Expenses in Milan, Italy

The last annual report of the municipal tramways of Milan, Italy, shows greatly increased expenses due to the higher expense for labor. The lines within the city were taken over by the municipality some years ago from the local Edison Illuminating Company, which still operates the suburban and interurban system. Early in 1919 the wages paid for platform labor were raised from 4 liri to 6.40 liri a day and of shopmen 5.85 to 9.35 liri. In the middle of May, another advance had to be made, that granted being platform labor, 7.20 to 10.90 liri a day, and shop men from 8.75 to 13.10 liri a day, the higher figures in each case being paid after seventeen years of service.

The *Corriere della Sera* estimates that the salaries and wages for the 5100 employees entail a yearly expense of about 34,000,000 liri, while the total income is about 40,000,000 liri. The pertinent question is then asked whether all other expenses, such as maintenance, repairs, construction, materials, and electric power can be paid out of the balance of 6,000,000 liri.

Glasgow No Exception

Expenses of Model Municipal System More Than Outstrip Increase In Gross Revenue

The Glasgow (Scotland) Corporation Tramways did not do so well for the year ended May 31, 1919, as for the previous year. The surplus to the common good was only £14,772 as compared with £160,984 for 1918. While the total revenue from traffic and other sources increased more than £120,000 traffic and other general expenses increased more than £200,000. There was also an increase of about £80,000 in deductions. Wage increases are reflected in the figures. There were also extraordinary allowances for upkeep.

INCOME ACCOUNT OF GLASGOW CORPORATION TRAMWAY FOR YEARS ENDED MAY 31, 1919 and 1918

	1919	1918
Traffic receipts.....	£1,527,487	£1,404,110
Sundry receipts.....	3,832	8,525
Total revenue.....	£1,531,319	£1,412,635
Traffic expenses.....	£674,167	£527,152
General expenses.....	175,004	156,949
Maintenance and repairs	219,509	179,812
Power expenses.....	106,685	86,029
Clydebank bridges.....	1,752	1,131
	£1,177,117	£951,063
European war.....	72,869	93,120
Total expenditure.....	£1,249,986	£1,044,183
Balance carried to net revenue account.....	£281,331	£368,452
Interest on investments	10,564	8,579
Total.....	£291,895	£377,031
Deductions.....	277,123	199,479
Surplus to common good	£14,772	£160,984

During the year the sum of £91,913 was expended on the upkeep of the track in ordinary repairs. In addition to this sum £137,394 was set aside out of the year's revenue to meet the cost of the renewal of track. This sum is calculated at the rate of £700 per mile of single track. There was also deducted from the permanent way renewals fund the sum of £31,829, being the amount expended on renewal of track during the year.

The average traffic revenue per car-mile increased from 12.832d. to 14.33d. This is very high indeed, considering that more than 62 per cent of the passengers pay only a 1d. fare. The allowance paid to dependents of employees serving with the military and naval forces amounted to £72,704 for the year.

The tramway employs 5027 male employees and 1628 females. During the year all sections of the staff received increases in wages. On May 16, 1918, unskilled and semi-skilled male employees received an advance of 5s. per week. On Nov. 3, 1918, a further advance of 3s. 6d. per week was awarded to able-bodied employees of these classes. On June 25, 1918, an advance of 6s. per week was granted to the women car cleaners. A further advance of 5s. per week was granted on July 9, 1918, to motresses, conductresses, women car cleaners, and on Jan. 29, 1919, a further advance of 5s. 6d. per week was granted, thus giving

the motresses and conductresses 25s. 6d. per week over pre-war rates and the women car cleaners 19s. 6d. per week over pre-war rates. There were other advances, but these are mentioned as indicative on the general trend of the wages on the system.

Attention has been called previously to the contribution of £14,772 to the common good. In addition to this the tramway paid £88,306 in taxes, etc.

A statement of the number of passengers carried during the year at each fare, and the revenue from each fare, with the percentage in each case follows:

Fare	Passengers Carried		Traffic Receipt	
	Number	Per cent.	Amount	Per cent.
1d.	290,080,376	62.48	£604,334	39.56
1d.	121,285,355	26.12	505,355	33.08
1½d.	31,750,977	6.84	198,443	12.99
2d.	10,348,905	2.23	86,240	5.65
2½d.	4,846,252	1.05	50,481	3.31
3d. and more	5,934,812	1.28	82,261	5.39
Sundries			370	0.02
Total	464,246,677	100.00	£1,527,487	100.00

Brazilian Company Reports

For the year ended Dec. 31, 1918, the Brazilian Traction, Light & Power Company, Ltd., Rio de Janeiro, Brazil reports surplus after charges and preferred dividends, of \$4,569,672 equal to \$4.29 a share earned on the \$106,515,500 of common stock, as compared with surplus of \$4,666,518 or \$4.38 a share in the preceding year. The income account for the year ended Dec. 31, 1918, (in Canadian currency) compares as follows:

	1918	1917
Gross revenue	\$6,122,412	\$6,005,138
Interest received	130,051	198,560
Total income	\$6,252,463	\$6,203,698
Administration expense, interest, etc.	832,791	937,180
Surplus	\$5,419,672	\$5,266,518
Amortization reserves	250,000	
Preferred dividends	600,000	600,000
Balance	\$4,569,672	\$4,666,518
Common dividends		1,314,136
Surplus	\$4,569,672	\$3,352,382

During the year, twenty-nine first-class vestibuled ten-bench trail cars, and ten single-truck motor freight cars were completed and put into service. Due to delays in deliveries of equipment ordered for the new passenger motor and additional trail cars commenced in 1917, construction has been necessarily slow, but the work is now well advanced on ten thirteen-bench and fifteen ten-bench passenger motor cars, and twenty-five ten-bench trailers, all of which will be ready for service during 1919.

Further additions have been made to the buildings and equipment of the

	1915	1916
Miles of track	140	141.1
Equipment:		
Passenger cars	317	312
Passenger trailers	57	47
Freight cars	55	59
Freight trailers	27	33
Miles run—all cars	9,425,231	10,153,657
Passengers carried	51,574,145	55,154,564

shops and foundry, and various articles heretofore imported can now be manufactured there with substantial saving.

The statement at the bottom of the first column gives comparative statistics of tramway system for the last two years.

Further Abandonments Authorized

Court Directs New York Railways to Discontinue Three Storage Battery Lines on East Side

Federal Judge Mayer at New York on Sept. 11 authorized Job E. Hedges, receiver for the New York (N. Y.) Railways, to cease for the present the operation of four short storage battery lines running through heavily congested sections of the lower east side of New York City. All of these lines except one are owned by the New York Railways. The latter is owned by the Sixth Avenue Railroad, which is leased by the New York Railways. Besides authorizing the suspension of the lines, Judge Mayer also resolved to return the Ninth Avenue line to its owner for the reason that the New York Railways, which leases it, has not been able to pay the rental and because it was losing money.

The four storage battery lines will probably cease operating within a fortnight. They had been carrying on an average of 1,000,000 passengers a month. Their total deficit, according to figures submitted by the receiver, has aggregated about \$414,000 a year. It is estimated that the net saving by abandoning operation will be \$300,000 a year.

Judge Mayer pointed out that the struggle now was to find some way of saving the more important lines in New York City from destruction. To accomplish this he said it was necessary to cut off the smaller and less important links of the system. The receiver stated that he had done all he could to keep the New York Railway system intact and that he hoped the responsibility for the cutting off of the crosstown service would rest with the municipal authorities.

In announcing his decision to authorize the suspension of the four storage battery lines, Judge Mayer referred to the order of Public Service Commissioner Nixon permitting a charge for transfers and continued:

The application to Commissioner Nixon was opposed by the municipal authorities, and what little relief has been obtained by this receivership was, I regret to say, obtained over the opposition of those the court hoped would co-operate in some way or another, reaching a solution of a very difficult problem which, as I stated the other day, is filled with intricate questions of law, of government relations, and of financial requirements.

When the Mayor learned that the four storage battery lines were to be discontinued, he issued this statement:

The head of the Bureau of Franchises and Commissioner of Public Works, Joseph A. Guider of Brooklyn will immediately work out a plan for the installation of a motor bus service along the routes of the lines discontinued.

6,000,000,000 Discouraged Dollars

Economists have written about the stabilized dollar and the diminishing dollar. Now comes W. P. Strandborg of the Portland Railway, Light & Power Company, Portland, Ore., who writes about "The Discouraged Dollar" in *Watts Watt*, the publication of his company, distributed on the cars. It is easy to understand the diminishing company, distributed on the cars.

It is easy to understand the diminishing dollar, for this shrinking personality is brought home every day in practically all purchases that are made. It might also be possible to learn something about the stabilized dollar if present-day economists were like the late William James and wrote like novelists, but they do not.

As for the discouraged dollar, Mr. Strandborg has made it quite plain what he is driving at. In fact, he sees 6,000,000,000 discouraged dollars in the electric railway field. In *Watts Watt* for Sept. 5 Mr. Strandborg says in part:

Look, for instance, at Henry Ford's dollars. The one dollar that Ford put into his business a few years ago is now worth \$125 and making enormous wages (profits) every day.

Look at the Rockefeller dollars in Standard Oil—the Schwab dollars in Bethlehem Steel, the Carnegie dollars in U. S. Steel.

Take the busy little dollars in the automobile industry, the textile industry, the packing industry, the leather, the coffee, the copper—and a thousand other industries—all fat, smiling and prosperous, with not a care in the world!

Then take the other side of the picture. Behold, the street railway dollar!

