Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 57 New York, Saturday, February 19, 1921 *Number* 8

It Pays to Keep Railway Shops Looking Neat

THERE is nothing novel in the suggestion that better work is done amid orderly surroundings than in an atmosphere of slovenliness. It is worth while now and then, however, to tighten up a little on the discipline which is necessary if shops, carhouses, grounds, etc., are to be kept in presentable shape.

A visitor to an electric railway property usually wants to go out to the shops in order to find out what is actually going on. He gains a concrete idea of the general management of the property from the appearance of the shops. No matter if the front office looks like a national bank, the shop, after all, tells the real story.

But it is not the effect on visitors which is the most important, but rather the effect on the men themselves. Neat surroundings conduce to the production of good work, and to pride in that work. During the war there was some excuse for a let-down in the matter of tidiness, but now that labor conditions are becoming normal the old spirit of craftsmanship and general neatness ought to return.

A new broom and a pot of paint will accomplish wonders.

Applying an Important Factory Principle in the Shop

IN REPLY to a question as to the number of men per car maintained that he considered necessary for a properly balanced shop organization, a prominent railway engineer stated that this depends to a large extent on the shop arrangement, the shop methods used and the machinery available for making repairs. He was undeniably right. The workman is but one link in the chain of equipment maintenance. A convenient shop arrangement will do much to lessen manual labor and so to reduce the number of men needed for carrying on the work.

The present condition of most electric railway properties is such that every conceivable means should be used to increase the productive capacity of the shops and to decrease the number of men necessary for operating the various machines and for making repairs. If money is not available to purchase all of the new tools and shop machinery at once, a more efficient arrangement of the machinery already on hand is worth careful consideration. Such factors as reducing the number of times that an armature must be handled in removing it from the truck shop and placing it in position in the armature room for repairs should be studied. A slight rearrangement of shop tools so as to bring wheel presses and wheel lathes between two outside doors of a shop enabled one railway to bring wheels and axles in at one door, to carry out the various operations in mounting and turning and to deliver them when finished through the other door to a platform ready for transportation to other shops of the system. The number of times that the parts were handled and the manual labor necessary were reduced and the work was speeded up considerably. A careful study of shop layouts and shop methods will assist in providing good workmanship at low unit costs and assist in carrying the railway over the present business depression.

A Thrift Suggestion—Treat the Poles to a Preservative

SOME one has said that decay destroys 95 per cent of all wooden poles, that insects and birds eat up another 4 per cent and that mechanical forces and miscellaneous causes dispose of the remainder. If these figures and accuracy are even only distantly related, something like 4,000,000 poles each year fall victims to the fungi which cause decay. Now the Forest Service states that in something like a half century, if present pole consumption is maintained, the wooden pole will be as extinct as the dinosaur. All the more reason then that distribution engineers and railway administrators should give attention to timber preservation.

During the spring and early summer of last year poles of all kinds were difficult to obtain at any price. Inadequate transportation and unsatisfactory labor conditions back in the woods made pole stocks practically non-existent even in the big pole yards of the Northern, Middle and Far West. This condition gave us a glimpse of what the pole situation will be a generation hence with our pole timber reserves depleted. While conditions in the pole market are much better than they were a year ago, it is certainly high time now for all prospective pole buyers to be estimating their next season's requirements and making plans as to preservative treatments.

A recent investigation in the Middle West indicates that from 60 to 70 per cent of the poles now being set receive some form of treatment or other. While this seems like a fair percentage at first glance, it is altogether too small when the available supply of pole timber is taken into account. It is true that very few treated poles have been in service long enough to render accurate data on increased life available. It is also true that there are about as many kinds of preservatives and methods of treatment as the proverbial "fleas on a dog." All of which tends to the confusion of the average distribution man who is not a timber preservative expert.

While some of the prominent communication companies and utility associations have formulated standard specifications for pole treatment, the whole problem is of such recent origin it is not an assured fact that these specifications lead to the best possible results and as a whole standardized practices have not been firmly and widely established. Nevertheless it is certain that good preservatives properly applied do greatly increase pole life and, therefore, that all poles should be treated,

the general principle of conservation alone being a sufficient reason. But with construction costs where they are today it is not necessary to go to the realm of ideals to "prove in" the case for preservation. When the problem is figured out in dollars and cents it is seen to be cheaper to use properly treated poles than untreated poles. This is especially true where, as is often the case, the cost of the new pole is only a fraction of the total cost of replacement. While the best practice and the best preservative may still be in the making, information which will make it possible for the average distribution man to secure good results can be found in the publications of the Forest Service and the several engineering experiment stations and timber associations. These sources of information should be utilized to the fullest extent.

The Association Passes Resolutions at the Chicago Conference

THE American Electric Railway Association is to be congratulated on its action at Chicago in adopting, without a dissenting vote, the resolutions with reference to the reports of the Federal Electric Railways Commission and of the special committee on public utilities of the Chamber of Commerce of the United States. This was the outstanding action of the midyear conference. It was the leading object which President Gadsden set out to attain at Chicago. The action of the association in this respect is an answer, or part of one, to the challenge or question outlined by Mr. Wehle in the issue of this paper for Feb. 5. For some reason there was no discussion of the resolutions on the floor of the convention; this was surprising to some, but is probably accounted for by the full discussion of the matter in the special committee and in the executive committee and also by the association members at large which took place previous to the conference.

What the association has done in this regard is to agree within itself that here is a program which will form a basis for meeting with the public. There is established a starting point for working out the details to fit the existing situations, surrounded as they are by various legal, financial, physical and social conditions of the different communities and companies. This is a first step. The industry can profit from it only in proportion as it will capitalize this united action and act in accordance therewith. A full program of publicity, local and national, must be pursued to acquaint the public with the fundamental and just bases of adjusting railway operation and stabilizing railway credit which are pointed out in these reports. The dramatic feature of this action by the railways must not be lost.

Papers Were Good, but Discussion Was Lacking

OTHERWISE, at Chicago, the association itself made no great accomplishment. This would not minimize the wonderful importance of the group of papers presented on the financial situation nor the speeches of Senator Weeks, Mr. Wilkerson and President Gadsden at the banquet in the evening. As Mr. Brady stated in his motion of appreciation to the writers of this series, the association may well be proud of these financial papers. It is to be regretted, however, that there was no open forum discussion of the many interesting topics suggested by them. Thus the thoughts or practices of men from different parts of the country on the questions of home financing, theories of valuation and forms of public aid, to mention only a few of the points brought up in the papers, would have been very helpful. The responsibility in cases of this kind is not entirely on those in charge of the program, but must be borne by the body at large. There is a certain mental inertia in an audience which needs to be overcome, either from within or without. If only some one had started a discussion in Chicago it would undoubtedly have led others to have given their experiences. Probably many attendants at the meeting left for home with the feeling: "Why didn't somebody start something by way of discussion?" forgetting possibly that they should have started the ball rolling themselves. Or if they felt some pricks of conscience, these came too late to be effective. President Gadsden's promise at the close of the Chicago meeting that there will be an active discussion at the October convention is most welcome.

As a matter of fact, the original purpose of the midyear conferences, begun in 1910, was the intimate discussion of economic and financial subjects, which could not very well be taken up during the distraction and in the bustle of the annual convention. The first midyear conferences were executive in their nature to encourage free discussion, and the only scheduled addresses were those given to stimulate remarks from the floor. The meetings have been changed from an executive to an open character, and the rule has been followed to have papers prepared on the subject under consideration. But the presentation of these papers should not monopolize all of the time, and if they are printed in advance, as they were this year, it seems hardly necessary to have them read in full. There should be a return to the original purpose of the midyear meeting, which should be a conference in fact as well as in name.

The 2-Cent Coin Would Prove Costly

ONE other action of the association was to pass a resolution, at the suggestion of T. N. McCarter and C. L. Henry, calling attention of Congress to the immense cost and inconvenience which the adoption of a 2-cent Roosevelt coin would cause the electric railways which use registering fare boxes. In the ELECTRIC RAILWAY JOURNAL for June 26, 1920, the general subject of new coins and their relation to the railways was treated editorially. There is not much to add to what was said then, except, at this time, following this action by the association, to repeat the position taken.

A 2-cent coin at present will satisfy only a sentimental demand. That it would assist any business in any way is apparently not claimed. Admirer though every one is of the great American Theodore Roosevelt, some means of commemoration other than the adoption of a new coin seems more appealing. It would work an expensive hardship on electric railways which would be always present in adding forever another element to coin registering fare boxes. There are, too, other businesses which would likewise be adversely affected wherever coin-receiving devices are used.

The association, it is gratifying to report, has received acknowledgment of receipt of the resolution by the chairman of the committee which is now considering the matter and has been assured by him that the position of the electric railways will receive due consideration.

Decasualizing Platform Labor at Boston

FROM the origin of the street railway industry to the present day an apparently insoluble labor problem has been offered by the fact that the need for platform service is more than doubled for two two-hour periods which necessarily fall within a range of twelve hours or more, if the hours are counted from the time that the cars required in peak-load transportation are taken out to the time they are returned to the carhouse. In the early days, many a company tried to solve this problem by a sort of rule-of-thumb basis rather than on a carefully planned schedule. The result was that the regulars often worked twelve to sixteen hours on the platform, while the extras got such crumbs as they could by hanging around the run board all day and most of the night. With the arrival of a fixed wage for extras and various State regulations concerning platform employment, more thought has been given to greater equalization of the work. In this way, the curse of casual labor has been reduced because the extra man is sure to earn some money every day.

In these days when wages and wage adjustments have suddenly become a very live topic, any radical departures from traditions, especially when they seem to be proving satisfactory to both employer and employee, are worth special study. For this reason it may be well to consider again the labor schedule of the Boston Elevated Railway as described by Edward Dana, general manager of the company, in the Oct. 2, 1920, issue of this paper.

The Boston Elevated Railway, to begin with, had to work out this problem within the restrictions offered by union operation, a guaranteed eight hours a day of platform service and State laws covering the over-all or elapsed period of platform hours and layoff hours. The last restriction, however, may be modified by agreement between union and company. In the ordinary course of events the older, and usually family, men would be willing to work an excessive number of hours, especially where an overtime rate applied. This would react unfavorably on the employment of the younger men from both their standpoint and that of the company; that is to say, the juniors would have fewer opportunities to earn more than minimum pay and the company would have fewer opportunities to get eight hours service per man at the rate for this class.

The management's proposal that all employees be treated as nearly alike as possible presented quite a new point of view to the employees themselves and was subjected to careful scrutiny before acceptance. In practice, however, the result has been to increase the number of employees who work the full eight hours, while the amount of time paid for but not worked to bring about eight full hours for all men is only 8.15 per cent of the total hours and the time paid as overtime amounts to less than one-half of 1 per cent of the total time. This plan has slowed down the turnover materially. The value of such stabilization of employment does not lie merely in the tangible savings that may come from cutting down overtime by the old men and undertime by the young men, but rather in the intangible benefits of the fewer accidents and greater courtesy that follow from higher morale. Finally, the union itself naturally prefers a permanent membership to one constantly changing.

