Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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The Last Call for Data for Statistical Issue

CHAIRMAN GADSDEN of the American Association committee on public relations has said repeatedly that one of the greatest handicaps which the Electric Railway War Board met in Washington during this past year in setting forth the position of the electric railways to the authorities was the lack of accurate, comprehensive electric railway data. The Electric Railway Journal is endeavoring at least partly to supply this lack through its annual Statistical issues, published each year during the first week in January. Blanks have been sent during the past month to all operating electric railway companies, calling for the miles of track built and cars purchased or built during the current year for publication in our issue for Jan. 4, 1919, and the statistics thus being collected are nearly complete. If any railway has not sent in the data requested, there is still opportunity to do so. It is both the privilege and the duty of each railway to assist in making these annual tables complete and correct.

How Good Transportation Helps the Local Merchant

AN INSTANCE of selfish opposition to an important feature of transportation improvement was noted during a recent discussion of an ordinance which was about to be submitted to a referendum. This opposition did not arise from any claim or pretense that the ordinance could not give the people good service. Indeed, it was based on exactly the reverse. It was contended that if the ordinance was adopted it would make it too easy—too cheap—for those who lived in a certain neighborhood to go downtown to buy goods. Needless to say, the obstructionists who raised this point were business men of an outlying community who wanted to discourage all trading in other districts. In its final analysis, their argument was that the hundreds of thousands who go to town every work day should be inconvenienced in their going and coming so that a few might be deterred from shopping in the larger district.

Making due allowance for the fact that a storekeeper is right in seeking to retain all possible customers for his own store, it is manifest that the best business centers outside the central or downtown district of a large city are those which have the best transportation service to such a district. People will not move into an outlying district unless they are assured of adequate facilities for traveling between their homes and their working places. Stores could not exist in remote districts unless people were reasonably satisfied with transportation to and from their work. It would appear to be shortsightedness of the narrowest kind, therefore, when business men of this class attempt to block plans for making their community still more accessible. It looks like a plain case of biting off the nose to spite the face.

Possibilities for More Extended Use of Welding

THE high cost of materials and the difficulty of obtaining material of all kind promptly from the manufacturer or dealer have recently given a tremendous impetus to welding operations in repair work. As emergency measures a great deal of welding has been carried on which would not have been done under normal conditions. This focussing of attention on welding has led to an accelerated development of the art, and particularly in the operations and equipment used in arc welding. Railways have used this system for bonding and minor repairs for many years, but for important operations where failure would be accompanied by serious results the system has been looked on more or less with suspicion. A case of this nature where welding may not be suitable is pointed out in a communication in this issue. The chief reason for the apparent apathy toward the use of arc welding is that haphazard methods have been employed. Almost any kind of electrical equipment, any kind of electrode material and any kind of labor for welders have been used. Another thing that has militated against a more extended use of arc welding is the difficulty of determining whether a completed job is good or bad. These arguments have less weight now because conditions have been improved rapidly.

The tendency in arc welding development has been toward the use of an automatic machine to lessen the skill required in navigation. Nevertheless, automatic arc welding machines will not take the place of the skilled operator for repair work and special jobs, although they occupy an important place in repetition work. There is also much research work still to be done, as practical use has preceded scientific investigation. The metallurgist, the physicist and the electrical investigator have some interesting problems to solve in determining the best conditions for producing good welds.

Many committees appointed by various technical societies and by the government have made extended investigations and reports, and numerous articles are appearing in the technical press which emphasize the importance of welding. Believing that electric railways will be benefited by a more extended application of welding the Electric Railway Journal has begun the

publication of a series of articles dealing with the various methods in use, the equipment necessary and the supervision and tests desirable to insure proper work. The first of these, treating of various systems in use, was published in the issue of this paper for Dec. 14. Additional information on the subject will be found in this and later issues.

Rail Failures: A Class of Trouble Which Seems to Have Overlooked the Electric Railways

IN THESE times of many troubles the electric railways have cause to congratulate themselves upon their comparative immunity from serious accidents due to rail failures. Unlike the steam railroads, we have seldom heard of this trouble upon electric railways although the tracks, upon private right-of-way at least, are built very much in the same manner, with similar rails, ties, ballast and other construction features. Meanwhile the steam railroads have been burdened with an increasing number of accidents from this source and several fatalities have occurred, which investigation proved were due to rail failures. These in turn were mostly of the type ascribed to transverse fissures. This sort of rail failure is very peculiar in that it usually comes suddenly, with no previous warning. It is a progressive fracture which starts from a hidden interior defect. The most careful inspection on the part of maintenance-of-way forces will fail to reveal the presence of transverse fissures which may cause a break within a few hours after an inspection has been made.

The committee on rail of the American Railway Engineering Association has been investigating the subject for several years. Although it has secured many valuable data, it has, as yet, discovered no definite preventative. However, it is believed that the change from bessemer to open-hearth steel for rails, which has been incorporated into the practice of most railroads, has helped considerably in reducing the number of broken rails. Constant study has been given to improvement in mill practice and many types of alloy steel have been tested in service as well as greatly increased rail sections, but the trouble persists much as the corrugation trouble which still bothers the electric railway in street track.

Perhaps the immunity of the electric railways from rail failures may be ascribed to the lighter axle loads and to the lesser impact which prevails even with electric locomotives, since it has been found that the impact upon bridges of more than 20-ft. span, produced by electric locomotives of the Chicago, Milwaukee & St. Paul or Norfolk & Western types, is not more than one-third that produced by steam locomotives. There can be no question but that severe impact will finally search out undisclosed transverse fissures.

A renewal of interest attaches to the subject because of the prominence again given it through the recent report of the chief of the bureau of safety of the Interstate Commerce Commission, covering the investigation of the accident which occurred in April last on the Long Island Railroad at Central Islip, N. Y. The body of the report is made up from the exhaustive study of the subject of transverse fissures prepared by J. E. Howard, engineer-physicist, and the discussion therein of the conditions in the so-called critical zone of the rail-head metal (which zone is at the surface and extends downward perhaps half an inch below the surface) serves to call attention again to the question as to how the action of the steel in the rail head in this zone may affect the tendency of rails in street service to corrugate. It is pointed out in the report that in this zone the elastic limit of the steel is exceeded, the relations of the elastic limits in tension and compression are disturbed, internal strains are introduced and the value of the modulus of elasticity is at least temporarily lowered and sometimes destroyed. The latter has been proved by laboratory tests.

Can it be possible that in the last item we have a substantiation of the argument advanced by several engineers to the effect that overstraining of surface metal is the prime cause of corrugation? Would transverse fissures develop, instead of corrugations, in street railway rails if the axle loads were as heavy as those on steam roads? It would indeed be interesting if tests upon corrugated rails could be made to disclose whether or not the modulus of elasticity has been destroyed in the critical zone of these rails. We understand that the structural changes above noted do not extend much, if any, below the critical zone, and it is rather interesting to note also that as a rule corrugations once removed from the surface (critical zone) seldom return. This would indicate that whatever the structural changes which occur in rail heads which become corrugated, these do not extend below a certain critical zone. Surely there is room here for important tests which may throw light on a vexing subject.

Can Your Organization Be Reconstructed to Advantage?

THE publication in recent issues of this paper of one or two new plans of departmental organization calls attention to a subject which is very timely. The great war having come to a close, it is important that the head of every large organization should turn to questions of efficiency with a view to securing the best possible results. This is especially true of electric railway companies.

A majority of these properties have barely managed to exist through the strenuous period of the past few years. Quite a number recently have been put in a position to secure more revenue through the action of utility commissions and city authorities. All will need efficient management if they are to make the best of their opportunities. The basic step in proper management is to have a workable form of organization, and the larger the property the more complicated this organization is bound to be.

It is undoubtedly true that many companies have furnished transportation in a reasonably efficient manner with a form of organization that would not stand the test of expert criticism. This does not prove, however, that better results might not have been attained under a different system. In such cases it will usually be found that a dominant personality at the head of the company made up for shortcomings in the form of organization. This, then, is not an answer to the argument that the method of conducting business should be safeguarded by the basic principles of efficiency.

We have seen this theory tested in some notable rate cases where the higher fares asked for were not granted because the petitioners were unable to show that they

were getting all possible benefits from the existing charges for transportation. The public, of course, is most intimately concerned with the workings of the transportation department, and under intelligent control this is the department which can do most to secure additional revenues for the company. The wise executive will give careful consideration to matters of this kind. He will overlook no chance to give a proper structure to his organization and see to it that men of the right caliber are placed in authority under him to carry on the functions of the various departments. This is a reconstruction period for electrical railways as for all other lines of business. Men are coming back from France to rejoin the organization. The duty, therefore, is to reconstruct where reconstruction is advisable.

State Commissions Should Act in Kansas City Fare Case

WHEN is a contract not a contract? This is the question which naturally comes to mind when one reads that the employees of the Kansas City Railway went on strike recently for higher wages, notwithstanding their agreement that any advance in compensation should be limited by the financial ability of the company.

The unusually complicated situation in Kansas City was brought about by the recent award of the War Labor Board fixing a higher wage scale and finding that the financial condition of the company would not permit it to pay the advanced wages or to readjust its schedules as directed, and also stating that "in strict justice, the public must pay an adequate war compensation for a service which cannot be rendered except at war prices." The public authorities refused to sanction higher fares, and as the financial condition of the company grew worse an appeal was made to the federal courts to restrain interference with the collection of an 8-cent fare. The federal tribunal, as reported in the Dec. 7 issue of this paper, held that under the circumstances the state boards of Missouri and Kansas had primary jurisdiction and denied the restraining order.

The employees, meanwhile, had grown restive under conditions which seemed to hold out no hope of higher wages and, disregarding the joint agreement which had been filed with the War Labor Board, they refused to operate the cars. This is truly a Gordian knot, and there is serious danger for the future of the railway properties until the matter is settled. It is probably true that the men should have higher pay. There has been no proof that the company has overstated its plea of financial embarrassment. The War Labor Board's decision differed from its ruling in other cases, in that it made the effectiveness of the award dependent on the ability of the company to meet its terms. This was made possible by the signed agreement between the company and the employees, and this contract was taken as an evidence of desire for fair play upon the part of the men.

In the final analysis the disentangling of this situation lies with the public utility commissions of the two states in which the Kansas City company operates. We hope that the members of those commissions will be big enough to accept the recommendation of the federal board "that the company should be permitted to make such charges for its services as will produce sufficient income to pay the wages herein specified." If the commissioners can find another way out let them do so. The interests of the public, the employees and the security holders demand, however, that some action be taken at once.

British Standardization Seems to Be Getting Somewhere

REFERENCE was made last week to a paper, presented before the annual meeting of the A. S. M. E., outlining the work of the British Engineering Standards Association. This work ought to prove, and undoubtedly has already proved, very valuable to the several standardizing agencies in this country. There may come a time when it will be advisable for these agencies to get together more closely, possibly even to form some kind of an engineering standards association in this country. Many of the standardization achievements of such organizations as the Master Car Builders' Association, the American Railway Engineering Association, the American Society for Testing Materials and the American Electric Railway Engineering Association have been very creditable and indicate the possibilities that are ahead. But a beginning only has been made; the surface has hardly yet been scratched. There is much overlapping of jurisdiction on the part of the associations and far too much exercise of individualism in design by engineers in the industries. To illustrate the latter it is only necessary to remind our readers of the electrical machinery situation a few years ago, which has its parallel in other fields now. Time was when each designer of a "dynamo" or motor wanted to express his individuality through it. "Freak" field magnets, queer brush rigging, etc., contributed to great variety in appearance and to high cost. Now all machines of this class look, in general, alike, and all are trim in appearance, efficient in operation and reasonable in cost.

An almost universal complaint that is met is that many association "standards" do not become real standards, that is, industry standards. There must be good reason for this, and the blame cannot all be placed on the industries. In many cases the standards are too academic. Presumably the same situation exists in Great Britain as here in this regard, although the Standards Association is endeavoring to forestall the formulation of academic standards. In the words of its secretary, it was early recognized that the association's main committee "should be an industrial organization in the closest touch with practical requirements and modern scientific knowledge and discovery; that it should undertake standardization only to meet recognized wants, and that periodic revision of the standards should be undertaken so that improvements might be incorporated, the various industries thus being prevented from becoming stereotyped and their methods hidebound."

The purposes of standardization of the British association, as of our own associations, are "to secure interchangeability of parts, to cheapen manufacture and to expedite delivery," all of these desiderata being closely connected with reduction of first cost and maintenance cost. Is it time for our engineering associations to get together on standardization to these ends?

Modern Track Needs Good Ballast

By R. C. CRAM

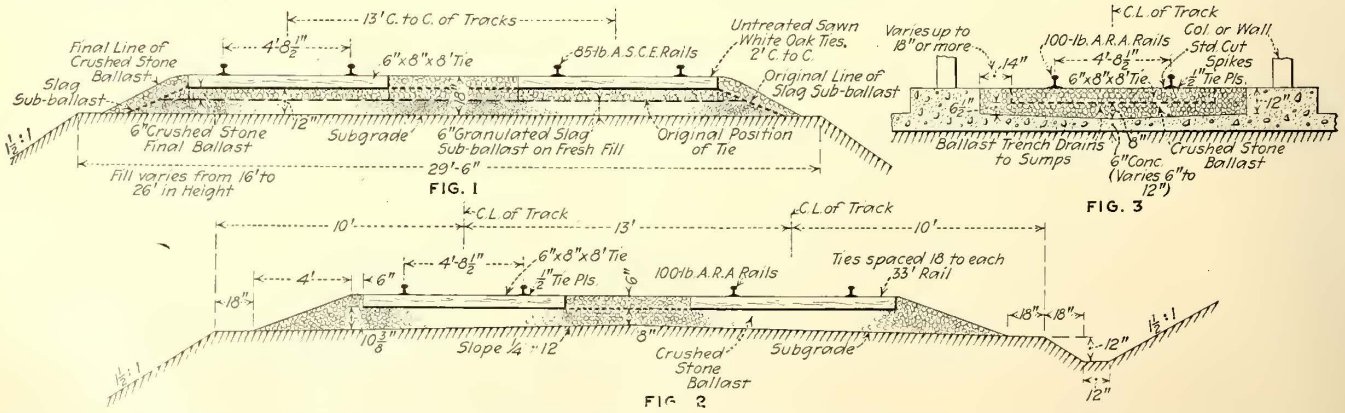
Assistant Engineer Department of Way and Structures,
Brooklyn Rapid Transit System

Well-Ballasted Track Is Economical to Maintain — The Author Shows Why, Describes Types of Construction, Gives the Properties and Materials Necessary for an Ideal Ballast, and Discusses Ballast and Ballasting from the Standpoint of the Best Engineering Practice

BALLAST is the name given to any material which is placed upon the subgrade (subsoil) in order to hold the track in line and surface. The name was derived from stone or gravel which had been brought to England as ship ballast and was there first used on some railroads to hold the ties in place. In the early period of electric railway development ballast other than natural soil was little used, largely because of the comparatively light weight of the cars, particularly in city service. During the early interurban construction period, ballast other than natural soil was considered rather unimportant, but as this class of road developed the construction practice began to take pattern after steam railroads and the use of ballast finally became a fixed part of electric interurban and high-speed railway track construction practice. To-day we have many electric railways which have ballasted track construciton equal in character to that of first-class steam railroad track.

The use of ballast for track construction in streets was quite slow in establishing itself as a feature of city track construction practice, although the desirability of ballast for this service was called to the attention of street railway managements as long ago as 1892 in a report to the American Street Railway Association, when the use of 6 in. or 8 in. of broken stone or gravel under the ties was recommended.

In recent years there has been a revival of interest in the subject, particularly on account of the important investigations which were made by the Pennsylvania Railroad engineers and more recently by the committee



TYPICAL SECTIONS OF ROADWAY AND BALLAST CONSTRUCTION

Fig. 1—Roadbed and ballast section, International Railway, new Buffalo-Niagara Falls line. Illustrates use of granulated slag sub-ballast as mat on fresh fill and final ballast of crushed stone.
Fig. 2—Typical sections of roadway and ballast, tangent tracks on fill or in earth cut. Type VI track, Public Service Commission. First District, New York, for subway lines above ground.
Fig. 3—Section of subway track, New York Municipal Corporation, showing method of ballasting.

on stresses in track of the American Railway Engineering Association.

The current electric interurban railway practice was the subject of a report by the way committee of the American Electric Railway Engineering Association in 1916, while the practice as related to tracks in streets was reported upon by the same committee in its 1914 and 1915 reports on the subject of proper foundation for tracks in paved streets. Much of the following discussion is taken from these reports or from Willard's "Maintenance of Way and Structures."

WHY BALLAST IS AN ESSENTIAL PART OF GOOD TRACK

Ballast is necessary for the following reasons: (1) To provide drainage for the ties, (2) to protect the subgrade by providing a uniform distribution of loads over the subgrade, (3) to hold the ties in place and the track in proper line, (4) to prevent vegetable growth, and (5) to provide material which will allow the track to be surfaced without disturbing the subgrade.

Experience has taught that in new construction, ballast should not be placed until the subgrade is completely finished to grade and that ballast should not be used to bring up low embankments to grade because it is too expensive a material to be so used, and furthermore in order to secure uniform operating conditions the depth of the ballast below the ties should be uniform throughout the entire length of the line. In order to overcome the difficulty which arises from such situations it is becoming a practice to first install an inferior ballast on the subgrade at levels which will permit it ultimately to take the position of sub-ballast under the ballast proper, which latter is to be installed after the roadbed has ceased settling under traffic. This method is called for in the plans of the International Railway in construction of the new Buffalo-Niagara Falls line as described in the JOURNAL for Aug. 10, 1918. The roadbed and ballast section for this line is shown in Fig. 1.

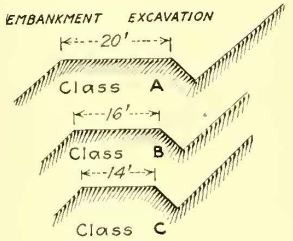


FIG. 4

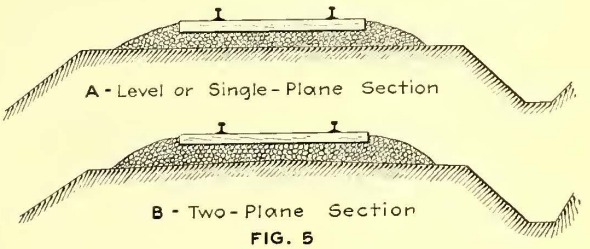


FIG. 5

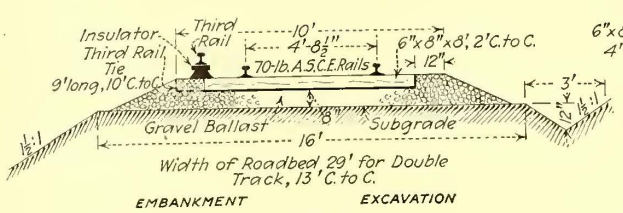


FIG. 6

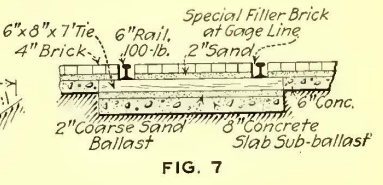


FIG. 7

MINIMUM WIDTHS OF ROADBED AND SOME TYPICAL ROADBED SECTIONS

Fig. 4—Minimum widths for single-track roadbed recommended by the American Railway Engineering Association.
Fig. 5—Typical roadbed sections.
Fig. 6—Roadbed and ballast section, Michigan United Railways.
Fig. 7—Construction for interurban track in paved streets, Michigan United Railways.

Such a method cannot be employed as a rule for tracks in streets, but a quite similar final result is reached by the customary practice of rolling the subgrade before placing the ballast. Thus the roadbed is consolidated and settled beforehand, while a comparatively uniform depth of ballast is assured through the elimination of pockets and because the ballast under load will tend to penetrate the subsoil to a uniform depth. It is the practice on many roads in street work to roll the ballast also, in which case it is finished at a grade 2 in. or 3 in. below the ties and the final tamping is done with finer stone or gravel to bring the ties to true subgrade. This method greatly increases the ability of the ballast to distribute the load more evenly over the subsoil and creates more uniform conditions in tamping.

In order that ballast may perform the functions previously outlined it should possess as many of the following properties as it is possible to obtain with the material selected: (1) It should retain no water; (2) it should have a firm grip upon the tie; (3) it should not disintegrate under action of traffic, tamping and the elements; (4) it should be easily worked and tamped; (5) it should be free from dust and not form dust; (6) it should not heave from action of frost; (7) it should prevent growth of vegetation, and (8) it should be of low first cost.

The selection of a suitable ballast material is governed by a number of controlling factors. The engineer may desire to use some particular material but financial conditions will prevent its use. Perhaps it may not be available in the locality. In such cases he is forced to find the best provided by nature and use it. The desirable uniformity is not to be found in any natural ballast, but with crushed stone or screened gravel the qualities desired can be obtained through control of the manufacturing process.

The kind of ballast selected will have an influence on the cost of maintenance of rolling stock as well as of the track. For instance, a dusty ballast will cause a more rapid wear of journals and other exposed moving parts of cars, while the differing character of materials requires varying degrees of tamping and replenishment. Ballast which does not drain readily will hasten the destruction of ties from decay, and material which requires frequent tamping will cause damage to the ties from the tamping tools. Rail and tie-plate cutting of ties is found to be much more rapid in ballast which contains grit.

From the foregoing it will be seen that it may often be found that a more expensive ballast, hauled from long distances, will ultimately prove to be the most economical and, as stated by Willard, "that ballast is the cheapest which, for a unit length of track and a given volume of traffic, section of rail and kind of tie, makes a minimum of the following items: Annual interest on first cost of ballast, plus yearly cost of tie renewals, plus yearly cost of replenishing ballast, lining and surfacing."

The materials used for ballast in order of desirability are as follows: (1) Broken stone; (2) coarse slag; (3) screened and washed gravel; (4) chats, granulated slag and disintegrated granite; (5) burnt clay; (6) bank-run gravel; (7) cinders; (8) chert and cementing gravel; (9) sand; (10) shells, and (11) earth.

Gravel is the material most commonly used both on steam and electric railways, but in city tracks it appears that crushed stone is used to a considerably greater extent than gravel. In selecting ballast the first consideration should be to obtain a material as free from clay and loam as possible, in order to afford an opportunity for water to drain off rapidly. Crushed stone possess most of the qualities of an ideal ballast; while screened and washed gravel is a fairly close second, and is quite extensively used in city track work. However, bank-run gravel is in more general use, due to its availability and comparatively low first cost.

Crushed stone should not be smaller in size than will pass through a ¾-in. ring nor larger than will pass through a 2½-in. ring. Gravel should be graded wherever possible and should not be of coarser size than will pass through a 2½-in. ring. Larger sizes have too many voids, while the smaller sizes seem to wear the ties less,

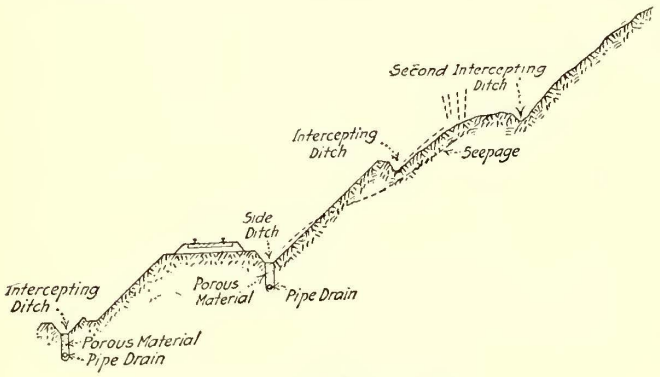


FIG. 8—ROADWAY DRAIN

are less noisy and more easily tamped and give a better surface generally with less labor.

Gravel varies greatly in quality in different localities, and bank-run gravel will vary in clay, sand and gravel as follows: Dust and clay, 0 to 20 per cent; sand, 5 to 60 per cent, and gravel, 35 to 90 per cent. Good gravel ballast, therefore, should not contain more than 10 per cent clay and 20 per cent sand, as greater proportions of these materials seriously interfere with drainage. It has been stated that ties will last from two to three years longer in washed gravel ballast as compared with bank run, and this is attributed to the lesser amount of water retained.

Slag, being available only in the vicinity of blast furnaces, has not been used as ballast by electric railways generally. Coarse slag, however, is said to be almost as durable as crushed stone and to equal it in many other ways. In certain cases it is stated that dry rot attacks the ties more rapidly in slag than in stone ballast. Granulated slag, however, is much inferior to the coarse variety, but is still superior in drainage qualities to cementing gravel, cinders or sand.

Granulated slag was used on the new Buffalo-Niagara Falls line of the International Railway for sub-ballast on fresh fill to allow for settling. It has been the intention, as shown in Fig. 1, finally to place 6 in. of crushed stone ballast on top of this but, as the depth of slag has now reached an average of about 10 in. and such good results are being secured, it is probable that the crushed stone will not be placed.

Chats, disintegrated granite, burnt clay, sand and shells are not much in use for ballast on electric railways but cinders are in quite general use, largely through their availability as a by-product from power stations. The quality of cinders has tended to depre-

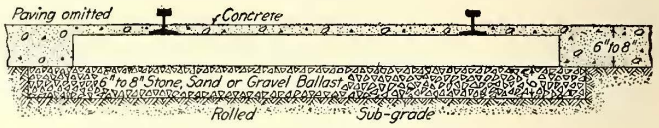


FIG. 9—PLAIN BALLAST CONSTRUCTION

ciate in some localities in recent years, as indicated in the abandonment of them for use in concrete in several instances where they were at one time largely used. There is a wide divergence of opinion as to their value, due to the claim that sulphur in them tends to decrease the life of the ties. Cinders stand eighth in the order of desirability for ballast materials, but when of good quality they serve a good purpose as sub-ballast and for ballast in yards and sidings or upon main lines having comparatively light traffic.

The comments of A. Swartz, traveling track specialist for the Doherty properties, may be quoted here. He says in the JOURNAL for Oct. 7, 1916:

> A great many properties have cheap ballast right at their own doors and can save money by using it. On one property visited, in a coal mining district, piles of shale which was the accumulation of years, provided a natural source of ballast at little cost. This forms an excellent ballast, furnishing good drainage. I noted the tendency of small railways not to make proper use of cinder ballast for track foundation but to allow the track to be maintained on ordinary soil. Power-house cinders, which are usually sold for less than their value or not used at all, could have been used here greatly to improve the riding qualities of the track. I strongly believe in the use of good cinders under ties, especially on open tracks in outskirts of cities or on interurban systems. Continued use will eventually make a good subgrade and the finest foundation for stone ballast.

Steam roads make a practice of cleaning crushed-stone ballast periodically but there is very little information to indicate that electric railways have done so to any extent. The Kansas City Railways, however, has a converted concrete mixer which, by means of screens,

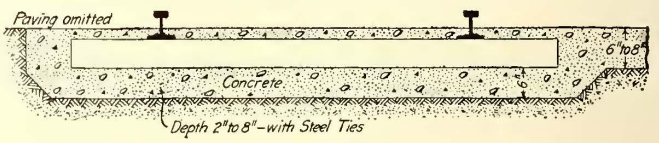


FIG. 10—BALLAST CONCRETE CONSTRUCTION, EITHER WOOD OR STEEL TIES, 2 FT. TO 5 FT. CENTER TO CENTER

is used for cleaning ballast, reclaiming it from ballasted tracks under reconstruction and using the stone either for ballast or concrete. The device was described in the JOURNAL for Dec. 2, 1916.

WHAT IS THE PROPER DEPTH OF BALLAST FOR ELECTRIC RAILWAYS?

The determination of the proper depth of ballast to insure a uniform pressure over the subgrade has presented a problem which is difficult to solve, but the investigations made by the committee on stresses in track will doubtless result in dependable data upon which a

formula may be based. Meanwhile, the formula for computing the bearing on the subgrade proposed by T. H. Johnson[1] seems to give results which check closely with Pennsylvania Railroad experiments. It appears that for heavy steam road conditions a depth of 24 in. is necessary with stone ballast, but nearly the same results will be produced if 8 in. to 12 in. of cinder subballast is used with 16 in. to 12 in. of stone. It will

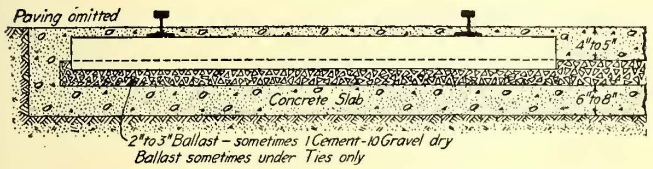


FIG. 11—CONCRETE SLAB SUB-BALLAST CONSTRUCTION

be noted that this depth is the same as the tie spacing in general use.

In general it may be said that the depth of ballast depends upon the nature of the soil in the subgrade, the size and spacing of the ties, the strength of the rail as a beam, the weight of the wheel load and the number of loads. A depth of 6 in. under the ties, regardless of the kind of ballast, has been in most common use on electric railways, although a few roads have required 8 in. and some specify 12 in. The recommendations in the A. R. E. A. Manual for 1915 are as follows: Minimum depths of ballast for Class A traffic, 12 in.; for Class B traffic, 9 in., and for Class C traffic, 6 in. A recommendation made last year calls for an increase to 24 in. for Class A traffic. A great many electric railways have a traffic substantially equal to Class B (see ELECTRIC RAILWAY JOURNAL for Feb. 23, 1918, page 359 for these classifications), and several are well within Class A. On this basis the customary 6-in. depth seems inadequate and the recommended minimum depths given in Table I from the 1916 A. E. R. E. A. way committee report should not be considered excessive.

It will be noted from Fig. 2 that the Public Service Commission for the First District of New York requires 8 in. as the minimum depth of ballast for tracks on fill or in earth cut. Furthermore, steam locomotive axle loads may run as high as 60,000 lb., but we have inter-

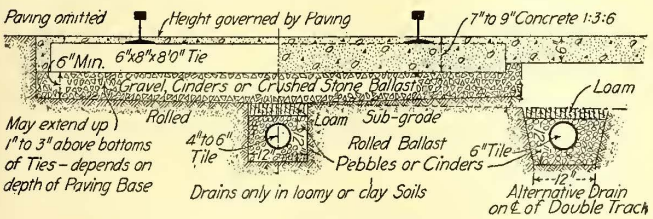


FIG. 12—"TYPE B" CONSTRUCTION FOR MOST SOILS EXCEPT VERY HEAVY CLAYS

Good for frequent service with cars up to 35 tons. Surface drain should be provided

urban car-axle loads of 27,500 lb. and some freight equipment with axle loads of 37,500 lb. Hence the electric railway axle loads range from 50 to 60 per cent of the steam-road axle loads and these percentages, when applied to the 12-in. depth of stone ballast now largely used by steam roads, result in depths of from 6 in. to 7.2 in. The latter, in turn, are but one-fourth to one-third of the 24-in. depth now being considered for Class A steam roads, while the comparative axle loads would

[1]See Willard—Maintenance of Way and Structures, page 217.

TABLE I—MINIMUM DEPTHS OF BALLAST RECOMMENDED BY COMMITTEE ON WAY MATTERS, A. E. R. E. A.

Ballast Material	Main Tracks, In.	Side Tracks and Yards, In.
Broken stone	8	6
Washed gravel	8	6
Bank run gravel	12	8
Cinders	12	8

call for from 12 in. to 14.4 in. for electric railways. The way committee recommends a minimum of 6 in. of ballast upon a rock subgrade and it is interesting to note in this connection that the New York Municipal Railway Corporation requires a depth of from 6½ to 8 in. for subway tracks laid upon the concrete tunnel invert, which simulates a rock subgrade, as shown in Fig. 3. The ballast section there shown is substantially the same as the section used in all the subway lines in New York City.