Of all the sad, dejected, mangy, disconsolate, unhappy, discouraged, melancholy and anaemic pieces of loose change—this little vagabond coin is the prize boob of the mint. Victim of a motley scourge of ills, sticking to its precarious job, underfed and overworked, banged and buffeted by rolling tides of misfortune, harassed from truck to keel, discredited, maltreated, scorned by its neighbors, its threadbare existence excites only pity among its fellows.

The poor devil is in such straits that it is in the hands of government specialists down in Washington, and from the reports it is difficult to determine whether the consultation of physicians is going to develop into a diagnosis, a clinic, an autopsy or a post mortem. And the street railway industry, itself, doesn't quite know whether it is to hope for a resurrection or prepare for a funeral. It's a standoff, a fifty-fifty bet, and it takes a swad of optimism to put it that strong.

There must be a reason for all this, for, once upon a time, the street railway dollar was happy, like the rest and made a comfortable living, but that was long ago and since then evil days have come upon it.

Why is it? Why are there no more dollars going to work in the street railway industry? Why is capital so vital for the maintenance and development of railway service absolutely shunning this formerly inviting field and turning to other and more attractive channels for investment?

The answer is merely that the dollar already in the business has become discouraged and the dollar that might have cast its fortunes with it is afraid to take a chance.

The street railway dollar is not allowed either a living wage or decent working conditions. It has an army of bosses, cracking the whip and issuing orders. The general public, if not openly hostile, is conspicuously indifferent; the federal government, until a few weeks ago, had been ham-stringing it with war imposts and ignoring it as an economic factor; state authorities have as a rule been interested mainly in circumscribing its natural functions and loading it with legal restrictions; county and municipal regulative and legislative bodies have been more concerned in curbing and leashing it than in giving it freedom of action.

These, friends, are some of the reasons the street railway dollar is "discouraged." And, there are very close to 6,000,000,000 of these dollars in the United States to-day in that same plight.

Financial News Notes

New P. R. T. Director.—Jeremiah J. Sullivan, Jr., has been elected a director of the Philadelphia (Pa.) Rapid Transit Company, vice John S. Phipps, New York, resigned.

City Invests in Traction Bonds.—The city of Charlottesville, Va., has purchased for its sinking fund \$5,000 of bonds of the local company, the Charlottesville & Albermarle Railway.

Interest Payment Deferred.—The Aurora, Elgin & Chicago Railroad, Wheaton, Ill., has notified the Citizens' Trust & Savings Bank, Aurora, Ill., trustees for holders of the collateral trust notes, the company is unable to make the interest payment which was due on Sept. 1.

Guarantee of Equipment Notes Authorized.—The Georgia Railway & Power Company, Atlanta, Ga., has been authorized by the Georgia Railroad Commission to guarantee the payment of equipment notes to the amount of \$132,231, this sum covering the purchase of fifteen new cars, of the center side-door type, with a seating capacity of fifty-one passengers.

Abilene Road Sold.—The property of the Abilene (Tex.) Street Railway has been sold at public auction by W. G. Swenson, receiver, to Henry James and George L. Paxton, both of Abilene, for \$5,500. The property includes approximately 5 miles of single track, several one-man cars, carhouses, etc. It is understood to be the plan of the new owners to put the line in repair and resume operation. Since the cars ceased operation several months ago, transportation has been by jitney and omnibus service.

Dismantlement Under Way.—The work of removing the remaining ties, rails, poles, and other property of the Alton & Jacksonville Railway, between Alton and Jacksonville, Ill., was started at Alton, on Sept. 11. The road belongs to the estate of the late John J.

Cummings, Chicago, who secured possession after receivership proceedings. During the war he received permission of the Public Utilities Commission of Illinois to dismantle the line and large quantities of the rails and other material were shipped to France for use in the construction of military railway lines by the American Expeditionary Forces.

Offering of Notes.—Halsey, Stuart & Company, New York, N. Y., are offering at 98.70 and interest to yield 7½ per cent, \$96,000 three-year 7 per cent collateral gold notes of the Ashland Light, Power & Street Railway Company, Ashland, Wis. The notes are dated Aug. 1, 1919, and are due on Aug. 1, 1922. The purpose of the issue is to reimburse the company for expenditures made for permanent additions and betterment. In addition to the note the company has outstanding \$200,000 of capital stock and \$720,000 of first mortgage 5 per cent bonds due on Jan. 1, 1939.

Dallas Doing Better.—Earnings of the Dallas (Tex.) Railway for August showed an increase over former months, operating fewer cars at greater speed and covering less mileage than in July of this year, according to the monthly report of Lynn B. Milam, supervisor of public utilities. Mr. Milam explained that while mileage has been reduced and speed increased, more people are evidently being reached than before through the consolidation and extension of the railway lines. Still further economic gains along these lines are expected when the new re-routing schedules go into effect.

Interest Payment Postponed.—Semi-annual interest on the \$2,500,000 of bonds of the Washington, Alexandria & Mount Vernon Railway, due on Sept. 1, has not been paid. These bonds are the obligations of the Washington-Virginia Railway, Washington, D. C., which absorbed the Washington, Alexandria & Mount Vernon, and the Washington, Arlington & Falls Church lines. The previous installment of interest, which was due on March 1, was not paid until early in July, the company taking advantage of a clause in the mortgage, which provides that there shall be no legal default until four months after the due date.

Berkshire Receiver Discharged.—Judge Hammond of the Superior Court on Sept. 9 in the case of the Berkshire Street Railway, Pittsfield, Mass., against the New York, New Haven & Hartford Railroad decided that the services of C. O. Richmond as a receiver were no longer required. The judge decreed: "That C. O. Richmond be not authorized to continue further to act as receiver of the property of the plaintiff corporation and that upon the filing and allowance of his account he be discharged as such temporary receiver without prejudice to the right to apply hereafter for the appointment of receiver of the property of the plaintiff corporation."

Plan to Forego Interest Approved.—The plan has been approved which was proposed in May, 1919, by the Augusta-Aiken Railway & Electric Company, Augusta, Ga., to the holders of the first mortgage 5 per cent sinking fund bonds due 1939 of deferring the interest on the issue for three years by turning the coupons into a five-year interest bearing note at 5 per cent and agreeing until such notes mature on June 1, 1924, to waive the operation of the sinking fund. This proposal was made in order to secure necessary funds for construction, replacements and floating debts. Provision is made in the deposit agreement that until the 5 per cent coupon gold notes have been paid off no dividends shall be declared by the company on either class of stock.

Swansea-Seekonk Line Gives up Ghost.—The Swansea & Seekonk Street Railway, forming part of a route between Providence, R. I., and Fall River, Mass., is to be sold to the highest bidder, according to a decision reached at a stockholders' meeting on Sept. 16, in Swansea, Mass. The assets will be distributed and the corporation dissolved at once. A strike of employees obliged the management to cease operation several weeks ago, and the directors found it impossible to resume service. The line was unusually torturous in its location and found great difficulty in competing with the electrified Providence-Fall River service of the New York, New Haven & Hartford Railroad. It was rescued from the junk dealers some months ago, local capital becoming interested in the effort to save the property.

Electric Railway Monthly Earnings

CITIES SERVICE COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., July, '18	\$1,789,252	\$34,959	\$1,754,293	\$7,062	\$1,747,230
1m., July, '19	1,583,722	56,957	1,526,765	176,828	1,349,937
12m., July, '18	21,331,886	399,579	20,932,306	20,648	20,911,658
12m., July, '19	21,361,104	690,169	20,670,935	1,369,205	19,301,730

COLUMBUS, (GA.) ELECTRIC COMPANY, COLUMBUS, GA.

1m., June, '19	\$104,852	\$59,465	\$45,387	\$30,312	\$15,075
1m., June, '18	95,152	*38,130	57,022	28,084	28,938
12m., July, '19	1,199,899	*649,655	550,244	356,075	194,169
12m., June, '18	1,178,395	*465,666	712,729	325,230	387,499

EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.

1m., June, '19	\$110,619	*\$70,662	\$39,957	\$13,325	\$32,846
1m., June, '18	102,080	*51,988	50,092	11,651	38,440
12m., June, '19	1,244,434	*766,947	477,487	156,170	329,590
12m., June, '18	1,018,128	*562,237	455,890	135,602	341,395

*Includes taxes, †Includes non-operating income.

EL PASO (TEX.) ELECTRIC AND SUBSIDIARY COMPANIES

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., June, '19	\$123,869	\$94,120	\$29,749	\$7,843	\$21,951
1m., June, '18	96,236	69,198	27,038	6,667	20,446
12m., June, '19	1,378,258	987,207	391,051	85,057	305,072
12m., June, '18	1,272,064	832,669	439,395	74,765	364,273

GALVESTON-HOUSTON ELECTRIC COMPANY

1m., June, '19	\$255,777	*\$186,057	\$69,720	\$35,649	\$34,071
1m., June, '18	230,752	*147,895	82,857	29,258	53,599
12m., June, '19	2,924,018	*2,121,528	802,490	378,815	423,675
12m., June, '18	2,385,354	*1,555,941	829,413	342,883	486,530

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

1m., June, '19	\$282,414	*\$183,470	\$98,944	\$25,041	\$183,486
1m., June, '18	259,162	*165,336	93,826	25,212	178,197
12m., June, '19	2,927,397	*1,943,771	983,626	300,506	178,120
12m., June, '18	3,078,818	*1,747,266	1,331,552	307,987	1,109,815

Traffic and Transportation

Register Decision in Boston

Hand Register Not to Be Used on Open Cars With Running Board After Jan. 1

The board of arbitration in the controversy between the Eastern Massachusetts Street Railway, Boston, Mass., and its employees concerning the use of the Rooke register in fare collection handed down its decision on Sept. 8, 1919. As explained in the *ELECTRIC RAILWAY JOURNAL* for Sept. 13, page 545, the board decided that the register shall not be used on open cars of the running board type after Jan. 1, 1920, but that it may continue to be used on all other types of cars at the discretion of the company.