Incidentally, it is interesting to note that the solution reached in Boston, *i.e.*, the increase of the load factor of the men, is the one recognized as desirable in other industries as well, though with them the variations are usually of a seasonal rather than of a daily nature. Typical cases are the clothing workers and coal miners, where efforts to introduce the same remedy, *i.e.*, to increase the average load factor as much as possible, are being made as most satisfactory for employer, employee and public.

Looking at the "Scrap Pile" from a Different Angle

IN CONNECTION with electric railway properties, the term "scrap pile" is used both metaphorically and literally, as was pointed out editorially in the issue of this paper for Jan. 15. There the principal point of view was that of the operator who desires to know when the time has arrived to confide his obsolete equipment to the limbo of the junkman's warehouse. The conclusion was that it is false economy to cling too long to antiquated rolling stock, etc.

There is another point of view from which the scrap pile can be viewed, which appeals especially to the master mechanic. To him the actual physical scrap pile has been a great source of supply during the past few years. The remarkable development of the welding art has made it possible for him to reclaim the old-fashioned junk pile almost entirely. Time was when for a comparatively minor break an entire motor shell or gear case would automatically be scrapped. Now, however, there is very little material that makes its way to the dealer in old metal. And not only so, but many castings or forgings that have been thrown away have been recovered and reinstated in useful work. When the master mechanic has nothing else to do, he studies his scrap pile to see what more he can save, and the men who do the welding will work overtime any day to show how far reaching are the possibilities in applying their skill. The junk pile is, then, not nearly so large as it was five years ago, and in future it will be still smaller. It would disappear altogether if it were not for the fact that there comes a time when it does not pay to repair further. Just when that time is each master mechanic must decide for himself, but there is a profound mathematical law which says in substance, or translated into English, "It does not pay to spend $1.05 to save $1."

Quotation from the Federal Electric Railways Commission Report

No. 8

IT would seem that so long as the railways depend upon earning power, and earning power depends upon passenger revenue, the fixed uniform fare is a broken reed for the industry or for the community to lean upon. Perhaps the general sentiment of the electric railways is best expressed by the evidence of Gen. Guy Tripp before this commission, as follows:

> We were all living in a fool's paradise in the street railway business when we suddenly woke up—when the war woke us up—to find that no business which cannot increase its revenues under any conditions can live or is sound.

Conversely, it may be said that no community should bind itself by contract or otherwise to continue after normal conditions have been restored a rate which might be found reasonable during this abnormal period.

Track Construction in Poughkeepsie

The Double Tracking of a Portion of the Poughkeepsie & Wappingers Falls Railway, Made Necessary by Increased Traffic and Debilitated Track Conditions, Was Carried Out by Using 103-Lb. Grooved Girder Rail with Bolted and Seam Welded Joints, Steel Ties and a Foundation and Paving of Concrete

BY A. J. STRATTON
Superintendent Maintenance-of-Way Eastern Pennsylvania Railways, Pottsville, Pa.

NEW TRACK CONSTRUCTION ON MAIN STREET, POUGHKEEPSIE

INCREASES in traffic and a debilitated condition of existing track led the Poughkeepsie & Wappingers Falls Railway to reconstruct and double track its line on Main Street, Poughkeepsie, from Cherry Street to Grand Avenue, a distance of 3,600 ft. With the single-track construction a headway of eight minutes was maintained during the daytime and one of six minutes during rush hours. This interval could not be decreased, due to the location of turnouts. The track had been built in 1893, of 60-lb. A. S. C. E. rail, at the time that the road was changed from horsecar to electric operation. (See the STREET RAILWAY JOURNAL for November, 1894.) The pavement was brick on a concrete foundation.

A clause in the company's franchise made approval by the city necessary for all track construction in paved streets. The standard of the company for this type of construction was 7-in., 70-lb. plain girder rail, with continuous joints, treated wood ties and 8 in. of grouted rock ballast. The Board of Public Works, with which the power of approval rested, declined to approve the type of construction and insisted upon the use of a grooved girder rail with concrete ballast extending not less than 6 in. below the bottom of the ties.

After several conferences the specifications in brief, as decided upon, were as follows:

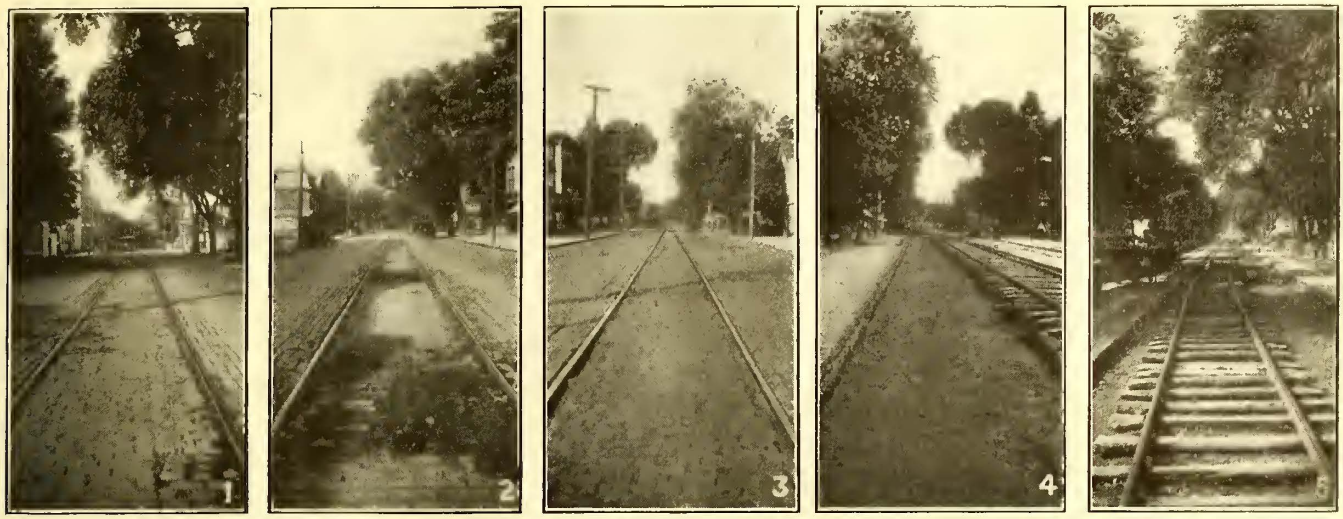
Rail, L.S. 103-478, International steel ties on 6-ft. centers, bolted joints, seam welded by the Lincoln process. Paving foundation and ballast to consist of 10 in. of a 1:3:6 mixture of concrete. Pavement to be of concrete, 6 in. thick, of a 1:1½:3 mixture. The shoulder between the outside rail and the adjoining brick pavement to be relaid with second-hand brick. The pavement and base to be monolithic.

The city assumed responsibility for all concrete work, the company paying for it by assessments covering a term of ten years.

SAVING WITH STEEL TIES

The company's decision to use steel ties was based upon the lower first cost of material and the saving in excavation and concrete ballast, as compared with other construction. The completed work showed a saving of $3.12 per single-track foot, divided as follows: In excavation, $0.63; in concrete ballast, $2.09; in spikes, $0.09; in cost of ties (steel vs. treated yellow pine), $0.31. In order to maintain the service on the existing track it was necessary to remove the pavement from the entire width of the track, to throw the old track to one side of the trench and then to excavate for one new track. A considerable amount of repair work on the old track was necessary, due to broken rails both at and between joints, probably caused by crystallization. In the making of these repairs it was found very economical and expedient to use an oxyacetylene outfit for cutting out broken joints. Gas was used for burning the bolt holes as well as for cutting the rail and it was possible to substitute a short piece of rail for a broken joint in ten minutes. Passing sidings had to be maintained for cars. This was accomplished by using existing special trackwork by constructing temporary stub end sidings

[EDITORS' NOTE.—Mr. Stratton, the author of this article, was in charge of the work described.]



1, 2 AND 3—APPEARANCE OF TRACK BEFORE RECONSTRUCTION WAS STARTED. 4 AND 5—PAVING REMOVED AND TRACK SHIFTED TO THE SIDE

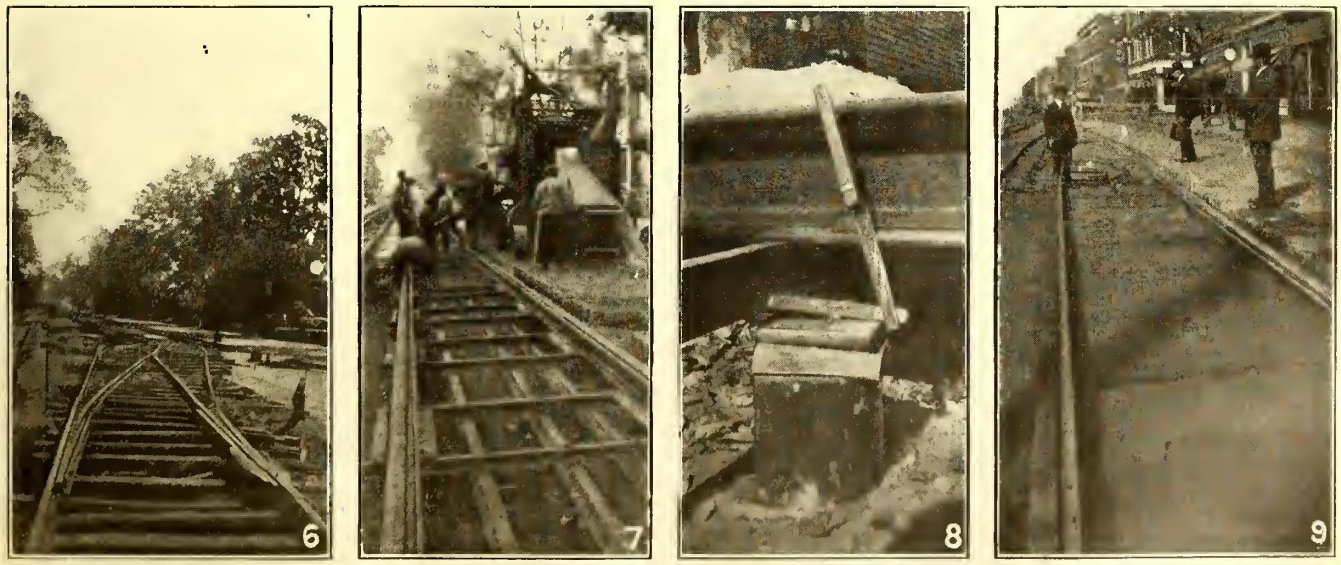
on the pavement and by using a portable crossover rented from another company.