The size and spacing of the ties determines the load each tie transmits to the ballast. The closer the ties are spaced the greater the number of points of contact between the ties and ballast and the more uniform the distribution of the loads. With a close tie spacing and uniform ties the subgrade will receive a more uniform distribution of the loads with a lesser depth of ballast than is required for a wider spacing. The minimum tie

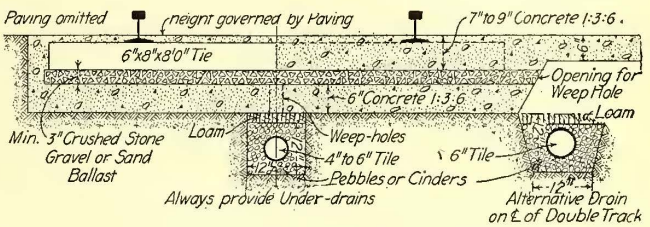


FIG. 13—"TYPE C" CONSTRUCTION FOR HEAVY WATER-RESTRAINING SOILS AND OTHER UNCERTAIN MADE GROUNDS

Good for heaviest cars. Surface drains should be provided

spacing is determined by the amount of room necessary to use hand tamping tools efficiently, which has been considered to be about 24 in. and is that generally used on electric railways. However, a lesser spacing can be used if mechanical tampers are employed. It will be noted from Fig. 2 that some roads are now spacing the ties at 22½-in. centers with 18-in. centers at the joints. Most electric railways use 6-in. x 8-in. x 8-ft. ties regardless of their spacing.

The strength of the rail as a beam determines the number of ties over which a given load will be distributed. Hence a comparatively slight increase in weight and depth of rail will have a decided influence upon the amount of ballast necessary to transmit the load. Any trackman will say that he has less trouble, with identical ballast and traffic conditions, in keeping a track in line and surface when laid with 80-lb. rail than when laid with 60-lb. rail.

The wheel loads and amount of traffic are important in deciding upon the amount of ballast needed for uniform distribution of the load over the subgrade. As in building work the foundation is proportioned to the size and weight of the structure, so in track work must the ballast be proportioned against the load of the train. A track without ballast would probably sustain the load of a hand car indefinitely, but it would soon go out of business if required to carry a 55-ton interurban car very long.

The nature of the soil in the subgrade is the first thing to be considered when determining the depth of ballast. A poor soil or one which retains moisture for long periods will require more ballast than a good soil. Soft wet clay, quicksand, marshy alluvial soils, silt and some clays which retain a high percentage of moisture have a bearing power less, or not greatly exceeding, the loads carried upon electric railway tracks, which will range from 1.75 to 2.6 tons per square foot. In order to assist the subsoil in sustaining the load, consideration must be given to proper drainage of both ballast and roadbed and the following general rules from the A. E. R. E. A. Manual may be followed to advantage: (1) As far as possible, water should be kept off the roadbed; (2) intercepting ditches should be constructed for protection of cuts; (3) intercepting ditches or pipe drains should be provided for protection of banks built on saturated soils; (4) side ditches should be constructed in cuts through all classes of materials; (5) pipe drains should be provided for drainage of wet cuts. Three kinds of drains are shown in Fig. 8.

Present Practice in Regard to Width of Roadbed

The width of the roadbed at subgrade should be sufficient to provide adequate support for the ballast as well as good drainage, especially in cuts. An investigation of electric railway construction practice made by *Engineering News* in 1910, and covering eighteen interurban railways having about 3000 miles of track, developed the following:

> The width of roadbed is very much the same as in steam road practice. For single track it ranges from 14 ft. to 16 ft. on banks and 20 ft. to 24 ft. (over ditches) in cuts. For double track it ranges from 24 ft. to 32 ft. on banks and 34 ft. to 41 ft. in cuts. The American Railway Engineering Association has recommended a uniform minimum roadbed width for banks and cuts of 20 ft. for heavy high-speed traffic (Class A); 16 ft. for medium speed and traffic (Class B), and 14 ft. for low-speed and light traffic (Class C). The general opinion, however, is that 16 ft. should be the minimum for both steam and electric railways, especially in cuts.

The foregoing widths are simply increased by the width of track centers for double tracks. It will be noted from Fig. 1 that the width recommended for Class A traffic is being followed by some modern high-speed lines. It may not be out of place to note also that a minimum of 13 ft. for track centers is largely used, although instances are reported where centers up to 16 ft. are used by such railways as the Union Traction Company of Indiana and the Inland Empire System.

The general steam road practice calls for 13-ft. track centers, and it is believed that electric railways can well afford to pattern after them. This distance will permit single-pole bracket trolley construction, with poles in the center between tracks, and will also permit an interchange of equipment with steam roads, to say nothing of the freight haulage which may develop. Fig. 4 illustrates the minimum roadbed widths as recommended by the A. E. R. E. A., while Fig. 5 illustrates the two principal roadbed cross-sections in general use on steam roads and on electric railways as well. In Fig. 5 Section *A* is a level section while Section *B* is a two-plane section, wherein the two planes intersect at the center of the track. Figs. 6 and 7 represent the ballast and roadbed practice of the Michigan United Railways Company for private right-of-way and in paved streets respectively. This is a modern high-speed interurban railway.

Ballast Practice Differs Sometimes When Tracks Are in Streets

Ballast when used under tracks in streets has often been called the foundation. The greater proportion (see Table II) of electric railway tracks in streets in the United States are laid upon stone, gravel, slag or cinder ballast, usually from 6 in. to 8 in. deep under the ties, with the 6-in. depth predominating. It is quite customary to roll the subgrade before placing ballast and to roll the ballast also. In some parts of the country, the natural soil is largely gravel or good sandy loam, and some roads situated in such territory use no other material for ballast than that found in the subgrade. On the other hand, in localities where heavy, water-retaining clay is found some form of ballast is always used. The quality of the soil and the frequent trenching under tracks for sewers and water mains has led to the use of concrete as ballast. In these cases, either a solid concrete ballast is installed for the full width of the trench, from 6 in. to 8 in. below the tie and extending upward to form the paving base, or a 6-in. concrete slab is installed as sub-ballast and from 2 in. to 3 in. of gravel, sand, or fine stone is used as ballast proper under the ties, in which case the concrete paving base is placed on top of the real ballast. These three types of ballast installations are shown in Figs. 9, 10 and 11, while the recommended practice of the American Electric Railway Engineering Association is indicated in Fig. 12, showing plain ballast construction. The way committee also proposed the concrete slab sub-ballast construction shown in Fig. 13, which is a type being used more and more frequently although never adopted by the Engineering Association. It is believed that the tendency is also toward the abandonment of the solid

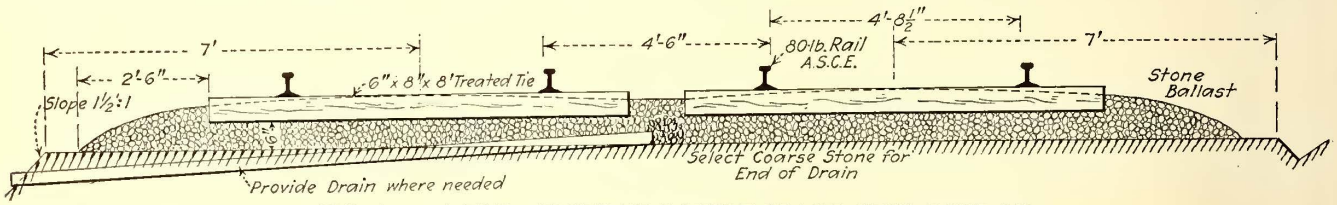


FIG. 14—SAMPLE SUBURBAN DOUBLE-TRACK CONSTRUCTION

TABLE II—TYPES OF BALLAST CONSTRUCTION USED UNDER TRACKS IN THE UNITED STATES. BASED ON REPORTS COVERING 7330 MILES OF SINGLE TRACK IN STREETS OF FORTY-ONE CITIES *

	Percentage
Plain ballast—6 in. stone or gravel	47
Solid concrete ballast	21
Concrete slab sub-ballast	3
Natural soil ballast (usually gravel or sandy loam)	23
Concrete beams, stringer and other modifications†	6
	100

* Report Committee on Way Matters, 1915.

† This type is being abandoned rapidly.

concrete ballast construction in favor of either the plain ballast type or the concrete slab sub-ballast type.

In connection with ballast in streets a great deal of attention is now being paid to proper drainage, and some form of tile drains are installed after the manner indicated in the accompanying figures. The question may be raised as to why a 6-in. minimum depth of ballast is specified by the way committee under such conditions, while an 8-in. minimum is specified for ballast in open tracks. This is explained by the fact that cars for street operation are generally much lighter than interurban cars and also because the ballast is confined in a trench, often well drained, at a somewhat greater depth below the surface of the subgrade soil, which is more compact than on the regular roadbed in the open and protected as a rule by pavement which should and does prevent most of the surface water from reaching the subgrade. Under the latter condition the subsoil is bound to remain more stable and a lesser amount of ballast may be used.

Cost of Ballast Varies Widely With Conditions

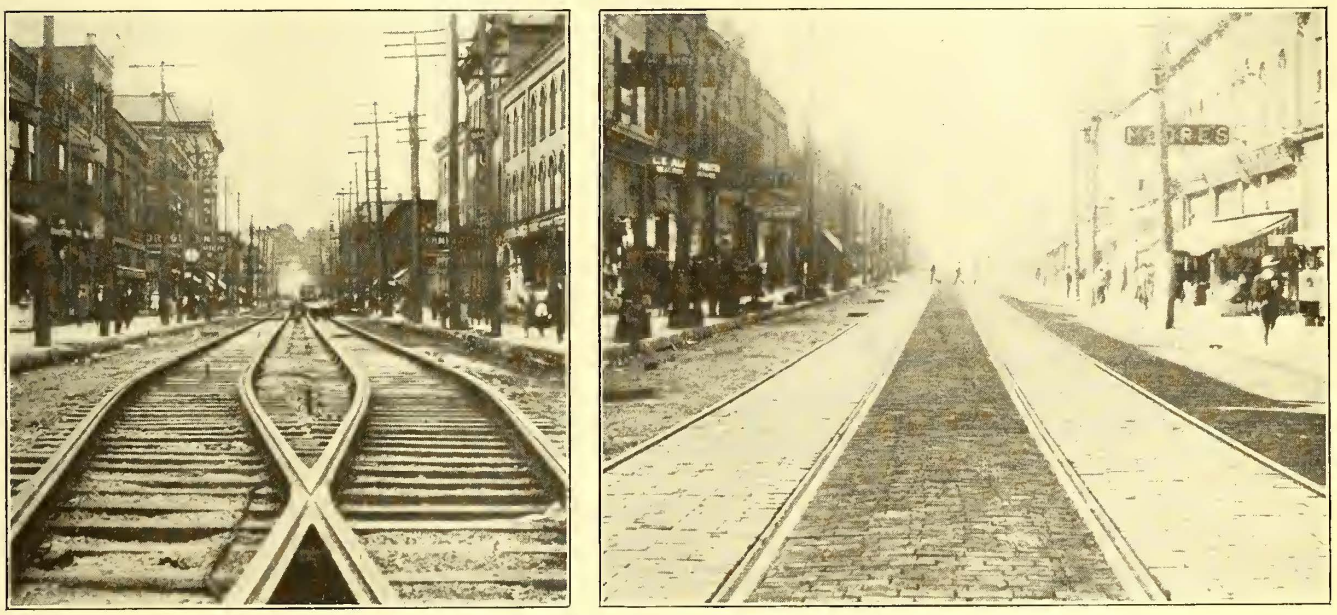
The cost of ballast varies greatly, being dependent upon its kind, depth and availability. The quantities in common use will vary from 2000 to 3000 cu.yd. per mile single track, and L. E. Fischer stated in the JOURNAL for Sept. 6, 1913, that the costs found for ten interurban roads ranged from 75 cents to $1.50 per cubic yard unloaded along the track, giving approximate costs of from $1500 to $4500 per mile of single track. Quite a few electric railway companies operate their own quarries or gravel plants for the production of ballast, but little information is available as to their production costs. The Michigan Central Railroad's crushed stone ballast plant in 1913 produced ballast at a cost of $0.759 per cubic yard in place in the track, with an average haul of 129 miles. A steam railroad gravel washing plant between Washington and Richmond, in 1908, produced gravel at a cost of $0.575 per cubic yard in place in the track.

Winter Track Construction at Sharon, Pa.

Some Details of Work Done Under Difficult Climatic Conditions to Provide Transportation for Workers in War Industries Plants

BY A. B. STITZER
Chief Engineer Republic Engineers, Inc., New York City

SHARON, PA., is one of the rapidly growing "steel cities" of western Pennsylvania, its industries now including the Sharon Steel Hoop Company, Carnegie Steel Company, American Steel & Wire Company, American Steel Foundry Company, National Malleable Steel Casting Company and Savage Arms Company, all operating at capacity to meet war-time needs. The expansion of the city, which has been consequent upon the war activity, necessitated the extension of the lines of the Mahoning & Shenango Railway & Light Company, which operates the street railways from Sharon to Sharpsville, Pa., to the extent of 3½ miles of new line to meet the emergency. Surety bonds in the sum of $20,000 were given to the municipality with a guarantee that the lines would be in operation by May 2, 1918. The engineering and construction work was placed in the hands of the Republic Engineers, Inc., and in spite of difficulty of obtaining labor and materials the line was completed and placed in operation on May 1. Some of the more interesting details of construction and methods employed are covered in the following paragraphs.

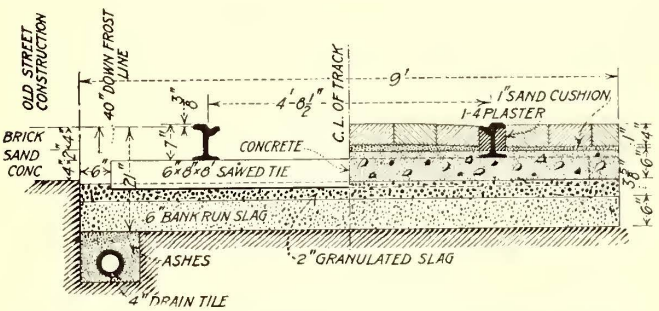


TRACK CONSTRUCTION AT SHARON, PA., BEFORE AND AFTER "PAVING IN"

The track is built of 7-in. American Electric Railway Association rail section, Lorain Section 103-478, in 60-ft. lengths, laid on 6-in. x 8-in. x 8-ft. oak ties, placed on 2-ft centers. Lorain brace tie plates were used every 8 ft. The joints are Continuous six-bolt joints, bonded with No. 0000 concealed bonds. The tracks are paved with vitrified brick on a 1-in. sand cushion and 6-in. concrete foundation; joints between bricks being filled with Barrett's paving pitch. To insure perfect drainage of the subgrade, a 4-in. tile drain was laid in the bottom of the trench and surrounded with cinders.

The authorization to proceed with this work was not given until Nov. 21, 1917, and, due to the limited time between this date and the date of operation guaranteed the city, no effort was made to do the paving until after the line was actually operating. Immediately after that date a track trench 9 ft. wide was excavated to a depth of 21 in., allowing for 8 in. of ballast under the ties. A Keystone steam shovel was used and the excavated material dumped from the bucket directly into the wagons. Motor trucks were used to haul away the material excavated on paved streets and they proved very satisfactory.

During the extremely cold weather the ground was frozen to a depth of 40 in., making it impossible for the steam shovel to progress with a 21-in. excavation. Since it was impracticable to dig below the frost line with the shovel and then to raise the frozen earth, a plan was devised by which material was removed very satisfactorily. A narrow trench 21 in. deep was cut along each side of the strip to be excavated. These two trenches were parallel and approximately 9 ft. apart. They were cut out with bull chisels. Cross trenches were cut between the side trenches about every 8 ft. A pipe connection was made to the steam shovel,



TRACK SECTION, SHARON, PA., BEFORE AND AFTER "PAVING IN"

a 50-ft. length of ½-in. hose attached, and a piece of ¼-in. pipe about 6 ft. long was inserted in the end of the hose. Steam from the shovel was turned through the hose and the ¼-in. pipe was forced into the frozen ground like a steam jet, making a hole of sufficient size to permit the placing of dynamite under the frozen sections of earth. A small charge of dynamite was ample to loosen and split these sections, so that removal and loading could be done by the steam shovel.

Where the new extension left the existing line there was quite a large fill to be made, with no material available except that obtained from excavation on other parts of the work. The connection was, therefore, nearly the last part of the construction completed, and it became necessary to do all hauling by team or motor trucks. Motor trucks of the "quad-drive" type were found most satisfactory in the snow and ice, the drive on both front and rear wheels making it possible for the tracks to continue in service even with one driving axle out of commission.

A Gallion unloader was erected at a convenient point for the transference of ballast from hopper cars to wagons and motor trucks. Bank-run slag was used for ballast, and it was dumped directly into the track trench behind the steam shovel to a depth of 8 in. This bank-run slag after being rolled with a steam roller, provided a very firm foundation.

The 60-ft. rails were hauled by motor truck and a heavy two-wheeled "dolly," similar to the type used by telephone companies for hauling poles. The rails were chained up near the center under the dolly and one end was hung to the end frame of the motor truck.

On account of the difficulty of obtaining other material for tamping up the track, granulated slag was used, this being a by-product of the iron furnaces. Granulated slag is produced by pouring hot slag into pits filled with water, this treatment causing the slag to disintegrate into a light fine grain form that greatly resembles sand in color and appearance, although the shape of the granules is more or less feathery.

To avoid labor shortage, men were imported from New York, and special efforts were made to make the outdoor work as agreeable as possible in bad weather. For this purpose two movable "comfort stations" were constructed. They consisted of sheds 10 ft. x 20 ft., mounted on 6-in. x 8-in. skids. They were equipped with stoves and benches and moved along the street as the work progressed. These sheds were used by the men for storing their dinner pails, warming and eating their food and protecting them from the weather so that they could "thaw out" from time to time.

The writer takes this opportunity to express appreciation of the fine co-operation of the engineers of the company in planning and carrying out the work described under unusually difficult conditions.

Twenty Questions on Boiler-Room Practice

ENGINEERS of the Westinghouse Electric & Manufacturing Company have formulated the following questions as suggestions to boiler users:

Is some one man in your plant responsible for the firing of your boilers? Do you make weekly inspections of draft leaks and steam leaks? Is black smoke issuing from your stack? How much coal do you find in your ash? Are you laboring under the delusion that to soak coal before burning increases its value? How much of your coal is so poorly stored that some of the thermal value is lost by weathering? Have you any control for your flow of air as it passes through the burning fuel? Are the dampers in good condition and operated from the front where they are handy? Is there a leakage of air through cracks in the boiler walls or through porous bricks, and have you ever gone over these walls with a lighted candle to find these leaks with a view to repairing them with plastic cement?

Is there leakage because the iron doors on the boiler-setting have not been packed with abestos to make them air tight? Are the baffle walls tight so that gases are properly deflected over the boiler surface instead of escaping directly to the flue? Are you guessing at the draft over the fuel bed or do you have a draft gage? Do you, also, have a draft gage at the flue damper? Is the fire level and free from holes? Are the air spaces in the grates clogged? Do you periodically clean the boiler tubes of soot, clinkers and scale? Is the fuel bed kept too thick or too thin for proper combustion? Do you constantly see places where steam is visibly wasted? Have you ever consulted a combustion engineer? Have you ever lived in a house heated with coal stoves in each room, and ventilated through the cracks in the windows and doors, and is a similar system economy in a power plant?

The Control of Concentrated Boiler Water Is Essential

By HARTLEY LeH. SMITH
Chief of Testing Bureau, Brooklyn Rapid Transit System

The Writer Discusses the Methods Used for the Control of Concentration in Boilers, Shows How the Ratio of Concentration from Feed Water to Boiler Water Is Determined and Describes the Calculation of Boiler Concentration Control Charts

THE concentrated water in the boilers of steam power plants very often receives no consideration whatever, even though the plant engineer may be duly concerned about the quality of feed water with respect to scale formation and corrosive properties. This is due to ignorance. Very often it is not known that invariably analysis of water samples taken from the feed lines and from the boiler drums will show differences not only of degree but total differences of kind. It is the feed water, to be sure, which contains the ingredients potentially capable of causing scale formation or corrosive attack on the boiler steel, or both. But the actual deposition of the scale, its physical form if deposited and the evidence of the corrosion, if corrosion actually occurs, are due solely to the chemical nature of the water in the drums and tubes. This is totally different from that of the feed water and is not a mere difference of concentration.

Illustrations of the above are easily given, both for the case of plants in which no chemicals are added for feed-water treatment and for the case of plants where chemicals are added. In the first case let it be supposed that the feed water contains calcium sulphate in solution to the extent of four parts in 100,000 parts of water. Samples of water taken from boilers supplied with this feed water might show twenty parts of calcium sulphate in solution but the ratio of concentration would not thereby be established as fivefold. The true ratio of concentration might easily be fiftyfold or eightyfold or higher. The cessation of concentration of the calcium sulphate would be caused merely by the limit of its solubility under the conditions of pressure and temperature in the boiler. After this has been reached at twenty parts per 100,000, it would concentrate no further but would precipitate instead, and after precipitating it would cement itself as hard scale in stonelike layers on the heating surfaces.

In the second case, where chemicals are added to the feed water for scale prevention or to guard against corrosion, as a very common illustration take the addition of soda ash in slight excess above the quantity required to convert the calcium sulphate to calcium carbonate. The excess of soda ash which will be very dilute in the feed water will concentrate in the boiler water, and part of the concentrated excess will convert itself to caustic soda.

Real Ratio of Concentration from Feed Water to Boiler Water Is Important

The real ratio of concentration will then not be shown by the calcium sulphate in solution in the untreated boiler water nor by the excess soda ash nor the caustic

soda in treated boiler water. Yet the real ratio of concentration from feed water to boiler water is of great importance in plant operation in all cases. It measures accurately, for instance, the summation of water got rid of by deliberate blowing-off of boilers and by blow-off valve leakage, as the writer has mentioned in a former article. It is of very great significance in the question of boiler priming. The true concentration must be known and controlled in every properly run boiler plant.

For the measurement of concentration it is only necessary to determine the strength of some permanently soluble salt in the feed water and in the boiler water. This salt should have the inherent property of remaining entirely apart from all of the many chemical reactions which take place while the very hot water is concentrating in the boilers. The practically omniprevalent salt answering this specification in boiler feed water is common salt, sodium chloride. The quantitative determination of its strength both in the feed water and in the concentrated boiler water is also a matter of the very simplest chemical laboratory processes easily capable of being carried out in any power plant, whether the plant has a laboratory or not. Sodium chloride determinations are therefore used to measure the true concentration of boiler water. The methods of making the determinations are on record in scores of references and are not germane to this article. The methods of control of concentration, however, will be considered.

The control of concentration is, of course, effected by controlling the salinity of the feed water, by controlling the blow-off leakage and by controlling the quantity of water deliberately blown off through the blow-off valves. It is only in tide-water stations using surface condensers that any control of the salinity of feed water is necessary. In other stations the salinity of the feed water is fixed. In every boiler plant blow-off valve leakage is bad and should be kept at a minimum by proper diligence in maintenance work. The control of boiler-water concentration then is determined by the amount of blowing-off required to reduce the concentration from the observed and undesirably high value to any desired value looked upon as suitable or standard. In a boiler plant of any size this means in practice determining how much each boiler should be blown to reduce its individual concentration to standard concentration.

Large Quantities of Water Should Be Blown Off in Installments

The problem would be simple were it not for the fact that where steaming rates are high and feed water is in any way bad the quantities of water required to be blown from some boilers may be very great. These quantities are greatest at a time when the feed water itself is bad. The requisite quantity cannot be blown from a boiler showing high concentration by giving the boiler one extremely large blow, because to do so would lower the water level below the gage glass and so make it impossible for the engineer to see what he was doing. The desired quantity of water should be blown off in immediately successive installments. When the feed water is bad and large blows are accordingly needed the filling up after each successive blow introduces very considerable quantities of salt into the boiler. Hence, if real control of concentration is to be effected—that is, if boilers showing really high concentration are to be successfully reduced to standard concentration—rigorously correct methods of determining the required total blowing must be used.

In actually blowing boilers it is customary to begin blowing with the water at the center line of the drums, and as gage glasses are usually mounted this means with the water showing at the middle of the gage glass. Each installment of a big blow is then made so as to lower the level to the bottom of the gage glass. The rigorous calculation required is then the determination of the correct number of such fairly small installments.

Quite obviously the closest analogy holds between this sort of thing and big gun pointing in modern warfare. Great underlying fundamental rigor is a necessity, yet practical application must mean nothing more than mere reference to charts from which the proper solution of all possible solutions is easily and quickly read.

With the foregoing as justification the following formulas required for the making of a boiler blowing concentration control chart are given in natural order. No attempt is made to prove the formulas used because to do so would be to exceed all reasonable space limitations of this article.

How Volume of Water Blown Out Is Calculated

At the commencement of a blow the water level is assumed to be at the middle of the drums and at the middle of the gage glass. At the completion of the first installment the water has been lowered just to the bottom of the gage glass. Therefore, at the commencement the volume of water in each drum has semicircular cross-section and at the completion the cross-section of the water volume is the segment of a circle. The difference of the areas of the semicircle and the segment multiplied by the length of the drums, and by the number of drums, is the volume of water blown out by one installment.

The calculation of the semicircular cross-section presents no difficulties, but calculation of the segmental cross-section is more complicated. Any standard text on mensuration will give the formula

$$A = R^2 \cos^{-1} \frac{R-h}{R} - (R-h)\sqrt{2Rh-h^2}$$ where

A = Area of the segment;
R = Radius of the circle (radius of the boiler drum);
h = Height of the segment (height of water in drum after blowing).

It must be understood that the angle whose cosine is $\frac{R-h}{R}$ is expressed in radians, not in degrees.

To illustrate, suppose the drum is 42 in. in diameter and that a 10-in. gage glass is used. Then $R = 21$ in. and $R - h = 5$ in. Hence $h = 16$ in., that is, there is 16 in. of water in the drum after the completion of one installment of the blowing; after which the boiler is filled up to the center and the second blow proceeded with, etc. Now $\frac{R-h}{R} = \frac{5}{21} = 0.238$ and $\cos^{-1} 0.238$

$= 76°14'$. But as a radian equals $\frac{180°}{\pi} = 57.2958$ deg., it follows by simple arithmetic that $76 \times \frac{14}{60} = 1.331$ radians. The formula then becomes in the illustration above designated:

$$A = (21)^2 \times 1.331 - 5\sqrt{2 \times (21) \times (16) - 16^2} = 484.5 \text{ sq.in. or } 3.365 \text{ sq.ft.}$$

The area of the semicircle is $\frac{\pi(21)^2}{144} = 4.81$ sq.ft. The cross-section of the volume of water blown out would then be 4.81 sq.ft. — 3.365 sq.ft. = 1.445 sq.ft.

Then if the length of the steam drums is 22 ft. and if there happen to be three drums the total volume of water removed by the first 5-in. blow would be: $1.445 \times 22 \times 3 = 95.37$ cu.ft.

The total quantity of water in the boiler with the water level at the center of the steam drums must be figured, and in doing this accurate account must be taken of the volumes of the front and rear circulating tubes, the front and rear headers, the water tubes, the mud drum, as well as the volumes of the steam drums to the center line. Not all of these items can be calculated with equal accuracy, but effort should be made to attain good approximation with each one.

To proceed with the illustration, based upon a three-drum Babcock & Wilcox boiler having twenty-one tubes across and fourteen sections high, that is, a total of 294 tubes each, 4 in. diameter, and happening to have the four lower rows of tubes of No. 9 gage while the remaining ten rows are No. 10 gage, the tabulation of total volume stands as follows:

Front and rear circulating tubes	12.8 cu. ft.
Front and rear headers (estimated)	30.0 cu. ft.
Eighty-four water tubes of No. 9 gage	113.2 cu. ft.
210 water tubes of No. 10 gage	287.0 cu. ft.
Mud drum	5.5 cu. ft.
Three steam drums filled to center line	317.7 cu. ft.
Total	766.2 cu. ft.

Now suppose that the observed salinity of the water in such a boiler is S parts of sodium chloride per 100,000 parts of water and that this salinity is too high and must be reduced by blowing off. The first 5-in. blow removes 95.4 cu.ft. of water, as shown above, and if the boiler operates at, let us say, 215 lb. per square inch absolute pressure the temperature of the water will be 388 deg. Fahr., and at this temperature the density of water is 54.02 lb. per cubic foot. The salt removed by the first 5-in. blow will then be:

$$\frac{S}{100{,}000} \times 95.4 \times 54.02 = \text{lb. of sodium chloride}$$

The original salt content was:

$$\frac{S}{100{,}000} \times 766.2 \times 54.02 = \text{lb. of sodium chloride}$$

The salt content remaining is therefore:

$$\frac{S}{100{,}000} \times 54.2 \times (766.2 - 95.4) = 54.02\left(\frac{S}{100{,}000}\right) \times 670.8$$

After this blow-down the boiler is immediately filled up to the center line of the steam drums with feed water, and let it be supposed that the temperature of the feed water is 200 deg. Fahr., making the density 60.12 lb. per cubic foot, and let it be further supposed that the salinity of this feed water is s parts of sodium chloride per 100,000 parts of feed water. Then in filling up to the center line the quantity of sodium chloride put into the boiler is:

$$\frac{s}{100{,}000} \times 95.4 \times 60.12 = \text{pounds of sodium chloride}$$

The total sodium chloride in the boiler then is:

$$54.02\left(\frac{S}{100{,}000}\right) \times 607.8 + 60.12 \times \frac{s}{100{,}000} \times 95.4 \text{ pounds}$$

It may be assumed that the boiler is receiving heat at a moderate rate from its furnace and that therefore, as it is pumped up to the center line, the entering feed water is at once raised from 200 deg. Fahr. to 388 deg. Fahr. so that the density of the mixture of old boiler water and new feed water is 54.02 lb. per cubic foot. The weight of water in the boiler, filled up to the center line of the steam drums, is then 54.02×766.2 lb.

The parts of salt per part of water that is the ratio of salt to water is:

$$\frac{54.02\left(\frac{S}{100{,}000}\right) \times 670.8 + 60.12 \times \left(\frac{s}{100{,}000}\right) \times 95.4}{54.02 \times 766.2}$$

The parts of salt per 100,000 parts of water would obviously be 100,000 times as much, that is:

$$\left[\frac{54.02\left(\frac{S}{100{,}000}\right)670.8 + 60.12\left(\frac{s}{100{,}000}\right)95.4}{54.02 \times 766.2}\right] \times 100{,}000$$

This of course reduces to:

$$\frac{54.02 \times (670.8) \times S + 60.12 \times (95.4) \times s}{54.02 \times 766.2} = S_1$$

Where S_1 is the salinity expressed as ports of sodium chloride per 100,000 parts of boiler water after the first 5-in. blow has been given and the boiler has been immediately filled up again to the center line of the steam drums, the feed water used in filling it up having not negligible salinity but rather salinity amounting to s parts per 100,000.

Now by exactly the same process of reasoning the salinity of the boiler water after the second 5-in. blow and filling up to the center line of the steam drums has occurred, and so on for any number of repetitions is a geometrical progression having the form:

$$S_n = \left(\frac{670.8}{766.2}\right)^n S + \left[\left(\frac{670.8}{766.2}\right)^{n-1} + \ldots \left(\frac{670.8}{766.2}\right)^o\right] \times \left(\frac{60.12}{54.02}\right) \times \left(\frac{95.4}{766.2}\right) s$$

Any text-book dealing with the summation of a series will show that when summed up the equation takes the form:

$$S_n = \left(\frac{670.8}{766.2}\right)^n S + \left[\frac{1 - \left(\frac{670.8}{766.2}\right)^n}{1 - \left(\frac{670.8}{766.2}\right)}\right] \times \left(\frac{60.12}{54.02}\right) \times \left(\frac{95.4}{766.2}\right) s$$

From this it is at once obvious that

$$\frac{S_n}{s} = \left(\frac{670.8}{766.2}\right)^n \times \frac{S}{s} + \left[\frac{1 - \left(\frac{670.8}{766.2}\right)^n}{1 - \left(\frac{670.8}{766.2}\right)}\right] \left(\frac{60.12}{54.02}\right) \times \left(\frac{95.4}{766.2}\right)$$

Now this last has the great merit of simplicity although perhaps its simplicity needs a word of explana-

tion. It expresses a linear relation between the ratio $\frac{S_n}{s}$ and the ratio $\frac{S}{s}$, and a linear relation is the engineer's desideration where the application of mathematics to the routine of daily work is concerned. It is understood that S_n is the salinity of the boiler water after any number of 5-in. blows have been given, each one followed by the filling up of the boiler to the center line of the steam drums with feed water which itself has salinity s.