NOT AN UNREASONABLE REGULATION

The members of this board were Samuel H. Pillsbury, Boston, representing the railway; James H. Vahey, Boston, representing the employees, and James L. Doherty, Springfield, as the third arbitrator. Hearings were held at the State House, Boston, in August, as a result of the agreement to arbitrate on whether the register was reasonable, accurate, safe and proper. A previous reference to this case appeared in the *ELECTRIC RAILWAY JOURNAL* of Aug. 23, 1919, page 413.

The board assumed that the terms "reasonable" and "proper" are practically synonymous and were to be interpreted in the light of the circumstances in the case. In dealing with its accuracy, the arbitrators held that as a mechanical device the register was not always accurate but subject to fluctuations in registration generally due to effects of wear and usage.

As far as the personal safety of the conductor was concerned, the board agreed that on inclosed cars little, if any, more hazard was involved either to the conductor or the passengers than from the use of the overhead registers, but on cross-bench open cars with side running boards, an element of more seriousness was introduced, even though rules were in operation to prevent passengers riding on running boards of such cars.

BARRED ON OPEN CARS

Comment from passengers of the railway company directed to the conductors intimating their dishonesty, while irritating and unfortunate, was held not to be a controlling factor in the right of the management to establish reasonable policies and that the use of the Rooke register, under all the circumstances, was not an unreasonable or improper exercise of the judgment and discretion lodged in the manage-

ment, and no change was recommended, except in one particular, namely: the use of the register on cross-bench open cars shall be discontinued on and after Jan. 1, 1920.

S. H. Pillsbury, the company's representative on the board, concurred in the finding against the use of the Rooke register on the open cars now operated upon the Eastern Massachusetts Street Railway, feeling it would not seriously affect its business. On the general principle, however, he did not concur as he was unwilling to prejudice the position of parties not directly affected by this proceeding, stating "that such finding does not appear to me to be supported by satisfactory evidence that the use of this register on open cars has resulted in accidents to employees or others."

A Bid for Popular Favor

Increased business through improved service has been adopted by the Chicago, North Shore & Milwaukee Railroad as a means of meeting a large wage advance recently granted to the employees. This wage increase amounts to \$300,000 a year, and the company hopes to meet it without increasing rates to the public. Strict economy and improved efficiency are the watchwords. Courtesy toward patrons and real service to the public are demanded of all trainmen and station agents.

Orders have been placed by the company for thirty new passenger coaches. Delivery on the new equipment is expected to begin late in the fall. New tracks have been built between Milwaukee and Carrollville, Wis., and the roadbed improved in a number of places. Everything possible is being done in the way of making a bid for popular favor. Direct through operation of North Shore trains into the Loop district in Chicago, which began a month ago, is expected to increase passenger traffic.

"We Want You to Feel at Home"

W. P. Strandborg, of the Portland Railway, Light & Power Company, Portland, Ore., writing in a recent issue of the company's paper, *Watts Watt*, includes the following among some desultory thoughts:

When you go into a store, an office or any other place of business you don't scatter refuse all around the place—you don't sit down in a chair and scatter peanut shells all over the room, and you certainly don't spit tobacco juice on the rug or carpet.

Why then do it in a street car? One street car company in the East got out some cards a while ago which read like this:

"If You Spit on the Floor at Home, Do It Here. We Want You to Feel at Home." That, of course, was sarcasm, but it went right to the point.

Buffalo Wants Ten Cents

Says There Is No Use TempORIZING if Company Is to Be Saved from Financial Disaster

The International Railway, Buffalo, N. Y., in a supplemental brief filed with the Public Service Commission for the Second District, on Sept. 9, by its attorneys, Kenney, Killeen & Nye, says it should have a 10-cent fare in Buffalo until its deficit is wiped out. It continues:

On a 6-cent fare this company will continue to starve, unable to pay its bond interest, unable to repave streets and reconstruct tracks, unable to wipe out its debts for taxes, back wages and accumulated bond interest, unable to render efficient public service.

On a 7-cent fare the company will be able to pay operating expenses, including current maintenance, to provide for ordinary renewals and replacements, and probably will be able to pay some part of its bond interest, but it will not be able to wipe out its accumulated deficit and will not be able to pay real wages, to the dollars which are invested in its public service.

An 8-cent fare will provide for the necessities of the company, except that it will not enable the wiping out of the deficit within a reasonable time.

The railway says a rate should be fixed which will restore the company to a condition of financial health so that it may function as an efficient agency of transportation. This can only be done, it asserts, after the credit of the company has been restored by the allowance of a rate of fare which will enable it to take care of its obligations, and to pay some return or wages to the money invested in the public service.

WOULD AVOID EXPERIMENTS

The company argues against experimenting with a lower rate of fare than the facts justify, claiming that an experiment, founded on the possibility that increased traffic may pull the company through is neither wise in itself nor judicious, considering the public interest. Such a course, it says, leaves the company without credit, unable to keep up maintenance, replacements and renewals, with its tracks, cars and buildings steadily deteriorating in operating efficiency and its capacity to render its public service daily diminishing.

	1910	1919	Increase Per Cent
Employees	2,641	3,160	19.65
Yearly payroll . . .	\$2,012,371	\$4,365,990	11.96
Average pay per employee	\$761.97	\$1,381.64	81.32
Gross earnings . . .	\$5,984,187	\$9,025,000	50.81

The railway says from 1910 to 1919 its payroll increased by about 117 per cent whereas gross earnings have increased only 50.8 per cent. Proof shows that the average price of material has increased since 1914 by approximately 120 per cent. The only way largely to increase the gross earnings at this time, according to the company, is largely to increase the rate of fare which the companies are permitted to charge. The company presented the accompanying figures in support of its plea for still higher rates.

Zone System in Effect in Jersey

Delay in Unloading Due to Passengers and Conductors Not Knowing Fare—Violence on Southern Division

The new zone system of fares on the Public Service Railway of New Jersey calling for 3 cents for the first zone and 2 cents for each additional zone or fraction, became effective last Sunday morning, Sept. 14, coincident with the pulling out of the first car at each of the twenty-eight operating car houses.

The system of fare collection, briefly outlined, provides that all passengers board the cars by the front door and receive from the motorman a zone check illustrated in the *ELECTRIC RAILWAY JOURNAL* of Sept. 6, page 485. On leaving the car, passengers pay their fare to the conductor, who on some 650 cars ring the fare up on a National cash register, while on other cars the cash is deposited in the fare box and the number of fares so paid is rung up on an overhead register.

The company took every precaution possible to make sure that the plan would operate smoothly. After the first day's operation, John L. O'Toole, assistant to the president, stated:

The record for the first day was beyond our fondest expectations. We had expected people would take to the zone system, but even our best hopes were surpassed. The co-operation of the car crews, too, was everything that could be looked for. The system will work better and better as it becomes familiar.

FIRST REAL TEST

The first real test of the system came on Sunday night at the Velodrome bicycle races. The zone in which the Velodrome is located commences only some few hundred yards from the entrance and many people wanted to get off in order to save the extra 2 cents. Even though the jitneys operating to the race track were crowded, and many persons walked to the race track, the cars were delayed. Some of the cars took from ten to fifteen minutes to make the few hundred yards from the commencement of the zone to the race track. The delay was caused by the pay-leave system, the inability of the conductor to make change fast enough and lack of co-operation on the part of the traveling public. The Public Service had anticipated this delay to some extent and had provided ticket-sellers to board and go through the cars on approaching the race track, selling passengers full-fare tickets in the hope of eliminating delay.

There were several instances on the longer routes where passengers unacquainted with the system protested against the fares, but after arguing with the conductor, accepted his verdict. The policemen detailed to important traffic centers had their hands full on account of the added street congestions caused by automobile traffic being held up by the cars that were unloading passengers.

On Monday, in anticipation of the real test, especially during the morning rush, the company had ticket-sellers

board all cars going to the Hudson & Manhattan tube station and the Hoboken-Fourteenth Street Ferry. This relieved to a large extent the delay at these points, but at centers where there were no ticket-sellers the delays in unloading somewhat disrupted car schedules—the cars became bunched, and as a result the company lost many riders who got tired of waiting for the cars and took the jitneys, which reported bigger business than ever.

SHIPWORKERS CAUSE TROUBLE

The first real trouble in operation was at the shipyards in Camden and Gloucester when the workers, on Monday and Tuesday, in protest at the fares and means of collection tore down car doors and side wire screens, broke the windows and bolted the cars prior to reaching the post-payment areas at the shipyards, while in other cases passengers pulled the trolley off the wire thereby stalling the car and then when the conductor was busy restoring the trolley would bolt the car by the door or climb through the windows.

In other parts of the southern division the car crews reported that citizens had piled obstructions upon the tracks with the view of wrecking the

cars and that their own lives as well as those of their passengers were in continual danger. Tuesday afternoon matters became so serious that the men began to refuse to operate the cars, so that in the early evening very few cars were in operation and it was necessary for the shipyard workers to walk or ride in jitneys to reach their homes.

CONDITION IMPROVING FROM DAY TO DAY

Outside of the trouble in the southern division each day's operation brought out two points for successful operation, namely, that nothing but ordinary intelligence was needed by both the car riders and the trainmen and that passengers who purposely hinder the workings of the system serve only to increase delays to other passengers. It is felt that with the use of more ticket sellers on the cars, the establishment of ticket agencies in the principal stores for the sale of full fare tickets and the gradual adjustment of car riders and trainmen to the zone-checks, the delays incident to the new system will disappear within a few days. As one editorial put it "In ten days the novelty of the plan will be gone and in thirty it will be an old story, if the car patrons give it a fair trial."