All excavating was performed by pick and shovel, the excavated material being hauled to adjoining dumps by team and dump wagon. The subgrade was rolled with a five-ton roller in accordance with the specifications of the city engineer. This was most useful in compacting the back fill over trenches dug by others to repair sewer, water and gas connections prior to construction of the new pavement. The ballast over these openings and over "soft spots" in the subgrade was reinforced by laying three parallel lengths of 60-lb. T-rail under the steel ties.

A shortage of track bolts due to non-delivery made necessary the use of but two bolts in the joint plates in portions of the new track over which cars were operated prior to concreting. This was responsible for the cold rolling of the head of the rail at the joint and made necessary the filing away of the lip so formed. Actual track laying proceeded rapidly as the accurate punching for the clips in the steel ties made gaging unnecessary. Preceding the pouring of the concrete ballast and pavement by twenty hours a section of track was blocked to surface, lined and the joint plates welded. The blocks were of white oak with the bark removed, 6 in. long and 5 in. in minimum diameter. Four of these were placed under alternate steel ties. Prior to the blocking of the track the joint plates were loosened and the rail bucked back so that a close joint might be obtained.

PLATES WELDED AT TOP AND BOTTOM

The joint welding was done with a Lincoln type W machine. A seam was welded at the top and bottom of the 30-in. plates. Each steel joint tie was welded to the rail and the members of the tie were welded so that a crossbond was provided at each joint. The concrete ballast and paving were placed by a contractor under the joint supervision of the city and company. The ballast and paving foundation, 10 in. in thickness, was poured for half of the total trench width, and the 6-in. surface poured for the area between the rails of the first track. The company furnished two men to assist the contractor's force in securing proper tamping of the ballast about the steel ties. The tools used were an ordinary tamping bar and an ice chisel, such as is used for the removal of ice from sidewalks. The latter tool was particularly effective in forcing the con-



6—TEMPORARY TURNOUT CONSTRUCTED ON TOP OF PAVING. 7—OLD RAILS WERE USED AS REINFORCEMENT OVER SOFT SUB-BASE. 8 AND 9—EFFECT OF EXPANSION ON TRACK AND CONCRETE BALLAST DISPLACING CONCRETE FOUNDATION

crete under the bearing plates of the steel ties. The concrete was mixed with just enough water to permit the mixture to discharge freely from the mixer.

On the day preceding that on which the contractor started to pour the base several hundred feet of track were blocked to line and surface. By 3 p.m. the expansion of the rail had pushed many of the ties from their supports, the actual expansion being 3¾ in. By 8 p.m. the track had receded to its original position. It was thought that sufficient concrete could be poured before the October sun became very powerful, to hold the track in position. Such, however, was not the case. By 10 a.m. conditions obtained as shown in an accompanying illustration. Nearly 200 ft. of base had been poured, but a longitudinal movement of more than 1 in. took place through that mass. It was possible, however, immediately to retamp the ties so that no damage resulted from this somewhat unusual incident. Joints were broken several hundred feet ahead of the mixer and the track expanded 2½ in., receding again at night.

TYPE OF CONSTRUCTION USED ON MAIN STREET

TABLE I—COSTS PER SINGLE-TRACK FOOT

1.	Engineering and superintendence	$0 250
2.	Removal of old pavement	737
3.	Grading	1 062
4.	Ballast	4 710
5.	Ties	1 466
6.	Rails, rail fastenings and joints	2 335
7.	Catch basins	.055
8.	Insurance	.080
9.	Other expenditures	.230
10.	Joint welding, exclusive of plates and bolts	.120
11.	Maintenance of old track	.208
12.	Track and roadway labor	.798
	Total for track	12 051

This disturbance appears to have been caused by the complete insulation of the rail and ties from the earth on the wood blocks. The heat absorbed by the rail could not be dissipated in any manner other than by direct radiation. To correct this condition an occasional brick pier was substituted for the wood block, thus enabling some of the heat to be transferred to the earth. No further trouble occurred after this was done.

Tables I and II contain detailed costs covering the entire work. As special trackwork connections had not been received in time for complete installation the cost figures apply to tangent track only.

In Table I, item 1 covers supervision, inspection, timekeeping, rental of engineering instruments, advertising and other expenses properly chargeable to this account. This expense is 1½ per cent of the total cost. The high cost of grading is partly due to the fact that the greater part of the old track was lowered to the bottom of the trench for the new construction. The cost of removing the excavated material to adjacent dumps by team and dump wagon averaged 55 cents per cubic yard with teams at $8 per day.

The ballast charge is for concrete only. Due to grade changes and slight adjustments to alignment the quantity of concrete exceeded the estimate by 6.8 per cent. The contract price of the ballast was $17 per cubic yard. The cost of ties plus unloading is included in item 5. Item 6 includes cost of material, freight, unloading, etc.

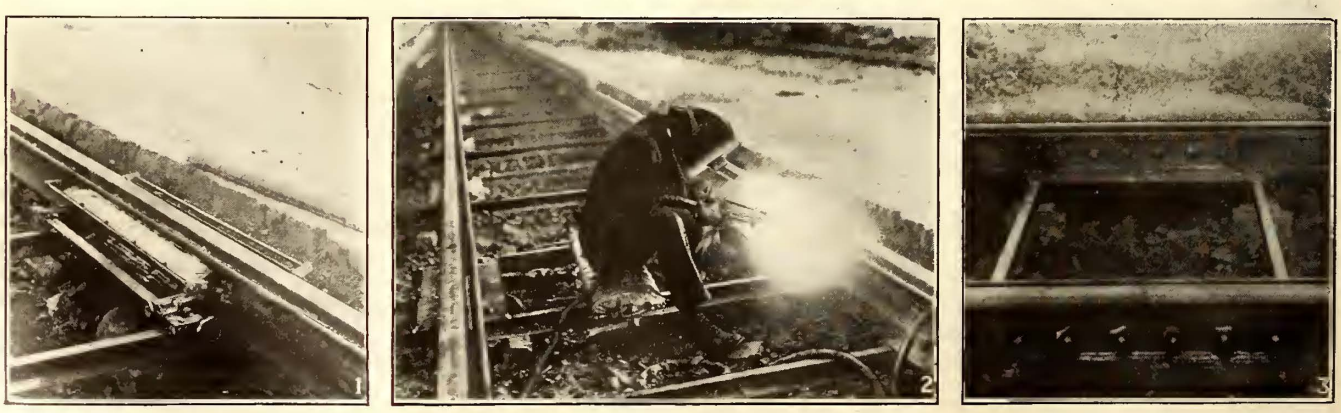
TABLE II—COST OF PAVEMENT PER SINGLE-TRACK FOOT

Six-inch concrete pavement	$3.08
Brick shoulder 1 ft. to 2 ft. wide	.55
Total for pavement	$3.63

Four catchbasins were installed with sewer connection, at a cost of $98.90 each. Item 8 refers to employer's liability insurance, and included in item 9 is the cost of shifting and rebuilding eighteen sewer manholes, plank for temporary vehicle crossings and various expenditures not properly chargeable elsewhere. The cost of joint welding shown in item 10 does not include cost of plate or bolts.

The following list shows the cost per joint. The current consumed was metered during the welding of a number of joints and the average taken:

Splice bars—No. 1—30 in.	$3.87
Track bolts—1 in. x 4⅜ in.	.63
Welding steel	.28
Power—7½ kw.-hr.	.18
Miscellaneous expense	.25
Labor	1.45
Royalty	.94
Total	$7.60



1—DEFLECTOR BAR IN POSITION FOR WELDING TOP EDGE OF PLATES. 2—THE WELDER AT WORK. 3—FINISHED WELDED JOINT, TOP AND BOTTOM SEAMS AND ENDS OF BOLTS WELDED, RAILS SPOT WELDED TO TIES

Item 11 includes the cost of installing temporary sidings and crossovers, as well as the maintenance of the old track in safe operating condition, and item 12 is the cost of installing the new track, handling material, providing temporary crossings for vehicles and similar charges.

The concrete pavement cost given in Table II relates to contract work only, the price being $22.75 per cubic yard. The width of the brick pavement varies from 1 to 2 ft. on each side of the railway area, due to adjustments necessary to meet the old pavement. The contract price of relaying this shoulder was $3.50 per square yard plus 50.6 cents allowed for cleaning old brick. Work began Aug. 9, and the trackwork completed Nov. 15 and the paving Nov. 20. Owing to the cold weather immediately following the completion of the pavement the contractor laid steam pipes under a covering of straw and, by using his steam roller, in a few days dried out the concrete last poured. The work was performed with a force of from twenty to fifty men. During the early days of the work labor was scarce and very inefficient. The closing down, however, of many local industries during October supplied plenty of labor, but experienced track men were not obtainable at any time. Common laborers received 50 cents per hour for a nine-hour day. In excavating for the new construction some oak and chestnut ties were unearthed which had been in the ground for more than forty-three years. These were relics of the old horsecar days and they were still in a good state of preservation.

Changes in M. C. B. Standards

Various Recommendations of Committees of the American Railway Association, Section III, Mechanical, (M.C.B.), Made at the Convention Last June, Which Were Referred to the Members by Letter Ballot, Have Recently Been Published by the Secretary of that Organization and Those of Particular Interest to Electric Railways Are Abstracted

CHANGES in "Recommended Practices and Standards" as adopted by Section III, Mechanical, of the American Railway Association, which are of interest to electric railways, and which have been formally approved, so that they now represent revised standards, are given below.

Committee on Car Construction

1. *Journal bearing lugs.* Breakage of lugs on journal bearings had been reported and strengthening of these had been suggested. This has been done and a tabulation of the new dimensions is given in the committee's report. The recent changes, it should be noted, do not interfere with interchangeability.

2. *Axle fillets.* Radii of fillets for all standard axles have been made $\frac{1}{8}$ in. on the journal at the collar, and $\frac{3}{4}$ in. on the journal at the dust-guard seat, on the dust-guard seat at wheel seat, and on wheel seat at collar. This does not interfere with interchangeability.

3. *Axle classification.* The standard axles have been given distinguishing class letters: Axle "A" for 3¾-in. x 7-in. journal, "B" for 4¼-in. x 8-in., "C" for 5-in. x 9-in., "D" for 5½-in. x 10-in., "E" for 6-in. x 11-in., "F" for 6½-in. x 12-in.

4. *Journal box classification.* The same classification letters for journal boxes and contained parts (bearings and wedges) have been adopted as for axles, thus journal box "A" is that for a 3¾-in. x 7-in. journal; bearing "A" is 3¾-in. x 7-in., etc.

5. *Truck classification.* The following truck classification has been adopted: Two-axle trucks 2A, 2B, 2C, etc., three-axle trucks 3A, 3B, 3C, etc., the letter designating the axle used.