The salinity S_n may therefore designate the desired and standard salinity of the boiler water, and the ratio $\frac{S_n}{s}$ is then the concentration ratio standard for the day. The ratio $\frac{S}{s}$ is the observed concentration ratio. A linear, that is straight line relationship holds between the two ratios, as the equation shows. Hence it is very easy to rule up a blowing chart, not in terms of standard concentration and observed concentration but between the ratios which these respective quantities make with the observed salinity of the feed water which may or may not vary from day to day, depending upon the power plant.

The exponent n is the unknown quantity. That is, how many times does a blow of 5 in. need to be repeated (the boiler being filled up to the center line of the steam drums after each repetition) in order that the observed concentration ratio may accurately be brought down to the standard concentration ratio? The equation last written could not possibly be solved directly with the exponent n made the dependent variable. But the linear relationship between the concentration ratios and the reading of the desired information graphically from a chart come to the rescue of the engineer. It is simply necessary to assume n equal successively to 1, 2, 3, 4, etc., on up to any number found necessary and with each numerical value so taken to calculate two properly-spaced points on the straight line and then rule each straight line on the chart. From the chart for any values of observed concentration ratio and the standard concentration ratio the corresponding numerical value of n may be read off, thus obtaining graphically the solution which could not possibly be obtained analytically. This is the legerdemain of the graphical method in the field of mathematical application, and as such is a resource of great power to the engineer.

The term $\left(\frac{670.8}{766.2}\right)^n$ is evaluated in the work of calculating the straight lines to be ruled upon the chart by the logarithmic method. That is, if we let $y = \left(\frac{670.8}{766.2}\right)^n$ then:

$$\text{Log } y = n \log \left(\frac{670.8}{766.2}\right)$$

From this by assuming that n has the values 1, 2, 3, etc., the values of log y are easily calculated, and hence the values of y, that is the values of $\left(\frac{670.8}{766.2}\right)^n$ are read from a logarithmic table.

The linear or straight line relationships resulting take the following form, values of n being selected at random for illustrative purposes:

$$n = 0 \qquad \frac{S_n}{s} = \frac{S}{s}$$

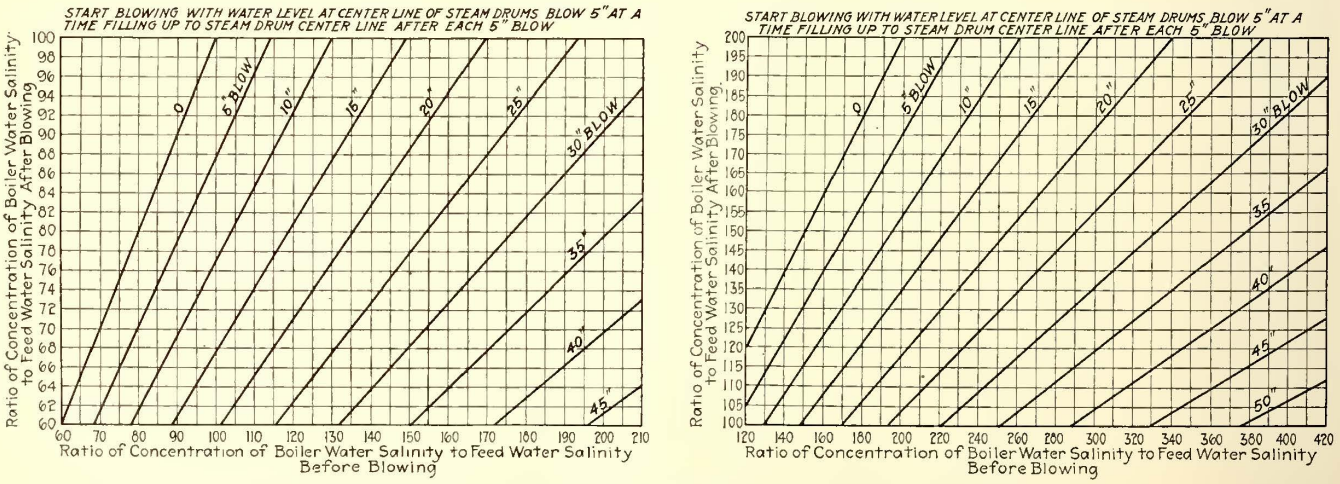
$$n = 1 \qquad \frac{S_n}{s} = 0.8755 \times \frac{S}{s} + 0.1386$$

$$n = 4 \qquad \frac{S_n}{s} = 0.5875 \times \frac{S}{s} + 0.4591$$

$$n = 7 \qquad \frac{S_n}{s} = 0.3942 \times \frac{S}{s} + 0.6743$$

The meaning of $\frac{S_n}{s} = \frac{S}{s}$ when $n =$ zero is that if the observed concentration ratio equals the standard concentration ratio the boiler needs no blowing.

The calculation of two points conforming to any one of the straight-line equations above written through



CONCENTRATION CONTROL CHARTS FOR BLOWING BOILERS

which two points the straight line on the chart would be ruled need hardly be given, since to any reader who has perused the article thus far such illustration would be superfluous.

The two charts which are shown cover standard concentration ratios ranging from 60 to 100 and from 100 to 200, and observed concentration ratios from 60 to 210 and from 120 to 420, the values of n going up to $n = 9$ and $n = 10$ respectively. On the charts the values of the total blows are listed; that is where $n = 1$ the blow is 5 in.; where $n = 3$ the total blow is 15 in., in three installments of 5 in. each, etc.

It is a question to be decided in each specific power station whether a fixed concentration standard or a fixed salinity standard should be adopted. The charts are applicable to either. Thus suppose in a given power station that the standard salinity $S_n = 170$ has been chosen and that a boiler shows actual salinity $S = 260$ on a day when feed-water salinity is $s = 2.0$. Then $\frac{S_n}{s} = 85$ and $\frac{S}{s} = 130$. Reference to the chart Fig. 1 shows that a total blow of 16 in. would be needed. Three successive blows of 5 in. would be given, followed by a 1-in. blow.

Again suppose that the standard concentration is $\frac{S_n}{s} = 65$ and that the observed salinity of a boiler is $S = 481$ when the feed-water salinity happens to be $s = 3.1$. The observed concentration is $\frac{S}{s} = \frac{481}{3.1} = 155$. Hence, by Fig. 1 the total blow required is 33 in. This would be given as six blows of 5 in. followed by a blow of 3 in.

Or take the case of another power station with very good feed water, say with $s = 0.8$. Suppose the standard concentration value is $\frac{S_n}{s} = 150$ (and this is equivalent to blowing off two-thirds of 1 per cent of the water fed into the boilers) and that a particular boiler shows an observed salinity of $S = 145$. Then $\frac{S}{s} = 181$ and reference to Fig. 2 shows that a 7-in. blow would be needed, secured in practice by one 5-in. blow followed by a 2-in. blow.

It must be understood that the charts of Fig. 1 and Fig. 2 and the equations on which they are based are applicable numerically only to the Babcock & Wilcox boiler discussed in this article, but it is obvious that the method by which the equations were derived would lead just as certainly to proper numerical equations having the same form but applicable to any other boiler of Babcock & Wilcox or other make.

Possibilities for Railroad Development in Europe

Jules Cels, the new French Under Secretary of Public Works, points out that, merely by the provision of links that national jealousies have hitherto prevented, a through railway may be built mainly on existing lines from Bordeaux through Lyons, Milan, Venice, Trieste, Agram, Belgrade and Bucharest. Such a road would have valuable present and future connections with the mid-Adriatic ports to be opened to Jugo-Slavia by the forthcoming peace treaty.

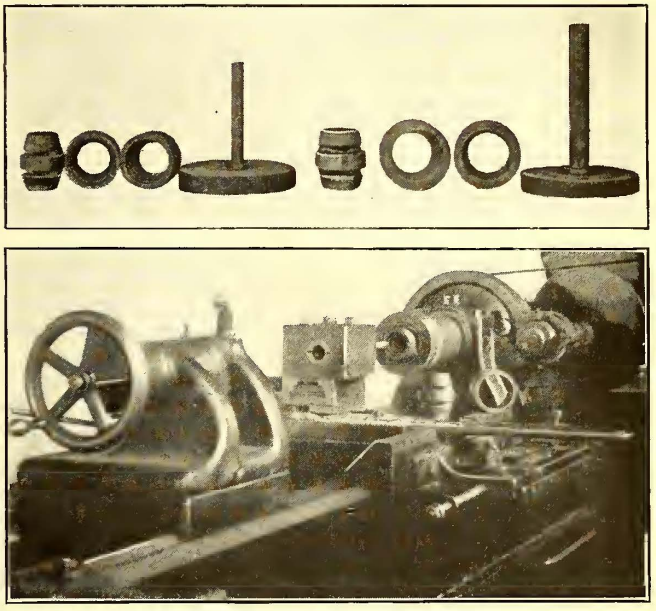
The common impression as of a land criss-crossed by railways is correct enough for some parts of Europe. But there is another Europe, a railroadless Europe, cursed by the militaristic policy that has built railways only for war or barred them to spite a neighbor. For vast sections so described there may be waiting a swift development recalling that of the very rapid development which has taken place in the vast sections of the Mississippi River in the United States and the benefits to be derived may be commensurate therewith.

Babbitting Compressor Armature Bearings

The Author Describes an Original Outfit and the Procedure Which He Has Found to Be Effective

By James W. Brown
Superintendent of Shops Wilkes-Barre & Hazleton Railway, Hazleton, Pa.

THE armature bearings for the Westinghouse D.I.E.G. compressor are of cast iron lined with babbitt. Owing to their being arranged for ring lubrication they are somewhat difficult to babbitt, due to the shape of the castings. The accompanying illustrations show a device which was designed in the shop of the Wilkes-Barre & Hazleton Railway to eliminate the trouble of holding babbitt in the bearing shells when pouring. As the commutator and pinion end bearings are of different sizes two babbitting devices are necessary. These are the same in construction but different in dimensions.



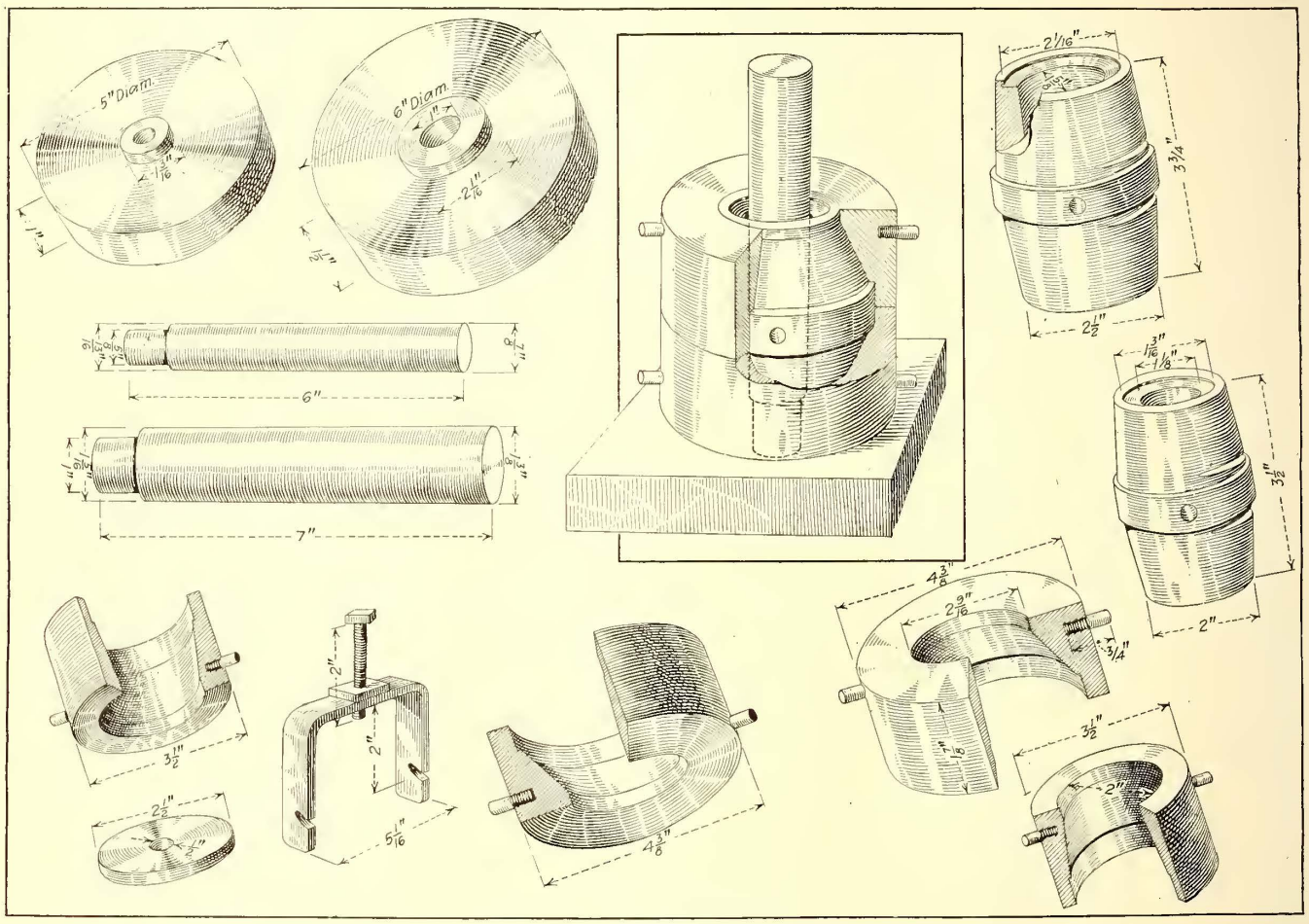
AT TOP, THE ESSENTIAL PARTS NECESSARY FOR BABBITTING A BEARING. AT BOTTOM, SELF-CENTERING CHUCK USED IN TURNING BEARING

The device consists essentially of four parts. The first is a cast-iron baseplate which is finished straight on one side and has a boss turned on the opposite side of such a diameter that the bottom end of the bearing will fit over it. A hole is drilled through the base of this plate to hold the mandrel core for the bearing. This mandrel is the second essential part of the device. It is 7 in. long for the pinion end bearing and of a diameter so that it will leave about $\frac{1}{8}$ in. of metal to be bored out of the bearing after it has been babbitted. This mandrel has a taper of about $\frac{1}{16}$ in. in its length. This provides for easy removal after the bearing has been babbitted. The third and fourth parts consist of two cast-iron shells, each one-half the length of the bearing. These castings are bored out to suit the outside diameter of the armature bearing. From the illustration of the armature bearing it will be seen that on the outside surface there is a narrow strip which is true with the inside counterbore. The two babbitting cast-

ings are bored straight for a short distance to receive the true surface of the bearing. The remainder is bored on a taper and made to fit the rough part of the bearing with a close fit. Where bearings are found very uneven it is sometimes necessary to file off the rough parts in order that they may fit the jig properly. When the two castings are placed together they form a straight casing entirely inclosing the bearing.

The bearings are prepared for rebabbitting by first removing all the old babbitt and cleaning them thoroughly. The bearing shell, together with the babbitting device, is then heated to a temperature that will remove any dampness that may be on the iron. It is our practice to paint the mandrel while hot with clay wash. This is applied with a brush and dries very quickly. The application of this clay wash insures a perfectly clean bearing and also facilitates the removal of the mandrel. The bearing shell is then assembled in the device by placing the mandrel in the bottom plate and the bearing casting around this with the large straight bored portion upward. The bearing is then placed over the boss on the base plate that is turned to fit the end counterbore. The top part of the shell casting is then placed in position and the bearing is ready for babbitting. To remove the bearing after poring we make use of the yoke shown in an accompanying illustration. This yoke is made of wrought iron with a thumb screw and washer for removing each half of the device from the bearing. After the bearing has been removed the fins are removed from the outside and the bearing is then bored out in a lathe in a special self-centering chuck. This chuck was designed in our shops for this class of work. It insures the bearing being bored out accurately and in true alignment with the narrow finished portion on the outside of the bearing. After the bearings are bored they are taken to a shaper and placed in a chuck when slots are cut to the proper width and depth to suit the oil ring.

As will be seen from the reproduction of the photograph there are no clamps or bolts necessary with this device. All parts can be quickly and easily assembled and the pouring can be carried out at any place that is convenient to the babbitt. As the upper portion is open any air or gas in the molten metal readily escapes and prevents blowholes. Also any impurities rise to the top and insure a perfectly clean bearing.



DETAILS OF BABBITTING DEVICE

Motor Vehicles for Snow Removal

In a recent report to the American Society of Municipal Improvement, by several engineers of high standing, attention was called to the importance of providing for snow removal by means of motor vehicles. The point was made that in the case of heavy snowfalls usually the first streets open to traffic are those containing surface car tracks, and in the Northern cities the railways are mostly equipped to keep the tracks clear. The result is that motor-vehicle traffic is at once diverted to these streets, resulting in congestion and delayed traffic.

Some Mysterious Car Ailments

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

Contributions Are Invited From the Field

More About Troubles With 600-Volt Fuses on Battery Circuits

A SHORT article in this department published in the Nov. 16 issue describes trouble due to tell-tales not blowing on 600-volt fuses when used on low-voltage circuits. Inquiry has been received as to why these indicators did not blow at the same time as the fusible element. The fuses were used on low-voltage control circuits with a 14-volt battery. Under normal operation the fuses were in series with the control magnets which would reduce the voltage drop across the fuse to as low as 3 volts. The fusible element of the fuse blew due to overload or a momentary short-circuit, which immediately cleared itself.

The tell-tales consisted of a very fine wire which was connected in parallel with the fusible element at the end caps of the fuses. Approximately 0.6 amp. was required to blow the tell-tales. They did not blow on overload at the same time as the fusible element due to the high resistance of the tell-tale which prevented sufficient current from passing through it. After the fuse had blown the resistance of the tell-tale in series with the control magnets was so high that not more than 0.2 amp. could pass through at the low voltage. It was therefore impossible for the tell-tale to blow.

The changes which the fuse manufacturer made consisted in shortening the very fine tell-tale wire, thus decreasing the resistance.

Trolley Wheels That Persistently Wore Out at the Wrong Place

RECORDS of defects which caused the removal of trolley wheels from service disclosed a peculiar condition on one electric road. At one car shop of the system a large number of wheels were reported as removed for excessive wear between bushing and wheel, or to use a shop term "the bushing hole was worn too large." Records from other shops on the same system showed none removed for this cause.

Tests to determine if the outside diameter of the bushings used was sufficient to insure a tight fit in the wheel showed that this was all that could be expected. It was evident that as long as the bushing turned freely on its axle there could be no wear between the outside of the bushing and the wheel. As this wear was occurring it must be due to binding between the bushing and the axle.

A close examination of the bushings and axles showed some to be pitted and burned slightly from carrying current. The shunts and washers were evidently not performing their duties properly. Further investigation showed that the side springs and washers were being allowed to become excessively worn at this shop before replacement. The conditions were called to the attention of the trolley man at that shop and the necessity of providing proper spring pressure to assist in conducting the current from the wheel to the harp was explained to him. Beneficial results were obtained at once and this class of trouble was almost entirely eliminated.

How the Enigma of Increased Fuse Requirements Was Solved

THE purchasing department of a large electric railway property called the attention of the department of equipment to a large increase that was occurring in the number of fuses used. The fuses were of 250 and 300-amp. capacity and were used to protect the main power circuits of the cars. Contact between the fuse

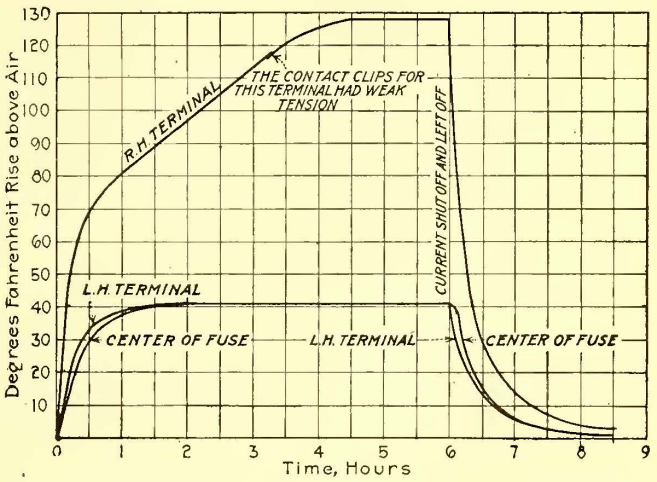


FIG. 1—GRAPHS SHOWING HIGH TEMPERATURE DUE TO POOR CONTACT PRESSURE ON THE FUSE TERMINAL

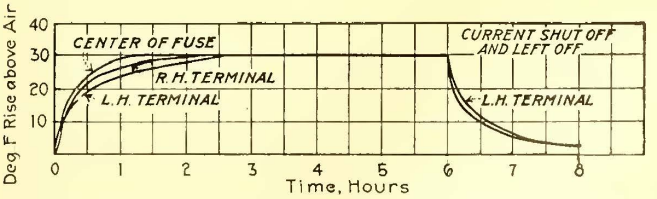


FIG. 2—GRAPHS SHOWING REDUCTION IN TEMPERATURE RISE WITH THE USE OF NEW FUSE BLOCK

block and the fuse terminals was made through phosphor bronze contact clips. Investigation at the various maintenance shops of the system showed that the fuses were blowing while in service. A check of the number used as compared with previous years showed that in-

creases were occurring only at a few of the shops. When this was called to the attention of the foremen at these particular points they stated that they believed the motormen were crowding their equipment harder than at other points and thus overloading the fuses.

Inspectors were detailed to watch operations on those lines and a record was started showing the car numbers on which fuses were blowing and the particular service in which these cars were used. After the record had been continued for a month it was evident that the trouble was confined to certain cars and that the most frequent cases of fuses blowing was where these cars were continued in service for long periods without rest. This seemed to indicate that the continuous rating of the fuses did not provide sufficient margin for the service requirements.

In order to determine the time that was required for the fuses to blow with various overloads a series of tests was made. The manufacturer of the fuses cooperated in making these tests and offered many valuable suggestions. Tests were first made on the 300-amp. fuses by blowing them cold with 450 amp. continuously. With this current the fuses blew in from three minutes and forty-nine seconds to four minutes and five seconds. Temperature tests were next made under conditions approximating actual service. This test service consisted of passing a current of 200 amp. through the fuses for thirty seconds, and then cutting it off for thirty seconds after which it was again turned on, etc. Fuse blocks and boxes which had been in service on cars for a considerable time were used. The results were surprising.

It was found that in most cases the temperature of the fuses mounted very rapidly and the fuses would blow due to excessive heating. The cause of the excessive temperatures was the poor condition of the fuse clips and terminals. On the same fuse a difference of 90 deg. Fahr. was found between the two terminals. The graphs for one such test are shown herewith as an example of the high temperatures that may be caused by poor contact pressure on the fuse terminals. Fig. 1 shows results of the first test made when a temperature rise of 128 deg. Fahr. above the surrounding air was obtained at the right-hand terminal, while the left-hand terminal and center of the fuse showed but 41 deg. rise.

The result of a second test made with the same fuse but with a new fuse block is shown in Fig. 2. The maximum rise of all parts of the fuse in this second test was but 30 deg. Fahr. and the temperature became constant after 3¼ hours. It can be readily seen from these graphs how important it is to maintain proper contact of the fuse clips.

A few tests of this nature showed where the trouble was located that caused the fuses to blow. A careful inspection of all fuse blocks was made by specially instructed men detailed for the work. Where weak tension or improper contact of the clips, improperly soldered connections or bad joints were found these were replaced. In a few cases the warping of the fiber cartridge of the fuse was found as the cause of poor contact. After the equipment was placed in good condition the number of fuses used dropped to the normal standard.

Fuses That Were Always on the Job

WHILE standing on the station platform near one of the terminals of a large electric railway system the writer was surprised to hear the shoe fuses blowing on a long line of subway cars which had been laid up for the day. These cars were being stored during off-peak hours on a section of express tracks not in use. After being laid up the main switches on the cars were opened so that potential was removed from all equipment.

What could cause shoe fuses to blow on a long line of idle cars with no one anywhere near them was a somewhat puzzling question. After making certain that the apparent occurrence was not a dream an investigation was started to find out the cause. The first information received consisted of a telephone message which stated that a car had been derailed about a mile further down the track and had short-circuited the third-rail so that the circuit breakers for that section in the power house had blown and that power had been cut off from that section. It took some time to associate the short-circuiting of the third-rail with the blowing of the shoe fuses on the idle cars. Ultimately, however, it was realized that the cable connecting the contact shoes through the fuses on the same side of the car formed a parallel circuit to the third-rail. This circuit, being of copper, was of very low resistance so that a large proportion of the current caused by the short-circuit had followed this path. This excess current passing through the shoe fuses had caused them to blow and what appeared like a very ghostly happening was really only a practical demonstration of the law of multiple circuits.

Overheated Resistor Trouble Solved

A LARGE amount of trouble was experienced at one of the shops of a large railway property due to overheated resistors. The transportation department was requested to take necessary steps to prevent motormen from running on resistance points, as it was evident that this was the primary cause. Special bulletins were issued to the motormen explaining conditions and cautioning them against improper operation. However, the symptoms failed to yield to local treatment and the last panels of the grid resistors continued to be overheated. In all cases the electrical equipment and the brake adjustment on the cars were found "O.K." The cars in question were equipped with type-K platform controllers, and the handles were kept by the operating department's motormen.

One car pulled into the shop while the writer happened to be present, and the mystery was soon unraveled. The handles which were of the solid-head type with bushings, were becoming excessively worn but were not worn beyond the limit set by the gages furnished for checking them. Some of the controller shafts were also slightly worn at the handle fit. The combined wear of the handles and shafts was such that with the handle thrown all the way around and up against the stop on the cap plate of the controller, the cylinder would still be left on the last resistance point with the last panel of resistance still in circuit. The motorman was not at fault in his operation, as he had his handle in running position. Careful checking of handles and shafts decreased the trouble.

How to Record Materials Received

Pittsburgh System, Based on Preservation of Original Complete Tally as Only and Final Record—Saves Labor and Safeguards the Payments for Materials and Supplies —Not an Experiment, Adopted by Many Other Roads

BY B. J. YUNGBLUTH
General Storekeeper for Receivers Pittsburgh Railways

RECORDING the receipt of materials purchased is a function which should be performed with extreme care and protected by as many safeguards as possible. Upon it depends the payment of bills. Payments run up into thousands, and by some companies into millions of dollars annually. Delayed or disputed payments affect credit.

THE PROBLEM IS STATED

The honesty of shippers may be taken for granted, but unfortunately everyone makes mistakes sometimes. In these abnormal times particularly, when everyone is working in "high" and much of the help is inexperienced, the work must be systematized and simplified. Memory should not be permitted to play any part where an actual expenditure of money is involved. All materials received should of course be tallied—counted, weighed or measured—and examined in every sense. It is probably true that this is done generally to the best of one's ability. How can the work be simplified so that an inexperienced employee can determine just what it is necessary to ascertain about each lot of goods received and to record the information and save time doing it? In addition to satisfying ourselves of the quantity of goods received, the shipment must be tallied in such a way that should a controversy arise, we have a specific record of how it was received, how packed or bundled, that we may support any possible claim. If it is contended, for instance, that 4350 pieces were received against a reported shipment of 5000, and we can show that of nine boxes received, five boxes contained 500 each, two boxes contained 600 each and one box 650, the burden of the proof rests upon the shipper.

We are all familiar with the fellow who is content to record receipts on his cuff, on the wall or on an old envelope from his pocket and who figures on ultimately practicing penmanship by writing the record in a nicely bound book. If procrastination does not get the upper hand and he is able to decipher some of his quickly made hieroglyphics, errors will frequently be made in transcribing, subjecting the whole transaction to doubt. With such uncertainty, one would hardly be justified in making a claim for "shortage" or a report of "overage" as is frequently the case. This condition is surprisingly prevalent to-day.

Form 926, (5 in. x 8 in.), of which a reproduction is given on this page, is an original tally which is at once a single and final record of each individual receipt. The form suggests to the receiving clerk all the information which it is necessary for him to supply. As much of the necessary wording as possible is printed so that a check mark or the least amount of effort is required properly to complete the record. The form is padded in a convenient size and shape to be carried in one's pocket and taken directly to the work, whether that happens to be in a railroad car, by the side of an auto truck in the yard, or at a job on the road.

5m-In trip—9-18 w Adopted 4-10
Revised 6-10; 4 12; 10-12; 7-13; 7-14

Form 926

PITTSBURGH RAILWAYS CO.
J. O. Callery, H. S. A. Stewart, C. A. Fagan, Receivers

MATERIAL RECEIVED AT
Homewood General Storehouse

R. C. No. 89715

FROM A. B. & C. Mfg Co

DATE 10/10 191 8

Order and Req. No. Shop Order Contract	Quantity	WEIGHT SHOW Gross Tare Net	From Car Initial N+S No. 1000 DESCRIPTION OF MATERIAL	Package Marks Package Nos. Package Weights No. Packages	CLASS NUMBER	INVOICE REGISTER NUMBER
56848						
615-418	8784		2/0 Trimed Line Cars	176 Boxes	20685	16981
				No 59600		
				15 No 59774		
				50 per box No 59775		
				34 Cars		

(AS CHECKED)
Mat'l O. K. ✓
Wrong Mat'l
Make Explanation in Remarks Col
Reqn. Complete
Partial Shipment ✓
Reqn. Checked by E
Order Checked by M
Shop Order Checked by
Card Indexed by

Packages O. K. 175 Bx
Packages Broken one box
Transportation Charges:
Check No. 736
Bill No. F 26812
Amount $ 8.12 100 Col.

Arrival Notice to J. D.
His Reqn. / Memo. / No. 846892
RECEIVED VIA AS CHECKED
Local Express
P. R. R. East Lib. ✓
Street Car
Shippers Wagon

Shipping Order
No.
O. S. & O. No. 400
R. R. Express
Shippers Mess
Our Messenger
Parcel Post
Otherwise

Remarks Box # 59775 Broken. Part contents missing R. R. Agent agrees

Tallied by B
Checked by E
Correct H By Storekeeper
Signed Y For Goods Storekeeper

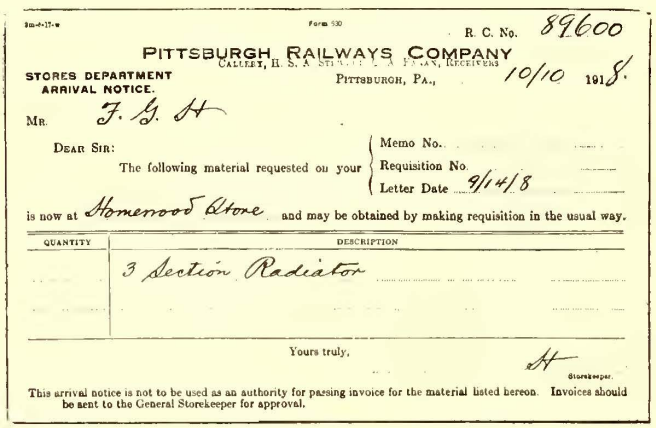
FORM 926, COMPLETE ORIGINAL TALLY AS WELL AS ONLY AND FINAL RECORD OF MATERIAL RECEIVED

The individual record secures individual attention by each person interested. The form is used in triplicate, numbered consecutively. The original goes to the auditor, the card copy to the clerk for checking against invoice and the third copy remains in the book. All copies are made at one writing.

All goods received must be determined to be either correct or wrong. The record must show positively which is the case. If correct, the goods are placed in stock, and if they were ordered for some special purpose an "arrival notice" (form 930) is sent to the persons interested, making it unnecessary for him to inquire continually for goods before and even after their arrival. If the goods are wrong, the reason must be given in the "remarks" column, whereupon an immediate investigation is made to learn if they can be used or should be returned. In the latter case, a shipping order for prompt return is made out and the shippers so notified.

In the event of "overs, shorts or damage" an "O S & D" report is sent to the purchasing agent who secures either a corrected invoice or an additional invoice. In the event of damage, frequently a claim against the transportation company is necessary. The form has provision so that the person making it out can indicate positively whether packages are O. K. or broken.