A fair trial is needed to learn the defects, if any, in the system so that improvements can be made where needed. In the next week's issue will appear a story in detail covering the manner of fare collection.

Eight Cents Cash in St. Louis

This With Tickets at Seven Cents Is Estimated to Return 6 Per Cent on \$50,000,000 Valuation

The right to collect an 8-cent cash fare, with a minimum ticket charge of 7 cents, has been granted the United Railways, St. Louis, Mo., by the Public Service Commission of Missouri. The new rates will become effective on Sept. 20. The company had asked the commission for a 10-cent cash fare for adults, a 5-cent cash fare for children, a 7.5-cent token fare for adults, and a 3-cent token fare for children, the establishment of the same rates on county lines, with the Meramec Highlands line divided into two 10-cent fare zones, a cash fare of 40 cents and a ticket fare 35 cents on the St. Charles line, and the abolition of the double transfer system.

The Public Service Commission granted the company an 8-cent cash fare for adults, a 4-cent cash fare for children, a 7.5-cent token fare for adults when tokens are bought in lots of less than fifty, and 7 cents when tokens are bought in lots of fifty or more, four children's tickets for 15 cents and 100 for \$3.50, the establishment of the same rates in the county as in the city, and an increase in the fare to St. Charles to 34 cents. The present transfer system will be continued.

The commission finds that the increased wages recently granted to the employees of the United Railways

amounts to \$2,860,336 per annum, the back pay to \$666,306 and the increased power costs to \$128,820 per annum, and that the increased fares granted will about pay these increased costs and a return of 6 per cent on a valuation of \$50,000,000 for the entire property, including the city, county and St. Charles lines.

AN EMERGENCY MEASURE

The appraisal of the property and audit of the books of the company now in progress by engineers and accountants of the commission will be finished within six months and the increased fares are put in effect as emergency rates for a temporary period of six months from Sept. 20, 1919, to enable the company to meet its increased costs until the commission can definitely fix a valuation of the property and a schedule of rates accordingly.

It is ruled by the commission that the properties of the United Railways must be treated as a whole for the purpose of rate-making. The commission says it is to the best interests of the city of St. Louis, including the car riders, that the county lines be operated, since they serve the city as effectively as though they were within the corporate limits. On the tentative valuation of \$50,000,000 placed by the

commission on the entire property, the division is in these items: United Railways city lines, \$44,000,000; county lines, \$5,245,735; St. Charles line, \$745,265.

The conclusions reached by the commission are that the present rates of the United Railways on its lines within and without the city limits of St. Louis are insufficient to yield reasonable compensation for the services rendered and are unjust and unreasonable for the company. Assuming that the fare passengers for the ensuing six months will approximate the traffic handled from Jan. 1 to June 20, 1919, the commission estimates the passenger revenue under the new rates will be \$9,199,258.

There is no change in the transfer system. In testimony before the commission, Colonel Perkins for the company asserted that the double transfer privilege was being abused and that people were enabled to make round trips by the payment of a single fare and the use of the double transfer. The commission stated that it found no substantiation for this.

TICKET RATE

The finding provides that the company shall provide and place on sale in its cars and other locations convenient to the public tickets or metal disks at the rates authorized. In the concluding paragraph of the opinion, Receiver Wells is warned that strict economy must be practiced. It suggests that the receiver can increase his income from operation by practicing certain economies in operation, such as adjusting schedules more closely for the demands of transportation; short-looping the cars, and operation of the one-man safety car. The company's decision on whether or not the award would be accepted and the terms obeyed, according to the opinion, had to be handed the commission before Sept. 15.

Neither the company nor the city is satisfied with the ruling of the commission, according to announcements by Receiver Wells and city officials. Mr. Wells found fault particularly with that part of the finding, which fixed a 6 per cent return on a valuation of \$50,000,000. J. L. Harrop, chief engineer of the Public Service Commission, had stated, however, that the commission in no way committed itself to that figure by its statement and also that the commission never had recognized the tentative \$60,000,000 valuation agreed on between the company and the city.

Receiver Wells for the company gave out a statement for the company. He said in part:

I hope that the people feel that we went into the fare matter with the commission in the utmost good faith and for the interest of the people first and then the investors. The character of the award is very disappointing to me, for it will make it exceedingly difficult to serve the public to the highest point of efficiency. The award does not materially benefit anybody. It creates a complicated system that will increase congestion in boarding the cars and the liability of accidents and will result in great delays. I felt perfectly sure the opportunity the people would have to buy

tokens at reduced prices at convenient places would have made the 10-cent cash fare immaterial. As it is now a great many cash fares will be paid and the difficulty of making change will slow the loading of the cars down 25 per cent. If our request had been granted the fare could have been paid with either one coin or one token.

This statement is made from the practical point of view and the numerous criticisms of a 10-cent cash fare were not warranted, being entirely theoretical, not practical. We will do the best we can under the circumstances.

MAY ASK REHEARING

Before the text of the commission's award was received by officials of the company, Colonel Perkins said that it was not unlikely that a rehearing would be asked by the company, but on Sept. 12 the company notified the commission that the decision would be accepted with the possible exception of the part fixing children's fares at 4 cents. Receiver Wells announced to the public that he contemplates petitioning the commission to allow the company to reduce this to 3 cents, the amount the company originally asked for.

Adults' tokens will be sold in packages of two for 15 cents, seven for 50 cents, and fifty for \$3.50.

Monthly Tickets on Bay State Experiment to Enable People to Ride at Reduced Rates Where Patronage Is Regular

On Sept. 15 reduced fares obtained through the sale of a fifty-ride, non-transferable, limited-life monthly ticket selling for \$3 were established experimentally by the Eastern Massachusetts Street Railway at Fall River, Mass. At Taunton a fourteen-ride ticket, selling for \$1, unlimited in every particular, was scheduled to go on sale on Sept. 20, and at Lowell, Mass., on Sept. 25, a ticket on which sixteen rides are sold for \$1, good for one person only and for an unlimited period, was scheduled to go into effect.

All of these special tickets are purely experimental. The company reserves the right to withdraw them at any time. They represent an effort on the part of the trustees, co-operating with the local civic authorities and business interests, to afford the public means of riding at reduced rates where the patronage is sufficiently regular to justify the purchase of tickets.

The flat fare unit remains at 10 cents. Holders of the above reduced-rate tickets are accorded the same transfer privileges as travelers paying the regular 10-cent fare unit. These reduced-rate tickets were put into effect in response to petitions by the local authorities urging that lower rates than the maximum fare unit be provided.

At Fall River about 7000 tickets were sold on the opening day. Before these went into effect the local authorities and the large mill interests conferred with the trustees, and the problem of establishing a lower rate was frankly discussed, all interests represented being in harmony.

In particular, the mill agents represented expressed their willingness to sell tickets for the railway on their own premises, to advertise the new facilities and to post bulletins in wash rooms and other places to make it easier for their employees to use the reduced-rate service. It was pointed out that adequate transportation facilities at these reduced rates are an important factor in maintaining contentment among mill employees.

Drug stores, department stores and practically every establishment in Fall River where circus tickets could be obtained in show-time, are also carrying these tickets for the company. The attitude of the local press and of the Chamber of Commerce shows much appreciation of the company's efforts to meet the situation.

Ruling on Fare Evidence

British Columbia Commissioner Decides That Gas and Electric Light Investments Should be Excluded

Major J. L. Retallack, Public Service Commissioner for the Province of British Columbia, rendered a decision on Aug. 6 as to the scope of evidence admissible in the 6-cent fare case of the British Columbia Electric Railway.

This was the case wherein it is set out that an inquiry is to be made into the fare charged in Vancouver. The question was whether the inquiry should be restricted to the city of Vancouver alone or the rest of the company's system.

The city took the former stand. The company pointed out that the whole company was involved because the credit of the company was one. The outlying municipalities also took a hand, opposing the contention of the city and averring that the outside districts had a right to consideration as they paid a great deal toward the revenue earned on the city lines.

After taking up commission precedents, Commissioner Retallack ruled that the Victoria system, the Vancouver Gas Company and the company's investments in land not directly for the purpose of its power, light and railway system, should be excluded from the inquiry. The commissioner said:

I therefore rule that, in the inquiry under the act, evidence should be accepted as to the British Columbia Electric Railway's investment of capital, present property values, operating and administrative costs, fixed charges, and receipts either directly or through its subsidiary companies in its electric railway system, as constructed and operated in the District of Vancouver (being the area contiguous to and inclusive of the delta of the Fraser River, the cities of Vancouver and New Westminster, the municipalities of Point Grey, South Vancouver and Burnaby), the city and district of North Vancouver and the districts served by the New Westminster and Chilliwack lines, and including its investments, present property values, administrative costs, fixed charges and receipts directly or through its subsidiary companies in its power and electric lighting system in said district.

The commissioner added, however, that such ruling did not decide what proportion of the return should justly be derived from the company's collec-

tions within the city, and a decision would be necessary if the city's application were acted upon, as to whether it was "just to secure such return for the company by, for the sake of example:

(a) Continuing the present system of rates, being a more or less different rate for each governmental division of the district of Vancouver.

(b) Establishing a basic rate, modified in relation to mileage for the whole of said district.

(c) Establishing the zone system throughout the whole of said district—viz., a fare figured in proportion to the density of population and mileage.

This being only a preliminary decision in the 6-cent fare case the matter is going on, one of the phases now up for discussion being the proposed appraisal of the company's property.