6. *Car classification.* A similar car classification has been adopted, namely, four-axle cars, 4A, 4B, 4C, etc.; six-axle cars, 6A, 6B, 6C, etc.

7. *Capacity of "D" axle.* The capacity of the standard axles increases by steps, and the committee felt that the steps would be made more uniform by increasing the capacity of the "D" axle (5½ in. x 10 in.) from 38,000 to 40,000 lb., the present dimensions being such that the allowable stresses shall not be exceeded. A proviso is made that no existing cars shall be marked up in capacity on account of this increase in allowable axle load until it has been determined that the body and trucks are safe under such a load.

8. *New axle "F."* A new large-size axle "F" has been adopted, with journal 6½ in. x 12 in., of nominal capacity 60,000 lb. and with bearing, wedge and journal box to suit.

9. *Figuring stresses in axles.* Referring to the 1896 report of the committee on axles, the present report states that the former did not specifically cover the locus of the points of application of load for calculating the part of axle between wheel seats. In 1901 this was referred to in connection with a report on chemical composition of all steel car axles. It is desirable to put this question in such shape that uniformity in calculations be realized. Frames above the journals of the same axle cannot spread more than 1 in., therefore the calculations for diameters of axle sections between wheel fits should be based on length between center of journal plus 1 in.

The following may be considered a continuation of the 1896 axle report, the only addition being the assumed distance between load applications:

$$\text{Allowable stress} = \frac{22{,}000}{1.26} = 17{,}460 \text{ lb.}$$

$$\text{Required diameter*} = \sqrt[3]{\frac{M}{W} \times \frac{W}{S} \times \frac{32}{\pi}}$$

Values for standard axles, based on the distance between load applications, L (distance between centers of journals) plus 1 in. are given in tabular form in the committee's report, to which the reader should refer for more complete information.

M = bending moment in inch-pounds.
W = weight in pounds.
S = stress in pounds per square inch.

Resultant theoretical diameters based on above tables and the standard method of calculation are as follows:

TABLE OF THEORETICAL AXLE DIAMETER

	(Y = distance from center of axle) Near Center		Inside Collar		At Wheel Fit	
Axle	Y, In.	Diameter, In.	Y, In.	Diameter, In.	Y, In.	Diameter, In.
A	1½	4.096	22½	4.707	24	4.748
B	1½	4.650	22½	5.348	24	5.395
C	1½	5.271	22½	6.050	24	6.108
D	3	5.870	22½	6.647	24	6.709
E	3	6.386	20½	7.154	24	7.289
F	3	6.811	20½	7.646	24	7.800

The whole matter is summed up in these definite recommendations:

First. For calculating the diameter of axles between wheel seats, assume that the loads take effect ½ in. from the center of the journal at each end of axle, making the distance between assumed points of load application 1' in. more than the distance between centers of journals.

Second. For calculating the diameters of axles outside of wheel seats, assume a lever arm from the section under consideration to the center of the journal, plus one-fourth of the standard journal diameter, and allow a unit stress of 10,500 lb. per square inch to determine the diameter for minimum road limit.

These recommendations clear up this matter, which heretofore has been indefinite.

It should be noted that the actual loads permitted to be carried are regulated by the A.R.A. code of interchange rules, from which the following is from Rule 86 of the 1920 Code:

TABLE OF AXLE CAPACITIES

Journal, New, In.	Nominal Capacity, Lb.	Total Weight on Rail, Lb.
3¼ x 7	40,000	66,000
4¼ x 8	60,000	95,000
5 x 9	80,000	132,000
5½ x 10	100,000	161,000
6 x 11	140,000	10,000

10. *Passenger-car pedestals.* The committee's attention was called to the fact that the standard passenger car pedestals have shown weakness and a large number of them break, indicating a necessity for redesign. For this reason sheets 21 and 22 of the book of standard drawings are eliminated. These show standard passenger-car pedestals for 3¾-in. x 7-in., 4¼-in. x 8-in., and 5-in. x 9-in. journals. New drawings are given which will be included in the new book of drawings.

11. *Journal-box lids.* Lids now standard are claimed to be unsatisfactory, and the present drawings of standard lids are withdrawn and a new specification substituted, which is given in full in the committee's report.

12. *Specifications for steel for car construction.* Specifications for materials used in car construction are varied from time to time. This has led on the one hand to the use of inferior materials and on the other to the rejection of materials which were really suitable.

Unit stresses commonly allowed for detail parts of cars made of steel, and which are subject to variable loads and occasional light shock, are 12,500 and 16,000 lb. per square inch. The minimum elastic limit should be double this amount, and the product of elastic limit and elongation should not be less than fifty times the allowable stress. As the test piece usually shows better physical properties than the casting or forging, the requirement for product of elastic limit and elongation should be increased by 50,000 lb., making it fifty times the allowable stress plus 50,000 lb. The reduction of area is considered of secondary importance. It should be seventy-five times the allowable stress. An addition of 50,000 lb. for variation between the test piece and the casting or forging may be made, but is considered unnecessary. The ultimate strength and content of carbon, manganese and silicon should be optional, as the other requirements control these sufficiently and the restrictions used in specifications heretofore have caused rejection of good serviceable material.

The recommendation which has been adopted is to provide specifications for all forged and cast steel used in car construction of two grades based on fundamental requirements given below:

CHARACTERISTICS OF STEEL FOR USE IN CAR CONSTRUCTION

Grade of Steel	A	B
Minimum elastic limit, pounds	26,000	32,000
Product of elastic limit and elongation	700,000	850,000
Product of elastic limit and reduction of area	975,000	1,200,000

The ultimate strength and carbon, manganese and silicon content are to be optional. Sulphur is not to exceed 0.05 per cent, and phosphorus 0.05 per cent.

The elastic limit is to be determined by extensometer and the elongation measured in a length of 2 in. Grade "A" steel shall be annealed if the carbon content exceeds 0.30 per cent or if the manganese content exceeds 0.75 per cent. Grade "B" steel shall be annealed if the carbon content exceeds 0.22 per cent or if the manganese exceeds 0.65 per cent.

Pieces of irregular section and of less carbon or manganese content, where shrinkage or other internal strains may be suspected, should also be annealed.

Unimportant details may be accepted on surface inspection only.

13. *Fundamentals of car design.* A number of matters are gone into under this heading, some of which are of great interest to the electric railway engineer. One item which merits consideration because of its being susceptible of alteration to suit electric conditions is that of strength requirements for sills and draft attachments, as follows:

In 1913 the committee adopted a basic figure for strength of draft attachments of 10 sq.in. of steel equivalent to grade "A" material for tension. This strength requirement was somewhat in excess of the strength of the coupler used at that time. A stronger coupler, type "D," has now been adopted, the strength value of which is equivalent to at least 12 sq.in. of steel of the same material.

In order to meet the increased requirements, and compare closely with the increased strength of the coupler, it is desirable to increase the strength requirements for draft-gear attachments and center sills by about 20 per cent.

The formulas on which the former requirements were based are as follows:

$$R = \text{Ratio}\ \frac{\text{unit stress}}{\text{end load}} = \frac{1}{A} + \frac{X}{SM}$$

A = Area of section in square inches

X = Eccentricity of load in inches

SM = Section modulus

For draft gear and draft attachments: (a) The minimum tension area is T; (b) the minimum shear area is 1.25 T; (c) the minimum bearing area is 0.625 T; (d) the maximum ratio $R = 1.51\ T$.

For center sills between rear followers: (e) The minimum tension area is 2.5 T; (f) the minimum shear area is 3.125 T; (g) the minimum bearing area is 1.563 T; (h) the maximum ratio is $R = 0.61\ T$.

The committee's recommendation is to increase the area *T* from 10 to 12 sq.in. of grade A steel, or an equivalent area of other grades of steel, and change the other values approximately in accord therewith: Area of center sill construction between rear followers, 30 sq.in.; minimum draft gear capacity, 150,000 lb.; ratio of unit stress to end load (maximum) for center sills, 0.05; ratio of unit stress to end load (maximum) for draft attachment, 0.125.

For draft attachments the area of steel in square inches equivalent to the minimum required strength values is:

Tension or compression (square inch. Grade "A" steel)	12
For shear, square inch	15
For bearing, square inch	7½

Recommendations of Committee on Specifications and Tests for Materials

1. *Steel tires.* Recommended practice specifications are modified in the following particulars: Passenger car tires, formerly listed as Class 3, are now placed in Class B. Further:

	Formerly	Now
Carbon content	0.70 to 0.85	0.60 to 0.80
Manganese content	0.50 to 0.80	same
Phosphorus, not over	0.05	same
Sulphur, not over	0.05	same
Silicon	not specified	0.15 to 0.35

In the new specification the analysis is to be made from a test ingot taken during the pouring of the melt, whereas the old specification permitted the purchaser to require the manufacturer to make the analysis from turnings from a tension test specimen or from a tire, and this analysis is to conform to the requirements above stated.

The new arrangement is a little fairer to the manufacturer and imposes no hardship on the purchaser.

With regard to physical properties, the old specification laid down certain figures of tensile strength, etc., and required that the specimen be cut from a tire. The new specification provides that tension tests need not be made unless so specified by the purchaser, and when required, these tests are to be made from a test ingot taken during the pouring of the melt, and which is required to have received approximately the same amount of work as the tires which it represents. Further provision is made that if the results do not meet the requirements, a re-test may be made on a specimen cut from a tube furnished at the expense of the manufacturer.

The comparative tensile properties are for passenger tires:

	Old	New
Tensile strength, pounds per square inch	125,000	115,000
Elongation in 2 in.	8 per cent	10 per cent
Reduction of area	12 per cent	14 per cent

While the committee does not specifically state the fact, the lowering of the carbon content, and with it the tensile strength, is done to provide a tire which, because softer, will be less liable to crack.

The old specification required a drop or "falling weight" test on one tire. This has been entirely eliminated, presumably because it is felt that such a test does not represent working conditions and is inconclusive, in that a tire of steel which would withstand such a test might nevertheless fail under the repeated small blows and vibration which it undergoes in actual service. It therefore does not warrant the expense of the test.

The old specification had nothing to say about mating, or permissible variations in dimensions; the new provides that the tires shall be grouped as to outside diameters and shipped in sets, and also provides limiting dimensions very much of the same character as those for solid wrought wheels.

Under "inspection" much of the matter in the old specification relates to subjects more properly belonging in the contract and has been eliminated in the new, the latter containing only the usual inspection clauses.