The fact that the blank calls for a record of the transportation charges and whether prepaid or collect



R. C. No. 89600

PITTSBURGH RAILWAYS COMPANY
CALLERY, H. S. A. STEWART, A. F. MAY, RECEIVERS

STORES DEPARTMENT
ARRIVAL NOTICE.

PITTSBURGH, PA., 10/10 1918.

MR. J. G. H

DEAR SIR:

The following material requested on your { Memo No. / Requisition No. / Letter Date 9/14/8

is now at Homewood Store and may be obtained by making requisition in the usual way.

QUANTITY	DESCRIPTION
	3 Section Radiator

Yours truly,

H
Storekeeper.

This arrival notice is not to be used as an authority for passing invoice for the material listed hereon. Invoices should be sent to the General Storekeeper for approval.

FORM 930, NOTIFICATION SENT TO PERSONS INTERESTED IN THE ARRIVAL OF CERTAIN MATERIALS

eliminates the possibility that such charges will be paid twice, namely, when added as they occasionally are to the invoice and again upon the delivery of the goods.

The individual records show all this information concisely and completely and enable one to pass upon all the circumstances intelligently and with a finality which is refreshing for its businesslike dispatch to both shipper and consignee.

How the Blank Is Used

The auditor receives his copy within twenty-four hours after the receipt of goods and uses it as a memo-posting in the stock ledger, so that if the invoice is not rendered promptly (a common thing these days) it acts as a potential debit against which requisitions may be posted. The card copy is checked against the requisition. It is then initialed by the storekeeper who examines it to familiarize himself with the day's receipts. It is then passed to the invoice clerk who checks the invoice at once or holds the card in alphabetical file until the invoice is received. When the invoice is passed to the auditor for payment, the receiving cards are filed in their numerical order, which also is their chronological order. The open file then contains only such cards as represent "material received not paid for," and each card regardless of its age is readily accessible and serves to keep "up front" all such unfinished business.

At inventory time, the value of unpaid-for items is a deduction from the assets, and it is vital that they should not be overlooked. The unfiled cards provide for this. When one's attention is called to the matter by these cards he will be surprised to find the large number of cases of delinquent billing on the part of the shippers, who repeatedly are requested to render invoices.

Advantages Enumerated

Briefly to review the advantages of this card, they are: A complete original tally is preserved as the only and final record; an individual receiving record is had, consecutively numbered; the form suggests all the information that is necessary; much of the information may be indicated simply by check marks; the indication of wrong material prevents passing invoice pending adjustment; difficulty in handling freight bills is overcome; the record facilitates the passing of invoices; it also assists inexperienced help.

The Future of the Steam Turbine

Wider Working Range of Pressure and Temperature With Better Heat Balancing Promise Considerable Further Increase in Efficiency

IN A REVIEW of the lines of progress in which the steam turbine may be expected to develop, engineers of the Westinghouse Electric & Manufacturing Company make, among other statements, those given in substance below:

Attention is now being directed generally to employing higher boiler pressures, as high as 600 lb. To-day 200 lb. pressure at 200 deg. Fahr. superheat is regarded as common practice in large plants. At 600 lb. pressure, steam having the same heat content as that contained at 200 lb. pressure and 200 deg. Fahr. superheat will have a superheat of about 128 deg. Fahr. This steam expanded to 29 in. of vacuum is theoretically capable of giving 13 per cent more energy than when generated at 200 lb. To utilize this ability the turbine will probably be of lower efficiency than the best present ones, but a net saving of from 6 to 7 per cent is possible with the higher pressure. Another source of improvement in large multiple-cylinder machines may be obtained from intermediate reheating by means of a separately fired superheater. This might produce an improvement of about 3 per cent but until lately the capital expense involved would hardly have been warranted.

Heat balancing between the feed water and the turbine is receiving attention at present, in some cases valves being provided to take steam from the turbine whenever there is a deficiency of auxiliary exhaust steam for heating feed water and to take steam from the heating system when the feed water heater is incapable of condensing all of the exhaust steam from the auxiliaries. Still more complicated schemes of heat balancing have been proposed. Further economy also may be expected by making more extended use of the economizer.

Progress in the construction of turbines has not been to reduce intrinsic cost. The higher operating conditions, pressure, superheat and vacuum, each involves

greater expense. In spite of this the price of large turbine units, under pre-war conditions, has been reduced to approximately 40 per cent of the cost of the earlier turbines of 5000-kw. capacity or thereabouts. The efficiency ratio has been increased in this size approximately 8 per cent. Considering the larger sizes that now obtain, the cost per kilowatt is further reduced and efficiency ratios have been improved 12 per cent. Actual heat consumption of B.t.u. supplied at the throttle has shown a reduction of 24 per cent between the 7500-kw. turbine of 1905 and the Interborough Rapid Transit turbine of 1914. The modern large turbines have accomplished a saving over the best reciprocating engine installations of approximately 47 per cent. The cost of energy has no doubt been reduced to one-half, if consideration is given to reduced size of buildings, etc.

Latest Practice in Electric Arc Welding*

The Systems of Electric Arc Welding Are Described And Some Limitations In Their Use Are Given

IN NO other industry in normal times are iron and steel made use of in greater quantities than on the great railway systems of America, and in this field lies the greatest opportunities for the electric welding process to effect economies. In the case of the railways the greatest economies can be made through reclamation work, and until very recently reclamation was the only class of work which the arc-welding process had invaded to any great extent, and even this was done on a comparatively small scale, and on only a few roads. It is now known that the arc-welding process can successfully be made use of in a very extensive manner in the construction and maintenance of cars and track.

Three Systems Are Used in Metallic Arc Welding

The power consumed in the metallic arc will depend on the nature and mass of the metal forming the electrodes. For ordinary metallic arc welding, 50 to 200 amp. per operator at from 15 to 25 volts (measured at the arc) will be required.

If the proper arc length is maintained uniform, on clean work the drop across the arc will never greatly exceed 22 volts for bare electrodes, and 35 volts for coated electrodes. These conditions, however, seldom prevail, as slight variations in the arc length are unavoidable, and as more or less dirt and oxides are usually present on the surfaces to be welded. In order that the arc may be maintained with reasonable ease under conditions as above mentioned, the voltage across the welding circuit, before the arc is drawn, must be two or three times as high as it is after the proper arc length is established. This higher voltage will support the arc and prevent it from being broken by overcoming the ordinary changes in the resistance, due to the variations of arc length and the dirt and oxides on the parts to be welded.

In some instances, a reactance coil is placed in the welding circuit to assist in holding back the first heavy rush of current, also to stabilize the arc momentarily. It may be said that the reactance coil is to a welding arc what the flywheel is to an engine. Furthermore the open-circuit voltage does not need to be so high with the coil as would be necessary if it were not used.

The three systems now in general use in this country for metallic arc welding are as follows: The multiple-operator, the single-operator system of stationary type, and the single-operator system of portable type.

The multiple-operator system is one in which more than one operator receives current for welding direct from the same machine, which is centrally located. A control panel is provided for each operator, of such design as to enable currents of different values to be obtained in any one circuit without interference with the other operators.

A single-operator, stationary-type system is one in which a separate machine is provided for each operator. As many of these machines are stationed at different points in a shop as the demands require, each machine receiving its power direct from the power circuit.

A single-operator, portable-type system differs only from the single-operator, stationary system in that the machine is mounted on a truck in order that it may be moved from one point to another as the occasion requires, receiving its power from receptacles conveniently located about the shop.

If the inherently low cost of the electric arc-welding process is to be fully realized, the flexibility of the system, whether portable or stationary, must be such as will permit welding to be done at any haphazard location in the shops or yards without making it necessary that the work be brought to the welders or welding equipment.

Cabbon Arc Welding First to Be Developed

The carbon-arc process was the first method of welding metals with the electric arc that was developed, and it has been in use for more than thirty years. The arc is drawn between the work to be welded and a carbon or graphite electrode, and the manipulation of the arc is very similar to that of the oxy-acetylene flame.

The current required for carbon-arc welding is usually between 300 and 450 amp. at approximately 50 volts. The design and control of the machines for carbon arc and metallic arc welding are practically the same.

The advantages of the carbon arc, where it can be used, are greater speed and lower cost. The class of work this process may be put to includes building up operations, repairing broken parts, electric cutting, etc., but not work where strength is of first importance, such as side sheets or frames. An experienced operator can produce a very good grade of metal in the welds, and one which can be machined without difficulty. The character of the work secured depends on the operators. It is not possible to weld on a vertical wall or overhead with the carbon arc. The carbon is made the negative in order that particles of carbon from the electrode will not be carried over into the weld, which would make it exceedingly hard and therefore difficult to machine. There is a considerable amount of welding on a railway which can profitably be done with the carbon-arc process. Its lower cost will no doubt lead to its adoption for repairing the commoner classes of broken and worn parts.

*Abstracted from 1918 report of sub-committee "A" on welding of Association of Railway Electrical Engineers.

Bankers Say Situation Is Serious*

Owners, Operators and Regulators Should Unite on Principle That the Public Needs and Must Pay for Adequate Transportation

BY O. B. WILLCOX
Chairman Public Service Securities Committee, Investment Bankers Association of America

INVESTMENTS in public utilities are not protected merely by the constitutional provision against taking property without just compensation and by the moral obligation of the state to protect invested capital and promote enterprises upon which the industries of the country in war and peace are so dependent. It is also now appreciated and publicly declared that the interests of the state and of the public are served and promoted by permitting rates which are sufficient both to insure adequate service and to create such credit for the operating companies as will attract the necessary capital to provide up-keep of the properties and their expansion. Thus private investment in public utility securities is protected in principle not only by the law but by the recognized interests of the state, the community and the public served.

While these principles have been so widely recognized by many commissions in recent months, and increased rates have been granted to many companies, the increases in rates to the utilities of the country as a whole have by no means equalled the increases in the costs of operation resulting from higher prices of fuel and materials and high wages. The development of commission regulation and the appreciation of its obligations to the public to encourage efficient service must operate to increase rates too low to protect interest or attract additional capital for utility expansion.

ELECTRIC RAILWAYS PARTICULARLY AFFECTED BY WAR

Electric railways have been particularly and seriously affected by the war through increased demands for service, fixed fares, high money rates and attenuated credit. The fundamental cause of the present condition is the inadequacy of receipts to meet the cost of that character and extent of service rendered by many companies. The demand is constantly for service costing more than it returns. It will of course be difficult, if not impossible, to decrease the amount or lower the character of the service to which the public has become accustomed.

In the congested centers much may be done in decreasing the costs of operation through the introduction of one-man cars, skip stops, standardized equipment, staggered hours and reroutings, and the elimination of unprofitable runs. The authorities may aid in reducing the costs of operation by eliminating franchise charges and special taxes, street paving, street watering and the like.

These modifications of operating costs are at the best merely palliative. They do not alter the fundamental fact that under the present conditions and the present costs of material and labor, many street and interurban railways are furnishing, in response to the demand of the public, a service which costs more than they collect in fares. Appeals for higher rates have been inadequately met by local authorities, by state commissions, and, in cases where it has jurisdiction, by the Interstate Commerce Commission, and in some cases increased fares have caused a falling off in travel and resulted in little, if any, actual increase in gross revenue.

The community with adequate and efficient street-car service is busy, growing and prosperous; while the town, large or small, which has inadequate local transportation is dull and dead, or dying. As the prosperity of the community as such is more important than the convenience and comfort of the individual, so is the interest of the community in adequate transportation greater than the interest of the individuals who enjoy it. It follows that if efficient local transportation adequate to the needs and welfare of the community costs more than can be collected from the fares paid by the patrons, the excess of costs over receipts must be paid by the community in some form, or the community will suffer from the lack of that kind of transportation which it requires for its industrial and social needs.

In cases where street car operations are unprofitable because of local imposition and taxation, these burdens must be removed or private capital will not provide the service required by the public. If street-car operations are unprofitable because the fares are too low, the public is and always will be the chief loser from low fares and the chief beneficiary from a higher fare which will permit successful and profitable operation. If the cost of service for any reason is so much above the receipts that an increase of fares to cover the deficit would result in a decrease in the use of the service and therefore no increase in revenue, the public interest may demand that the service required be supplied at public expense supported by taxation.

The recent Bay State, and Boston Elevated acts are particularly interesting in recognizing the necessity for the continuance and expansion of efficient traction service to the extent of providing, in the Bay State case, that certain serial bond payments if not earned shall be made up out of taxation, and in the Boston Elevated case that all deficits in operation, including depreciation, renewals and interest and dividend payments shall be made up out of taxation. These two Massachusetts acts and the general one all provide for flexible fares, readily changeable, either up or down, to meet varying costs of operation and requirements of service. The result of operation under these acts will be watched with great interest, both by electric railway operators and by investors in the securities of public service corporations.

*Abstract of committee report presented before meeting of Investment Bankers Association of America in Atlantic City, on Dec. 10, 1918.

In other cases where the receipts are not sufficient to provide the costs of the service required by the public, the states or the communities served will be faced with the alternatives of either paying deficits in operation or of taking over the properties by purchase and operating them as state or municipally owned institutions. The result will be the same so far as the service costs more than the revenues—the public must pay the difference through taxation. But taking over the properties involves the withdrawal of large amounts from the taxable property of the community and all the problems and difficulties of public ownership and operation, which it is believed the American people do not desire to undertake. The whole situation is difficult and very serious.

It is believed that the study of electric railway problems by owners, operators and regulating officials, particularly if they find a basis for co-operation in the principle that the public demands and must pay for adequate local transportation, will point the way to a solution of the electric railway problem which will protect existing investment, assure the companies the credit required for expansion, and give the public the local transportation necessary to its welfare and health. The interest of the investors presents the study of this problem as one of the first duties of the public service securities committee of the Investment Bankers Association during the reconstruction period.

Depreciation Should Be Provided For

The war and the results of operation under war conditions and high costs have given the subject of depreciation more than an abstract or academic interest, since it is observable that those companies which have made adequate provision for depreciation meet the present emergencies with less difficulty than those companies which have not done so.

Public utility commissions, operators and investment bankers should all be equally interested in seeing that funds devoted to public use are not impaired through failure to make ample provision out of earnings for both maintenance and replacements, in such a way as to maintain the full efficiency of the property and preserve the integrity of the investment. No other course is honest, rational or expedient. It is honest, because the public should pay for the depletion of property and capital through wear and tear and obsolescence exactly as it should pay for other costs of using private capital and property for public use; rational, because in time the public would otherwise be deprived of the property and consequently of the service through its destruction in public use without replacement; expedient, because private capital can be attracted to public service only if protected against loss.

National Aspect of Utilities

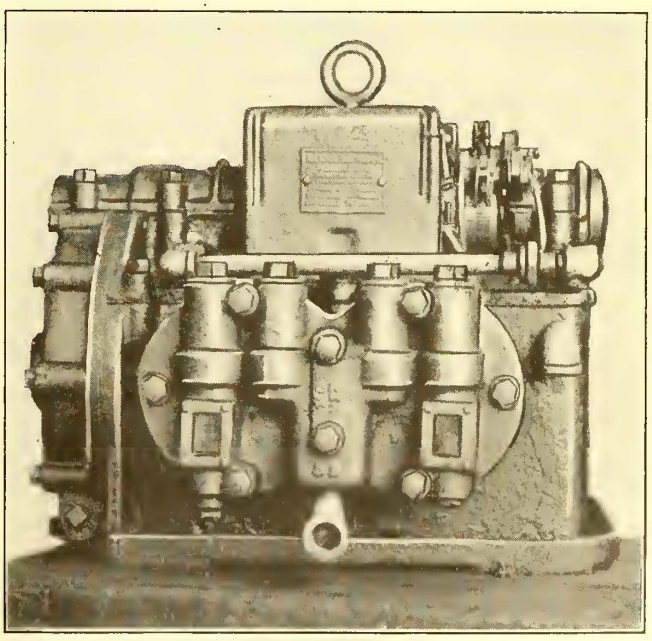
The experiences of the war have confirmed the conviction of the American people that, for rapid and economical industrial production private capital under private management is more efficient than government ownership or operation, and that co-ordination in the national interest of national effort to a common end may be effected by national agencies, through general consent and co-operation without government ownership or operation or the exercise of the powers of absolute control.

State regulation and supervision is sufficient for local service; national supervision, and not only supervision, but encouragement and support, may be urged, as public service becomes increasingly national in scope and is better understood in its relations to such subjects as power supply, fuel conservation, labor economy, and the distribution of population and of wealth-producing agencies in industry.

If our national representatives take up the consideration of federal aid or supervision of public utilities as their importance to the whole country becomes more apparent, they will approach the subject with full knowledge of the effects on the country's industrial efficiency of the loss of credit of the steam railroad companies, resulting from restrictive legislation and repressive regulation by the Interstate Commerce Commission. And it may be hoped that they will give due weight to the experience of public regulation of utilities through state commissions, that the interests of the state and of the public are best served and promoted by permitting rates which are sufficient both to insure adequate service and to create such credit as will induce the investment of capital needed for expansion.

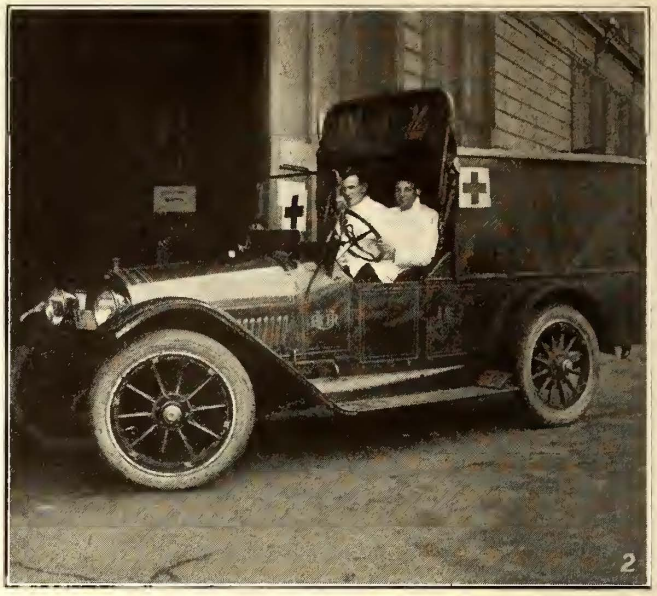
Providing Lubrication for Air Compressors

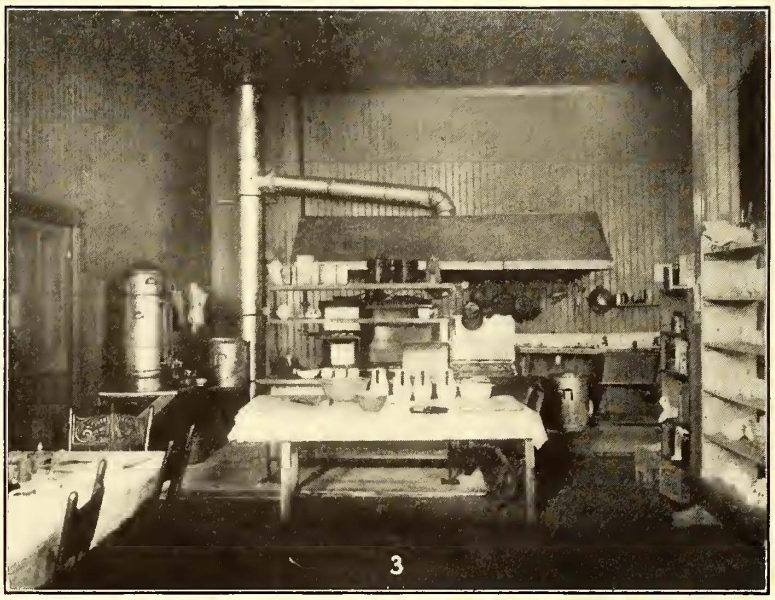
WITH the National AA-1 compressor, the motion of the pinion churns oil up into the oil well and keeps the pinion end lubricated, but it is necessary to occasionally lubricate the commutator end. In the



PIPE ATTACHMENT TO SUPPLY LUBRICATION TO COMMUTATOR END OF COMPRESSOR

shops of the Denver (Col.) Tramway, a ⅜-in. pipe has been attached between the drainage holes on the pinion and commutator ends, as shown in the accompanying photograph. The churning of the pinion thus forces oil around into the commutator end and keeps it equally well lubricated. A fiber disk has also been placed in the open commutator end to keep out the dust.





Views Showing How the United Railroads of San Francisco Aided in the Recent Spanish Influenza Campaign.

Fig 1—Staff of doctors, nurses and helpers at the United Railroads' Hospital.

Fig. 2—An emergency repair car which did duty as an ambulance.

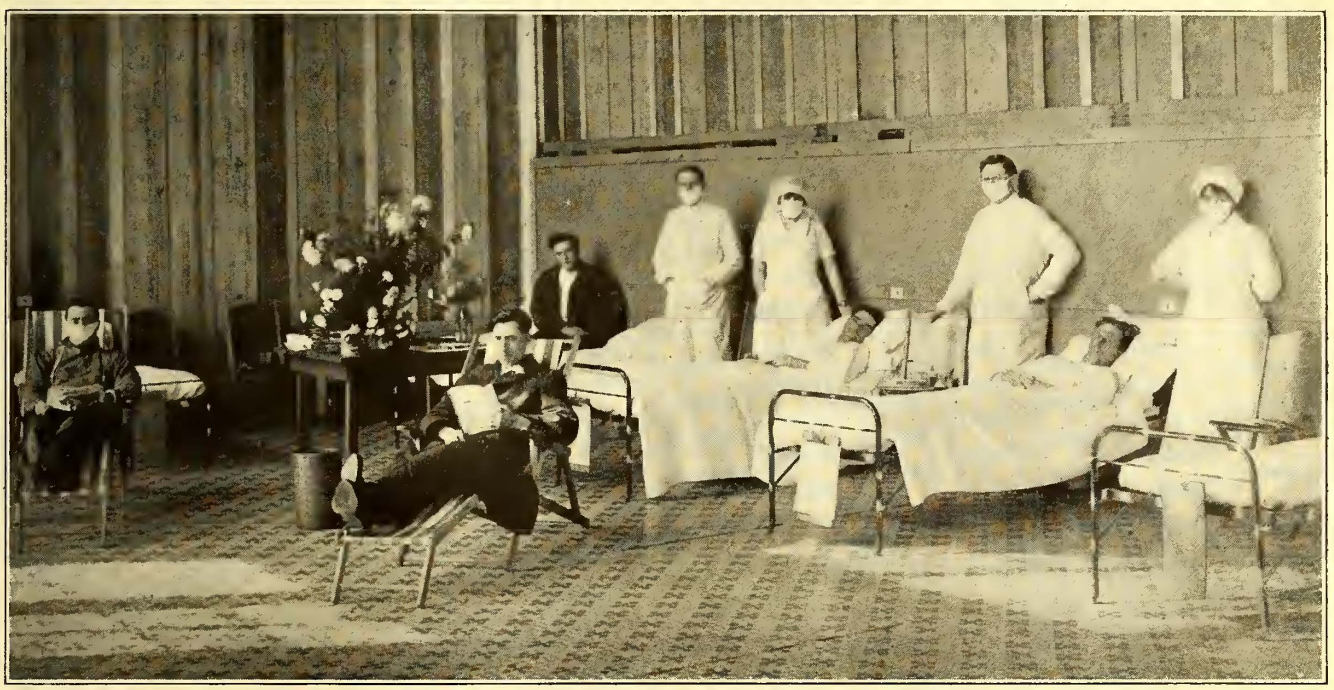
Fig. 3 — Hastily-improvised kitchen in the influenza hospital.

Figs. 4 and 5—Views of sections of the influenza hospital. Note the abundance of sunlight.

Fighting Influenza on the Coast

Successful Record Against the Recent Epidemic Made by the United Railroads of San Francisco

ONLY two deaths due to influenza out of 750 cases among a total of 2800 employees is the record to which the United Railroads of San Francisco points with pride. The good record was attained, it is believed, because as soon as the epidemic became general the company equipped a hospital of its own where all employees not otherwise adequately provided for could be accommodated. In addition, trained nurses made regular calls upon employees who were being cared for at their own homes. Company officials realized at the outset that a private hospital would be the only way of preventing a very heavy mortality among employees living in lodging houses or private rooming houses. In many such cases the proprietors refused to go near lodgers for fear of contagion and there was slight prospect of getting them into municipal hospitals because of the congestion there.



VIEW OF CORNER OF UNITED RAILROADS IMPROVISED INFLUENZA HOSPITAL

The hospital was established in a room previously used as a gymnasium for employees. It was made serviceable for the emergency use by putting in a large gas range and temporary kitchen facilities, sixty cots and several light partitions which made convenient quarters for the doctors and nurses. The entire medical staff of the company, totaling seven doctors, was assigned to the work and seven trained nurses, four male orderlies and two cooks, besides ambulance driver and helper, completed the emergency hospital staff.

At first the hospital had unused capacity and patients from the city hospital were accepted until the company employees filled all the cots. The hospital was opened on Oct. 26 and closed Nov. 15. In this time the number of patient-days (total number of patients multiplied by the number of days' treatment) was 642, of which 175 were taken over from the city hospital and the remaining 467 were cases among the company's own employees.

The cost of equipping the hospital was about $6,000 and the payroll of the staff amounted to about $500 per week. In addition to service in the hospital, two trained nurses, one working north of Market Street and the other covering the district south, made a total of 890 calls on patients who were cared for at home. In the two fatal cases reported the patients were not reached in time to receive proper attention. It is felt that if these cases had been reported in their early stages the record might have been 100 per cent.

HAD IMPROVISED AMBULANCE

Another difficulty met early in the campaign against the epidemic was the scarcity of ambulances to carry the invalids to the hospital. In consequence, company officials cast about for their own equipment which could be adapted for this use, and it was found that the remodeled Haynes used as a runabout emergency repair car by Chief Electrician S. L. Foster could be made to serve admirably by simply removing the tools and adding side curtains. Fortunately, the car body was just long enough to accommodate a canvas cot. The car was accordingly pressed into service and used almost continuously during the height of the epidemic.

Ten-Cent Fare Refused to Bay State

Commission Insists Upon Two Months' Trial of Seven-Cent Fare for Combined Inner and Outer City Zones and Five-Cent Fare for Two-Mile Zones on Country Lines—Says Company Should Test One-Man Car Operation in Immediate Future

THE right to charge a flat 10-cent fare in cities and a 10-cent minimum with 5-cent zones on country lines has been denied to the Bay State Street Railway by the Massachusetts Public Service Commission, in a decision made public on Dec. 13. Instead of a continuance of the present zone system, however, the commission recommends a two-months' trial of a simpler zone system, including a 7-cent fare for the combined inner and outer zones in cities and a 5-cent fare for 2-mile zones on the country lines. The rates asked for by the company have been suspended until Jan. 1, and the commission will substitute its proposals as soon as the company files a supplement or new schedule.

The Company Needs More Money

In introducing its remarks the commission points out that the public-trustee and service-at-cost act approved by the Governor on June 3, 1918, has not been accepted by the company, although the Legislature had felt that reorganization would follow within a comparatively short time. The principal reason why relief has not been sought under the act is that under war conditions it has been exceedingly difficult to raise the necessary capital. A secondary reason is the fact that the increase in the rates effective on June 24, 1918, has not produced the anticipated results.

Since Dec. 13, 1917, the company has been in the hands of a receiver. On Dec. 1, 1918, a total of 30.4 miles of unsafe track was closed down with the approval of the court, and a petition to discontinue 288.2 miles at least during the winter months because of failure to earn operating expenses is now pending.

The company, it is said, is in dire need of more money. For the year to end Dec. 31, 1918, the total deficit will be $2,804,223, and a full year's operation with present fares and present wages will mean a deficit of $3,825,920. Were the company to obtain all the increase estimated for the fares proposed, it would not be likely under existing conditions to become prosperous.

Will the Proposed Fares Bring in the Money?

In fulfilment of its duty to the public, however, the commission believes that it should go farther and require satisfaction that there is "at least a reasonable prospect" of the new fares producing the increase in revenue. It is said to be within the commission's knowledge that many electric railway officials are skeptical as to the wisdom of a 10-cent minimum rate.

Continuing the commission says in part:

> Our experience in many other cases leads us to place little faith in the estimates of gain submitted, and to share the fears expressed by the representatives of the communities. The best that can be said of the new schedule, from the point of view of the company, is that it is a chance, the risk of which is increased by the fact that the service is poor and will continue to be poor, under the most favorable conditions which can be anticipated, for some time to come.
>
> To view the new rates from the public point of view, there is a certainty of a most disturbing effect. It is impossible to raise fares within a period of two years to such an extent without disrupting and dislocating the conditions to which community life has become adjusted. The new schedule means that the company will practically abandon the short-haul business in the city centers, and from the centers to the nearby suburban towns the rates will be so increased that it is difficult to believe that much regular daily traffic can in the long run be preserved. Still more disturbing, moreover, is the fact that, even if the new fares should prove unsuccessful in producing the revenue desired, experience has shown that it would be well-nigh impossible thereafter to reduce them.
>
> It seems safe to say that the present unsatisfactory situation will lead to further action of some sort by the Legislature. Without undertaking to predict what that action may be, there are certainly many who are coming to believe that it is wiser to place a part of the burden of the cost of necessary electric-railway service directly upon the community as a whole, than to suffer increases in fares which do not produce the results that they are designed to produce, and which are seriously disturbing to social and economic conditions.
>
> We believe we are justified in disregarding speculative estimates or arbitrary rules and in taking the action which our best judgment leads us to believe will secure the best net results for all concerned. The company is in dire need of additional revenue, if only to provide a safe margin above necessary expenses of operation. Stating our proposition broadly, we propose to authorize for a brief trial period an increase in rates which seems likely, in our opinion, to produce a larger actual gain in receipts than the tariff proposed by the company and will at the same time result in less serious damage to the community.
>
> It seems to be the general opinion that one important reason why the present schedule of fares has failed to produce anything like anticipated results has been its great complexity and the confusion which has been created by so radical a change not only in the fares themselves but in the methods by which they are collected. To quote from the testimony of the vice-president of the company: "I am confident since the zone system has been in effect it has not been given anything like a fair trial, because it was immediately loaded down with a mass of tickets in city centers, and off-peak tickets and that sort of business, outside of the fact that the conductors and the communities themselves were wholly unacquainted with the method."
>
> There seems to be no doubt that, along with the loss of traffic occasioned by the high rates, there has been another and a substantial loss arising from the fact that the new system has provided greater opportunities for the percentage of dishonest conductors and dishonest passengers bound to exist among so large a number, and from the still more important fact that it has led, through congestion and confusion, to the missing of many fares where no question of dishonesty was involved.

Rates the Commission Wants Tried

Taking into consideration all circumstances and conditions, the commission has decided to authorize the immediate adoption of a new schedule as follows:

1. For the city lines the company may combine the present inner and outer zones into one area, charging a 7-cent fare by the sale of five tickets or metal tokens for 35 cents. To encourage the use of tickets the cash rate may be made 10 cents. These new rates shall apply as far from the center on all lines as the 8-cent cash fare now in force, except in Gloucester and Hyde Park, where it shall cover the present central area, there being but a single zone in each of these two districts under the existing schedule. Half-fare tickets

for school children shall be sold at the rate of ten for 35 cents, as long as such tickets are required by law.

2. In regard to the country lines the commission says that the difficulty in collecting fares on the mileage plan now followed is, perhaps, sufficient reason for substituting the simpler 2-mile blocks without overlaps with a 5-cent unit, for the disadvantages of the present method affect the public as well as the company. To this extent, therefore, the schedule proposed on the country lines will be approved. The commission is unwilling to accept, however, a minimum of 10 cents as a general proposition. On lines where discontinuance is threatened because of failure to earn operating expenses, the commission will permit any rates to be charged which are agreed upon by the communities and the company for the purpose of keeping the road open, but on lines which are not in this category it feels that 10 cents is too high a minimum rate. The company may either make the minimum rate 5 cents or follow the same plan as in the cities, selling tickets or tokens, good for a single zone ride, at the rate of 5 for 35 cents. The commission is not at all sure that the former alternative is not the better for the company as well as the community.