Increases Announced on Massachusetts Roads

Several Massachusetts electric railways recently announced their intention to increase fares.

The Worcester Consolidated Street Railway has filed with the State Public Service Commission a revised schedule of fares under which the city of Worcester will be divided into two zones with a 5-cent fare in each zone. The inner zone, having its center at the City Hall, will be four miles in diameter. Beyond the limits of this zone, an extra fare will be collected. The company will charge 2 cents for transfers. Interurban rates are also raised to approximately 2.5 cents a mile. The present fare in Worcester is 7 cents, no charge being made for transfers.

The Interstate Consolidated Street Railway, Attleboro, will replace the present 5-cent fare unit with one of 6-cents, without the transfer privilege. Zone limits will remain as at present.

The Milford, Attleboro and Woonsocket Street Railway, Milford, will install a 7-cent unit. The present unit is 5 cents.

The Fitchburg & Leominster Street Railway, Fitchburg, has notified the Commission that on Oct. 1 it will begin charging 10 cents. The present 7-cent fare was authorized last November. Strip tickets will be sold at the rate of six for 50 cents. They now cost 50 cents for eight.

Must Honor Ticket

If the higher courts sustain a ruling made recently by Judge Caverly, the Chicago (Ill.) Elevated Railways will have to accept for full fare payment the tickets which were previously sold for 6 cents each. This decision was made in a suit brought by Robert E. O'Connor whose attorneys argued that the wording of the tickets "good for one fare" made a binding contract for transportation of the holder even when the legal rate of fare had been raised to 8 cents. Judgment to the amount of 2 cents was rendered in favor of the plaintiff. It was announced that the elevated companies would appeal the case.

A somewhat similar issue is raised in a suit brought at White Plains, N. Y., on Sept. 2, to recover 5 cents for breach of contract. The action has been filed in the Court of County Judge Frank G. Young against the Yonkers Railroad by Henry Koster, retired merchant, of Yonkers. Mr. Koster boarded a car for Yonkers when the company doubled the fare between Yonkers and New York. When he refused to pay a second fare, which he maintained was an illegal charge, he was ejected. He demands his nickel back, alleging the company failed to keep its contract to carry him to his destination for the fare he paid. He sues for \$1,999 for the humiliation, discomfiture and inconvenience which he alleges he suffered by being publicly ousted from the car after having paid his fare.

Commission Not Empowered to Prescribe Jitney Rules

* The Public Service Commission of Massachusetts has no power to prescribe regulations governing the operation of jitneys, but may either approve or disapprove such regulations when adopted by municipalities, according to an opinion filed recently by Attorney General Henry C. Atwill. The Attorney General had been called upon to pass on the commission's power to act on the protest of the Holyoke Street Railway against jitney regulations of the Board of Aldermen of that city.

An appeal was taken from the rules prescribed by the commission in several cases where objection was taken to the regulations of Holyoke authorities. The opinion of the Attorney General holds that in prescribing jitney regulations in Lawrence, Haverhill, Malden, New Bedford, Lynn, Salem, and elsewhere in the eastern part of the State, the commission exceeded its authority.

Seven Cents for Cincinnati

On Sept. 13 it was announced that the rate of fare on the Cincinnati (Ohio) Traction Company's lines would be increased to 7 cents on Oct. 1. A deficit of \$113,000 in the cost of operation occurred during July and August. The franchise provides that the fare may be automatically increased half a cent, when a deficit in the cost of operation occurs, but the company is required to make an announcement of the fact on the fifteenth day of the month preceding the date the increase goes into effect.

Increase on Fitchburg & Leominster

A new wage scale, embodying a maximum of 56 cents an hour, has been established on the Fitchburg & Leominster Street Railway, Fitchburg, Mass. The basic eight-hour day is provided, with time-and-one-half for overtime. The company plans to petition the Public Service Commission for authority to raise its fares.

Transportation News Notes

Atlanta Using Tokens.—The Georgia Railway & Power Company, Atlanta, Ga., has been using metal tokens since Sept. 1. Each token costs the passenger 6 cents. This is the same as the cash fare. The use of the tokens does not affect the sale of books containing seventeen tickets for \$1.

Higher Zone Fares on Pennsylvania Interurban.—The Southern Cambria Railway, Johnstown, Pa., which operates interurban lines in Cambria county, has announced an increase of zone fares from 6 cents to 7 cents effective on Oct. 3. At the same time the wages of employees will be increased.

City Has Jitney Regulatory Power.—In a recent decision handed down by Superior Judge R. M. Webster, the action of the City Council of Spokane, Wash., in denying a jitney license to an applicant was sustained, the Judge holding that the City Council has power to regulate all traffic on the city streets. Counsel for the applicant has announced that the local jitney owners' association will appeal the ruling to the State Supreme Court.

Zone System Desired by New Bedford Line.—H. H. Crapo, president of the Union Street Railway, New Bedford, Mass., appeared before the Massachusetts Public Service Commission recently in support of a new fare schedule. It is proposed to divide the city into two 5-cent zones, the center of the city being the division point. Mayor Ashley urged that the 5-cent fare be retained during the rush-hour periods. A finding will be made later.

Would Abandon Small-Lot Freight Service.—A petition to abandon its less-than-carload freight service in the eastern division of the city of Birmingham has been filed by the Birmingham Railway, Light & Power Company with the Public Service Commission of Alabama. In the petition it is pointed out that the increased use of motor trucks and the extension of street paving were reasons which were reducing the volume and making the traffic unprofitable in less than carload lots.

Fare Case Reopened Following Complaints.—Orders have been issued by the Oklahoma Corporation Commission reopening the fare case from McAlester, involving the Pittsburgh County Railway, which operates in McAlester. The commission last August granted a 7-cent fare applicable to all parts of the city. Complaints were made that the company had restricted its service, and the order reopening the fare case followed.

Seven-Cent Fare Upheld.—The Public Service Commission of Pennsylvania has sustained the 7-cent fare of the Valley Railway, operating from Harrisburg to Carlisle, Mechanicsburg, New Cumberland and other places in Cumberland county, and Marysville, in Perry County. It dismisses complaints filed by the boroughs of Carlisle and West Fairview, and by various residents and associations of West Shore towns. The complaints were heard last winter and spring, and a valuation of the system was made.

Five-Cent Fares a Political Issue.—Retention of the present 5-cent fare will be an issue in the coming political campaign in New York City. Robert L. Moran, Democratic candidate for reelection as president of the Board of Aldermen, has announced that he will make the fare question the chief plank in his platform. He favors a 5-cent fare "if the public can be guaranteed adequate service for that rate." If he is re-elected he promises to investigate the management of the railway companies "with a view to getting for the public the best possible service at the lowest possible fare."

No More Free Ferry Transfers.—The contract between the New York Railways and the city of New York, which operates the Staten Island Ferry, by which passengers could travel between St. George, Staten Island, and any point reached by the cars of the company running to the ferry terminal at Whitehall Street, terminated on Sept. 15, by order of Federal Judge Mayer. Hereafter the passengers will receive the needed transfers when they buy their tickets at St. George, but the purchase will be accompanied by a warning that the railroad company will not honor them and that they will have to pay another 5-cent fare if they want to ride in the cars of the railways.

City Asks for One-Man Cars.—City Attorney Pierce Tyrell of Elgin, Ill., has petitioned the Public Utilities Commission of Illinois to order the use of one-man cars on the city lines in Elgin by the Aurora, Elgin & Chicago Railroad. Mr. Tyrell has made this plea to combat the plea of the company for an 8-cent fare for city passengers. He hopes to have the fare placed at 6 cents or even at 5 cents, if the operation of one-man cars is allowed by the commission. Elgin will also ask the commission for a consideration of its case separate from the case of the company in connection with its local Aurora lines, on which an 8-cent fare is also being sought.

Fares Still Unsettled in Jacksonville.—The City Council of Jacksonville, Fla., has passed a second ordinance submitting to a special municipal election the question of granting the Jacksonville Traction Company a 7-cent fare. The first ordinance, referred to in the *ELECTRIC RAILWAY JOURNAL* some time ago, was vetoed by Mayor Martin because it did not provide for popular control of fares once the higher

rate had been granted. The new ordinance stipulates that the Council may call for a special election to decide the question of lowering fares. The company must defray the expenses of the special election at which the question of higher fares is to be decided.

Will Not Reopen North Shore Case.—The application of Corporation Counsel William P. Burr of New York to have the Public Service Commission of the First District reopen the case of the New York & North Shore Traction Company and to restore the 5-cent fare on that company's lines within the city limits, was denied by the Public Service Commission after a hearing in the Flushing Town Hall on Sept. 5. Between 500 and 600 residents of Flushing, Bayside, Whitestone, Douglaston and Little Neck applauded when Deputy Public Service Commissioner Alfred M. Barrett, of Flushing, announced that the Corporation Counsel's application for a rehearing in the matter had been denied.

Seeks Injunction in Illinois Fare Case.—The East St. Louis & Suburban Railway, East St. Louis, Ill., has asked the United States District Court, at Danville, Ill., for an injunction to restrain the Public Utilities Commission of Illinois, the Attorney-General of Illinois and the State's Attorney of St. Clair County from interfering with the company's charging more than 2 cents a mile. When a nine-day strike on the East St. Louis & Suburban Railway was ended recently, an agreement of the men to return to work pending some action of the Public Utilities Commission, it was understood that an advance in wages would be made if rates were increased. The appeal to the Federal Court followed.