2. *Journal bearings.* This matter of journal bearings is one of particular interest to the electric railways which very generally buy to the A.R.A. (M.C.B.) specification. The important changes are the following: (*a*) Before lining the brass back must be bored and tinned; (*b*) after lining, the ends shall be made smooth by scraping, filing or machining. They must not be ground or rubbed with abrasive materials; (*c*) composition of back to be as follows:

	Class A, Per Cent	Class B, Per Cent
Lead	16 to 24	24 to 30
Tin	5 to 7	4 (min.)
Total of other impurities, maximum	4	3
Copper	67 to 77	63 to 72

The purchaser should specify whether Class A or Class B is required, as otherwise the specification provides that Class A will be provided. It is evident that Class B is the softer, cheaper material.

(d) Composition of lining. Two kinds of lining composition are included, Class C for linings of a nominal thickness over ⅛ in., and Class D for linings ⅛ or less in thickness.

	Class C	Class D
Tin	3 to 5	0.5 to 1.5
Antimony	8 to 10	.....
Antimony plus tin	12 to 14	3 to 5
Arsenic, maximum	0.2	.....
Total of other impurities, maximum	0.5	0.5
Lead	85 to 88	94 to 96

Either composition of the back may be used with the composition of the lining metal specified for the thickness of lining which is ordered.

3. *Axles, shafts and other forgings, annealed and unannealed.* The new specification divides the material into two classes, the one "medium" and the other "mild." Medium forgings are intended for important large parts such as axles, etc. Mild forgings are to be used only where so ordered, for parts of minor importance and those which are to be case hardened.

Another new provision is that unless otherwise specified, annealed material shall be furnished for medium forgings. All axles over 6 in. in diameter at center shall be annealed. Mild forgings may be furnished unannealed unless otherwise specified.

The process of manufacturing the steel is limited to either open-hearth or electric.

It is interesting to note that this is the first reference to "electric" steel in the association's specifications, and as such is a recognition of the increasing importance of this process, already referred to editorially in a recent issue of the ELECTRIC RAILWAY JOURNAL.

While annealing is provided for as above stated, it is required that material ordered to these specifications shall under no circumstances be quenched.

The chemical composition of the two grades is as follows:

	Medium, Per Cent	Mild, Per Cent
Carbon	0.38 = 0.52	0.08 = 0.18
Manganese	0.40 = 0.70	Max. 0.55
Phosphorus	Max. 0.05	Max. 0.05
Sulphur	Max. 0.05	Max. 0.05

While it is not so stated in the specifications, it is obvious that the "mild" grade is the only one of the two which can be used for parts that are to be welded. The physical properties of the "medium" agree with the old specification. For the mild grade the following properties are required: Tensile strength, 47,000 lb. per sq.in; yield point, 0.5 tensile strength; elongation in 2 in., 30 per cent; reduction of area, 45 per cent.

A rather drastic move is the elimination of the old clause that "a sufficient discard shall be made from each ingot to secure freedom from piping and undue segregation." The committee gives no reason for omitting the clause.

4. *Carbon steel axles.* This is the standard specification for the ordinary freight-car axle purchased to chemical specification and drop test. The title is misleading inasmuch as the annealed steel axles referred to under paragraph No. 3 above are also carbon-steel axles.

The chief changes are the inclusion of the electric process in the manufacture of the steel, the raising of the top limit of manganese content from 0.60 per cent in the old to 0.70 per cent in the new, and the inclusion of the following formulas for calculating height of drop of a 2,240-lb. weight, and the permanent set produced by the first blow.

H in feet = square of diameter of axle at center in inches.

$H = d^2$

L = length of axle in inches.

Set for axles over 65 in. in length $= \frac{L}{1.9d} - \frac{d}{2} + \frac{1}{2}$ in.

Set for axles 65 in. or under in length $= \frac{L}{1.9d} - \frac{d}{2} + 1$ in.

Drop test for 3¼-in. x 7-in. journal axle is included: Diameter of axle at center, 4¼ in.; length of axle, 83¼ in.; height of drop, 18 ft.; number of blows, 5; maximum permanent set, 8¾ in.

5. *Solid wrought wheels.* The old specification for solid wrought wheels, which only covered locomotives and tenders, is now revised to include car wheels, the chemical requirements remaining unchanged.

Under "tolerances" the height of flange is required to be not more than $\frac{1}{16}$ in. over that specified. The old specification allowed $\frac{1}{8}$ in.

A list of gages and tapes which shall be used is given: Wheel circumference measure, A.R.A. sheet 16 B; maximum flange thickness, gage A.R.A. sheet 16; maximum flange thickness, gage A.R.A. sheet 16; rotundity gage, thickness gage A.R.A. sheet 16 A; gage for measuring service metal A.R.A. sheet C-1; plane gage, A.R.A. sheet 16 A.

COMMITTEE ON CAR WHEELS

This report refers chiefly to 33-in. chilled cast-iron wheels. Two new designs of wheels have been adopted, one 650 lb. and the other 750 lb., to take the place of the present 625 and 725-lb. wheels. These are of the same so-called archplate design, similar to the 700 and 850-lb. wheels adopted in 1917. These designs are in accordance with recommendations of the Association of Manufacturers of Chilled Car Wheels, and have been adopted on account of the universally favorable reports on the performance of the 700-lb. archplate wheel in comparison with the 650-lb. wheel of the former design. Designs of the new wheels are given in the report.

The old method of stenciling tape size is discontinued and instead a permanent record is provided as follows: Five small lugs ⅜ in. in diameter by ⅜ in. high are to be cast on inner plate near the hub, as shown on a sketch given in the report. As each wheel is taped the necessary number of lugs are to be cut off, those remaining to indicate the tape size. For example, for a normal wheel of tape-size No. 3, two lugs are to be broken or cut off, the three remaining indicating a tape-3 wheel.

A slight change is made in the maximum and minimum flange thickness gage in order to prevent wear of the gage.

The recommended practice for mounting wheels is changed in the following particulars:

1. Wheels having flanges worn so as to take limit gages for remounting cast-iron wheels shown on M.C.B. sheet 16 A shall not be remounted.

2. Wheels must have a straight bore with the exception of the chamfering for not more than ⅜ in. at the back hub face, which may be allowed to facilitate application to axles.

3. Wheels should be mounted centrally on the axle. All axles should be center punched and some form of gage be used to measure the location of the wheel from the center punch mark. The center mounting of wheels is necessary in order to secure proper running of the wheels and to prevent hot boxes.

4. Wheels should ordinarily be fitted to axles, and not axles fitted to the wheels. It is usually unnecessary to turn the wheel seat of second-hand axles unless they are a tapered fit.

5. In mounting either new or second-hand wheels, care should be used to see that the wheels are of the same diameter. In the case of new wheels, the wheels should be taped in order to check the tape size marking, and in no case should wheels of different tape sizes be applied to the same axle.

6. The alignment of axle lathe, the trueness of the centers and the jaws on boring mills should be checked frequently in order to insure proper mounting of the wheels.

7. While the wheels are being bored the high spots on the flange should be marked, and in mating the high spots should be put opposite the spots on the mate wheels.

While the provisions only represent common practice in the mounting of wheels, it is the first time they have been formulated in the A.R.A. specifications and for this reason are notable.

CONCLUSION

The action taken by the A.R.A. (M.C.B. Association) in adopting these matters is from an engineering standpoint one of the most sweeping ever taken by it. In one way or another these affect the interests of the equipment men of the electric railways, and for this reason they have been presented to the readers of this paper so that they may be in touch with the trend of affairs in the steam railway field.

Standard Hand Brake Riggings*

Some of the Most Common Types of Hand Brakes in Use on Electric Cars and the Principles Involved in Their Action Are Described and Methods Given for Calculation of Forces Acting in the Several Parts—Particular Attention Is Devoted to Devices Other than Levers for Increasing the Braking Force

BY H. M. P. MURPHY

IN COMPUTING the forces developed in any foundation brake rigging it is, of course, necessary to start with some known force. This is generally the one exerted at the brake handle where hand brakes are used, or by the brake cylinder push rod with air brakes. As hand brakes are quite generally used on electric railway cars, methods for computing the force exerted on the chain attached to the hand-brake pull-rod will be considered first.

All common types of hand-brake riggings in present use consist essentially of a wheel or handle (crank arm) mounted on a shaft or staff connected with a drum, around which a chain is wound in order to apply the brakes. In some standard constructions this drum is

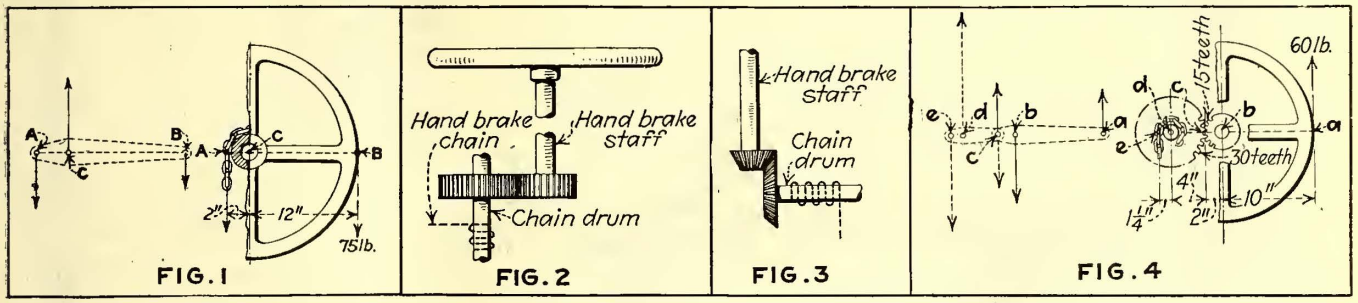


FIG. 1 FIG. 2 FIG. 3 FIG. 4

FIG. 1—GEARLESS STAFF HAND BRAKE. FIG. 2—SPUR-GEARED STAFF HAND BRAKE. FIG. 3—BEVEL-GEARED STAFF HAND BRAKE. FIG. 4—DIAGRAM OF FORCES FOR SPUR-GEARED STAFF TYPE OF HAND BRAKE

located directly on the hand-brake staff and is often tapered in such a way that the chain is wrapped around the small end when the brake shoes are tight against the wheels. In other cases a cam is substituted for the drum and it is so designed that it gives the same effect as the tapered drum. When hand brakes are applied to cars in connection with air brakes, the pull rod or chain controlled by the hand-brake mechanism is generally attached directly to some one of the levers of the airbrake rigging in such a way that the brakes may be set on both trucks from one or both ends of the car.

The principles involved in the determination of the forces developed by any standard hand brake are exactly the same as those outlined in a preceding article published in the ELECTRIC RAILWAY JOURNAL for Jan. 15, 1921. The problem is simply one of leverage, for chain drums, hand wheels, etc., are merely disguised forms of simple straight-line levers as will be shown in the following paragraphs:

In order to investigate the laws connected with hand brake riggings, consider the typical form of apparatus shown in Fig. 1, where a brake wheel 24 in. in diameter or 12 in. in radius is shown on a shaft carrying a small chain drum, the distance from the center of the drum to the center line of the chain being 2 in. Now it is obvious that the force developed on the chain will be constant, if a given total force be applied to the rim of of the rim to which this force be applied. In order to show clearly that the mechanism in question is actually a simple lever device, suppose that the given total force is applied at the point *B* as indicated in the figure. Evidently the line *ACB* is equivalent to a simple straight-line lever and, therefore, the relation existing between the forces acting on the rim of the wheel and on the chain may be accurately determined by the proper application of the "General Leverage Rule" given in the preceding article.