3. As for workingmen's tickets, the commission deems it desirable that reduced-rate tickets, sold at not higher than 70 per cent of the regular cash fare, should be provided between certain points as "absorbers" of the "shock" of the increase. The financial effect upon the company will be slight, for it estimated but $83,000 gain from the elimination of all these tickets, and the management now concedes that they should be retained between the points where they are most extensively used.

In proposing this new schedule the commission emphasizes strongly the need for full co-operation on the part of the communities. It says:

Whatever may have been the sins or errors of the past, the water is over the dam. Moreover, it is clear that the chief factor in the present unfortunate plight of the company is the recent extraordinary rise in wages and prices, rather than any of these things. It is a condition by which the public is now confronted. The problem is not one of securing any immediate return of any particular amount on the investment, but of meeting the necessary and unavoidable cost of furnishing the service. If the railway should be sold at receiver's sale, and even if it should be split up into a number of different parts, the same problem would remain under present conditions.

Unless present earnings are materially increased, or aid is provided from the public treasury, the service must inevitably become even worse than it now is, or be in whole or in part abandoned. As long as the car riders are required by law to bear the entire cost of operation, individual fares must be determined by the number of passengers among whom the total cost may be divided. It therefore follows, to speak broadly, that fares must go up as riding falls off.

It is natural that the public, incensed at increases of fare which, judged by former standards, seem unjust and unreasonable, should be disposed to encourage jitney competition, to indulge in spite walking or to adopt other measures which will result in a decrease of riding and a consequent decrease in revenue. The inevitable effect of such action, however, is to increase the fares for those who must continue to use the service. It is highly important, therefore, that city and town officials and the public generally should further the spirit of good-will and co-operation in order to insure a fair trial for the fares proposed by the commission.

The commission wants its fare system to be tried for two months. If at the end of that time this has, in combination with any other factors, produced an increase in gross earnings, in comparison with the corresponding period of the previous year, of 15 per cent

This Is the Bay State Fare History in Outline

Since Oct. 1, 1916, the Bay State Street Railway has had four increases of fares in Massachusetts. The first, which went into full effect on Oct. 16, 1916, covered all the interurban lines and the city lines in Woburn and Gloucester. It was felt that it would yield about $350,000 increase in revenue. The second was in Fall River, where the reduced fare tickets sold at the rate of six for 25 cents were eliminated on March 15, 1917, the company estimating that the change would produce about $50,000 additional revenue. The third, effective on July 15, 1917, covered all the city lines not included in the first advance. The probable gain was placed by the company at $720,000. The fourth went into effect on June 24, 1918, and the management estimated the increase at $1,671,000.

Revenue Gains Fall Below Estimate

The total expected gain from all four increases was thus about $2,791,000, and all the estimates made allowance for probable shrinkage of traffic. In contrast, the company's estimate of revenue for a full year under present fares, according to experience to date, is $10,466,000, an increase of only $1,099,783 over the revenue for the year ended June 30, 1916. During this period the company had a substantial increase in freight receipts (included in the above revenue figures) amounting to more than $100,000. The gain will probably be not more than $250,000 over the revenue actually received in 1917.

The following table shows the course of receipts immediately before and immediately after the fourth increase became effective, in comparison with the receipts of the corresponding period of the previous year:

Prior to increase—

First six months of 1918	0.25% decrease

Subsequent to increase—

July, 1918	5.44% decrease
August, 1918	1.87% decrease
September, 1918	0.46% increase
October, 1918	10.17% decrease

The large falling off in October, it is said, was undoubtedly due in great part to the influenza epidemic. Accurate figures are not available, but the commission understands that the November earnings show an increase of about 7 per cent.

Present Schedule and Proposed Ten-Cent Rates

Under the present schedule, all of the cities served by the Bay State company, excepting three of the smaller communities—Gloucester, Woburn and the Hyde Park district of Boston—have an inner and an outer zone. The radius of the inner zone averages somewhat more than 1½ miles, but less than 2 miles. The width of the outer zone averages about 1 mile. Within the inner zone the cash fare is 6 cents, but tickets, good to and from the center, are sold at the rate of 5 cents each. Similar tickets, good only during the so-called "off peak" hours, are sold at the rate of 4⅛ cents each. The cash fare between the outer and the inner zones is 8 cents, but tickets similar to those just mentioned are sold at the respective rates of 7 1/7 cents and 6⅛ cents each.

On the country lines which are operated outside of the city zones, the fares are on a mileage basis. For 249 miles of track the rate is 2 cents per mile; for 37 miles, 2½ cents, and for 117 miles, 3 cents. The variation in rate is dependent upon traffic density and consequent earning power. On a number of the routes workingmen's tickets, good during the morning and evening rush hours, are sold at about 70 per cent of the regular rate.

The company, in the new schedule which the commission has now refused to allow, proposed to eliminate all tickets, including the workingmen's tickets; to establish city zones, substantially the equivalent in most cases of the present inner and outer zones combined, with a uniform fare of 10 cents; and to divide the country lines into zones about 2 miles in length, with a minimum fare of 10 cents good for two zones, and 5 cents for each zone thereafter. It estimated that this change would produce from $2,000,000 to $2,500,000 of additional revenue.

100 to 400 Per Cent Increase in Fares Over 1916

The new schedule, the Massachusetts Public Service Commission says, has been spoken of as if it represented a mere increase from 6 cents to 10 cents, similar to the recent increase of the Boston Elevated fare from 5 cents to 8 cents. Such a comparison, however, is said to be misleading, because of the radical revision of fare zones on the Bay State lines which took place last summer.

Starting in each of these cases with the fare which existed as late as October, 1916, the maximum Boston Elevated increase is 60 per cent, while the proposed Bay State fares would vary from a minimum of 100 per cent (subject to a few exceptions in the case of rides covering two zones or more) to a maximum certainly as high as 400 per cent and perhaps higher.

Moreover, the Boston Elevated is still carrying passengers a maximum distance of about 18 miles for a single fare, although this has risen to 8 cents, while the maximum distance for 10 cents under the new Bay State tariff from one side of a city zone to the other would be about 5½ miles.

or more (after allowance for loss of revenue on any lines discontinued), the experiment should be continued for a similar period, in the hope that the situation may be further improved by action of the Legislature or by change in economic conditions. If, however, such an increase in revenue is not realized during the two months or is not substantially maintained thereafter, the commission will not stand in the way of a trial of the schedule which the company has proposed. In such an event, the commission says, the situation will be so critical that it would not be justified in interposing further obstacles to this experiment. Before any resort to such a schedule, however, it would earnestly recommend serious consideration, both by the company and by the cities and towns, of the provisions of the General Acts of 1918 permitting direct financial aid from the latter.

ONE-MAN CARS SHOULD BE TRIED

Undoubtedly the management of the Bay State Street Railway has been industrious along the line of trying to secure economy of operation, but the commission expresses the belief that one-man car operation should be tested, that the question of obtaining greater car mileage per car-hour should be studied further and that a close tally should be kept of receipts and operating results on the various lines and divisions.

In regard to one-man cars the commission says in part:

> In 1917 a new one-man safety car of modern type was purchased, and an old single-truck car was remodeled along somewhat similar lines for this form of operation. On Oct. 13, 1917, the commission approved the operation of both of these cars, specified fifteen routes upon which they might be used and authorized the company to purchase as many more new cars of similar design as it might desire to acquire. The further remodeling of old cars we refused to approve until comparative tests of the old and new type had been made in actual practice, but this question was left entirely open without prejudice, pending the submission of the results of such tests. Notwithstanding this action by the commission, however, we find that neither one of these cars has since been operated, but both have been allowed to remain unused in storage.
>
> Upon inquiry we are informed the new car is too complicated; but no effort has been made to test its operation in actual service, and it appears that it is precisely the same type of one-man car which is being operated with apparent success in other parts of the country. We are informed also that the old car has been remodeled again, but no petition for the approval of the car so altered has been presented to the commission, nor has even the right been sought to test it in actual operation. It seems to the commission from this record that the management is trifling with a matter of very vital importance.
>
> We have done what we could to encourage the use of one-man cars of proper design, not only by the Bay State Street Railway but by other companies in the State, not because such operation is any pet theory of the commission, but because it is coming to be recognized very generally in practical electric railway circles as one means of helping to solve the problem. From such knowledge as the commission has, it is led to believe that the Bay State Street Railway has many lines which are suitable for the operation of such cars, and upon which they would lead to a very desirable measure of economy. The management will, in our judgment, be open to very justifiable criticism if it does not take steps to test, in the immediate future, this form of operation.

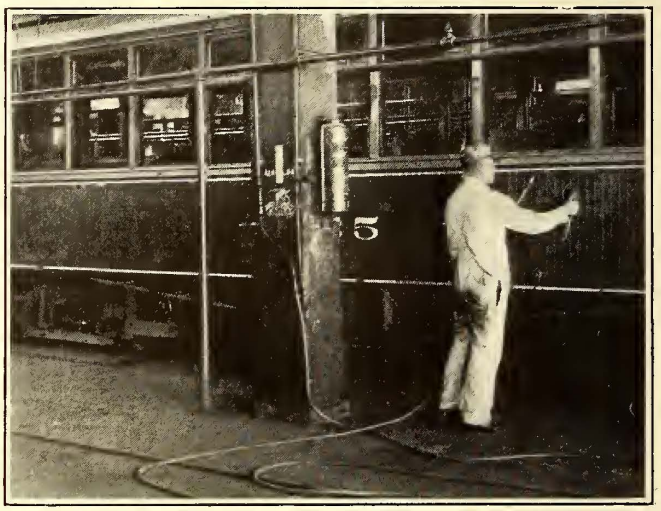
Extensive plans have been prepared in Rome for the development of the port of Ostia, 15 miles from Rome at which the latter city has access to the Mediterranean. The plans for improvement include the construction of an electric railway between Rome and Ostia.

Omaha Uses Portable Gas Torch With Single Hose Line

By Its Use Greater Flexibility of Operation Is Secured—Cost of Burning Reduced 40 Per Cent

THE Omaha & Council Bluffs Street Railway, Omaha, Neb., is using in its paint shop several portable gas torches, which not only accomplish 100 per cent more work than the ordinary blow torch, but also have great advantages over the two-line gas torch.

The Omaha torch has only one hose line, and this feature makes it very easy for the operator to handle the torch and makes it possible to work all around a car from one wall connection. The gas and air connections as illustrated are so distributed that the torch will reach any point in the paint shop or car-repair shop. A regular hose coupling is used at the gas end, and a bowes coupling in the air. These two pieces of hose are very short as indicated, and the air and gas are brought into the same line by a connection which includes a $\frac{1}{4}$-in. T into which is screwed a $\frac{1}{4}$-in. L. The hose is $\frac{1}{2}$ in., and the three pieces of pipe are $\frac{1}{4}$ in., the end of the $\frac{1}{4}$-in. pipe from the air being connected to a $\frac{1}{32}$-in. hole inside the T, and inserted far enough to just pass the end of the L connection.



PORTABLE GAS TORCH IN USE AT OMAHA PAINT SHOP NOTE WALL CONNECTION SHOWING AIR AND GAS BROUGHT INTO ONE LINE

The torch itself consists of a length of $\frac{1}{4}$-in. pipe, onto the end of which is screwed a $\frac{1}{4}$-in. x $\frac{3}{4}$-in. reducing coupling. A plug is screwed snugly into the large end of this coupling, and two concentric grooves, $\frac{3}{32}$-in. deep are made in the end. Six $\frac{1}{16}$-in. holes are bored in the small ring and fourteen holes in the larger. After the torch is lighted the flame is adjusted at the wall connection, and no further attention is needed. The $\frac{1}{4}$-in. pipe does not become excessively heated and may be held in the hand close up to the burning end.

Trouble was constantly experienced with the old type of blow torch, it being found practically necessary to hold a second torch in readiness at all times. With the new torch, which has now been in use about two years, the time required to burn a car has been reduced from 100 hours by the old method to sixty hours at present; thus cutting the cost about 40 per cent.

Better Lighting with Fewer Car Lamps at Dallas

THE Dallas (Tex.) Railway has been rewiring the lighting circuits of its cars and refinishing the interior in lighter colors to improve the diffusion of light. Originally twenty lamps each of 23 watts were used. These were connected in four circuits. In the remodeled cars two circuits of 36-watt Mazda lamps are

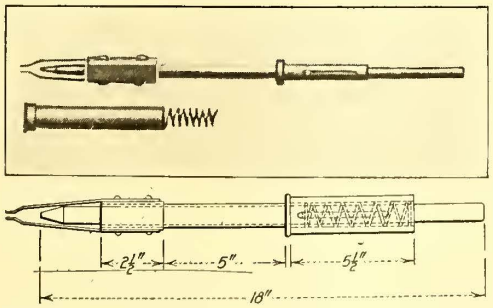
INTERIOR OF DALLAS (TEX.) CAR WITH REARRANGED LIGHTING

used, or only half as many lamps as formerly. The sockets for the new lamps are of the locking type and are set on a board running the length of the headlinings. This board together with the headlinings and carlines are painted white. The energy consumption is reduced from 460 to 360 watts per car.

Nail Gun Saves Temper of Workmen and Speeds Up Work

A HANDY tool to facilitate the driving of nails in inaccessible places has been devised by the Topeka (Kan.) Railway for use in its shops. The men have named it the "nail gun."

The construction of the gun as indicated in the accompanying illustration consists of a ½-in. drill rod,



APPEARANCE AND DIMENSIONS OF NAIL GUN

18 in. long, placed in a ½-in. brass tube taken from an old window guard. In each side of the tube near one end two slits lengthwise of the tube were cut perhaps ¼ in. wide and 4 in. long, and the outside of the tube was threaded on that end. A little below the end of the slit a shoulder was soldered onto the tube, and a piece of brass ¾ in. square and 2½ in. long, formerly used for a terminal on a blow-out coil, was drilled with a ⅝-in. hole and soldered onto the other end of the tube. Two strips of ⅝-in. x 1/16-in. spring steel were fastened onto opposite sides of this with two screws each, and the two projecting ends of the steel were crimped together. A pinion was placed through the drill rod to run in the slits in the ½-in. tube, a ring was slipped down against the pinion and then a long coil spring down against the ring. A piece of 1-in. brass tubing 5½ in. long, in one end of which is a threaded plug bored with a ½-in. hole, was then slipped on over all and screwed into place.

A nail placed in a small groove between the prongs of spring steel is firmly held. The tool is then pushed into the inaccessible place, and with a few sharp blows on the end of the drill rod the nail is driven securely in place.

Brake Lever Stops Prevent Accidents

TO INSURE the action of brakes on double-truck cars in case any breakage occurs in the levers or rods pertaining to one end of the equipment, the Denver (Col.) Tramway has installed a simple device on all cars. A strip of ⅝-in. x 2-in. steel is bent up into the shape shown in Fig. 1 and applied to the underframe of the car by four lag screws, as indicated in Fig. 2.

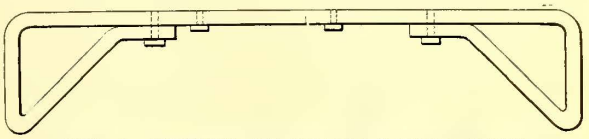


FIG. 1—DESIGN OF BRAKE LEVER STOP

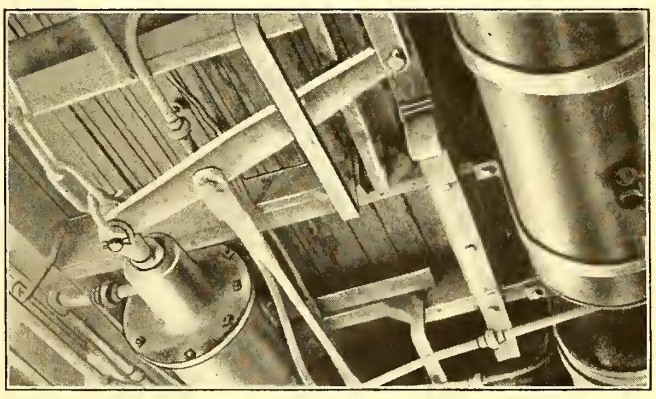
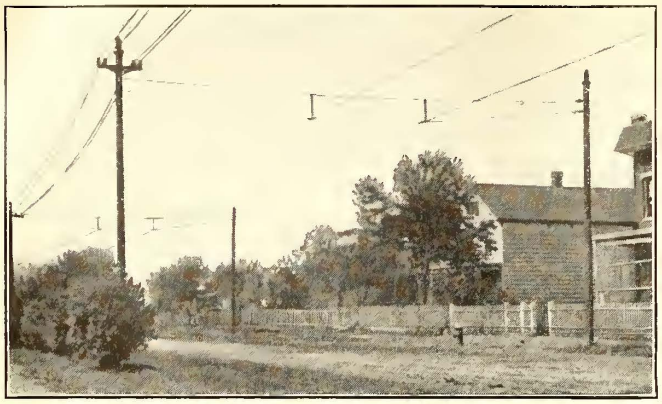


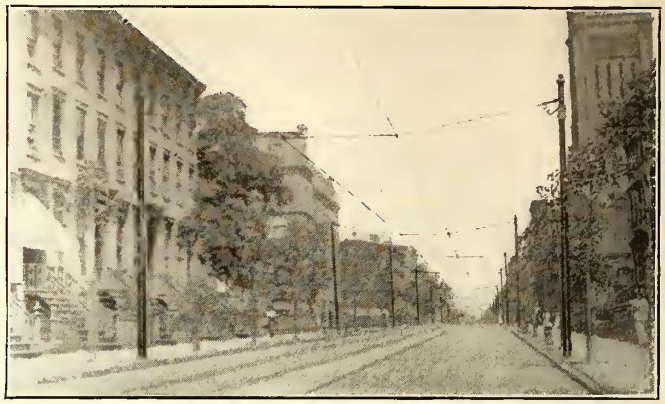
FIG. 2—APPLICATION OF BRAKE LEVER STOP TO CAR

This provides a stop for both brake levers. The bending is done to give such a length between stops as to provide, in case of a broken lever, a maximum travel of 7 in. for a piston with an ordinary travel of 4 in. or 5 in. In case of a break, the lever is thrown back against the stop. This still leaves 4 in. of piston travel, which is sufficient to allow the other lever to perform its proper function.

This device is inexpensive and is easily made and applied, care being taken that the bending is so done that when applied the stops will provide for the correct distance of piston travel. The lever stops were put on the cars as a result of some serious accidents and it is known that they have fulfilled their mission in several instances.



DOUBLE SIDE FEED SPAN CONSTRUCTION



SINGLE SIDE FEED SPAN CONSTRUCTION

Safety and Cost Determine Construction of Side Feed Spans

By G. H. McKelway
Engineer of Distribution Brooklyn (N. Y.) Rapid Transit System

THERE are two general types of side feed construction. In one, which is by far the most usual, the side feed span is made of an insulated copper wire which not only carries the current from the feeder to the trolley wire but also supports the latter. The ordinary means of support of this construction consists of a side feed yoke, the lips of which are hammered around the side feed span at a point where the insulation has been removed.

With the other construction the function of the side feed is merely to carry the current to the trolley wire and it is relieved entirely of the weight of the latter, which is carried by a separate span of galvanized iron or steel wire installed beneath the insulated wire. Connections from the side feed span to the trolley wire are made by taps hanging from the former and terminate in special side feed ears on the trolley wire.

The advantages claimed for the first type of construction are cheapness and ability to use the same type of ears at all points on the line. The advocates of the separate span construction claim that the construction is safer. Further, while a special type of ear has to be used with it, yet the ordinary straight-line hanger can be used on all of the spans. In the other construction yokes must be used on some of the spans.

When the insulated wire is placed above the span wire the latter protects it from any danger of being broken by wild poles, and also lessens the danger of the trolley wire being broken. When a break occurs, with the single-span construction the trolley wire may drop low enough to cause trouble and perhaps be broken, while with the two-span construction, if the lower span is broken the trolley wire will be supported from the taps hanging from the insulated span. Another safety point made by the advocates of the double construction is that there is less chance of the side feed being burnt off with it than with the other type, as the weight of the trolley wire tends to pull apart the single span when it is overheated, while that strain is absent when the two wires are used.

The whole question as to which is the better type to use can be reduced to the decision as to whether the increased safety obtained with the double span is worth the increased cost of installing it.

For important lines with heavy traffic when delays are expensive both as to fares lost and because of the good will of the traveling public that might be sacrified the best construction will be the cheapest in the long run and the insurance of good service will be well worth the comparatively small increased cost. For relatively unimportant lines the use of the double side feed spans will not pay as the cheaper construction will be good enough for them.

Southwestern Quarterly Conference

At Gathering at Houston, Tex., Fuel, Labor and Fares Were Discussed

THE second quarterly conference of the Southwestern Electrical & Gas Association was held at the Bender Hotel, Housten, Tex., on Dec. 9. The principal topics considered were fuel, labor, rates and fares.

In regard to fuel it was decided that, while the present supply of gas in the northern portion of the state and the present and future supply of Mexican oil and residual in the Gulf Coast section shows no sign of early diminution or increase in price, there is in the interior of the state a great need for a cheaper fuel and one whose continuity of supply for a long time in the future may be relied on. While Texas has within its state lines and lying contiguous to its principal fuel-using sections over 6,000,000,000 tons of lignite which can be cheaply mined and carried, its character is such as to make it an inefficient and unsatisfactory substitute for coal, fuel oil or natural gas at the present time. It was shown, however, that the experiments now being made are virtually solving this question and that by the "carbonization" of lignite, by changed methods of distilling it for gas and residuals, it can be made a very close competitor with all the other available fuels in efficiency, with the further vital requisite of an uninterrupted continuity of supply for a century or two in the future.

With reference to the problems of the employees returning from government service it was unanimously agreed that they would be immediately reinstated in their former positions where such positions had not been abolished under the exigencies of war times, and that under the latter condition other equal positions should be open to them, their seniority in service being preserved, and that in all cases preference would be given to those who returned maimed, wounded or in any

way injured while serving their country in government service.

The matter of the standardization of rate and fare bases throughout Texas was also fully discussed, and action was taken to have the association office make this a matter of immediate action. The consensus of opinion on the best method of increasing fares was that no hard-and-fast rule could be laid down but that both the public and its representatives should be approached on this matter with the utmost candor and that all statements made and figures offered should be strictly true and uncontrovertible.

It was also decided to hold the next convention of the association at Galveston, Tex., between May 15 and June 10, 1919. There will be no other "conference" of the association before the 1919 convention.

LETTERS TO THE EDITORS

Process of Repairing Bagged and Ruptured Tubes of Water Tube Boilers by Welding

STEAM BOILER AND FLYWHEEL SERVICE BUREAU.
NEW YORK CITY, Dec. 17, 1918.

To the Editors:

An article in reference to the repair of bagged and ruptured tubes in water-tube boilers, appeared on page 285 of the Aug. 17, 1918, issue of the ELECTRIC RAILWAY JOURNAL, as follows:

> In the boiler rooms of the Doherty properties in Toledo, Ohio, all bagged and leaking boiler tubes are being welded by the oxy-acetylene process. William Long, superintendent of production, states that as many as fourteen welds have been made on one tube before it was discarded. The process is first to heat the bag on the tube, with the torch, using a slow heat until the bag is a bright cherry red. The bag is then driven back, beginning at the outer edge and working in toward the center. In case there is a hole in the bag this is first welded shut. Boiler tubes are also being reclaimed by welding sections of tubes onto damaged tubes that have been removed. The cost of welding is approximately 75 cents per single weld, including all labor, material and cost of setting up the apparatus. When several welds are made on one boiler, the cost is less.
>
> Crystallized boiler tubes are also being successfully annealed by use of the oxy-acetylene process. The two ends are heated to a bright cherry red and allowed to cool, after which they are rerolled and given a hammer test. After treatment the tubes are found to be as soft as new ones.
>
> The Toledo Railways & Light Company reports that by use of these methods a great saving is being made in boiler tube costs. The process is another illustration of the extent to which modern welding is being applied in all technical fields.

This article appears to have received rather wide publicity. It has recently been quoted in a letter sent out by W. G. Williams, district engineer of the Mid-Continent Division, United States Fuel Administration, evidently with the intent of conserving tube material.

The boiler-insurance engineers believe that any general introduction of the methods of tube repair proposed in this article cannot help but increase the already too numerous accidents caused by tube failures in the water-tube type of boiler.

There is a class of tube accident which occurs in connection with water-tube boilers with more or less frequency, which is produced by the blowing out of a piece of the tube, and while it is very difficult to assign a definite cause for this class of accident, it may be most logically explained as being produced by repeated local heating and cooling of the failed section. It would appear that in a structure as rigid as the ordinary boiler tube the proposed method of welding and driving up small bags, as practiced by the Toledo Railways & Light Company, might contribute to this class of accident, due to severe internal stresses that may be produced by local heating.

The welds made in the manufacture of the welded type of boiler tube are frequently the cause of tube accidents. The best engineering practice requires the use of seamless tubes for water-tube boilers, or at least that the first few rows of tubes exposed to the products of combustion and which are the ones generally concerned in tube failures, should be of the seamless drawn type.

Owing to the fact that tube accidents are often accompanied by a loss of life or the very serious personal injury of the attendants, besides a large amount of property damage, it is believed that only the best material should be used for tubes, especially in boilers of the water-tube type.

Tube failures are of such frequent occurrence that the engineers of the companies doing steam-boiler insurance business feel that the danger should not be increased by this practice of heating and welding.

STEAM BOILER AND FLYWHEEL SERVICE BUREAU.

Zone System Advisable for Large Cities

EDMONTON (ALTA.) MUNICIPAL STREET RAILWAY
EDMONTON, ALTA., Dec. 10, 1918.

To the Editors:

The address by L. S. Storrs in reference to the zone system, presented at the recent New York conference of the American Electric Railway Association and published in the ELECTRIC RAILWAY JOURNAL of Nov. 2, elicits the following comments:

Mr. Storrs maintains that the European system of collecting fares is no guide for the adoption of the zone system on American electric railways. From my experience I would say that there is no better system for large cities. A large proportion of the electric railways in the old land are able to pay dividends to the stockholders and, where municipally owned, hand over to the treasury large sums of money after taking care of interest, sinking fund and depreciation. For instance, the city of Glasgow paid over to the treasury in 1917 the sum of $250,000. Without a doubt that speaks well for the zone system there.

Mr. Storrs also gives figures comparing Glasgow with Columbus, and Bridgeport with Aberdeen, and discusses the railway facilities afforded on this continent and in Great Britain. The whole bone of contention appears to be the system to adopt for the collection of fares. According to his figures there are more miles of track in this country per 1000 of population than in Great Britain, which clearly indicates that there are not so many passengers to be carried per car-mile—all the more in favor of the zone system.

I might say that the Glasgow Corporation Tramways carry about fifteen passengers per car-mile, and each passenger receives a punched ticket which represents a

receipt for fare paid. If the conductors over there can punch tickets at the rate of 150 per car-hour, the conductors on this side should be able to perform the same duty. The different denominations of money might make it somewhat more difficult, but not enough to retard the conductors in getting all the fares.

A great deal of discussion has arisen over passengers overriding the distance paid for, but a conductor should be able to keep an eye on all passengers and see that this does not occur. The tickets or checks used are of different colors, and by these a conductor knows where a passenger should leave the car.

Discussion has also arisen as to the possibility of conductors stealing fares, but with the system of checks used this is almost impossible. The checks are numbered in series, and each conductor must turn in the amount of cash received for the number of checks issued.

It would be impossible, of course, to have such low fares here as in Europe, but that is a matter for each railway to decide. It seems to me that the best fare to adopt here would be 4 cents for the first zone and 1 cent for every additional zone to the end of the line. If this should not produce sufficient revenue, the zones should be shortened, but it would be inadvisable in any case to increase the fares.

A 10,000 4c. Fare		B 20,000 5c. Fare		C 30,000 6c. Fare		D 40,000 7c. Fare		E 50,000 8c. Fare		F 60,000 9c. Fare		G 70,000 10c. Fare		H 80,000 11c. Fare		I 90,000 12c. Fare
From	To	From	To	From	To	From	To	From	To	From	To	From	To	From	To	From To
N. Ed.	80 St	N. Ed.	95 St	N. Ed.	111 Av											
80 St	95 St	80 St	111 Av	80 St	106 Av	N. Ed.	106 Av	N. Ed.	101 St	N. Ed.	109 St	N. Ed.	122nd	N. Ed.	108 Av	North Admonton
95th	111 Av	95 St	106 Av	95 St	101 St	80 St	101 St	80 St	109 St	80 St	122 St	80 St	108 Av	95 St	118 Av	to
111 Av	106 Av	111 Av	101 St	111 Av	109 St	95 St	109 St	95 St	122nd	95 St	108 Av	95 St	118 Av			118th Av
106 Av	101 St	106 Av	109 St	106 Av	122nd	111 Av	122nd	111 Av	108 St	111 Av	118 Av					
101 St	109 St	101 St	122nd	101 St	108 Av	106 Av	108 Av	106 St	118 Av							
109 St	122nd	109 St	108 Av	109 St	118 Av	101 St	118 Av									
122nd	108 Av	122nd	118 Av													
108 Av	118 Av															
To	From	To	From	To	From	To	From	To	From	To	From	To	From	To	From	

TYPICAL TICKETS FOR A NINE-ZONE SYSTEM

I attach sample of checks which might be used on such a system. For example, a person who wished to ride one zone would purchase a 4-cent check; two zones or one zone and a portion of another, a 5-cent check, etc. If the person wished to ride the entire distance, he could buy a 12-cent check.

The collection of fares and issuing of checks is really very simple. For example, a person takes his seat in a car, say at some point between North Edmonton and Eightieth Street, and wishes to ride to 109th Street. In this case the conductor would collect 9 cents and issue a 9-cent check, punched in the column denoting the zone where the person boarded the car. This check would indicate the destination of the passenger. Should the latter override the distance, the conductor would collect an additional 4 cents. This would probably prevent any person attempting to defraud the company a second time by overriding the distance originally paid for.

When a conductor starts on his day's work, he has a stock of checks of each denomination. The total number of each is marked down on a card or form which he carries with him. The checks are put up in pads of 100 and are numbered consecutively. At the commencement of each trip the number of the uppermost check of each denomination is marked on the card. At the completion of the day's work this card, with the unsold checks, will show exactly the day's sales, and the conductor must account for the money representing these sales. In case of a shortage of cash, he must make good.

The concensus of opinion at the conference of the American Electric Railway Association was that no zone system yet adopted by the railways on the American continent has proved satisfactory, and that the flat increase in the unit fare has not given the desired results. If the European system were given a trial, I am sure the results would be satisfactory.

I think it would be inadvisable for cities with a population of less than 100,000 to adopt the zone system. The reason is that with low fares a certain density of population is essential to obtain satisfactory results. In other words, the short-haul traffic is the traffic which pays best, and a low fare would tend to encourage this branch. In smaller cities a better system would be to adopt one-man cars and a higher fare.

Edmonton is experiencing at the present time the same difficulties as most electric railways, and probably a few more owing to the excessive capital investment per head of population. We are carrying 10,400,000 passengers a year on an average fare of 5.15 cents. The total earnings for the year are $535,000, and the total expenses $630,000.

If our fares were increased to four tickets for 25 cents instead of five for 25 cents as at present, and children's tickets ten for 25 cents (and there is an indication that this may take place in the near future), and if the number of passengers carried were 10,200,000 (a decrease of 200,000 being allowed because of the increase in fares), our fares would average 6 cents. The total revenue would then amount to approximately $624,000.

It would be out of the question to attempt the zone system with Edmonton's present population, as we would have to earn $90,000 more revenue to pay the additional platform expenses.

I have endeavored to demonstrate why the zone system should be adopted in large cities and the one-man car system in small cities. Should any reader desire further information with regard to the zone system, I would be very glad to take the matter up with him, as I believe this system will eventually have to be adopted.

I. H. MOIR, Superintendent.

The Columbus Railway, Power & Light Company, Columbus, Ohio, has distributed to its employees copies of a booklet entitled "Courtesy," written by David Gibson. On the cover is a note from President S. G. McMeen addressed to the employees with the suggestion that "perhaps we can get more courtesy in 1919 by giving more."