No Extra Charge to Token-Holders.—Holders of the 20,000 5-cent tokens of the Tri-City Railway, Davenport, Iowa, will be allowed to use them for street-car fare on the company's Illinois lines without the payment of additional 2 cents, following the installing of the 7-cent fare, as allowed by the Illinois Public Utilities Commission. At first, conductors asked for payment of 2 cents with each 5-cent token, but did not insist on the extra collection in case the passenger dis-sented. The remaining 5-cent tokens will be accepted as full fare and as fast as they collect will be taken out of circulation, as the company has provided a full supply of 7-cent tokens of smaller size. The company has removed cash-collection boxes from its cars.

Campaign to Reduce Accidents.—The Georgia Railway & Power Company, Atlanta, Ga., is conducting a campaign to reduce the number of collisions between automobiles and trolley cars. The latest phase of this campaign is a booklet entitled "For Humanity's Sake," several thousand copies of which are being distributed among the automobile owners in Atlanta. The booklet illustrates by pic-

tures and description the most prevalent type of automobile accidents with street cars, shows how a little caution on the part of the automobile driver as well as that of the railway motor-man could have avoided them, and makes a determined plea for elimination of the great waste in property and human efficiency that such accidents cause.

Safety Zones Recommended.—Establishment of the safety-zone plan, arranged to protect passengers boarding or leaving electric railway cars and still permit vehicle traffic to proceed, is recommended by L. E. McGee, police and fire commissioner of the city of Dallas, Tex. Mr. McGee made his recommendations after a thorough investigation with a view to instituting the one-way traffic rule in the business district of Dallas. The one-way traffic rule is opposed on the ground that the many long blocks would work confusion and the one-way rule would retard rather than speed-up traffic. The establishment of a safety-zone plan is recommended instead. He would have the zone marked by movable standards, which would be used only during the rush hours.

Would Raise Local and Interurban Fares.—The Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., has petitioned the Public Service Commission of Indiana for an 8-cent cash fare between any two street stops in East Chicago and Indiana Harbor; permission to sell five tickets for such travel at 35 cents; 3 cents a mile for passenger fare between points on its interurban system with a 10-cent minimum and a 10-cent penalty for cash fare, and a twenty-five trip, sixty-day commutation ticket, good to purchaser only, between Gary and East Chicago for \$4, and between Gary and East Chicago for \$5. The company has also filed notice that it has petitioned the Interstate Commerce Commission for permission to cancel commutation tickets between Gary and Kensington, Ill., and other points in Illinois.

Wants All Cars Fenderless.—The Capital Traction Company, Washington, D. C., will petition the Public Utilities Commission to allow it to remove fenders from all its cars. On June 29 the company was authorized by the commission to operate all its cars on the Georgetown line, as an experiment, without fenders. This involved between sixty-five and seventy cars. After two months and a half of fenderless cars the company is now looking forward to making the fenderless car a permanent innovation in Washington. The experiment has proved entirely satisfactory, decreasing accidents, it was said, and reducing operating expenses to some extent. The superintendent of operations, while not in possession of exact data on the amount saved or the accidents prevented, was fully confident that the fenderless car was a benefit both to the company and to the public.

Personal Mention

David Daly at Keokuk

General Manager of Houston Company Transferred by Stone & Webster to Their Mid-West Properties

David Daly, general manager of the Houston (Tex.) Electric Company since 1905, has been promoted and transferred to Keokuk, Ia. Mr. Daly will be district manager at Keokuk for the Mid-West properties of the Stone & Webster interests and will also have charge of the Mississippi River Power Company, which operates one of the largest hydro-electric power plants in the country. In addition to being general manager of the Houston Electric Company for nearly fourteen years, Mr. Daly since 1913 has had charge of the Galveston-Houston Interurban Railway.

After graduating from Harvard University, Mr. Daly entered the organization of Stone & Webster, in their Boston office, being assigned to the statistical department in handling insurance matters. Later he went to Ponce, Porto Rico, where he became manager of the Ponce Electric Company. His health failed in Ponce and he returned to Boston where he remained until Aug. 1, 1905, when he went to Houston as manager of the Houston Electric Company, succeeding H. K. Payne. In 1913 the management of the Galveston interurban was added to his duties.

Mr. Daly went to Houston at a time when it was just beginning its era of phenomenal growth from a small to an important city. The local railway was kept fully abreast of the city's development and in 1914, when the jitneys first began operation there it was in a high state of efficiency. The novelty of the jitneys in their early stages took nearly \$500,000 in revenue from the railway during the first year of their operation. This and the war forced retrenchments in both maintenance and additions. The jitney matter is now in process of adjustment in the federal courts.

Mr. Daly always has taken a lively interest in civic affairs and has given liberally of his time to movements designed to promote Houston's growth and civic betterment.

No successor to Mr. Daly, as manager at Houston has yet been announced. Pending the permanent filling of the place, Luke C. Bradley, district manager for Texas of Stone & Webster, will have active charge of the operation of the properties.

T. J. Ramsey, assistant auditor for the Texas Electric Express Company at Dallas, Tex., has been transferred to Sherman, Tex., as special route agent.

H. Stuart Johnson, manager of the Honolulu Rapid Transit & Land Company, Honolulu, H. I., expects to arrive in the United States about Oct. 1 for a two-months stay.

Harold B. Kuder has succeeded Malcolm McIntyre as special car agent and assistant to the general manager of the Detroit (Mich.) United Railway. Mr. Kuder was company stockkeeper prior to his new appointment.

F. Windle, who was appointed assistant superintendent of transportation of the Pittsburgh, Harmony, Butler & New Castle Railway on Jan. 1, 1919, has been made superintendent of the company. Mr. Windle was formerly superintendent of the Indianapolis & Louisville Traction Railway. His railway experience covers a period of more than twenty-five years.

Sir Albert H. Stanley, chairman of the London, England, underground undertakings, has been elected a member of the National Industrial Council, which is to consider questions of labor and wages. Sir Albert, who recently visited the United States, was made president of the Board of Trade in the Lloyd George cabinet in 1917. He resigned a short time ago on account of ill health.

Malcolm McIntyre has been appointed night superintendent of the city lines of the Detroit (Mich.) United Railway. He has been with the company for a number of years and has held the following positions: Agent at Algonac; carhouse foreman, assistant superintendent of the Jefferson line, superintendent of the Pontiac and Orchard Lake division, and special car agent and assistant to the general passenger agent.

W. S. Murray, consulting engineer, New York City, has been appointed chairman of the traction and transportation committee of the American Institute of Electrical Engineers. The purpose of this committee is to keep the membership of the institute informed as to electric traction progress, particularly in providing suitable papers for meetings. For most of his professional life Mr. Murray has been engaged in electric traction and allied transmission work, being for eleven years associated with the New Haven Railroad in its pioneer alternating-current electrification. He opened his consulting office in New York early in the present year.

Edgar W. Bright, for the past twenty years in the engineering, purchasing and maintenance departments of the Boston (Mass.) Elevated Railway, has organized the Massachusetts Lumber & Creosoting Company, and will shortly begin the construction of a modern

wood preserving plant. Mr. Bright has specialized in tie and timber purchasing and treatment for the past fourteen years, and as designer and supervisor of the Boston Elevated wood-preserving plant at South Boston, has had wide experience in the operation of equipment of this class. Mr. Bright is president of the new company, the vice-president being Ernest Lent, who has been his assistant for some time in the Boston Elevated Railway.

Maj. John Lansdale, formerly assistant engineer in charge of valuation work of the Pacific Electric Railway, Los Angeles, Cal., has returned to the United States after nineteen months service in France. Major Lansdale received his commission as Captain of Engineers in June, 1917. After several months of intensive training at Leavenworth, Kan., he went to France, where he was made Engineer Officer in charge of constructing the railroad line to Base Hospital No. 27. He subsequently held a number of other posts, and was promoted to Major of Engineers in August, 1918. At that time he was cited by General Pershing for "especially conspicuous and meritorious service." He will rejoin the Pacific Electric Railway in the near future. He was in charge of building the Nevers cutoff at Nevers, France.

George H. Dick, secretary to J. J. Dempsey, vice-president of the Brooklyn (N. Y.) Rapid Transit Company in charge of traffic, has severed his connection with the company to enter the employ of the R. E. Seamans Company, Inc., of which Mr. Dempsey has recently been elected a vice-president. Mr. Dick will remain with his old chief in practically the same capacity as in the past, acting as his secretary and as office manager of the New York office of the Seamans Company. Mr. Dick entered the service of the B. R. T. as a stenographer on Feb. 1, 1906, and in August of that year was placed in charge of the record room of the elevated lines. In September, 1908, he became secretary to Mr. Dempsey, who was then superintendent of elevated lines, and continued with him when Mr. Dempsey became vice-president on Jan. 1, 1918.

Obituary

George M. Lewis, lawyer and street railway promoter, died on Aug. 28 at his home in Wilkes-Barre, Pa., at the age of seventy-one years. Mr. Lewis took an active part in organizing the electric railway system of the Wyoming Valley, in Pennsylvania, which formed the nucleus of the present Wilkes-Barre Railway. He was graduated from Lafayette College, Easton, Pa., in 1873, and for the last fifty-five years had made his home in Wilkes-Barre.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Crossarm and Pin Orders Increasing

Prices of Pine Arms Up 15 Per Cent—
Fir Arms Up 10 Per Cent—Wood
Pins Firm

In anticipation of fall construction and winter maintenance needs there has been a good volume of wooden crossarm and pin ordering to date. There is, however, considerable room for improvement if stocks of certain grades of fir arms are to be accumulated and regular stocks of woodenware maintained.