As an example illustrating the method outlined, suppose that a total force of 75 lb. is applied to the rim of the wheel in Fig. 1 and let it be required to find the the wheel, regardless of the part of the circumference resulting force developed on the chain. By applying the "Leverage Rule" and considering the brake-shaft center, C, as the fulcrum,

$$\text{Desired force} = \frac{(\text{known force}) \times (\text{lever arm of known force})}{\text{lever arm of desired force}}$$

or

$$\text{Force on chain} = \frac{(\text{force on rim of wheel}) \times (\text{lever arm of force on rim of wheel})}{\text{lever arm of force on chain}}$$

$$= \frac{75 \times 12}{2} = 450 \text{ lb.}$$

The preceding investigation shows that in order to determine the force developed on any hand-brake chain, wound on a drum which is attached directly to the hand-brake staff, it is merely necessary to know the total force applied to the rim of the wheel or handle; then to multiply this force by the radius of the wheel or crank arm, and to divide the product thus obtained by the distance from the center of the drum or shaft to the center line of the chain.

It should be noted that it is customary to assume a force of from 50 to 75 lb. as that which is applied to the rim of the wheel or to the handle of the crank, as

*This is the second of a series of articles on brake rigging calculation. The first appeared in the Jan. 15 issue of this paper.

this amount can readily be applied by a man in ordinary operation.

In all cases care must be taken to ascertain the correct distance from the center of the drum shaft to the center line of the chain. This is especially important when a tapered drum or cam is used, for in such constructions the distance in question is variable and, therefore, the brake must be fully set when measurements are made. The object in using a tapered drum or a cam is to enable the operator to take up the slack in the rigging with a comparatively slight rotation of the wheel, the chain being made of such length that when the slack is all taken up the chain will be coiled on the small part of the drum, thus permitting the desired force to be obtained on the chain.

to the hand-brake staff, while the large gear and chain drum are fastened together so as to revolve about a common center. By an inspection of this figure it is clear that the line *a b c* practically constitutes a simple straight-line lever, the force developed at the point *c* of this lever being delivered to the point *c* of the similar lever *c d e*. Consequently to find the force developed on the hand-brake chain by a given force applied to the hand wheel it is merely necessary to employ the "General Leverage Rule" as already discussed.

To illustrate the application of the principles just outlined, suppose that a force of 60 lb. is exerted on the rim of the hand wheel shown in Fig. 4 and let it be required to find the resulting force obtained on the chain.

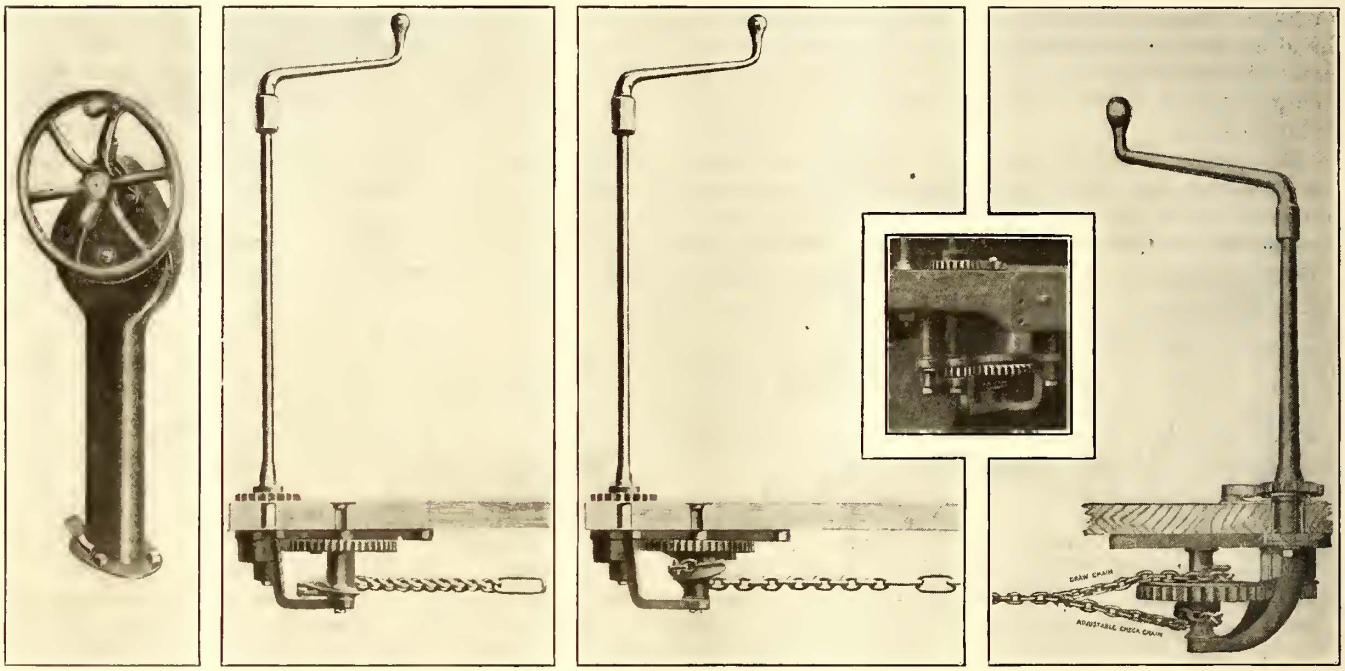


FIG. 5—SEVERAL TYPES OF HAND BRAKES USED ON ELECTRIC CARS

In many cases where a powerful hand brake is required, the hand-brake chain or rod is not attached directly to one of the levers employed in the air-brake rigging but to an intermediate multiplying lever, which in turn is connected with the main rigging. The principles involved in the determination of the forces developed by such constructions are, of course, identical with those discussed in the preceding paragraphs.

Use of Geared Hand Brakes

In some instances gears instead of levers are used to multiply the force applied to a hand brake wheel or crank. Figs. 2 and 3 illustrate such devices. In Fig. 3 bevel gears are employed, whereas in Fig. 2 the gears are of the plain spur type.

The principles involved in the computation of the forces developed in geared hand-brake riggings are simply those of leverage, each gear acting like a straight-line lever. In order to show this, consider the system illustrated in Fig. 4, which is a top plan view of a geared hand brake. The hand wheel has a 10-in. radius, the small gear or pinion a 2-in. radius and the large gear a 4-in. radius, while the distance from the center of the chain drum to the center line of the chain is 1¼ in., all as indicated in the figure. It will be noted that the hand wheel and small gear are both attached

By considering the middle point *b* as the fulcrum of the lever *a b c*,

Force acting at point *c* =

$$\frac{\text{(force on hand wheel)} \times \text{(lever arm of force on wheel)}}{\text{lever arm of force at point } c} = \frac{60 \times 10}{2} = 300 \text{ lb.}$$

and considering the middle point *d* of the lever *c d e* as the fulcrum,

Force delivered to chain =

$$\frac{\text{(force at } c) \times \text{(lever arm of force at } c)}{\text{lever arm of force on chain}} = \frac{300 \times 4}{1.25} = 960 \text{ lb.}$$

If the gears used had been of the bevel type the solution of this problem would have been just the same providing, of course, that the radius of each gear had been unchanged.

As the accurate measurement of the proper radius or diameter of a gear is quite difficult, it is customary to employ the numbers of teeth instead of these dimensions, for it is a very easy matter to count the teeth in a gear and then the calculations can be made with perfect correctness. In order to use this method the following rule may be followed:

To find the force delivered to the chain of a geared hand-brake rigging multiply the total force applied to the hand wheel or crank by the product of the radius of this wheel and the number of teeth in the gear attached to the chain drum, then divide this result by the product of the number of teeth in the gear on the hand brake staff by the distance between the center line of the chain and the center of the chain drum.

This rule may be expressed more concisely in the following mathematical form:

$$\text{Force on chain} = \frac{\text{(force on wheel)} \times \text{(radius of wheel)} \times \text{(number of teeth in drum gear)}}{\text{(number of teeth in staff gear)} \times \text{(distance between chain and drum centers)}}$$

To illustrate the preceding rule, let it be required to find the force delivered to the chain of the rigging shown in Fig. 4 when a force of 60 lb. is applied to the rim of the hand wheel, the numbers of teeth in the gears being 15 and 30 and the leading dimensions as given in the figure.

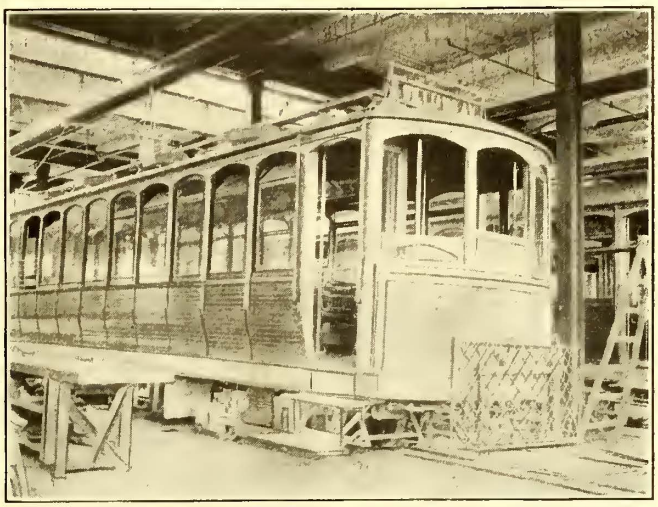
By inserting the numerical values in the mathematical formula just given we have:

$$\text{Force on chain} = \frac{60 \times 10 \times 30}{15 \times 1.25} = 960 \text{ lb.}$$

By comparing this result with that obtained by using the gear diameters instead of the numbers of teeth it is seen that they are the same in both cases.

The most common four types of hand brakes used on electric cars are the gearless staff, spur-geared staff, spur-geared staffless and worm-geared staff. Several illustrations are given of these types, but as the principles involved are the same, calculations can be readily made in the same manner as described. In the examples given the drum on which the chain is wound has been considered as uniform throughout its length. With conical, eccentric or specially shaped drums the effective radius or lever arm for the chain is in all cases equal to the distance from the center of the drum to the center of the chain when the brakes are fully applied.

This radius will vary according to the shape of the drum, the method of winding, the shape and character of the chain and the travel of the brake shoes. Tests made by G. L. Fowler using dynamometers in the truck pull rods showed braking pressures at the wheels to vary as much as 40 per cent with the same pressure applied to the brake handle.