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

$6,870,130 Damages Claimed

United Railroads, San Francisco, Asks That Amount for Injury to It by Municipal Line

Four claims for damages have been filed against the city and county of San Francisco, Cal., by the United Railroads, San Francisco. They aggregate $6,870,130. The basis for their presentation rests upon the provision of the Constitution of the United States and the similar provision in the Constitution of the State of California which hold in substance that private property shall not be taken for public use without just compensation.

The United Railroads contends that in constructing the outside tracks on Market Street and on Church Street between Market and Sixteenth Streets and operating cars of the municipal railway thereon the city has damaged the company's Market Street and other franchises in the amount mentioned. In litigation now pending in the Supreme Court of the United States the United Railroads contends that the city had no right to construct these outside tracks. If this litigation should result in a finding that the city was within its rights in constructing the outside tracks and operating cars upon them there would still remain to be settled the question of just compensation for private property taken or damaged in making such public improvement.

In estimating damages the test has been based on the extent to which the market value of the property taken or damaged has been depreciated by reason of the construction and operation of the public improvement. While the United Railroads contends that its entire system has been damaged, that is, depreciated in value, to the extent of the total amount claimed by reason of the construction and operation of the outside tracks, this total is represented by four different claims filed at different times because the city's work was done at different times on different parts of the street. The four claims therefore divide the company's damage as follows:

$856,250—Resulting from the construction and operation of the tracks on Market Street between Van Ness Avenue and Church Street and on Church Street between Market and Sixteenth Streets.

$288,500—Resulting from the construction and operation of the tracks on Market Street between Church Street and the Twin Peaks Tunnel.

$4,825,380—Resulting from the construction and operation of the tracks on Market Street between Van Ness Avenue and Geary Street.

$900,000—Resulting to the entire system of United Railroads as distinguished from damage to the Market and Church Street franchises.

The construction and operation of the outside tracks by the municipal line have rendered access to and egress from United Railroads cars, which are on the inside tracks, very dangerous. This, the company says, has greatly depreciated the earning power, not only of the Market Street franchise but the entire system of the company. In other words, it is not a mere case of fair competition, but a situation which enables the city to get the business by physically preventing the United Railroads from obtaining it. As market value ordinarily means such an amount as a willing purchaser would pay a willing seller, it is contended that a willing purchaser would pay a willing seller much more for the United Railroads system without the city operating the outside tracks than such a purchaser would pay with the city in possession of such tracks.

A Voice in the Wilderness

J. W. Perry, president of the Southwest National Bank of Commerce, speaking on Dec. 11 before the Kansas City Association of Credit Men, laid much emphasis on the necessity for bringing about closer sympathy between the public utilities and the public and the need for private, rather than public ownership. The meeting was held the night of the day on which employees of the Kansas City Railways quit work to enforce their demand for higher wages; and business men appreciated the fact that the railway, as the War Labor Board had declared, could not pay more wages unless it received more revenue. Mr. Perry said in part:

"It is up to us to strengthen our utilities. And we can't do that by robbing them. We must give the utilities, as well as everybody else, a fair deal. They are entitled to a profit on their merchandise, as any other business man is. The public don't recognize the elements of cost in service, and the plain justice of compensating the one who gives service. I know that you can't carry a passenger from Rosedale to Swope Park for 5 cents at a profit—anybody need only walk that distance once to get a clear idea as to what the service is worth.

"I have no suggestion to make for solving the problems of our utilities, but they are entitled to a fair deal. When the government took over the railroads, it raised the rates. Why weren't the rates raised before, while the railroads were being operated by their own officers?

"I hope to see the day when utilities will receive a reasonable profit. And labor should receive—and give—a square deal, too."

Free-for-All Suggestion

Lynn Merchant Steals a Page Out of "Looking Backward" for Practical Application

R. S. Bauer, the Lynn, Mass., merchant who some time ago retained Peter Witt, Cleveland, to report on conditions on the Bay State Street Railway in Lynn, considers the latest proposal of the railway, which provides for a 10-cent cash fare as an initial charge within each zone, not only an exorbitant car fare, but an extortionate one. Mr. Bauer has been conferring again with Mr. Witt. He seems to think that possibly the solution of Lynn's railway problem lies in municipal ownership with free rides. In a recent public statement Mr. Bauer said in part:

"The city of Lynn owns the public highways upon which this corporation operates; its equipment is in a way a part of our public highways. I propose that the city of Lynn purchase from the Bay State Street Railway the entire track and overhead feeding wire equipment, and carhouses in Lynn by a twenty-year bond issue, which should be large enough to permit the purchase of 120 one-man, front-entrance cars, giving the people in Lynn a service with not more than a ten-minute wait between cars, with a three-minute wait during the rush hours, and extending this service over every track in Lynn, including the belt line and other abandoned sections, and that the entire service in Lynn be operated by the city, making absolutely no charge for car fare anywhere; in other words, that the street cars under this municipal ownership and operation carry the people of Lynn wherever they want to go within the city limits absolutely free; the operating expenses to be met by a tax levy.

"Free rides would in my judgment in five years build up every vacant lot within the city limits. We would have within ten years 200,000 people in Lynn. Our merchandising interests, manufacturing interests, home-owning interests and rental interests would operate on stabilized land values, that would be increased fully 100 per cent all over the city by granting to the citizens of Lynn this opportunity of going back and forth wherever they want to go within the city limits, without the necessity of paying any car fare at all. Our taxable valuations in five years would almost double what they are to-day. Increase in values, and home-making and rental-making opportunities that would follow the adoption of this plan would more than take care of the expense of operation."

Effort to Fix Status of Women

Final Ruling Asked in Regard to Cleveland Women—Review of Case That Has Taken on National Interest

On Dec. 16 Miss Rose Moriority, representing the women conductors of the Cleveland (Ohio) Railway, was in Washington to file an application with the War Labor Board, asking for a final ruling in the case of the Cleveland women. The application includes mention of the calling of a strike, the insistence of the Cleveland branch of the Amalgamated Association on the Cleveland Railway making an agreement to dismiss the women by March 1, and the actual making of this agreement by the company. All of these things are claimed to be in violation of the order of the board issued on Nov. 29. The company and the union are being asked to show cause why they should not be decreed in contempt of the board.

The order of Nov. 29 was to the effect that the company withhold the discharge of the women in its employ, pending a decision by the National War Labor Board on the merits of the question and that the local branch of the Amalgamated Association withhold insistence upon the award already made pending such decision. This order was signed by W. H. Taft and Frank B. Walsh, joint chairmen, and the interested parties were instructed to govern themselves accordingly. The proceedings that followed offer the grounds for the complaint that has just been made.

How the Question Came Up

The controversy over the employment of women as conductors by the Cleveland Railway dates back many months and has many angles. In a statement which he made last September, J. J. Stanley, president of the Cleveland Railway, said that more than a year before that time the company began to feel the effect of war calls on the manpower of Greater Cleveland. While the number of car riders decreased, the service demands made by the city increased. The explanation for this seemingly contradictory statement is found in the great increase in the number of munition plant employees and the large amount of equipment necessary at certain specified times to handle the traffic thus presented. These demands the company was unable to meet. There were barely sufficient trainmen to take care of the regular schedules, but the company had no extra lists from which to draw men for rush-hour or special service.

On Feb. 10, 1918, the company advertised extensively for men, but only three men were secured. On Feb. 22 the City Council committee on street railways made a tour of inspection to investigate complaints that labor shortage was crippling the service. Two days later, William Rea, secretary of the local branch of the Amalgamated, was quoted in the Cleveland *Plain Dealer:* "About 400 of the old men have left since spring to take up more lucrative jobs."

Lack of Men Cuts Service

Street Railway Commissioner Sanders' check of service on March 13 showed that a number of rush-hour runs had been abandoned because of lack of men. He then came to the aid of the company by decreasing the service required. Following the declaration of war by this country, Mr. Stanley ordered that no applications be taken from aliens unless they had received or were securing their first papers. All orders for special cars were declined from that time.

When the men asked for an advance of 25 cents an hour in wages on April 15, the management requested the men to discuss with it a rearrangement of seniority lists and schedules and to permit the employment of women on an equitable basis with men. Mr. Stanley told them at that time: "We must and will employ women to run the street cars of Cleveland. It is a dire necessity of war and absolutely the only solution to the problem of the shortage of men." He said further that the shortage was between 400 and 500 and that runs were being suspended on all lines because of it.

On April 19 the company proposed an immediate increase in the wages of motormen and male conductors. It also suggested that conductors physically able and competent be shifted to positions as motormen, their places as conductors to be taken by women. Representatives of the union contended that sufficient men could be secured, if wages were paid equal to other industries, and that if this prophesy did not prove true, they would consent to the employment of women.

Effort to Secure Men Fails

The publicity given the expected increase in the wage schedule, after the matter was taken over by the National War Labor Board on May 28, failed to increase the number of applicants at the employment office. Newspapers prophesied an increase in wages all the way from 10 to 25 cents. When the board's award was made on Aug. 1 there was still no encouragement, and three weeks later the company began to advertise for women to be trained for conductors. It was stated that women would be paid the same as men and that no man would be forced to yield his job to a woman. Street Railway Commissioner Sanders called the move a step to prevent a breakdown in the transportation service. Officers of the union still insisted that the shortage was mythical.

As the women were trained and fitted for the work they were put in charge of cars. They showed much ability and good judgment in handling their work. On Sept. 3 William Rea, secretary of the local branch of the union, declared that all male employees would quit the cars at midnight the following Wednesday unless the women were dismissed by 2 o'clock on that day, and that they would remain out pending an investigation of the necessity for their employment. President Stanley asserted the right of the company to employ such persons as it saw fit.

Newspapers editorially supported the stand that in war times it was necessary to employ women at such work as they could do so that the men could perform duties required by the government for which the women were not fitted. The men, however, insisted upon a federal investigation which had been suggested by Mediator A. L. Faulkner to avert trouble. The company finally agreed to submit the following questions to two representatives of the United States Department of Labor, since the matter could not be carried to the National War Labor Board until all other means of settlement were exhausted:

1. Shall women conductors be taken from the cars pending an investigation of the main issue between the company and its employees?

2. Is the Cleveland Railway, because of a shortage in man-power, justified in employing women conductors?

H. B. Deilmann and Margaret Russanowska were sent to Cleveland by the United States Labor Department to make the investigation. On Sept. 9 they ruled that women should remain on the cars pending the final decision, as their removal now "would even more seriously cripple the present inadequate transportation of the vast number of workmen dependent upon the street car service."

By Sept. 21 the situation seems to have looked different to them, as they decided the second question in the negative and ordered that all women should be removed from the cars on and after Nov. 1. It was admitted that the company would have to lower its standard somewhat . . . "but the excellent street railway service of Cleveland will suffer no great detriment by lowering the strict standard adhered to by the company in the past."

Later the women conductors appealed to Secretary of Labor Wilson and stated that all other parties at interest but themselves had been represented in the investigation and they felt that there should be a new hearing on the matter. He informed them that unless

grave error in the finding could be shown or additional evidence could be produced, he would be unable to reopen the case. They pointed out in another communication several alleged errors and mentioned the additional information that could be furnished, but nothing came of it. A long telegram from the Cleveland Chamber of Commerce, urging that the women be retained remained unanswered.

Women File Complaint

Then followed the complaint made by the women conductors, through Miss Rose Moriority and Attorney Florence Allen, in which all the facts were laid before the Federal War Labor Board. They were instructed by former President W. H. Taft, a joint chairman of the board, to ask for a restraining order against both the company and the local branch of the Amalgamated Association. This was followed by an interlocutory order from the board citing the defendants to appear before that body on Nov. 7. In the meantime the United States Labor Department had extended the time for the discharge of the women from Nov. 1 to Dec. 1, on the ground that a general investigation would be made with a view to fixing the status of women in the industries. On Nov. 29 the order mentioned at the outset was issued by the War Labor Board.

Union officials called upon Mr. Stanley on Dec. 2 and demanded to know what he was going to do about discharging the women conductors, as the preceding day was the last day of the extension named by Secretary of Labor Wilson. In replying to a question by Mr. Stanley, they said they had received the order of Nov. 29 of the War Board, but denied that it had jurisdiction in the case. Mr. Stanley informed them that the company would obey the War Labor Board's order, as it always had done before.

Strike Threatened

Mr. Stanley was informed that a meeting had already been called for that night to vote on a strike, if the women were not removed at once. The vote was largely in favor of a strike and late that night the officials of the road were notified by telephone that the last cars would leave the Public Square at 4.30 on the morning of Dec. 3. The cars were idle for the following three days.

Mayor Harry L. Davis appeared before the War Labor Board on Dec. 3. On that day the board ruled that, owing to the fact that the Mayor had represented to it the grave situation created by the strike and stated that men were becoming available by virtue of the reduction of the forces of industry and the return of men from the camps, it would recommend that the Cleveland Railway employ no more women and that within the next thirty days the present force of women be replaced by competent men. It further recommended that the women be given other places in the organization as far as possible. Both the Mayor and the City Council took the matter up at this point and Mr. Stanley informed them that if the men would return to work and enable the company to resume service, he would see that the interests of the men were properly protected.

The City Council wired the War Labor Board, asking that it be made perfectly clear whether the board's communication was a recommendation or an order. The board replied that it was advisory, as shown by the language, and that the order of Nov. 29 was still binding on the company, and further that the men had broken their contract, since it provided that all disputes should be settled by arbitration and the employees should continue to work pending the announcement of the award.

On Dec. 5 the women, through Miss Moriority, offered to waive their legal rights to their employment, the rights already recognized by the War Labor Board and awaiting final ruling, and join with the company and the union in a telegram to the board asking for an immediate final ruling, without further hearing. Mr. Stanley agreed to this, but W. D. Mahon, representing the union, refused. The women then said they would do nothing which would cause a prolongation of the strike.

Mr. Stanley then announced that if the men would return to their cars at once, he would replace the women as fast as possible with men and find other positions for the women as rapidly as he could. After March 1, he said, the company would employ no women as conductors. Late on the evening of Dec. 4 the men voted on Mr. Stanley's proposition and the announcement was made that it had been carried by 583 for to 571 against it. However, more than 1200 of the men did not vote.

Women Seek to Join Amalgamated

On the morning of Dec. 3 Mrs. Laura Prince, chairman of the women's organization, wired the War Labor Board that the men had gone out on a strike in violation of the board's order and in contempt of the board. This laid the foundation for the complaint that has now been made.

Before the strike was declared the women endeavored to become members of the Amalgamated Association, under orders which had been issued by the national officers, but they were refused application blanks. An application made by mail was ignored. They have complied with every requirement of the contract made between the company and the union.

Miss Moriority believes that there is an opportunity to secure a decision that will affect all the women in industries of the entire United States. The fight in Cleveland has assumed an aspect that promises to become nation-wide in its effect.

Women a Problem in Detroit

Review of Testimony Before War Labor Board, Which Will Pass on Their Continuing in Service There

Pending a decision by the National War Labor Board women conductors will continue in service on the Detroit (Mich.) United Railway. William H. Taft and Basil M. Manley, associate chairmen of the board, took testimony in the case at Detroit on Dec. 13. The next night members of the local railway union voted to reconsider their former demand that the women conductors be discharged from the service by Jan. 1. The union decided that the 260 women now on the cars might continue work for the time being but voted against issuing any more work permit cards to women. The union men will continue their protest against the employment of women when the War Labor Board hears further testimony in the case, at Washington, probably on Dec. 23.

The woman conductor question came to a crisis in Detroit about three weeks ago when the union notified the company that no new women must be employed and that those already in service must be discharged by Jan. 1. The union followed up this ultimatum by refusing work permits to a class of fifteen women who had completed preliminary training and were ready for practice on the cars.

The company promptly appealed to the National War Labor Board. It held that the union was violating the provision of the wage award made by the labor board in which the board declared, and the union agreed, that the company might engage women and colored men if necessity demanded. The company held that the union had admitted the necessity by issuing working cards and accepting union dues from the women now in service. The company also declared that the question as to whether there was no longer any necessity for the use of women was one which should be decided by the War Labor Board.

At the hearing the representative of the union attempted to drag in matter reflecting on the moral character of some of the women, but Mr. Taft ruled that the principal point to be decided was whether or not there was necessity for the employment of women by the company last September and whether the necessity still continues.

Efforts were then made by the union to show, by means of testimony of employment office agents, that the shortage of male labor was not now so acute. While this is true to a limited extent the company claims that the available labor supply is largely of a class not desirable for railway work. The union also contended that the women shirk such work as adjusting

the trolley, fitting the air hose to the car, etc. The union also claimed that women are worked longer hours than allowed by State law, but failed to back up this claim with testimony.

LABOR SHORTAGE SEVERE

The company showed that on Dec. 9 of this year the total number of motormen and conductors in the Detroit city service, (including the women), was 2359 and that this number was 304 short of the number required to operate the schedules. Therefore if the company was denied the right to retain the women in the service there would be a shortage of 564 men to operate the schedules now in effect. The company, so testimony showed, has employed and is employing every male applicant who is qualified to act as motorman or conductor and yet there is a serious shortage.

The company did not deny the charge of the union that no men were being employed as conductor on the Woodward, Jefferson, Hamilton and Fort lines. In this connection the company explained that it had spent a large sum of money remodeling carhouses on these lines to accommodate women and that it desired to confine the employment of women to these lines.

In discussing the work performed by the women now in the service, Edward E. Ives, assistant general superintendent, declared: "The company's position in this matter is that the women have very splendidly performed their duties as conductors. The general character of service is very materially improved by reason of having women in our employ as conductors. Women have raised the standard of the work."

SEX AN INDIVIDUAL PROBLEM

Mr. Ives had prepared a statement regarding alleged immorality on the part of women, but did not submit it because Chairman Taft ruled the subject to be irrelevant. In view of the statements made by union officials it is of interest that Mr. Ives regards sex control and sex conduct as an individual problem. He holds that railway work does not intensify it. No report of sex difficulties has been made to the company.

A petition by Attorney Weadock that the board permit the company to continue hiring women conductors while the matter was under consideration was denied by Chairman Taft. In referring to the wage award of the War Labor Board, which fixed the rate of pay for the men and also gave the company the right to hire women conductors, Mr. Taft significantly remarked that this was a binding contract, having been accepted by both parties, and that if violated, either party would have recourse to a court of law. It was also agreed that in the present case if either the company or the men are dissatisfied with the ruling of the associate chairmen they have the right of appeal to the full board. The women conductors have engaged a woman attorney who represented them at the hearing.

Kansas City "Carries On"

Assured Protection, the Kansas City Railways Resumes Service at Wages Consistent With Present Fares

The Kansas City (Mo.) Railways resumed service on Dec. 13, two days after the strike of Amalgamated Association employees. Each day since as many more cars have been added as the police department could provide with guards. It soon became a question of running cars without guards or calling out the Seventh Regiment to protect cars.

VERY LITTLE DISORDER

There was little violence following the resumption of service. One demonstration on Dec. 13 was led by conductorettes. In another cars were attacked in a quarter in Kansas City, Kan., largely inhabited by foreigners. The women conductors who joined the strikers have exhibited more animosity and energy than the men in the demonstrations.

When service was resumed, the company had men to run more than 100 cars. The list grew rapidly, with the return to work of strikers, and with new employees. The company employed 100 former soldiers, men recently discharged from the army training school, for motor mechanics at Kansas City. These men, with their experience of military discipline, and their training, proved exceptionally efficient. They were able to take out cars, and handle them efficiently, with brief coaching.

There has been an absence of pressure from any side except the strikers and their immediate sympathizers, to cause the company to yield. City officials take the position that the strikers are trying to force the city, the public, the State commissions and the United States Supreme Court to allow the railway to charge higher fares so that the strikers may receive higher wages.

THE ISSUE VERY CLEAR

The issue between the company and the strikers is clear-cut, to a degree unusual in such incidents. It is a matter of curiosity in Kansas City as to what excuse the union officials can reasonably make for calling the strike. It will be remembered that on Aug. 17 the union and the railway signed the renewal of their contract, making an agreement that the subject of wages should be submitted to the War Labor Board. This board decided that the wages should be raised, after the company had secured the authority to increase its revenue. There was doubt as to whether the company could proceed with raising fares and wages, under the authority of the decision of the War Labor Board. The company therefore asked the Federal Court for an injunction to restrain cities, public service commissions and others from interfering with its increasing of fares. The Federal Court decided that it could not issue such an injunction because the property of the railway was not jeopardized —the court declaring that the company was not required, under the War Labor Board's order, to pay higher wages until it had been allowed to increase fares. The company appealed from this decision to the United States Supreme Court, at the same time asking the State Utility Commissions to allow it to charge higher fares, so that it could pay higher wages.

Union officials and representatives are understood to have intimated, at the time of the Federal Court hearing in Kansas City, that they would not be bound by any decision of that court; and shortly before the strike union officials are said to have stated that the men should consider the award of the War Labor Board as unconditional. Frank O'Shea, first vice-president of the Amalgaamted Association, was present when the local union decided to strike. A few hours previously he had been in conference with President Kealy of the company, and had then given no intimation that he would suggest a strike.

UNION ASKS HELP

Mr. O'Shea has been asking—through newspapers—that somebody help the union men to persuade the company to submit to Mr. Taft for an interpretation of the War Labor Board's finding. Publicity sources sympathetic with the strikers are publishing material tending to indicate that Mr. O'Shea and the strikers have never understood the decision properly, and that if they get a clear understanding of it they will gladly return to work, pending decisions and granting of authority in due course by the authorities in whose hands the matters of wages and fares properly should and do rest.

The company is announcing to its employees that it sees clearly the manner in which they have been misled. It said that the officers would be glad to receive the men back into their former places by Dec. 17, without prejudice or discrimination. After that date the strikers were to be required to apply to the employment department, losing their privileges of priority with the company.

Service was suspended for several days on the Missouri Short Line, which gets its power from the Kansas City Railways, and on other interurbans that use this power within the city limits. The Bonner Springs line brought city patrons into the business district with motor trucks.

A telegram on Dec. 19 to the ELECTRIC RAILWAY JOURNAL from its correspondent in Kansas City said that the company was then operating 200 cars in the day time. No settlement of the strike was then in sight. Up to that time only a few strikers had returned to work.

Contempt of Court Charged

Union Acts "in the Dark of Night, When Honest Men Are Supposed to Be in Bed"

An attempt to bring about a strike on the lines of the Indianapolis Traction & Terminal Company, Indianapolis, Ind., on Dec. 12 in the face of a pending suit for injunction in the United States District Court may implicate international officers of the Amalgamated Association.

Injunction Obtained

As reported in this paper on Nov. 9, page 852, action was brought in the Federal Court at Indianapolis on Nov. 2 to enjoin the officers of Local No. 645 and organizers of the Amalgamated Association from inducing or persuading employees of the Indianapolis Traction & Terminal Company to take a strike vote in violation of their open shop working agreement with the company.

Upon hearing the petition for a temporary injunction, the Federal Court assumed jurisdiction in the case, and after further hearing on Dec. 4 an agreement was made in open court that none of the defendants would attempt to bring about a strike or cessation of work until the counsel could prepare further briefs in the case.

A meeting of about seventy-five members of the union was called on Dec. 11, and an attempt made by local officials and others to evade the agreement made in court by having members other than the defendant officers preside at the meeting. Orders were issued to call a strike at 2 a.m. on Dec. 12.

Information of the strike vote reached Robert I. Todd, president of the company, and he appealed to the Federal Court for an order citing leaders of the union to appear in court and show cause why they should not be punished for contempt of court. A ruling of the court was issued shortly after 2 a.m. on Dec. 12, and notices were served by the United States Marshall on all the defendants. The attorneys who had represented the Amalgamated officials in court disclaimed any knowledge of the breach of the court agreement.

Plea of Ignorance Made

When the case came up for hearing at 10 a.m. that morning, they pleaded their ignorance of the action taken by their clients, and stated that they did not wish to represent them in this action and begged the court to extend the hearing until the defendants could employ other counsel. The court decided to take up the petition for injunction immediately and after hearing evidence on the matter issued a temporary injunction against the union officials seeking to induce the car service men from breaking their contract with the company, and against the city of Indianapolis as regards enforcing an ordinance procured by union labor men and providing for the operation of cars by men who had had thirty days training by an employee who had been in the service of the company for one year. This measure if enforced would have tied the hands of the company in case of a strike.

The court set Saturday morning at 9 o'clock for the fifteen defendants who were cited to answer contempt of court charges. The court expressed its disapproval of the union in taking so many important actions "in the dark of night, when honest men are supposed to be in bed," and stated that the officials of the union could not escape responsibility by saying that the meeting at which the strike was called was unauthorized and presided over by a man unknown to themselves.

At the hearing on Dec. 14, the district attorney was instructed by the court to subject the officials of Local Division 645 of the Amalgamated Association, and all other persons responsible for the attempted strike, to criminal prosecution in the Federal Court, charging contempt of court against the responsible parties. It is expected that about two weeks will be required for the district attorney to file the necessary information.

I. T. S. Strike Settled

Service was resumed on the interurban lines of the Illinois Traction System on the morning of Dec. 16 after ten days' suspension following a walkout of motormen and conductors at midnight on Dec. 5. An eighteen-hour conference between the joint board of the Brotherhood of Interurban trainmen and officials of the company and a day of referendum voting by the local lodges brought about an agreement on the wage scale to be paid for the year beginning Dec. 1, 1918.

Under the agreement the interurban trainmen will receive an increased wage of 25 per cent. This means 50 cents an hour for a nine-hour day on the main divisions. A proportionate increase is also allowed trainmen on the bridge cars of the company at St. Louis and on the Chicago, Ottawa & Peoria Railway. It is understood that the company has also dated the increase back to Oct. 15.

The trainmen originally demanded a wage of 65 cents an hour, or 63 per cent over the scale prevailing in the contract expiring on Dec. 1. The case was taken by the trainmen to the War Labor Board and referred back to conference between the men and the company for settlement. Upon failure to reach an agreement on Dec. 5 a portion of the trainmen went on strike and all other divisions were tied up in sympathetic walkout.

Orders to the men to return to work issued by Brotherhood officials were unheeded and numerous conferences attended by the trainmen, the company and business interests followed in an effort to settle the controversy.

The wages fixed by the contracts are in accord with the scale recommended by the committee of business men from the cities along the line of road and accepted by the company on Dec. 12.

Indianapolis Directors Out

Experiment in Co-operation Founders When Public Directors and Officers Disagree Over Fare Needs

The three public directors of the Indianapolis Traction & Terminal Company, Indianapolis, Ind., have resigned. The three directors were appointed in compliance with an order issued by the Public Service Commission on Oct. 12. This order increased the car fare from six tickets for 25 cents and twenty-five for $1 to 5 cents straight and 1 cent for a transfer, which was to be rebated when the transfer was used. The directors provided for in the order were to be named, one by the Governor, one by the Mayor and one by the Chamber of Commerce and the board of trade. The Governor named Alfred F. Potts, Mayor Jewett named Edward A. Kahn and the commercial organizations named B. A. Worthington. The commission's order in regard to fares was to be effective until Dec. 13.

The resignations were precipitated by plans formulated by the company for asking the Public Service Commission for permission to raise more revenue. With these plans, reviewed elsewhere in this issue, the public directors were not in sympathy. A statement made by the resigning directors follows in part:

"Budgets and financial statements were offered showing the company's financial conditions which were confusing and conclusions drawn to which we could not agree.

"Finally the break came when we were asked to vote in favor of petitioning the Public Service Commission to allow the company to keep the 1 cent paid for transfers, which is now rebated.

"We at once announced that we would resist such a proposition. We pointed out that it was the laboring people who were asking for transfers and to require them to pay 6-cent fares while others rode for 5 cents, would be an injustice.

"Our opposition to the scheme so angered Mr. Todd, the president, that he turned on us and in a loud voice and threatening manner declared:

"'If you three public directors won't stand by us in this matter you will be responsible for wrecking the company.'

"Others tried to pacify the situation, but we had enough, and left the meeting, with the remark that they could 'consider our resignations as tendered.'

"It has been plain to us for some time that we could do nothing to better conditions unless we were willing to co-operate in efforts which we could not approve. Our chief regret is that we have not been able to aid the Public Service Commission by co-operating in some effort to secure better service, but our continuance on the board was made impossible. Of course the withdrawal of the public directors will not prevent the company from presenting its petition for more money. It will be up to the commission to decide on the merits of the case."

Iowa Utilities Commission Proposed

That there will be a determined effort to create a State utilities commission as one of the most important programs of the coming session of the Iowa Legislature now seems certain.

Relief from many of the problems which have baffled the utilities of the State during the past two years is absolutely necessary and the utilities commission is looked upon as a most logical means of such relief.

Senator W. G. Haskell, Cedar Rapids, has already announced that he will father a bill to create such a body. Mr. Haskell points to action in his own city in settling increased fares by arbitration as proof of the fair methods of adjusting disputes between the utility companies and the people.

Preparing Officers for Technical Positions

The United States Employment Service, Department of Labor, Washington, D. C., has announced that it will make a special effort in assisting to obtain re-employment for technical and other highly trained men who are retiring from the commissioned and enlisted ranks of the army and navy. Among these men are many engineers, executives, chemists, statisticians, purchasing agents, employment managers, cost accountants, etc. All employers wishing to get in touch with these men should communicate with the Professional Section, United States Employment Service, Department of Labor, Washington, D. C.

City Operation Suggested

Chicago may turn to municipal operation as the solution of its traction problem. At the meeting of the local transportation sub-committee on Dec. 12, Walter L. Fisher, the city's special counsel, submitted a plan which contemplates that the city lease the surface and elevated lines and operate them as a municipal enterprise. This he offered as a substitute for the proposal to turn the properties over to a corporation not for pecuniary profit, which was rejected by the people at a recent referendum.

The obstacle in the way of municipal ownership is that the city has practically reached the limit of its borrowing power under the constitution. Attorney Fisher believes that a lease could be so drawn that the city will not incur any indebtedness under this restriction. He would have the city agree in the lease that the rentals to the present owners shall be payable only out of the revenues of the properties to be leased and these revenues would be made to fit the circumstances through adjustable fares or service at cost. Two new statutes would have to be secured from the Legislature, one permitting the consolidation of the surface and elevated lines and the other paving the way for a leasing plan.

Another feature of the latest Fisher plan is intended to remove popular objection to corporate management by allowing the city a two-thirds control on the board of trustees and shortening the term of office of these officials. In other respects the ordinance recently voted on would not have to be seriously changed. The companies have not expressed an opinion on the new proposal, but the matter will be discussed at future meetings. It is possible that some plan will be submitted at the April election.

News Notes

Would Municipalize Line.—Resort business men and Philadelphians owning property in Ocean City, N. J., at a meeting on Dec. 11 called by Mayor Champion appointed a committee to use its best efforts to secure subscriptions for the purchase of the Ocean City Electric Railroad.

M. O. Vote on Jan. 6.—The City Council of Niagara Falls, Ont., has passed a by-law to be submitted to the electors on Jan. 6, to take over the line of the Niagara, St. Catharines & Toronto Railway, which runs between the north and south end of the city, and operate it as a municipally owned railway. A year's notice has to be given to the company, whose franchise expires in March, 1920.

First Clash in M. O. Fight.—A committee report instructing the City Attorney of Minneapolis, Minn., to ask the Legislature to provide a law under which the Minneapolis Street Railway, included in the system of the Twin City Rapid Transit Company, could be taken over by condemnation proceedings was voted down in committee on Dec. 5. It was expected the matter would come before Council as a whole on Dec. 13.

Brooklyn Officers Indicted.—Messrs. Williams, Dempsey, Menden, Hollock and Blewitt, all officers of the Brooklyn (N. Y.) Rapid Transit Company or its subsidiaries or affiliated companies, and the motorman of the wrecked train were indicted on Dec. 20 on two counts each, one for manslaughter in the first degree and the other for manslaughter in the second degree, in connection with the accident on Nov. 1 in which more than ninety-five passengers were killed and more than 150 others injured. Trial has been set for Jan. 6.

General Harries First in Berlin.—According to Associated Press dispatches of Dec. 11, Brigadier-General George H. Harries, in civilian life a vice-president of H. M. Byllesby & Company and a former president of the American Electric Railway Association, was the ranking member of three American officers first to reach Berlin since the signing of the armistice. General Harries and his aides arrived in Berlin on Dec. 10 as members of the American commission for the repatriation of war prisoners.