Prices on pine crossarms advanced 15 per cent on Sept. 15. At New York warehouse 6-ft., four-pin and six-pin yellow-pine arms cost \$78.10 in less than 1000-linear-foot lots, and 75 per cent long-leaf arms \$89.64. In lots of more than 3000 linear feet these respective prices will be \$65.08 and \$74.70. Deliveries are good. Fir arms went up 10 per cent on Sept. 1, with one grade ranging from \$92.04 to \$110.45 for the same size and quantities as above with mill deliveries, and another grade \$51.19 in carload lots and two to three months' deliveries. On pins prices have remained rather steady, and no change is looked for in the near future. Locust pins, 1½ in. by 9 in., are quoted at \$45, \$40, \$24 per 1000 in lots from less than 250 pins to 5000 and over.

Rail Requirements Large

Volume of Business Not Large But Improving—Good Deliveries Now Made from Mills

Although steel rail and accessories equipment buying so far this year has been smaller than in any similar period for a number of seasons, the time is coming shortly when rail renewals will have to be made. The recent order given out by the Railroad Administration for 200,000 tons of rails placed in the steam railway field is merely an indication of what is to be expected. It has been estimated that the demand for the steam railroads up to the first of the year would be 1,000,000 tons, and it is believed that one-third or one-fourth of this amount may be ordered by that time.

There is no danger of the steam roads monopolizing the mill space, as all that has been ordered to date can be run off in a short time. The mills are in good shape to receive orders for the high T-rail, girder rails or the standard A.S.C.E. and other sections. Some of the mills are running a little bit slack, but nevertheless deliveries are

good. The mills are in good shape to handle anything in the way of rail orders, accessories or special track work. One large mill which will accept orders as small as 250 tons can make deliveries within two weeks of order.

As a rule when there is plenty of mill space, orders come in slowly and the demands for rails are small. Later on when the railways commence buying the companies will be crowded with orders and mill conditions will approximate those at the early part of the war. Generally speaking, the price quotations which hold good at the present time, are those made at the time of inquiry. Girder rails are now bringing \$65 per gross ton, in 250 ton lots, while the high T-rails are bringing around \$60 per gross ton. The standard A.S.C.E. and A.R.A. types are quoted at \$45 to \$51 per gross ton.

Encouraging Outlook in Used Equipment Market

Increase in Buying for Fall Delivery Expected—Prices Probably Will Be Advanced

During the past two months the condition of the used apparatus market has improved to a marked degree and a large volume of business has been transacted. This state of the market is not localized, but is characteristic of the whole country. Inquiries for export are in a healthy state and point to a satisfactory market in that direction.

The power generation apparatus market is in good shape in respect to demand for the steam driven sets, although for other generating equipment stocks as a whole are low and there is less available material for sale now than before the war. Prices have been holding steady all summer and are given on an average as 50 to 70 per cent of new apparatus prices. A rising market is looked forward to as the lengthening shipments of the larger sized motors from manufacturers causes increased sales for the second hand dealer.

Spanish Railway to Buy Equipment

Compania de Travias de la Corunna, Spain, has issued securities in order to carry out the construction of the Corunna-Soda electric line, which will be 11.4 miles long. The purchase of the material for the construction of this new line will be made in foreign countries, and the opportunity for American concerns to supply the material and to oversee the construction is favorable.

"Price at Delivery" Policy Is Questioned

Manufacturers Differ as to Practices, Although Conditions Justify Withdrawal of Schedule

The practice started during the war of billing goods at the price in effect at the time of their delivery is growing among electrical manufacturers, who must buy raw material on this basis. However, the basis for the trend toward this new "price at delivery policy" is labor, because the increased cost of raw materials, such as iron, copper and coal, which are required by different manufacturers, is mainly an increase in the cost of labor. The manufacturer is also confronted with increased fabricating costs and a decreased output of labor at the same time.

A number of central station and industrial buyers do not object seriously to this policy provided it is kept in effect for a complete cycle of rising and falling prices. Broad-gaged business men do not ask manufacturers to protect them against an increase in price and also to give them the benefit of any reduction which may become operative between the time of ordering and of delivery. But this has been and still is the policy of a number of representative manufacturers.

LABOR COST MAY GOVERN

Many buyers feel that a manufacturer should take whatever steps he may deem necessary to protect himself when he receives an order. This can and is being done by some manufacturers, but it is not always practicable. The ratio of the cost of labor to that of material in an article may be so high that labor is the governing factor in making the price, and in this case the manufacturer in unable to protect himself against the growing inefficiency and rising wages.

It is easy for a manufacturer to change his price policy if he does so without considering the results. A manufacturer may have the best possible intentions but will probably have some difficulty in explaining to an irate customer why his goods were shipped just late enough to come under an increased price schedule or just early enough to miss a reduction in price. There is some question therefore whether a change to a "price at delivery" policy would not cause the manufacturers to lose more in customers' good will than would be justified by the more scientifically correct price arrangement.

Rolling Stock

Brockton & Plymouth Street Railway, Plymouth, Mass., has ordered two safety cars from the Wason Manufacturing Company.

Georgia Railway & Power Company, Atlanta, Ga., has been authorized by the Georgia Railway Commission to guarantee the payment of equipment notes amounting to \$132,231 for the payment of the 15 center-entrance cars recently ordered from the American Car Company as noted in the July 12 issue of the ELECTRIC RAILWAY JOURNAL.

Recent Incorporations

Waco, Tex.—O. A. Ryffe, president and general manager of the Central Texas Electric Railway, formerly the Waco-Temple Interurban Association, has announced the organization of the Central Texas Engineering & Construction Company, the purpose of which is to construct the proposed interurban line from Waco to Temple. The capital stock is \$50,000. Headquarters will be maintained in Waco.

Track and Roadway

Indianapolis (Ind.) Street Railway.—The following extensions to the street car lines of the Indianapolis (Ind.) Street Railway have been authorized and will be pushed through this fall: Brookside Avenue car line extension to the plant of the Premier Motor Company; College Avenue extension of city service to Forty-sixth Street; the Shelby Street extension to the city limits on the tracks on the Interstate Public Service Company. It was also agreed that within a year the question of extending city service to Fifty-second Street would again be brought up. A "Y" switch for Forty-sixth Street will be needed.

Toronto (Ont.) Civic Railway.—Works Commissioner Harris of Toronto, Ont., informed the Board of Control early this month that the plans and specifications for the proposed Mount Pleasant road car line, on which his department has been working, will be ready for submission to the Railway Commissioners very soon.

Dallas (Tex.) Railway.—The Dallas Railway has been ordered by the City Commission to construct a line on Seventh Street, from Seventh and Tyler, thence on Edgefield to King's Highway or as far as the funds available will permit. This order followed a hearing before the City Plan Commission on the proposed routings of this extension and the recommendation of the commission for the Seventh Street route.

Portland Railway, Light & Power Company, Portland, Ore.—In a petition filed with the State Public Service Commission by the city of Portland, Ore., the Portland Railway, Light & Power Company is asked to extend its lines

from the present terminus at Fessenden and Jersey Streets to the St. Johns terminal. The line would be about 1½ miles long, and would cost between \$30,000 and \$35,000 to build. The petition declares that the city has no objection to the extension being classified as an interurban line, and the city offers to give reasonable franchise rights over the city streets, and to help gain reasonable franchise rights over county roads.

Philadelphia, Pa.—Two proposals were submitted to Director Twining of the Department of City Transit on Sept. 9 for the completion of the steel superstructure of the Frankford elevated road on Front Street for a distance of 173 feet. The bids were those of the McClintick-Marshall Company, who offered to complete the operation for \$31,277, and the Phoenix Bridge Company, \$40,846. Less than sixty feet of superstructure work remain to make the physical connection between the Frankford L and the Market street subway lines at Arch street. No award will be made until after a decision has been handed down by the Supreme Court regarding the validity of the municipal loan of \$12,970,000.

Dallas (Tex.) Railway.—Street car service for the Mount Auburn and Lakeview additions to the city of Dallas are assured. Mayor Wozencraft announces that he has secured \$40,000 of a fund of \$50,000, for which J. F. Strickland, president of the Dallas Railway, agrees to build and operate a line through these additions to a con-

NEW YORK METAL MARKET PRICES

	Sept. 2	Sept. 16
Copper, ingots, cents per lb.	22.37½	22.12½
Copper wire base, cents per lb.	26.00	26.00
Lead, cents per lb.	6.00	6.25
Nickel, cents per lb.	41.00	41.00
Spelter, cents per lb.	7.85	7.55
Tin, cents per lb.	55.75 to 56.00	56.00
Aluminum, 98 to 99 per cent, cents per lb.	32.00 to 33.00	32.00 to 33.00

OLD METAL PRICES—NEW YORK

	Sept. 2	Sept. 16
Heavy copper, cents per lb.	18.50 to 19.00	19.00 to 19.50
Light copper, cents per lb.	15.00 to 15.50	15.50 to 16.00
Heavy brass, cents per lb.	10.50 to 11.00	10.00 to 10.50
Zinc, cents per lb.	4.75 to 5.00	4.75 to 5.00
Yellow brass, cents per lb.	9.00 to 9.25	8.50 to 9.00
Lead, heavy, cents per lb.	5.00 to 5.10	5.00 to 5.10
Steel car axles, Chicago, per net ton.	\$26.00 to \$27.00	\$26.00 to \$27.00
Old carwheels, Chicago, per gross ton.	\$25.00 to \$27.00	\$25.50 to \$27.00
Steel rails (scrap), Chicago, per gross ton.	\$22.75 to \$23.75	\$22.75 to \$23.75
Steel rails (relaying), Chicago, gross ton.	\$26.50 to \$27.50	\$26.50 to \$27.50
Machine shop turnings, Chicago, net ton.	\$9.25 to \$9.75	\$9.25 to \$9.75