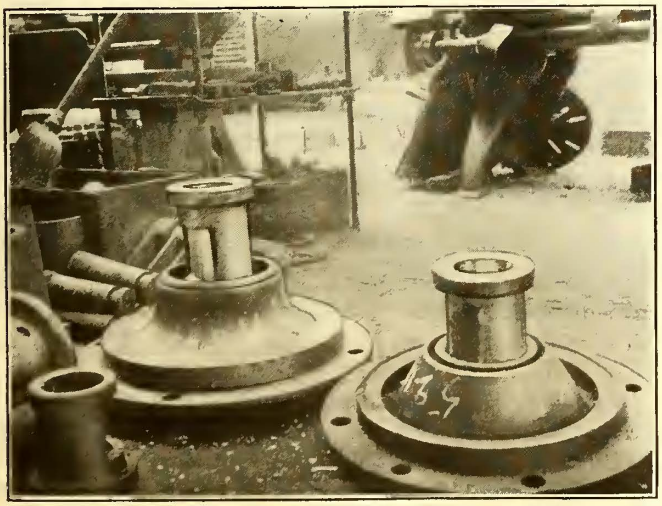


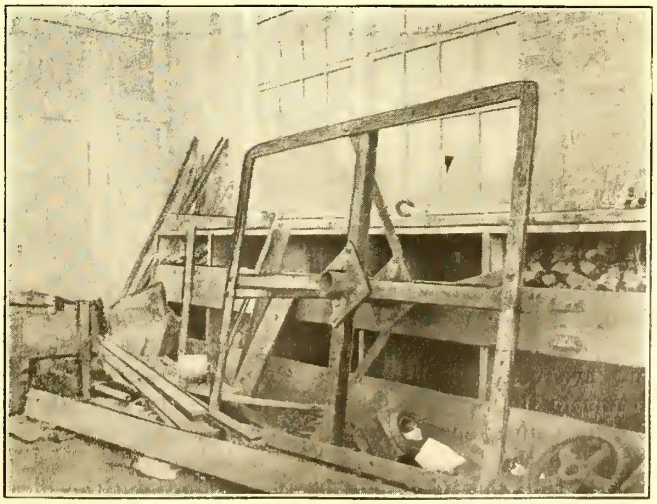
OPEN CAR IN PROCESS OF CONVERSION TO CLOSED TYPE AT PORTLAND

Shop Notes from Portland

Some New Devices that Have Been Found Economical in the Mechanical Department of the Portland Railway, Light & Power Company, Portland, Ore.— Electric Welding Used Extensively

AMONG the best-known electric railway shops in the United States are those of the Portland Railway, Light & Power Company, which were built in 1912 and were described in the issue of the ELECTRIC RAILWAY JOURNAL for July 26, 1913. The shops have been in use more than eight years and during this time have demonstrated their adaptability to the needs of the property. Articles covering details of practices in the shops have appeared in the columns of this paper from time to time, many of them signed by F. P. Maize, master mechanic. About six years ago Mr. Maize put into operation a planning system by which the routine and special shop work is taken care of somewhat along manufacturing lines. He covered this plan in an article in the March 18, 1916, issue, page 539, and H. C. Brumbaugh, of the mechanical department of the same company, told of the modifications which had been made in this system during the following year. This article was printed in the March 17, 1917, issue, page 488. One of the editors of the paper visited the Portland shops recently and learned from Mr. Maize that the



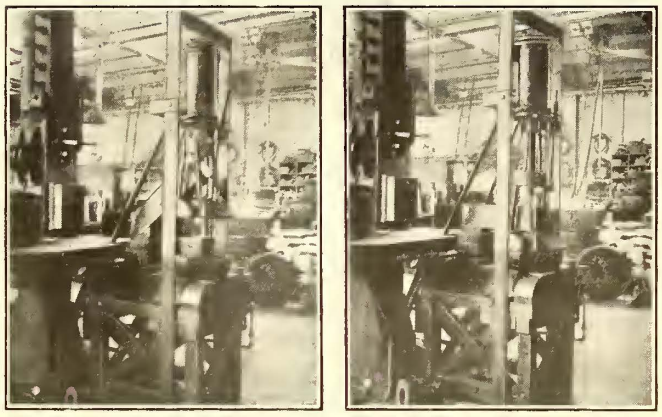


AT LEFT, BOX-TYPE MOTOR BEARINGS HAVE BEEN BUILT UP BY WELDING ON COPPER. AT RIGHT, A SPECIAL TRACKWORK JIG WHICH HAS GIVEN A GOOD ACCOUNT OF ITSELF

war had not made necessary the abandonment of the planning system, but that abnormal labor conditions had made it necessary to combine some of the operations into groups in order to simplify the system somewhat.

At the time of the visit a job of remodeling summer cars was going through the shop, eleven cars being included in the order. A photograph of one of these cars is reproduced.

The plan in this remodeling was to produce a one-man



FIELD COIL PRESS, COMBINED WITH TESTING TRANSFORMER

car at a minimum of expense, to which end the side was closed in with wood, utilizing the curtain grooves in the posts as guides. Rectangular fixed sash were placed above the sidings, and above these were placed small sash which could be inclined inward for ventilation. In addition eight Garland ventilators were installed on the roof, four on each side. Simple folding steps and door were installed and the car was completed. The changes mentioned cost about $400.

Welding has been practiced in this shop for many years, one of the latest applications being in the building up of babbitted brass bearings for General Electric 210 box-type motors when these become worn so as to be loose in the motor housing. The bearings are built up with copper by the electric arc on the deposit system, old motor field wire being used for welding metal. When they are built up they are turned off a trifle large and hydraulically pressed into the housing. The fit is made so that a force of about four tons is required in the press.

This Jig Facilitates Special Trackwork Welding

A great deal of the special trackwork for the company is made in the shop, electric welding being extensively employed. In this connection a jig has been devised for holding pieces of special work in a vertical position to facilitate the depositing of the welding metal.

The jig was made from the frame of a discarded Brill maximum traction truck, with a center bearing attached to the frame, as shown in one of the illustrations herewith.

The frame is of flat steel $\frac{7}{8}$ in. x 3 in. The bearing is simply a piece of 3-in. pipe with square flanges, which are spaced about 18 in. apart. The frame and bearing are connected by angle irons carried from the frame to the bearing flanges at both ends, one side of the jig being kept flat so that it will act as a faceplate, to which the special work can be bolted.

In action the jig is laid on the ground and the piece of special trackwork is bolted in place. The jig is then hoisted by means of a crane and the whole thing is supported on a rod resting on trunnions.

The special work is bolted so as to balance around the axis as nearly as possible. The operator in welding up the joints can thus rotate the work so that the joints come in such a position as to suit his convenience. Obviously the weld is most satisfactory when gravitation aids in the depositing of the metal. This simple device is reported to have been very effective in accomplishing this purpose.

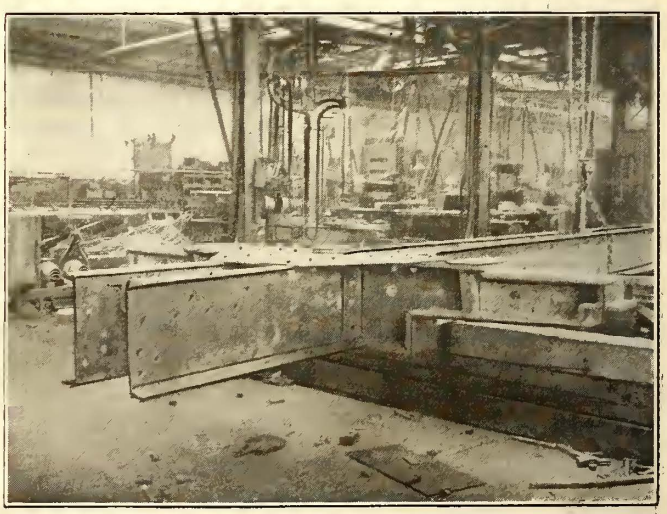
A Steel Underframe that Will Withstand Bumping

The Portland company has a great many freight cars, the construction of which is not as rugged as might be desired. It has been found in some cases desirable to put under the bodies of these cars a steel underframe like that of which one end is shown in one of the illustrations. This is built up of two 15-in. channel sections, with cast-steel bolsters riveted in place and reinforced with a $\frac{1}{2}$-in. gusset plate, riveted and welded in position; $\frac{7}{8}$-in. rivets being used. This is the company's standard underframe for freight cars, which have a carrying capacity of 80,000 lb. and a length of 41 ft. As shown in the picture, the center sill runs through and the bolster is made up in two sections.

One of the latest devices constructed in the shop is the field coil press, by means of which a hot field coil can be compressed to shape and the transformer test for insulation can be applied at the same time. Pictures of the press are reproduced herewith with a pressure plate in the "up" and "down" positions respectively.

The press consists of an 8-in. air cylinder mounted at the top of a frame of 1 in. x 4-in. steel bar. The plunger carries a rectangular pressure plate with a hole in it large enough for it to surround the core of the transformer. This pressure plate is of wood and it is attached to the plunger by four legs.

The testing transformer is mounted on a stout wooden table, and at the base of the vertical limb is a plate upon which the field coil under pressure and test rest.



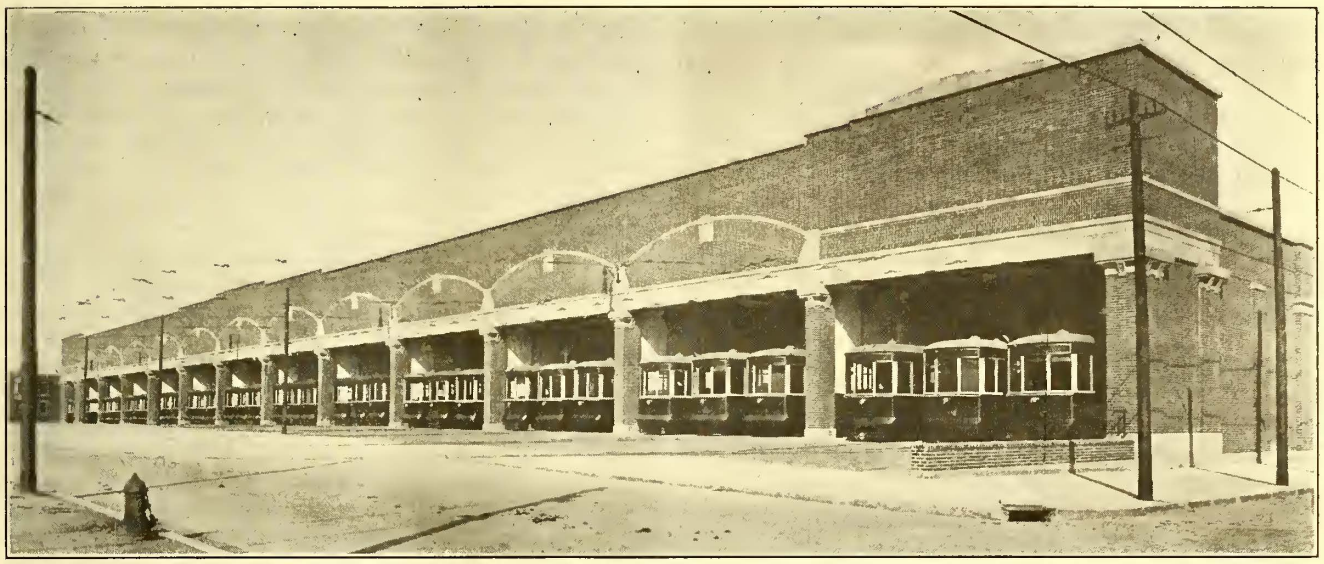
PART OF UNDERFRAME FOR FREIGHT CAR

Valves for controlling the air supply to the cylinder are mounted at the side of the table.