Bankers to Write Utility Report.—Otto H. Kahn, a member of the firm of Kuhn, Loeb & Company, New York, N. Y., and Francis H. Sisson, vice-president of the Guaranty Trust Company, New York, N. Y., it was learned on Dec. 15, have been selected to write the report on the vital questions confronting public utility corporations which is to be made by the special committee appointed by the Merchants' Association of New York, the appointment of which was noted in this paper for Dec. 14, page 1068.

Another Louisville Wage Demand.—The wage matter has again come up in Louisville, Ky., where H. C. Mitchell, secretary of the union of employees, has taken up with the Louisville Railway an increase of 7 cents an hour, making the scale 45 cents. In September the company advanced wages from 31 cents to 38 cents. The case may be appealed to the War Labor Board by the union men before Jan. 10, in the event that the decision of the company is unfavorable. The previous wage adjustment was reviewed in the ELECTRIC RAILWAY JOURNAL for Nov. 16, page 896.

Illinois Central Chicago Electrification.—Electrification of the Chicago terminal system of the Illinois Central Railroad has been brought up again by an ordinance prepared by the railway terminals commission and submitted to a committee of the City Council. The same ordinance provides for track elevation, a new passenger terminal station and the development of the lake front for harbor and park purposes. Electric operation is to be put into effect in four stages, but the number of years for each stage is not specified in the ordinance. The first stage covers the entire suburban service within the city limits; the others cover different sections of the freight and main passenger lines.

Program of Meeting

Air Brake Association

The twenty-sixth annual convention of the Air Brake Association will be held in Chicago May 6-8, 1919. There will be reports by six committees and two topical subjects. One of the latter is to be on the M.C.B. air-brake defect cards and the other on how engineers and trainmen can assist in air-brake maintenance. There will also be an informal meeting on one of the afternoons conducted by a junior officer, at which no stenographic report will be made, for a free informal discussion of any subjects brought up. It is believed that this move will bring out information not obtainable on the floor of the reported convention and will also encourage the younger members to speak their minds freely.

Financial and Corporate

Reorganization Suggested

President of Schuylkill Railway Advances Plan for Financial Rehabilitation of Company

Announcement has been made in detail of the plan suggested by Powell Evans, president of the Schuylkill Railway, Girardville, Pa., to the holders of the $640,000 of first consolidated 5 per cent thirty-year gold bonds of 1905 for the reorganization of the company. It is the intent of the offer that the plan suggested shall be initiated within one year from Sept. 30, 1918, or that the proceedings for the reorganization by foreclosure shall be started before that time.

INTEREST PAYMENTS IN DEFAULT

The Schuylkill Railway was incorporated in Pennsylvania in 1903 as the successor to the properties of the Schuylkill Traction Company and the Lakeside Railway. It owns and operates 28 miles of road. The company has an authorized and issued capital of $400,000. The underlying securities of the Schuylkill Traction Company and the Lakeside Railway amount to $760,000. There are also outstanding $640,000 of first consolidated 5 per cent bonds and $150,000 of 5 per cent income bonds of the Schuylkill Railway. No interest has ever been paid on the income bonds. Of the first consolidated 5's of the Schuylkill Railway $180,000 are held by the public, and the remainder by Mr. Evans as manager. Interest has heretofore been paid on the $180,000 of consolidated bonds in the hands of the public, but practically no interest has been paid upon the portion of the issue held by Mr. Evans personally. On April 1, 1918, it was even necessary to pass the interest on the part of this issue held by the public.

While the gross revenue of the company has increased from $181,873 in 1910 to $340,701 in 1917, and while fixed charges have remained almost a constant, operating costs have risen so rapidly that the accumulated deficit is $236,650. As the largest individual holder of the securities of the companies included in the system President Evans advances the plan of reorganization, feeling convinced that consideration for the future of the company make it highly desirable that all of the lines be unified under one ownership.

READJUSTMENT WITHOUT FORECLOSURE

Eleven different conditions are set forth in the plan advanced by Mr. Evans for the reorganization, the net result of which would leave the company with only nominal current obligations, with fixed charges reduced to a minimum and with provision made for the distribution of the net income. Upon consummation of all the provisions of the readjustment, Mr. Evans and all the others subscribing to the plan, are to release to the company all other interests which they hold.

It is stated that the plan of reorganization has been assented to by a large majority of the holders of the outstanding bonds of the consolidated issue, but it has not yet been declared operative. It is expected that the reorganization will be brought about without the need for foreclosure sale.

St. Louis Valuation Plan Stated

Chairman Busby of the State Public Service Commission of Missouri said on Dec. 8 that the report was erroneous that had been published in St. Louis that the commission intended to make a valuation of the United Railways of that city regardless of the finding of the Supreme Court as to the authority of the commission to increase fares. He said:

"What I did say was that if the ruling of the court sustains the power of the commission to increase electric railway fares, the commission will then proceed within thirty days to value the property of the United Railways."

Chairman Busby said the State would have to bear the expense of such a valuation.

Service Abandonment Approved

The Public Service Commission for the Second District of New York on Dec. 10 approved the declaration of abandonment of service by the Dunkirk Street Railway, leased to the Buffalo & Lake Erie Traction Company, of parts of the Dunkirk company's road, provided the railway shall give the city security for the payment of all taxes and assessments. The tracks or other apparatus belonging to the road are not to be removed until further order of the commission. The order will not become effective until proof is filed with the commission that security has been given the city of Dunkirk and that the Supreme Court has authorized the receiver of the Buffalo & Lake Erie Traction Company to abandon.

The receiver of the Buffalo & Lake Erie Traction Company has control of the Dunkirk Street Railway. Commissioner Barhite says there is some question whether the receiver can or should be permitted to abandon any property which comes into his hands. That point will be left to the determination of the Supreme Court, of which court the receiver is an officer, upon an application made to it upon notice. The receiver has promised to take action to protect the city.

Slight Valuation Change

Oregon Commission Explains Reasons for Modifying Its Portland Figures of April, 1917

The Public Service Commission of Oregon has issued an order modifying the findings of the valuation of the Portland Railway, Light & Power Company in its order of April 30, 1917. The valuation is slightly decreased as to interurban lines, but is slightly increased as to city lines in its railway divisions and as to the electric utility division in Oregon and in other States.

The valuation under the order of April 17 was as follows:

Railway division:		
Interurban lines..	$ 8,925,650	
City lines	18,233,371	
Total railway...	$27,159,201	$27,159,021
Electric utility division:		
In Oregon	$18,866,984	
In other States...	625,168	
Total electric utility	$19,492,153	$19,492,153
Total railway and electric utility		$46,651,174

In the new order the valuations are:

Railway division:		
Interurban lines..	$ 7,686,700	
City lines	18,568,073	
Total railway..	$26,254,773	$26,254,773
Electric utility division:		
In Oregon	$19,742,279	
In other States...	654,121	
Total electric utility	$20,396,401	$20,396,401
Total railway and electric utility		$46,651,174

It was said at the commission offices that the changes made in the valuations of the respective divisions are so slight as not to reflect any material differences in rates. The new valuations will not reflect changes in rates as they now stand, but will apply only to rates made under future orders.

In giving the reasons for making the changes the commission says in part:

> The record now shows certain of the lines to have been built, at the time they were, with a primary object of facilitating the construction of generating stations upon the Bull Run and Clackamas Rivers, and that the existence of the lines did materially lessen the expenditures on those plants. It also is shown, by the amount of revenue derivable therefrom, that business now available and in prospect upon those portions of the lines beyond certain limits could scarcely be considered as sufficient justification for their construction and operation with such revenue as the primary motive.
>
> This feature has not heretofore been presented to the commission and was, therefore, not considered in preceding findings. Under the showing now made it seems that at least a part of the value of the Springwater and Bull Run lines might be properly charged into the pool power property with the generating stations which were in part responsible for their being undertaken. By such an assignment the total value for rate purposes of the entire property will remain unchanged.
>
> The portion charged to interurban lines will be decreased with a consequent increase in the assignment of value to every other division of the electric property. As a measure for the amount so to be transferred the company has submitted an estimate of what would probably have been added to the cost of the generating stations had transportation of materials and labor not been available over the lines in question. This estimate amounts to $1,286,820, and covers the problematical cost of building, repairing and maintaining roads and bridges necessary to the construction had rail lines not been in existence. It also covers the direct costs of hauling and other expenses incident to changes which might have been necessary in the construction program as followed with the lines in place.

Receiver for Des Moines

Recently Enacted Model Franchise Did Not Contemplate War-Time Conditions

The Des Moines (Iowa) City Railway, which for the last three months has been in a controversy with the city over a request for increased fare, has been thrown into the hands of a receiver by the Federal Court. The receivership was precipitated by action of the North American Construction Company, Chicago, which has done the reconstruction work in Des Moines for the Des Moines City Railway during the past two years.

Two Receivers Named

The construction company bringing the suit has unpaid claims of $19,000 against the railway. Confession of judgment was made by the company and Federal Judge Martin J. Wade appointed Homar A. Miller, Des Moines banker, and Emil G. Schmidt, president of the Des Moines City Railway, receivers. The placing of the company in the hands of the Federal Court would appear to negative suits brought by the city and by a citizen to prevent the increased fare sought by the railway. As noted in the ELECTRIC RAILWAY JOURNAL for Dec. 14, page 1068, the Iowa Board of Conciliation had found that the company was entitled to a 7-cent fare.

The Des Moines City Railway is operating under one of the more recently enacted franchise ordinances. After ten years of franchise controversy and negotiations, the company toward the end of 1915 secured what was considered at that time to be a workable renewal franchise grant. The negotiations leading up to the settlement were followed in the ELECTRIC RAILWAY JOURNAL and a résumé of the main provisions of the franchise was published in the issue of this paper for Jan. 29, 1916, page 205.

The franchise was to extend for twenty-five years from the date of final acceptance by the company after the approval of the electors, and within three years after the passage of the ordinance the company was obliged to follow a program of reconstruction, rehabilitation and new construction calling for an expenditure of $1,500,000.

Some of the Franchise Provisions

The maximum rate of fare for an additional single ride within the limits of the city in one direction was fixed at 5 cents, but the company in at least twenty-five convenient places was required to sell to any person applying therefor six tickets for a quarter, each as good as a 5-cent fare. The fare for children under twelve years of age was two tickets for 5 cents. Payment of a 5-cent fare entitled a child to a ticket which would be accepted as fare for another ride.

The grant also provided that the company should give the city the right during the term of the franchise upon at least six months' notice in writing to purchase the entire system. For this purpose it was agreed that the value of the property as of Aug. 1, 1915, was $5,000,000. The acceptance of the ordinance by the company followed immediately after the decision of the State Supreme Court on Jan. 22, 1916, that the election at which the franchise was passed upon by the voters was valid.

In June of the present year the Council as a special concession permitted the company to withdraw the sale of tickets.

Receiver for Buffalo Suburban Line

Harry Evers of Teller & Evers, brokers of Buffalo, N. Y., has been appointed receiver for the Buffalo & Lackawanna Traction Company on application of the City Trust Company.

The action is the result of the petition of George Bullock, receiver for the Buffalo & Lake Erie Traction Company, for authority to abandon its lease of the Buffalo & Lackawanna Traction Company's line between Washington and Clinton Streets, Buffalo, to the Lackawanna city line.

The Buffalo & Lake Erie Company defaulted on Dec. 1 in the payment of interest on the $1,600,000 of Buffalo & Lackawanna Traction Company 5 per cent bonds.

Melbourne Traffic Gains

The revenue of the Melbourne (Australia) Tramways for the year ended June 30, 1918, amounted to £901,474, a gain of 7.09 per cent as compared to that of the preceding year. The number of passengers carried was 113,034,157, an increase of 9.61 per cent. The train mileage totaled 12,833,029, an increase of 409,100.

The average fare per passenger in 1918 was 1.914d., as compared to 1.959d. in 1917, the reduction being due to a revision of the method of recording children's fares. The revenue per train-mile increased from 16.261d. in 1917 to 16.859d. in 1918.

The total receipts for 1918 were £903,020. The operating expenses totaled £511,365, and transfers of £30,000 and £100,000 were made to the renewals reserve and the reconstruction reserve respectively. The net surplus for the year amounted to £260,207.

While the total revenues in 1918 exceeded those of the previous year by £59,690, the higher operating costs almost absorbed all the gain. The operating ratio was 56.6 per cent in 1918 as compared to 54.8 per cent in 1917.

At the request of the Australian Tramway Employees' Association, the agreement between the municipal tramway board and the association, which will expire on Dec. 2, 1918, was last June amended in several ways. The most important change was the abolition of a bonus which varied with the cost of living. This bonus has now been incorporated in the rate of wages.

Fort Dodge Dividends

How One Electric Railway Has Fared Under Railroad Administration Authority

Homer Loring, president of the Fort Dodge, Des Moines & Southern Railroad, Fort Dodge, Iowa, in a circular dated Dec. 3, reviews the progress of the control of the road under the United States government since Jan. 1, 1918, and refers to the dividend payments made recently. The road showed a net income of $404,371 for the year ended 1917. After the declaration of preferred dividends of $91,000 and common stock dividends of $168,750, there was a balance of $144,621. The compensation to be paid for the use of the road was fixed by law as to the average operating income for the three years ended June 30, 1917, with such additions as are justified by special circumstances. This compensation, however, has not yet been determined.

Company Averaged $351,986 a Year

The average operating income of the company for the three years after deducting interest charges was $351,986. Seven per cent dividends on both the preferred stock and the common stock amount to $266,000. According to Mr. Loring, special additional compensation will be claimed for the new Webster addition, which was not in complete operation until 1918, and for equipment purchased in 1915 and 1916. He says that as the law under which the railroads are controlled provides that dividends in excess of the average paid during the three years ended June 30, 1917, cannot be paid without express authority from the Railroad Administration, it has been necessary for the company to secure authority for each dividend. He explained that dividend payments have been delayed because of the enormous amount of work thrown upon the Railroad Administration.

The preferred dividend due on Aug. 1 was paid on Sept. 30. The preferred dividend due on Nov. 1, he explained, was being paid on Dec. 3. He says that pending definite fixing of the annual compensation of the road the Railroad Administration refused to consent to quarterly common stock dividends of more than 1¾ per cent. The dividend payable ordinarily on Aug. 1 on the common stock was reduced to 1¾ per cent by the administration and payment was delayed until Oct. 17. The Nov. 1 dividend on the common stock was paid on Dec. 3 at the reduced rate.

Property Well Maintained

Mr. Loring says that it is hoped that after the compensation is fixed the administration will permit the company to return to the former 7 per cent common stock basis and to make up the amount of the reductions on that issue as imposed previously by the government. He says that the property is being well maintained by the administration, and if eventually returned to the owners will be in as good physical condition as formerly.

Financial News Notes

New Union Traction Directors.—Arthur V. Morton, vice-president of the Pennsylvania Company for Insurance, has been elected to the board of the Union Traction Company, included in the system of the Philadelphia Rapid Transit Company, to fill the vacancy caused by the death of James Gay.

Kansas Road Sold at Foreclosure.—The property of the Southwestern Interurban Railway was sold under foreclosure recently for $75,000 to H. M. Preston, Tulsa, Okla., vice-president and treasurer of the company, acting for the holders of the first mortgage 6 per cent bonds. A public grant of $40,000 made to the company at the time of the construction of the road requires that the road shall continue in operation.

Another Hearing on Abandonment.—Public Service Commissioner Cheney, in Oneonta, N. Y., on Dec. 11, gave another hearing on the petition of the Southern New York Power & Railway Corporation for permission to abandon part of its line in Oneonta. The city and its Chamber of Commerce are opposing the plan of the railway to stop operating the line from Church and Chestnut Streets, through Church, Center and Maple Streets, to the end of the line near the Normal School.

A Bright Spot Amid Desolation.—The Charlottesville & Albemarle Railway, Charlottesville, Va., reports that it has paid its regular 3½ per cent semi-annual dividend on its preferred stock, also 1 per cent dividend on the common stock for the last six months, in addition to putting a considerable amount aside for surplus. All this has been accomplished in spite of the fact that the company had no war activities on which to draw while its expenses have increased considerably on account of labor, etc.

Wants Receiver for Montgomery Company.—Judge Henry D. Clayton set the case of the Commercial Trust & Savings Bank, New Orleans, La., against the Montgomery Light & Traction Company, Montgomery, Ala., for hearing on Dec. 13, in the United States court for the middle district of Alabama at Montgomery. The Commercial Trust & Savings Bank of New Orleans is asking that a receiver be appointed for the Montgomery corporation.

Receiver for Maine Road.—A receivership for the Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., was decreed by Judge Morrill of the Supreme Court on Dec. 16. William H. Newell, attorney for the company, and Alfred Sweeney, general manager, were appointed receivers. The court action was taken on petition of A. H. Ford, vice-president and general manager of the Cumberland Light & Power Company, which controls the railway at Lewiston. The Lewiston, Augusta & Waterville Street Railway operates 165 miles of standard gage electric railway.

Boston Elevated Would Issue Notes.—The Boston (Mass.) Elevated Railway has petitioned the Public Service Commission of Massachusetts for approval of the issuance of $3,000,000 of notes or negotiable coupon bonds, payable in not exceeding seven years and bearing interest at not exceeding 7 per cent per annum to provide for construction and equipment and for funding its floating debt and purchase of such real and personal estate as may be necessary for operation of its railways.

Memphis Note Goes to Protest.—Suit has been brought to recover on a promissory note of the Memphis (Tenn.) Street Railway to the Bank of Commerce & Trust Company in the sum of $150,000. The bill states that the railway is entitled to a credit on the note in the sum of $57,530, this representing the amount on deposit in favor of the bank on Dec. 2, the day on which the note went to protest. T. H. Tutwiler, president of the railway, is reported to have said that while the note was payable on demand the bank had agreed not to call the note for payment without giving the corporation sufficient time to meet it.

Discontinuance Hearing Postponed.—The federal court hearing on the petition of Wallace B. Donham, receiver for the Bay State Street Railway, Boston, Mass., for permission to discontinue the operation of many lines because of failure to pay operating expenses or for other reasons, was postponed on Dec. 17 until Dec. 31, after a brief session before Judge James M. Morton, Jr. In the course of the proceedings S. H. Pillsbury, attorney for Mr. Donham, announced that the receiver wished to amend his petition and to continue operation of forty of the routes previously listed for discontinuance.

Mr. Shonts Answers Mr. Venner.—J. P. Morgan & Company, New York, N. Y., have issued a statement embodying a reply from T. P. Shonts, president of the Interborough Rapid Transit Company, to allegations recently made by C. H. Venner regarding the three-year 7 per cent notes of the railway company. Mr. Shonts declares the income statement issued in connection with the offer of the notes was made in accordance "with the regulations laid down, not only by the Public Service Commission, which has jurisdiction over the operations of the Interborough, but also prescribed by the Interstate Commerce Commission in dealing with interstate railroad accounts." He adds: "I have no intention of analyzing all the misleading statements in his circular and shall limit my comments on it to stating that there is nothing therein which requires any modification of the statements contained in my letter to you of Aug. 31, 1918."

Electric Railway Monthly Earnings

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$73,541	*$55,664	$17,877	$20,219	†$2,342
1m., Oct., '17	79,191	*44,793	34,398	19,499	14,899
12m., Oct., '18	919,128	*570,157	348,971	237,923	111,048
12m., Oct., '17	873,287	*501,008	372,279	226,181	146,098

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., Oct., '18	$151,946	*$138,433	$13,513	$32,121	†$18,608
1m., Oct., '17	89,429	*116,560	†27,131	30,310	†57,441
12m., Oct., '18	1,740,407	*1,421,367	319,040	375,996	†56,956
12m., Oct., '17	1,327,492	*1,057,549	269,943	357,432	†87,489

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

1m., Oct., '18	$353,675	*$283,395	$69,740	$63,085	$6,655
1m., Oct., '17	354,895	*274,019	80,876	49,220	31,656
12m., Oct., '18	4,221,027	*3,122,890	1,098,137	663,570	434,567
12m., Oct., '17	3,932,348	*2,751,229	1,181,119	549,561	631,558

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.

1m., Oct., '18	$1,799,629	*$1,349,937	$449,692	$497,774	†$48,082
1m., Oct., '17	1,763,894	*1,111,252	652,642	455,892	196,750
12m., Oct., '18	21,534,194	*14,725,606	6,808,588	5,891,593	916,995
12m., Oct., '17	19,149,110	*11,593,883	7,555,227	5,215,012	2,340,215

GRAND RAPIDS (MICH.) RAILWAY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$97,455	*$95,581	$1,874	$19,443	†$17,569
1m., Oct., '17	103,246	*72,767	30,479	18,378	12,101
12m., Oct., '18	1,273,010	*1,001,633	271,377	233,084	38,293
12m., Oct., '17	1,308,025	*875,092	432,933	214,712	218,221

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1m., Oct., '18	$235,249	*$176,719	$58,530	$39,769	$18,761
1m., Oct., '17	211,324	*137,377	73,947	40,919	33,028
12m., Oct., '18	2,752,428	*1,784,352	968,076	485,408	482,668
12m., Oct., '17	2,439,835	*1,563,605	876,230	493,747	257,483

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m., Oct., '18	$627,971	*††$484,472	$143,499	$185,669	$42,170
1m., Oct., '17	522,294	*323,328	198,966	176,864	22,102
12m., Oct., '18	7,408,679	*††4,805,337	2,603,342	2,200,186	403,156
12m., Oct., '17	5,895,640	*3,272,373	2,623,267	2,160,703	462,564

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

1m., Oct., '18	$3,299,624	*$2,400,703	$898,921	$1,495,080	a‡$76,460
1m., Oct., '17	3,563,592	*1,916,581	1,647,011	1,079,033	a‡724,570
4m., Oct., '18	12,735,248	*9,095,371	3,639,877	5,693,638	a‡200,141
4m., Oct., '17	12,473,400	*7,118,611	5,354,891	4,282,788	a‡2,080,762

* Includes taxes. † Deficit. ‡ Includes non-operating income. †† For the month, $18,839 and for twelve months, $349,448 included for depreciation. *a* Includes accruals under rapid transit contracts with city payable from future earnings.

Traffic and Transportation

Mr. Witt Favors Zones

Each Passenger Should Pay for the Service Rendered and Nothing More

Peter Witt, Cleveland, who has been in Boston conferring with the management of the Boston Elevated Railway, was interviewed by W. C. Spargo in the Boston *Traveler* recently. Mr. Witt has strong convictions as a result of his various studies. He sees things from the viewpoint of the disinterested third party. When he consents to speak there is no mistaking what he means. Mr. Witt is quoted in part as follows:

Zones the Only Hope

"There is only one thing that can save the property of the Boston Elevated and make it a paying proposition, with both the company and the public satisfied and happy, and that is the establishment of a zone system.

"I don't say that the zone system will be installed. That is up to the trustees. But you asked me my opinion of what Boston needs and what will benefit everyone concerned and I have given it to you. I have been over almost every line in Greater Boston and have come to the firm belief that the only thing that will save this property and bring it to its fullest use and therefore its greatest service is the installation of a zone system.

"There is one thing that should always be carried in the very front of the mind when anyone starts to straighten out railway tangles. He should remember always that he is selling something to the consumer. The only way a salesman is successful in the long run is to have his buyers happy and glad to buy.

"Apply that to railroading. If you can have your riders glad to purchase their tickets or pay their fares, you have won a mighty big portion of the battle. To do this you have to give them service at the lowest possible rate —a rate they feel is justified—clean cars, capable crews and fast time. The zone system is the easiest and, in some cases, the only way to achieve those ends.

No Public-Be-Damned Policy in Boston

"Many times in studying the railway conditions in various cities I find that the feeling may prevail that, as street cars are the main means of transportation, the riders will have to make the best of prevailing conditions. I don't say this is the case in Boston. In fact, the extreme opposite is the case with the men in charge here, but the point I make is that in establishing a successful system the thought must prevail that the service shall be made so good and so cheap that walking is discouraged and therefore car riding encouraged.

"If the fare is right there isn't anyone who wants to walk. Any time you find citizens willing to walk six or eight blocks because they think the car fare is too much for that distance, you know that there is a big fault in arrangements somewhere.

"In my opinion, the proper arrangement is that each rider shall pay for what he gets, nothing more and nothing less. A man is never satisfied to pay out of his purse for what another man is getting, and my contention is that each individual rider must be satisfied—yes, even more than that, pleased—so that he will step into a car every time he can.

"Such an arrangement can be put into effect anywhere where there is difficulty with the prevailing system, but I do not care to go deeply into that phase of the matter now, as I have not yet made my report to the trustees.

"The combination of lines in Boston, which to many minds makes it a complicated system, makes it, in my estimation, a simple system and will make it easy and not difficult to establish justice between the short-distance and the long-distance rider."

Wants Three Cents a Mile

The Schenectady (N. Y.) Railway's application for a 3-cents-a-mile rate on all its divisions was submitted to the Public Service Commission for the Second District, on Dec. 11 for determination. H. T. Newcomb of New York, representing the railway, argued in favor of the company's application, while argument in opposition was made by Corporation Counsel Arthur L. Andrews, representing Albany, and others. About half dozen briefs were filed.

Corporation Counsel Andrews asked for a dismissal of the application as far as the Albany-Schenectady division is concerned, contending that the revenues were sufficient on that division. The actual return on that division, he said, was 15 per cent in 1917 and 12 per cent in 1918. Chairman Hill formally overruled the objection, stating that the commission would consider the facts when the order was made.

Mr. Newcomb said the company was carrying passengers for less than 40 cents a car-mile when the cost was 42 cents. The company is now facing a deficit of $116,000. Interest, he said, was due on March 1, 1919, and no money had been accumulated to meet the payment. He said that the company was running at a loss of $200,000 and facing insolvency. There was a deficit from operations in Schenectady. The situation was desperate and the company must have relief.

Rochester Service Cut

City Agrees to Trial of 25 Per Cent Cut in Non-Rush-Hour Service for a Month

Proposed curtailed electric railway service in Rochester will be given a test after the holiday season. This was decided upon at a hearing before the Public Service Commission for the Second District of New York on Dec. 11 on the order which the commission, on its own action, served on the New York State Railways directing it to show cause why adequate facilities and service should not be given.

Corporation Counsel Cunningham appeared for the city at the hearing before Chairman Hill and Commissioner Barhite. Vice-President James F. Hamilton and Attorney Beach represented the railway.

Trial Period Essential

Charles R. Barnes, chief of the electric railway division of the commission, was the only witness called. He said the reduction of service proposed by the company was on all lines generally, but the reduction did not affect the service during the rush hours.

Corporation Counsel Cunningham said it would be impossible to determine the adequacy of the proposed reduced service until it is in operation, and then Chairman Hill suggested that the city consent to a trial of the new schedule for a month or so after the holidays, with the hearing to be resumed after the experiment or test. Mr. Cunningham said he did not like to consent to such a course, but if the commission felt that that was the proper course he would not make objection.

Mr. Barnes said from figures produced the company by the reduced schedule would save in operation 258 car-miles, or about 8 or 10 per cent. He said the New York State Railways was giving better service in Rochester than in any other city in the district. If there is reason to reduce the service it might be reduced experimentally without serious detriment. The reduction is during the non-rush hours and at a time when there are unoccupied seats. Mr. Hamilton said the 25 per cent reduction was in the schedules.

The railway officials and Mr. Cunningham agreed with the suggestion by Chairman Hill and Commissioner Barhite as to a test period of the proposed reduced schedules. The chairman said this should not be binding upon the commissions.

Further Procedure After Trial

It was decided to begin the testing of the new schedules on Jan. 2 to continue for a period of about a month, the proceeding before the commission being held open until after the time has elapsed. Then further procedure will be determined by the commission.

The plea of the Rochester lines for an increase in fares was denied recently by the City Council following the presentation of a report of its law committee. This matter was referred to in this paper for Dec. 7, page 1026.

Indianapolis Wants More

Company Contends Sixty-Day Trial of Five-Cent Fare Proves Need for Six-Cent Fare

The hearing of the case of the Indianapolis Traction & Terminal Company before the Public Service Commission of Indiana, in the matter of increased fares, following the expiration of the sixty-day trial period of operating under a 5-cent fare, began Dec. 13.

About a week previous to the hearing, at a meeting of the directors called to adopt a form of report to the commission, the three public directors, appointed by the commission in its award of Oct. 5, resigned, they having declined to join in a petition asking for a further increase, although the revenues of the company had failed to show the necessary increase under the 5-cent fare.

This failure was attributed to the cutting down of travel during the period, due to schools and amusement places being closed on account of the "flu" ban, and the increase in wages which the commission had made a condition of the increase. The company therefore filed its report, and the three former public directors each filed a separate report.

How the Public Directors Felt

Mr. Kahn, one of the public directors, in his report sought to show excessive capitalization of the company, and underlying properties, and that cash was not received and invested in the property from the issue of other securities. In his examination before the commission it was shown that he had taken no steps to confirm his statements, and as a matter of fact the report of the commission's own accountants showed that the securities in question were authorized by the State Legislature at the time of passing the act which granted the franchise to the Indianapolis Street Railway. In one instance where Mr. Kahn said that no funds had been secured from an issue of $5,000,000 of securities it was shown that $4,680,000 in actual cash had been received and put into the property.

Mr. Worthington, another of the public directors, in his report attempted to repudiate the securities of the company, and criticised the salaries received by officials. In his testimony, however, he admitted that the management was efficient, and that it was necessary to pay reasonably large salaries to secure competent officials.

Company Presents Figures in Detail

Mr. Potts, the third public director, in his statement expressed the view that a 5-cent fare was the "breaking point," and that increased revenue could not be secured from a higher rate of fare, as an increased number of people would be deterred from riding.

The company presented detailed figures of receipts and expenses during the sixty-day trial period as compared with similar periods of 1917 and 1916. It showed that the emergency had not passed with the ending of the war, and that further relief would be required by the company properly to meet its obligations and provide additional equipment and improvements to the service. It was conceded that some increased revenue might be derived by remodeling all the present cars to the pay-as-you-enter type, but that this would require an expenditure of approximately $210,000, and that the company at this time did not have the funds to make this change, unless it could be assured of increased revenues by the establishment of an adequate rate of fare.

The report showed that as a result of the large increase in wages it had been possible for the company to secure the necessary men to operate its cars, and that thirty-five additional cars had been placed in service. The table included in the report giving the earnings for the sixty-day trial period, shows that from Oct. 14 to 31 during 1918, as compared with 1917, the decrease in revenue was $16,240. For the November period an increase in revenue of $15,411 is shown in the statement. As against the increased revenue anticipated by the commission in ordering the 5-cent fare, a total decrease of $70,024 is shown for the sixty days, or a loss of $1,186 a day.

While the report of the company does not request any definite increased rate of fare, during the second day of the hearing, on Dec. 14, Robert I. Todd, president of the company, suggested a 6-cent fare to tide the company over its present difficulties. The chairman of the commission suggested that in the company's original petition it had asked for a 5-cent fare and 1-cent charge for transfer. Mr. Todd stated that such a large increase in wages as ordered by the commission was not contemplated at that time. He estimated that the 1-cent transfer charge would result in a revenue of a little more than $100,000; that the 5-cent fare would produce about $250,000 additional revenue; the additional increase to a 6-cent fare (without charge for transfer) would probably produce $375,000 additional revenue, or a total increase annually of $615,000 over the original 4-cent ticket fares which were in effect until Oct. 11.

Must Keep Up Equipment

The Public Service Commission for the First District of New York has issued an order directing the Brooklyn Rapid Transit Company to keep the rolling stock and other equipment of its elevated and subway lines in good repair, and not to use any of it that is not in safe and proper condition. It is stated in the order that the practices of the company in repairing, replacing and maintaining the equipment of both the surface and rapid transit lines are "improper, insufficient and inadequate," and that the transportation of passengers is not "properly cared for and safeguarded."

In an opinion written by Chairman Hubbell after several hearings, it is said that "numerous instances were reported which seemed to indicate an administrative policy falling substantially short of due regard for the safety of passengers."

In June, the report says, 182 trains were turned back at the Brooklyn Bridge because of defective apparatus, 265 in July, 339 in August, 285 in September, and 228 during the first twenty-five days in October.