ELECTRIC RAILWAY MATERIAL PRICES

	Sept. 2	Sept. 16	Sept. 2	Sept. 16	
Rubber-covered wire base, New York, cents per lb.	30	30	Galvanized wire, ordinary, Pittsburgh, cents per lb.	3.70	3.70 to 3.80
Weatherproof wire (100 lb. lots), cents per lb., New York	33	34	Car window glass (single strength), first three brackets, A quality, New York, discount †	77%	77%
Weatherproof wire (100 lb. lots), cents per lb., Chicago	30.75	33	Car window glass (single strength), first three brackets, B quality, New York, discount.	77%	77%
T rails (A. S. C. E. standard), per gross ton.	\$49 00 to \$51 00	49 00 to 51.00	Car window glass (double strength, all sizes AA quality), New York discount	79%	79%
T rails (A. S. C. E. standard), 20 to 500 ton lots, per gross ton	\$47 00 to \$49 00	47 00 to 49 00	Waste, wool (according to grade), cents per lb.	16 to 19	16 to 19
T rails (A. S. C. E. standard), 500 ton lots, per gross ton	\$45 00 to \$47 00	45 00 to 47.00	Waste, cotton (100 lb. bale), cents per lb.	10 to 14½	10 to 14½
T rail, high (Shanghai), cents per lb.	3	3	Asphalt, hot (150 tons minimum), per ton d livered		
Rails, girder (grooved), cents per lb.	3	3	Asphalt, cold (150 tons minimum, pkgs. weighed in, F. O. B. plant, Maurer, N. J.), per ton		
Wire nails, Pittsburgh, cents per lb.	3.25	3.25 to 3.50	Asphalt filler, per ton	\$30.00	\$30.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.50	3.50	Cement (carload lots), New York, per bbl.	\$2.90	\$2.90
Railroad spikes, screw, Pittsburgh base, cents per lb.	7.50 to 9.00	7.50 to 9.00	Cement (carload lots), Chicago, per bbl.	\$3.05	\$3.05
Tie plates (flat type), cents per lb.	2.75	2.75	Cement (carload lots), Seattle, per bbl.	\$3.13	\$3.13
Tie plates (brace type), cents per lb.	2.75	2.75	Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$2.25	\$2.15
Tie rods, Pittsburgh base, cents per lb.	7	7	Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$2.27	\$2.17
Fish plates, cents per lb.	3	3	White lead (100 lb. keg), New York, cents per lb.	13	13
Angle plates, cents per lb.	3.90	3.90	Turpentine (bbl. lots), New York, cents per gal.	\$1.80	\$1.63
Angle bars, cents per lb.	3.90	3.90			
Rail bolts and nuts, Pittsburgh base, cents per lb.	4.50	4.50			
Steel bars, Pittsburgh, cents per lb.	2.35	2.35			
Sheet iron, black (24 gage), Pittsburgh, cents per lb.	4.20	4.20			
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.	5.75	5.25			
Galvanized barbed wire, Pittsburgh, cents per lb.	11	4.10 to 4.20			

† These prices are f. o. b. works, with boxing charges extra.

nection with the present street railway lines and to operate a through service with the downtown district of Dallas. The fund of \$50,000 is being raised from among the property owners of the two sections to be served. The new line will take the place of the old line from which and to which transfers were given. This line has been operated by the real estate company that opened these two additions, and was not a part of the system of the Dallas Railway.

Houston, Richmond & Western Traction Company, Houston, Tex.—The Houston, Richmond & Western Traction Company, which proposes to build an interurban railway from Houston to San Antonio, with a branch from Yoakum to Victoria, is meeting with much encouragement from towns along the proposed route. The line is being promoted by Edward Kennedy, H. A. Halverton and others of Houston. The promoters have put their proposition before the people of Yoakum, and it has been accepted.

Dallas (Tex.) Railway.—The Dallas (Tex.) Railway has begun work on the Myrtle Street extension, the first of the extensions and improvements recently approved by the City Commission. This is one of the extensions called for by the terms of the franchise granted the street railway company. The Myrtle extension will extend to the Oakland Cemetery in South Dallas. Next in order will be the Oak Lawn extension and the new line out Seventh Street in Oak Cliff.

Seattle (Wash.) Municipal Street Railway.—Service has been inaugurated on elevated railway of the Seattle Municipal Street Railway, the first car operating over the structure on September 4th. For the present, the special shipyard service in the morning and afternoon will be operated over the surface tracks. It is expected that the elevated will save about fifteen minutes on the Fauntleroy and Alki trips.

Binghamton (N. Y.) Railway.—The Public Service Commission of the Second District on Sept. 11 conducted a hearing on the application of the Binghamton (N. Y.) Railway for permission to extend its lines to Fort Dickinson. The cost of construction, estimated at \$9,000, would be met by issuing receiver's certificates.

Power Houses, Shops and Buildings

Public Service Railway, Newark, N. J.—The Public Service Railway, Newark, N. J., on September 12, applied to the Board of Public Utility Commissioners for permission to purchase a tract of land in Warren Street, Trenton, on which to erect a small terminal building. The land is offered for sale by the Trenton Banking Company at \$45,000. The railway would exchange a \$10,000 plot which it now owns and a \$35,000 mortgage for the land.

Trade Notes

Stone & Webster Activities

Since April 1 contracts for new construction representing work in sixteen states and in Canada and totaling about \$20,000,000 have been taken by Stone & Webster, Boston, Mass., and the outlook for a world-wide expansion of business is believed to be bright by this organization. About \$6,000,000 will be invested in electric lighting and power facilities, about \$8,000,000 industrial developments and \$6,000,000 in miscellaneous enterprises.

James H. Manning has been appointed assistant engineering manager for the company. He is a graduate of the Worcester Polytechnic Institute, class of 1906, and after four years of drafting and field work, joined the company as superintendent of construction on the Franklin, Verdi and White Salmon hydro-electric developments. Later he was made head of the hydraulic division. Elbert G. Allen, who has been appointed advisory engineer, is a graduate of Massachusetts Institute of Technology. For six years he was engaged on various engineering work at Boston and in the Puget Sound district for the company and later became superintendent of construction at Dallas, Tex. In 1918 he was made assistant engineering manager. As advisory engineer he will devote his entire time to consultation and special problems.

H. W. Johns-Manville Company, New York City, has commenced excavating for a large plant at Waukegan, Ill.

National Fibre & Installation Company, Yorklyn, Del., has awarded a contract for a two-story reinforced-concrete addition, 60 ft. by 140 ft.

Hemingray Glass Company, insulator manufacturer, has moved its general office from Covington, Ky., to Muncie, Ind., where the factory is located.

Spencer Turbine Company, Hartford, Conn., is the successor of the Organ Power Company, manufacturer of motor-driven steel blowers for organs, and the Spencer Turbine Cleaner Company.

Bryant Electric Company, Bridgeport, Conn., manufacturer of electric switches and other electrical products, has awarded a contract for a four-story addition, 60 ft. by 220 ft., on Hancock Street.

General Electric Company, Fort Wayne, Ind., plans to increase its working force by approximately 1000 employees. During recent months business has constantly increased until now the company is deeply feeling the need of more men.

Inquiry 30590.—The American office of a firm in Sweden desires to be placed in communication with manufacturers with a view to securing agencies for the sale in the Scandinavian countries of railway and street-car supplies.

Inquiry 30573.—The purchase of large quantities of cotton waste is desired by a company in Sweden.

Page & Hill Company, Minneapolis, Minn., announces that J. E. Lynch has taken over the management of the firm's Chicago office. He served in France with the 311th Engineers and was promoted from private to the rank of lieutenant shortly after the signing of the armistice. Sig. Norman has just returned after twenty months of service in France with the 20th Engineers and will be assistant manager of the Newport, Wash., office.

Street Railway Material Desired in Colombia.—According to Trade Commissioner P. L. Bell, Bogota, the city of Medellin, Colombia, is to build a new electric street railway 25 kw. long (approximately 15.5 miles). American manufacturers of equipment which might be used are advised to get in direct touch with the officials of that city, addressing letters as follows: Distrito de Medellin, Medellin, Colombia—c/del Ingeniero en Jefe, soliciting specifications and offering their help and engineering assistance for the selection of the proper and most adequate equipment and offering any particular specialties of which they can send complete details.

New Advertising Literature

General Electric Company, Schenectady, N. Y.: Bulletin No. 47,417 on type FP-7 oil circuit breakers.

W. H. Matthews & Bro., Inc., St. Louis, Mo.: A leaflet stating the advantages of their type BF "Fuswitch."

American Malleable Castings Association, Cleveland, Ohio. A booklet on malleable iron and its production.

Strombery Electric Company, 606 South Michigan Avenue, Chicago, Ill.: A circular describing the company's automatic time system.

Allis-Chalmers Manufacturing Company, Milwaukee, Wis.: Bulletin No. 1105 describing stationary and portable air-compressor equipment.

Clayton & Lambert Manufacturing Company, Detroit, Mich.: Bulletin No. 4, descriptive of its oil-burning machines.

Carbo-Hydrogen Company of America, Pittsburgh, Pa.: A catalog describing the use of carbo-hydrogen apparatus for cutting steel and iron.

Spray Engineering Company, 93 Federal Street, Boston, Mass.: A sixteen-page illustrated booklet descriptive of its Spraco air washing and cooling equipment, which is especially applicable for steam-turbine generators.

Chase-Shawmut Company, Newburyport, Mass.: Catalog No. 191, descriptive of the Shawmut renewable fuses, has been issued through the company's general sales agent, the Condit Electric Manufacturing Company.