The order prohibits the operation of elevated cars more than 1550 miles and of subway cars more than 2700 miles without inspection.

Seven Cents for Denver

The Public Utilities Commission of Colorado on Dec. 18 announced its order establishing basic values for the Denver Tramway as of Dec. 31, 1917, as follows: city lines, $20,867,750; interurban lines, $2,806,350; total for system, $23,674,100. The commission made no finding as to the value of non-utility property, stating, however, that it is substantial. The order further establishes a 7-cent fare, plus a 1-cent charge for transfers. The company must secure corresponding action by the City Council regarding the fare because the question of the jurisdiction of the State commission is before the State Supreme Court. A 6-cent fare went into effect in Denver in September, both municipality and the State having joined in giving relief.

Six Cents for Dayton

A communication from J. Sprigg McMahon, attorney for the electric railways operating in Dayton, Ohio, to the City Commission on Dec. 11, announced the willingness of the companies to accept the proposal of Ross M. Harris, engineer employed by the city to investigate operation and valuation and the volume of business of the roads, although they consider the rate of fare suggested by Mr. Harris insufficient to meet the increased expense brought about by extremely high prices of materials and the additional wages granted by the War Labor Board.

The men are now receiving about $25,000 more a month than formerly and the companies must make up about $100,000 of back pay. The rates proposed by Mr. Harris are 6 cents cash for adults or nine tickets for 50 cents, 3 cents for children under twelve years of age or six tickets for 15 cents. This schedule is to continue for eighteen months after the peace conference shall have finished its work.

Railway men have contended that the rate of fare should be straight 6 cents for adults and 4 cents for children. They also feel that the terms of the ordinance embodying these rates are too drastic. The City Commission is inclined to put the matter to a vote of the electors.

Atlanta Fares Tabled

Retiring City Council Puts Up to the Incoming Body the Matter of Fare Increase

In a special session called for the purpose of considering increased fares for the Georgia Railway & Power Company, the City Council of Atlanta, Ga., on Dec. 14 tabled, without debate, a communication from the War Labor Board, which recommended an increase in fares for the company. The Council then referred to the 1919 Council a communication addressed to the Council by Harry M. Atkinson, chairman of the board of directors of the power company, and refused to allow Mr. Atkinson or President P. S. Arkwright to address the members of the Council.

Councilman Makes Statement

At the close of the reading of Mr. Atkinson's letter to the Council, asking for action at once on account of the threatening situation before the company, Councilman Orme exclaimed:

"It is not right for this Council to invoke gag rule! I want to ask that, out of courtesy, these officials of the railway be heard. They have a right to be heard on this important question, as have others, for they are among the best citizens of Atlanta, and among the biggest taxpayers. There are questions involved that we should fully understand, and I think it nothing but fair that they should have the right."

A motion to table the Atkinson communication, which was introduced by Alderman McClelland, was killed by a vote of eleven to twelve, and then Councilman W. F. Buchanan moved that the paper be referred to the ordinance committee. Before a vote was taken on the Buchanan motion, Mr. McClelland moved, as a substitute, that it be referred to the 1919 Council. He stated that he had received a message from Mayor-Elect J. L. Key, asking that the rate-increase matter be held up, and that Mr. Key had valuable information on the subject. Mr. McClelland declared he could see no reason why the new administration should not handle the matter.

Ignorance Admitted

Alderman Johnston moved that President S. Arkwright be extended the privilege of the floor.

Councilman Orme seconded the Johnston motion, and Councilman Ed. Mincey arose to a point of order, appealing to the chair for a ruling upon the question as to whether or not motions to refer, of which two were before the house, did not take precedence over other motions. The city attorney, however, ruled that the privilege of the floor of the Council could be extended to President Arkwright, provided there was no objection. Alderman McClelland then made it known that he would object. As the unanimous consent of the Council is necessary in order to allow anyone to speak on the Council floor, this killed the effort to allow Mr. Arkwright to be heard.

The wage increase to the Atlanta men by the War Labor Board was reviewed in the ELECTRIC RAILWAY JOURNAL for Dec. 14, page 1062. The board addressed the Mayor and Council in regard to the need of more revenue by the company.

Interurban Case Postponed

Following a three-day session of the State Railway Commission of Kentucky investigating charges of unlawful increases on the seven interurban lines operated by the Louisville Railway and Louisville & Interurban Railroad jointly, the hearing was adjourned until Jan. 9, on account of a request for an itemized statement of the material which made up the $4,000,000 that the company claimed went into the construction of the original lines.

Des Moines Unremitting

The controversy over fares between the Des Moines (Iowa) City Railway and the City Council stands in the situation that the city has refused the company's request for the increase and the company advises that there is nothing left to do but await receivership, referred to elsewhere in this issue.

The last appeal of the company to the Council for relief was made on the grounds of the section of the franchise which provides that the Council has authority to fix rates high enough to cover interest, depreciation and operating costs.

This request was referred by the Council to the Corporation Counsel, who advised that the Council was powerless to act in the matter. Corporation Counsel H. W. Byer's reply to the Council was as follows:

"The question involved was fully considered by this department in the early part of this year and on June 18 a communication was sent to your honorable body in which among other things it was said:

" 'In the absence of a statute making it the duty of the City Council to fix and determine reasonable rates of fare for street railways, or some provision in the franchise authorizing it to modify or change the terms of the contract with respect to fares, the Council would be without the power to suspend or change any of the rates of fare.'

"There is no such statute nor is there any such provision in the franchise contract, hence it follows that the Council is without legal authority to grant the application now before your honorable body.

"Since the communication above referred to we have made further examination of the decisions of the courts of last resort of the country, and all of them, so far as the question is dealt with at all, confirm us in the opinion we gave in June.

"We, therefore, without further comment, recommend that the application of the company be denied and return the same herewith."

Dallas Changes Carried Out

City Commission Proceeds to Put Beeler Recommendations Into Effect With Modifications

The recommendations of John A. Beeler for improving electric railway traffic in Dallas, Tex., are being adopted by the City Commission with certain changes and modifications. The main feature of the report, crosstown service on all the principal lines of the Dallas Railway, has been adopted by the city and is being carried out wherever possible. The company is now at work placing new curves and other track work that will make possible the inauguration of other crosstown service.

Abandonment Opposed

The abandonment of the Henry-Nettie end of the Hickory Street line, as recommended by Mr. Beeler, in connection with the crossing of the Hickory lines, has brought many complaints, and the commission has asked that a shuttle car be operated on that part of the line on which abandonment was recommended, the shuttle service extending from Hickory and Nettie to Henry and Commerce. The Supervisor of Public Utilities has been instructed to see that this service is instituted and maintained, with transfer at both ends of line.

New Feed Lines Planned

Mr. Meriwether, general manager, said that new feed lines were now being strung in Oak Cliff to furnish power needed to operate the increased number of cars on the Tyler line.

Mr. McCarter Promises Improvement

Thomas N. McCarter, president of the Public Service Railway, Newark, N. J., has made the following statement concerning the service of the company's lines:

"With the cancellation of war contracts and the demobilization of army and navy forces enough man-power will shortly be available to enable the Public Service Railway to restore service to the highest point of efficiency it had acquired previous to the war. It is admitted that the service is not what it ought to be. It is not what the company would like it to be, nor what the company purposes to make it as rapidly as conditions will permit.

"For nearly two years the company has been laboring under handicaps the magnitude of which the riding public has had no real conception. Every effort is being made by the operating offices to hasten the return of normal conditions. In the meantime the company's patrons are respectfully asked to bear with it, as the problem it has to deal with is a most difficult and perplexing one."

Complaints against service in New Jersey have perhaps been most insistent at Camden, where industrial activity reached stupendous bounds.

Transportation News Notes

Skip Stops in Louisville Go.—The skip stop has been abandoned by the Louisville (Ky.) Railway at the request of Mayor Smith.

New Bedford Line Wants More.—The New Bedford & Onset Street Railway, New Bedford, Mass., has filed with the Public Service Commission of Massachusetts notice of an increase in fares from 7 cents to 8 cents, to become effective on Jan. 11, 1919.

Tokens in Boston.—The trustees of the Boston (Mass.) Elevated Railway have ordered 5,000,000 metal tokens to make easier and more complete the collection of the 8-cent fare. With the introduction of the tokens the company will return the cash boxes to the cars.

Six Cents in Missoula.—An order was issued on Dec. 6 by the Montana Railroad and Public Service Commission authorizing the Missoula Street Railway to increase rates from 5 cents to 6 cents and to abolish special round-trip reduced rates to out-of-city points. The new rates were to become effective on Dec. 15.

Still Operating at Five Cents.—The Mobile Light & Railroad Company, Mobile, Ala., reports that the supplementary list of fare increases published in the ELECTRIC RAILWAY JOURNAL for Dec. 7 was in error with respect to that company, which was reported as operating at a 6-cent fare. The company in Mobile is still operating at a 5-cent fare.

Rhode Island Hearing Dec. 20.—Attorneys representing the various cities and towns which have appealed from the decision of the Utilities Commission of Rhode Island, granting the Rhode Island Company an increase in fares, and of the company, recently agreed that when the matter came up on Dec. 16 in the Supreme Court they would ask for a continuance to Dec. 20.

Rockford Interurban Fares Fixed.—Fares on the Rockford & Interurban Railway, Rockford, Ill., will be increased to 2.6 cents a mile, when tickets are bought, and to 3 cents a mile when passengers board cars without tickets. The fare of 2.6 cents will, of course, be charged passengers without tickets, who board cars at stations where there are no opportunities to purchase tickets.

Suspension Threat Put Into Effect.—The Sherbrooke Railway & Power Company, Sherbrooke, Que., carried into effect on Nov. 30 its threat to abandon service, the City Council not having agreed to an increase in fare. Three days later, however, service was resumed, a compromise having been arranged under which the company will operate for five months at a 6-cent fare with five tickets for 25 cents.

St. Albans Agrees to Seven Cents.—At a special meeting of the City Council of St. Albans, Vt., on Dec. 9 it was voted to release the St. Albans & Swanton Traction Company from its obligation to limit the fare within the city to 5 cents and to give permission to the company to charge a fare not to exceed 7 cents. A City Council resolution adopted before the road was constructed has limited the fare to not to exceed 5 cents.

Mayor Wants Skip Stops Abolished.—Mayor Charles T. Baumann in a letter to A. D. Mackie, general manager of the Springfield (Ill.) Consolidated Railway, has threatened to use the police force of the city, if necessary, to compel the company to abandon skip-stop operation. Mr. Mackie is reported to have said that skip stops, installed after government instructions, will not be abolished except on order of the government.

Sioux City Opposed to Skip Stop.—Citizens of Sioux City, Iowa, are demanding the elimination of the skip stop plans by the Sioux City Service Company. Only a few weeks ago the City Council adopted an ordinance providing for stopping cars outside of the business districts only at alternate blocks but with the coming of winter opposition to the plan has arisen. Councilman Mann has introduced an ordinance repealing the skip stop measure.

Cedar Rapids Referendum on Dec. 17.—In Cedar Rapids, Iowa, the Iowa Railway & Light Company felt the absolute need of an increased fare. A commission was appointed made up of members of the Chamber of Commerce, representatives of labor and leading citizens. They went into the question of earnings and expenses and reported to the City Council in favor of a 6-cent fare. The Council then named Dec. 17 as the date for an election where the decision might be ratified or rejected by the people.

Step Toward Richmond Increase.—With President R. Lee Peters casting the deciding vote, the Common Council of Richmond, Va., recently adopted the measure authorizing an increase in fares for the Virginia Railway & Power Company in Richmond, Va. The measure now goes to the Aldermen for concurrence or rejection. The resolution adopted merely provides for the advertising of the proposed change in the franchise permitting the increase. The advertisement is designed simply to notify the public that the Council is preparing to act.

St. Louis Wants Action Soon.—An early hearing on the petitions for an increase in revenues for both the city and county lines of the United Railways, St. Louis, Mo., has been requested of the Public Service Commission by the president of the company, Richard McCulloch. Accompanying a letter to the commission, containing this request, Mr. McCulloch sent a table which estimates that for the year ending Dec. 1, 1918, the company will face a deficit for city and county lines combined of $1,664,280. This estimate is the amount by which, it is said, present revenues would fail to meet the costs of operation and a 6 per cent return on investment.

Six Cents for Rockford.—As a result of its inquiring into the matter of increased fares for the Rockford (Ill.) City Traction Company the Public Service Commission of Illinois found that a fair value for the property was $1,312,500 and the reasonable rate of return should be 7 per cent and that the sum of $30,000 should reasonably care for the annual depreciation, with the operating expenses in 1919 estimated at $495,675. The commission authorized the following fares: Cash fares, 6 cents; ticket fares, to be sold by conductors and at company's office, nine tickets for 50 cents; school tickets, good on school days between 8 a.m. and 5 p.m., forty for $1. The company is required to file ten days after the close of each month a statement showing, not only its operating revenues, but its non-operating and all other revenues and expenses.

Scranton Case to Go to Commission.—Efforts on the part of the Scranton (Pa.) Railway on Dec. 6 to have the city compromise and withdraw its fare complaint against the company fell flat and both sides admit that they have gone as far as they can in the matter and are now willing to leave the whole thing with the Public Service Commission. The company will continue to charge the 8-cent fare and issue rebate slips until the commission makes its ruling. A representative of the city said: "Our lowest offer is not low enough for the company and the company's highest offer not high enough to reach our lowest." The matter was characterized by both sides as just a case in which there was an honest difference of opinion as to the issues involved.

Withdraws Application for Election.—The Memphis (Tenn.) Street Railway has withdrawn its application made to the City Council for an election to secure permission to raise fares to 6 cents. Prior to this action by the company the election had been tacitly agreed to and the date almost fixed. About this time there arose a popular demand for guarantees as to service and commutation tickets in books of 25 or 50-cent values. The company contends that it is giving the best service possible at present fares. It has recently increased the pay of employees to a new schedule, and has thus added still further to its burden of increased operating cost. Meanwhile the city is considering the matter of annexing the town of Binghampton and other outlying districts. The population of Memphis would thus be increased by about 35,000. Some of the places that it is contemplated taking over and making part of Greater Memphis are not now reached by the lines of the Memphis Street Railway.

Personal Mention

New P. R. T. Vice-President

Mr. Tulley to Have Charge of Welfare and Public Relations—Messrs. Ellis and Davis Advanced

Herbert G. Tulley has been elected vice-president of the Philadelphia (Pa.) Rapid Transit Company in charge of welfare and public relations. This is a new position created by the board of directors on Dec. 16. Mr. Tulley will supervise the administration of the co-operative plan of 1918. He was one of the principal aides of President T. E. Mitten in perfecting this plan, which has the indorsement of the National War Labor Board and so far of 92 per cent of those working in the service of the company.

Mr. Tulley is forty-six years of age. He received his early training in the British Army, and was honorably discharged after seeing years of service in India. He received his first training in street railway matters under T. E. Mitten on the Chicago City Railway and was brought to Philadelphia when the Stotesbury-Mitten management took hold. His task in Philadelphia since 1911 has been to instill into the minds of the conductors and motormen an abiding faith in the good intentions of the management which he represents. At the hearing of complaints made to the Public Service Commission, relative to the insufficient service of a year ago, when both men and materials were unobtainable, Mr. Tulley so impressed both the complainants and the Public Service Commission by his frank and outspoken manner as to have been one of the greatest of all factors in securing a decision most fair and generous to the company.

HERBERT G. TULLEY

As part of his new duties Mr. Tulley will endeavor to make clear to the several inquiring business and improvement associations the true purpose and intent of the management which he represents.

F. B. Ellis was elected secretary of the Philadelphia (Pa.) Rapid Transit Company, and G. W. Davis was elected treasurer of the company by the board of directors at the meeting on Dec. 16 to fill the positions of secretary and treasurer made vacant by the sudden death of R. B. Selfridge. Mr. Ellis was formerly assistant secretary and Mr. Davis was formerly assistant treasurer. Both of these gentlemen have been in the employ of the company since its organization, their term of service with the street railway system of Philadelphia extending back to the underlying companies.

Alfred Raworth, electrical engineer for the South-Eastern & Chatham Railway of England, has arrived in this country to study American practice as applied to steam road electrification. The South-Eastern & Chatham Railway officials contemplate electrifying about 450 miles of track on their lines running to London.

F. L. Hinman has been appointed mechanical engineer of The Sheffield Company, Sheffield, Ala. This company, which is under the management of The J. G. White Management Corporation, New York City, furnishes railway transportation, electric light and power, and water service in Sheffield, Tuscumbia and Florence, Ala. For a number of years Mr. Hinman was master mechanic of the New York State Railways, Syracuse lines. He left the employ of that company in the early part of this year, to become associated with the United States Ordnance Department, with headquarters at Watervliet arsenal, Watervliet, N. Y., in which service he was engaged up to the time of his present appointment. Mr. Hinman entered electric-railway work as a shop apprentice in Syracuse.

J. W. Welsh, recently on the staff of A. Merritt Taylor, manager of passenger transportation of the Emergency Fleet Corporation of the United States Shipping Board, has become connected with the American Electric Railway Association as special engineer to conduct studies and investigations of special subjects. He will have charge of the information service of the association and will be located in New York. Mr. Welsh entered upon his duties on Dec. 16. Before he was called to Washington by Mr. Taylor to assist the government, Mr. Welsh was electrical engineer and traffic agent of the Pittsburgh (Pa.) Railways, with which he became associated in 1906 as assistant electrician. In 1910 he was made electrical engineer and in 1913 took charge of the traffic department of the company. Prior to this time he was employed as an electrical engineer by the National Tube Company, Wheeling, W. Va., and also by the Westinghouse Electric & Manufacturing Company at East Pittsburgh. He was graduated from Wittenberg College in 1900, Harvard University in 1901 and Massachusetts Institute of Technology in 1903. Mr. Welsh assisted on Mr. Taylor's staff in providing transportation facilities and abating deficiencies, where such existed, to the various shipyards on the Atlantic and Pacific Coasts. Since 1914 he has been chairman of the power generation committee of the American Electric Railway Association.

Obituary

Henry Mueller, division superintendent of the surface lines of the Brooklyn (N. Y.) Rapid Transit Company operated from the Ninth Avenue depot, is dead. Mr. Mueller entered the service of the company as a conductor about nineteen years ago. He was promoted to inspector and then dispatcher, when he was transferred from Ninth Avenue to the Canarsie depot. A short time later he was appointed depot master at East New York. His next promotion placed him in the position of assistant superintendent at Flatbush depot. Then after a lapse of almost nineteen years Mr. Mueller was made division superintendent at Ninth Avenue.

Robert Brown Selfridge, secretary and treasurer of the Philadelphia (Pa.) Rapid Transit Company since the formation of that company, president of four of the underlying companies of the Philadelphia Rapid Transit System, secretary and treasurer of thirty-eight companies and secretary of one company, died on Dec. 11. Mr. Selfridge was born in Philadelphia on June 17, 1852. He was educated in the public schools of that city and entered business in 1869 with Wilson, Anderson & Sinnett, wholesale drygoods merchants. He went to the Pennsylvania Railroad in Philadelphia in 1872 as clerk in the auditor's department, division of freight and receipts, and continued in that department in various capacities until Jan. 1, 1889. While still in the employ of the Pennsylvania Railroad he audited the books of the Lombard & South Streets Passenger Railway and on Jan. 1, 1889, was elected secretary and treasurer of the railway. In addition to his duties with the railway he was also auditor of the People's Passenger Railway and of the Omnibus Company General. He continued in an official capacity upon the consolidation of the various street railways in Philadelphia until July 1, 1900, when he was elected secretary and treasurer of the Union Traction Company which had taken over all of the lines in the city.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Second-Hand Car Market Quiet

Cars Which Were Needed for Cantonment Service Are Finding Their Way Back Again

When the country went on a war footing, camps and cantonments sprang up overnight and cars were needed quickly for the transportation of troops. As they could not all be built in time the second-hand car came in great demand and every available car was pressed into service. Prices began to climb as demand increased and from the usual or normal price of $1,500 it soon reached $3,000 and in some cases $4,500. Some of these cars after extremely hard service are now being returned to the market.

As a result stocks of cars on hand are much better although they are still only fair. Prices are about double the normal basis. The market is so delicate, however, dealers state, that if any sudden influx of cars should appear prices would immediately sag. This is considered most unlikely, however. The large railway systems, the natural feeders of the second-hand supply, as well as the smaller roads, are husbanding their rolling stock by repairing and remodeling old cars if at all possible.

So far as could be learned, there are but few inquiries for used rolling stock at the present time, but the situation is being viewed optimistically.

Ban on Rattan Imports Lifted

Car Seat Manufacturers Have Plentiful Stocks on Hand but Importers' Stocks Depleted

Rattan, which was placed on the restricted import list on July 26 by the War Trade Board is once again, by a recent ruling of the same board, admitted to importation as reported in last week's issue of the ELECTRIC RAILWAY JOURNAL. Early in the war car-seat manufacturers stocked up heavily on rattan and at the time the restrictions went into effect had heavy shipments en route to the United States. It is estimated that they still have on hand at least six months' supply. Demand therefore at the present time by car-seat manufacturers is very quiet.

The general market, however, is bare of supplies. Importers are practically sold out and incoming supplies being dependent wholly upon shipping facilities are most uncertain. Prices remain at about the same high level they reached in October, namely around 40 cents per pound, which is an increase of almost 200 per cent over normal. Increased imports, which must begin coming in soon, will undoubtedly cause the price of the raw products to go to a lower level.

One of the largest dealers in sweeper rattan reported this week that there was no inquiry at all from the electric railway companies and that stocks on hand are exceedingly low. The first snowstorm will probably quicken the demand. It is a well-known fact that street railway companies as a rule do not purchase equipment and material to combat winter storms until the storm actually arrives, when they are insistent upon immediate delivery.

Active Demand for Jacks

European and South American Railways are Buying in Large Quantities—Supplies Plentiful

Jacks for railway repair work are in excellent demand. Business along these lines usually shows up strongest in March and September when the companies get in their supplies to carry them through the summer and winter.

This year, however, the demand has been steady and insistent for domestic use and for export; to quote one of the largest producers, "all they could possibly handle."

Owing to the impossibility of obtaining any new rolling stock either in Europe or South America during the past two years, repair work has been carried to an extent probably never before reached, and all styles of jacks have been and still are a necessity.

Stocks on hand are good and shipments from factories prompt. Prices in the past year, it is reported, have advanced about 10 per cent.

New General Manager for Portland Cement Association

The Portland Cement Association announces the appointment of William M. Kinney as general manager to succeed H. E. Hilts, resigned. Mr. Kinney has been connected with the cement industry in cement and concrete promotion work for more than eleven years, having occupied for the past four years the positions of engineer of the promotion bureau and inspecting engineer of the Universal Portland Cement Company. He has been particularly active in the work of the American Society for Testing Materials, being vice-chairman of Committee C-1 on cement and a member of the executive committee

Leasing Arrangement for Economy Meters

Recently Adopted as an Optional Plan for Users of These Energy Checking Devices

The Economy Electric Devices Company, Chicago, has put out in several cases recently a rental plan for those who prefer to lease Economy railway meters rather than to buy them. The plan is based on the use of at least fifty meters. The company supplies its regular engineering service in inaugurating the energy-saving campaign and establishes the record-keeping follow-up system as where the meters are purchased; it also supplies extra parts for maintenance. The railway company installs and maintains the meters.

The contract is for a definite period of three years with privilege of continuation at a reduced rate, with rentals payable monthly, with a 5 per cent discount for prompt payment each month. The contract includes a cancellation clause which is effective after twelve months' rental has been paid. The rate of rental is determined by the average selling price of the meters, for any given installation, and varies with the size of the meters, whether they are alternating current or direct current, whether for cars or locomotives, etc. A sample rental would be:

First year.....	6½ cents per day per meter
Second year...	6 cents per day per meter
Third year....	5½ cents per day per meter
Thereafter	5 cents per day per meter

In this particular case, provision was made for the outright purchase of the meters and automatic termination of the rental contract on any anniversary as follows:

Purchase price first anniversary....	$46.75
Purchase price second anniversary..	38.50
Purchase price third anniversary....	30.25

In comparison with an outright purchase, the manufacturer of course must plan on receiving back the meters at the end of the contract, and the depreciation on them after three years of use would probably be greater for the manufacturer than for the railway, because the manufacturer would have to turn them back into the shop and rearrange them for the requirements of some other road, while the railway could keep on using them. More bookkeeping is also required and working capital is tied up with a lease. On the other hand, the manufacturer claims a number of advantages for some companies in a plan of this kind, notably it permits a road at once to begin realizing on car energy savings without making additions to capital account.

Reduction in Stocks Urged

Purchasing Agent Advises Adjustment so Advantage Can Be Taken of Drop When it Comes

If there ever was a time when utilities should economize and reduce stocks on hand it is now, according to W. H. Smaw, head of the purchasing department of the Georgia Railway & Power Company, Atlanta. Mr. Smaw takes the position that railways should be so placed as to be able to take advantage of lower prices when they come.

"Sooner or later," said Mr. Smaw in a recent statement, "there is bound to be a reduction in prices. Just when, nobody can say. It may be six months, a year, or two years, but it is coming. And we must not be caught with an accumulation of high-priced stock on hand.

"If the materials and supplies we require become lower in price we must be in a position to take advantage of the drop.

"The government is gradually lifting the priorities restrictions and war contracts, except in shipbuilding, and this will release materials that we need or shall need. Shipping conditions are bound to improve, and we can then expect reasonable deliveries. So there will be no reason to order a year's supply for protection, and we can buy for two or three months instead.

"For these reasons, all purchases should be passed on by the purchasing department with relation to quantity before the order is placed."

Receiver for Jewett Car Company

The Jewett Car Company, Newark, Ohio, builders of street railway cars, has gone into the hands of a receiver. No statement of assets and liabilities has been given out. The company has been in operation in Newark for about twenty years and employed several hundred men. W. S. Wright, president of the company, in a statement to the creditors dated Dec. 12 said:

"This company after having gone through the strenuous war-time period and having experienced all of the labor and material difficulties necessarily entailed by war conditions, which prevented efficient or profitable manufacturing, is now in the position of having a very large volume of profitable contracts, approximately $400,000.

"Due, however, to the lack of running capital, necessary to execute these contracts and to the difficulty of financing at the present time, some of the largest creditors, after an investigation, have thought it advisable to have a receivership to preserve the goodwill, property and assets of the company and to complete the contracts on hand and continue the business."

William C. Miller, Newark, Ohio, has been appointed receiver.

Market for Armature Coils Good

Manufacturers Have Fair Stocks and Shipments Can Be Made in Two Weeks

Nearly a year ago the larger railway systems began placing their orders ahead for motor repair parts and particularly for extra coils. The disastrous experiences of last winter showed the wisdom of this.

The demand for armature coils is steady and good and the railways are now in a position to make their repairs promptly from supplies on hand.

A representative of one of the largest manufacturers stated that his company had foreseen the large demand for armature coils and had installed additional machinery accordingly which would handle coils for several of the best-known motors. Supplies on hand are good and shipments can be made in lots of 100 coils in two weeks.

Prices of armature coils have advanced in the past two years approximately 70 per cent due principally to the advance in copper.

The Owensboro (Ky.) City Railroad is remodeling a number of its cars and is installing new motors of a more modern and higher-powered type. A contract has been placed in the East for most of the necessary equipment.

Track and Roadway

New York, New Haven & Hartford Railroad, New Haven, Conn.—The entire classification yards of the New York, New Haven & Hartford Railroad are to be electrified and while the work is under way the temporary supports for the electric system from the west cut northward are to be replaced by permanent supports of steel. The contract for the job has been let and the contractors are preparing to start at once on a job that is expected to take at least two years. The change from steam to electricity will be made in the Cedar Hill district. A considerable amount of steel work will be required to carry the wires of the electric system to New Haven, and in the region of the new station the steel work will be of an elaborate nature, spanning many tracks. In the Cedar Hill district the electric system probably will be extended as far as the East Haven tunnel and to North Haven station on the Hartford district. A northward extension will enable the road to electrify the new branch from Montowese across to North Haven. A new power house will probably be constructed in connection with the extension of electricity.

Rockford City Traction Company, Rockford, Ill.—The Public Utilities Commission of Illinois has ordered the Rockford City Traction Company to extend its double track in Seventh Avenue from its southern terminus just north of Third Avenue, a distance of 1350 ft., making turnouts and connections with the present tracks on Fourth Avenue and Fifth Avenue and to extend its double tracks on Seventh Street from the terminus of its passing tracks just north of Ninth Avenue, a distance of approximately 750 ft., to Eleventh Avenue, the construction of same to comply with the ordinance of the City of Rockford and be installed and ready for use not later than Jan. 1, 1920, provided, that all necessary consents, if any, to be granted by the City of Rockford, have been granted by May 1, 1919.

Brantford (Ont.) Municipal Railway.—The electors of Brantford will shortly vote on a by-law for $125,000 for the construction of an extension of the Brantford Municipal Railway to Terrace Hills.

Texas Electric Railway, Dallas, Tex.—A period of substantial development for north Texas was forecast by J. F. Strickland, president of the Texas Electric Railway and the Dallas Railway. Mr. Strickland had just returned from a trip to New York, where he had gone in connection with financing projects soon to be undertaken by his companies in Texas. Although Mr. Strickland declined to announce plans for immediate construction of new interurban lines out of Dallas, it is known that his company is contemplating such new projects. Mr. Strickland said new lines undoubtedly would be built from Dallas to Denton, Gainesville, Terrell, and Greenville.

Power Houses, Shops and Buildings

Arkansas Valley Interurban Railway, Wichita, Kan.—A new station and shops will be built by the Arkansas Valley Interurban Railway at 120 First Street, Wichita.

Ardmore (Okla.) Electric Railway.—It is reported that the Ardmore Electric Railway proposes to construct a new power plant in connection with the construction of a new electric line.

Philadelphia, Pa.—Bids will be received by the Department of City Transit of Philadelphia about Jan. 1 for the construction of two 20 ft. x 60 ft., brick and steel passenger stations on the new Frankford Elevated Railway at Alleghany Street and two at Somerset Street, to cost about $15,000 each. The Department of City Transit plans to build 20 ft. x 60 ft. brick and steel passenger stations on the Frankford Elevated Railway as follows: Two on Torresdale and Kensington Avenues, two on Tioga Street and Kensington Avenue, one on Front and York Streets, one on Front and Dauphin Streets, two on Front and Berks Streets, two on Front Street and Girard Avenue, one on Front Street and Fairmont Avenue and one on Front and Green Streets, to cost about $15,000 each. H. Binswanger, Bourse Building, architect.

Montreal (Que.) Tramways.—The contract for alterations and additions to the carhouse of the Montreal Tramways has been awarded to the Metal Shingle & Siding Company, Ltd., Montreal, at $29,000.

Trade Notes

American Transformer Company, Newark, N. J., has moved into its new and larger factory at 178-182 Emmet Street, just two blocks northeast of its former location.

O. E. Quinton has resigned his position of vice-president and general manager of the Peter Smith Heater Coompany, and after Jan. 1 will become associated with Walter E. Hinmon, who has recently resigned as sales manager of the Cooper Heater Company. They will form a new company to manufacture car heaters. An announcement of the plans and personnel of the new corporation will be made shortly.

Arthur Power Saving Recorder Company, New Haven, Conn., announces that within the past week an order has been received for the complete equipment of one large property involving several hundred cars. It has also received several smaller orders. The demand for power-saving recorders in the opinion of the company, is reflecting the need which street railways have of economizing in order to meet the present high cost of operation.

New Advertising Literature

Dearborn Chemical Company, Chicago, Ill.: A twenty-four-page booklet, telling of the success that has followed the use of the company's No-Ox-Id as a preventive of rust and corrosion of iron and steel, as well as describing other Dearborn specialties used in manufacturing processes.

Greenfield Tap & Die Corporation, Greenfield, Mass.: Catalog No. 40, a new 288-page publication of the small tool division. Superseding Catalog No. 37, the new catalog, which is well illustrated, gives descriptions and prices on taps and dies, screw plates and reamers, as well as continuing a number of pages of useful information and tables. While this catalog is about 4⅝ in. x 7¼ in. in size, a pocket edition is being supplied to jobbers and dealers for general trade distribution.