This combined pressing and testing device is a great time saver as it eliminates one operation in putting a field coil "through the mill."

Substantial Energy Saving on P. R. T.

Cars Operating Out of Callowhill Depot Are Equipped with Meters Which Are Used Both for Economical Operation and for Timing Inspections—Instructors Explain to Men Methods to Be Used in Order to Reduce Amount of Power Consumed—Records Posted in Trainmen's Quarters, Resulting in Great Rivalry to Keep Records Low



CALLOWHILL DEPOT, PHILADELPHIA RAPID TRANSIT COMPANY

SINCE the middle of last summer the Philadelphia Rapid Transit Company has been operating substantially all cars out of the Callowhill Depot with the aid of Economy watt-hour meters, which are used both in inducing energy saving and in controlling maintenance inspection. Nine complete routes and one partial route are operated from this depot, the total number of cars equipped with meters being 300. A total of 310 meters suffices for this work. The type of meter employed is one equipped with the usual kilowatt-hour dial for reading the car-energy consumption and in addition with three inspection dials, known respectively as A, B and C dials, for indicating when the car equipment is due for inspection.

Installation of the meters was begun at the Callowhill Depot on May 5, 1920, and was completed on Aug. 12. The meters were installed at an average rate of three per day, and as soon as each route was completely equipped the trainmen were asked to turn in a record of meter readings at the beginning and end of each relief, one record card being required for each car on which each man operated. The cards used are of the form shown in Fig. 1, a standard size of 4 in. x 6 in. having been selected for convenience in filing. It will be noted that this card calls for the name of the motorman, the date and the number of the motorman's badge, the motor car, the trail cars, the route, the run and the block. The times and places when and where the motorman takes the car are called for, as well as the meter reading corresponding.

While the meters were being installed, and before the motormen were asked to turn in cards, the readings of all meters already installed were reported each day, together with the corresponding mileage, so as to fur-

FORM 6161

PHILADELPHIA RAPID TRANSIT COMPANY—ECONOMY METER CARD

Motorman_____ BADGE No. _____

Date_____ TRAIL CAR NUMBERS _____ MOTOR CAR No. _____

USE SEPARATE CARD FOR EACH CAR OPERATED

ROUTE	RUN	BLOCK	TIME	PLACE	METER READING
			ON		
			OFF		
ADDITIONAL TRIPS			ON		
			OFF		

REPORT BELOW LOST TRIPS, CUT TRIPS AND OTHER DEVIATION FROM SCHEDULE

DO NOT WRITE HERE
K. W. H.
A. K. W. H.
MILES

BACK OF CARD MAY BE USED TO REPORT ANYTHING WHICH INTERFERES WITH ECONOMICAL USE OF POWER

FIG. 1—CARD USED FOR RECORDING ORIGINAL METER DATA FILED BY MOTORMAN

PHILADELPHIA RAPID TRANSIT CO REGULAR EXTRA

NAME

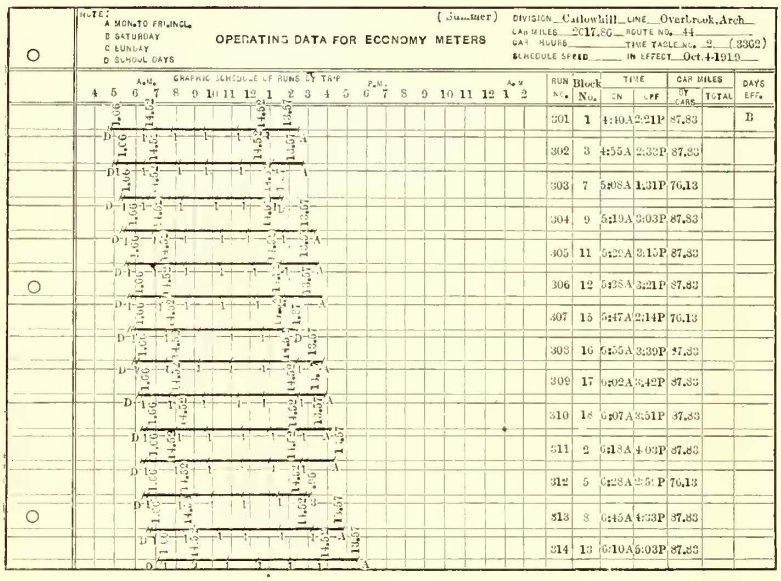
Yr	Route	Run	K. W. H.	Miles	K. W. H.—C. M.	Yr	Route	Run	K. W. H.	Miles	K. W. H.—C. M.
Jan 1-15						July 1-15					
16-31						16-31					
Feb 1-15						Aug 1-15					
16-28						16-31					
Mar 1-15						Sept. 1-15					
16-31						16-30					
Apr 1-15						Oct 1-15					
16-30						16-31					
May 1-15						Nov 1-15					
16-31						16-30					
June 1-15						Dec 1-15					
16-30						16-31					
TOTAL						TOTAL					

FIG. 2—GUIDE USED IN FILING METER CARDS AND IN SUMMARIZING DATA

nish the basis for later determining the saving. Daily records were not available for some of the routes, so that the so-called reference period was estimated by using the total power consumption on each car from the time the meter was installed until the motorman turned in the first record. These records of the performance prior to the time that the motormen began turning in cards were carefully gone over and any items which appeared unreasonable and could not be substantiated were omitted from the result. The meters' dials were in full view of the motormen during this period.

Instruction and Follow-up

Previous to the inauguration of the system on each route an instructor saw each motorman on the route and explained the method of filling out the card, having the motorman fill out a sample. On the morning of the day when the motormen were to begin turning in their records one of the inspectors was on duty at the carhouse to see that each man was provided with a


OPERATING DATA FOR ECONOMY METERS

RUN No.	Block No.	TIME ON	TIME OFF	CAR MILES BY CARS	CAR MILES TOTAL	DAYS EFF.
301	1	4:40A	2:21P	87.83		B
302	3	4:55A	2:33P	87.83		
303	7	5:08A	1:31P	76.13		
304	9	5:19A	3:03P	87.83		
305	11	5:29A	3:15P	87.83		
306	12	5:38A	3:21P	87.83		
307	15	5:47A	2:14P	76.13		
308	16	5:55A	3:39P	87.83		
309	17	6:02A	3:42P	87.83		
310	18	6:07A	3:51P	87.83		
311	2	6:13A	4:03P	87.83		
312	5	6:28A	2:51P	76.13		
313	8	6:45A	4:33P	87.83		
314	13	6:10A	5:03P	87.83		

FIG. 3—GRAPHIC SCHEDULE FOR USE IN CHECKING DATA ON METER CARDS

card or cards and that he remembered his instructions in filling them out.

A statement was made up showing the energy consumption per car-mile by each individual motorman, and this was posted in the trainmen's quarters each day for the first three days after the inauguration of the system on each route. Since the first three days the records have been compiled by half-month periods. These statements are posted in the trainmen's quarters within two or three days following the end of each period.

The instructors were given copies of the daily reports for each newly inaugurated route and of the semi-monthly reports for all routes. They rode with the men whose records showed high power consumption and explained the method to be used in order to reduce the amount of power consumed. They also rode with the men whose records showed particularly low power consumption and gave them encouragement to continue their careful operating and to describe their methods to the other men.

The record as posted each half month showed the men classified by type of run and by line, giving the name of the man with the best, or lowest, energy consumption in each class at the head of the list, and showing the others in the order of kilowatt-hour consumption per car-mile.

The men showed considerable enthusiasm and rivalry in trying to keep their records low and accomplished substantial savings almost immediately after they began turning in records.

After the instructors had been engaged in this work for two months they were assigned to give instructions at other depots in order to reduce power consumption on lines running out of those depots in which the cars were not equipped with meters.

At the end of the run the motorman turns in his meter card to the receiver. It is turned over to a clerk, who notes on the meter card the number of kilowatt-hours which have been used and the mileage operated.

The cards are then filed by badge number of motorman, each line being filed in a separate drawer. The cards are filed behind a guide record card like that shown in Fig. 2. This routine work for the 300 cars requires the full time of one girl, but actually two are employed for about half time upon it in order to provide an understudy for the work.

An important part of this routine task is the checking of the motorman's entries and finding and entering on each card the mileage corresponding to the run. A graphic schedule like that shown in Fig. 3 is employed for this purpose. A second chart, like that shown in Fig. 4, is used for quickly making adjustments in mileage in case of extra trips or turnbacks.

At the end of each semi-monthly period the filing drawer for each route is removed from the file and the entries on the cards are totalized for kilowatt-hours and miles for the period by means of an adding machine. The adding machine slips are turned over to a clerk, who computes the kilowatt-hours per car-mile for each man and on each route for each of the three groups of men; that is, for those having early runs, swing runs and late runs respectively.

In the semi-monthly summarizing work four clerks and a stenographer are employed for one and one-half days.

The results are tabulated in uniform style and posted in the trainmen's quarters in from two to three days following the end of the period covered.

Putting the Results in Attractive Form

For use of the company officials the data are also graphed for each route in the general form represented in Fig. 5, which shows the saving expressed in terms of an average pre-meter-period consumption. The does not allow for seasonal variation in energy consumption per car-mile, which is cared for in the chart reproduced in Fig. 6.

The effect of the use of meters on an individual motorman is graphically shown in Fig. 7, in which a progressive improvement is noted. The motorman whose record is here given started in with an energy consumption higher than the average for the line and at the end of the period recorded had a much lower record than the average, having reduced his energy consumption practically 30 per cent in less than three months.

An important use of the Economy meters is that of making mechanical and electrical car inspections on the basis of kilowatt-hours rather than on the mileage and time basis. These meters have a separate set of three dials for this purpose.

The A, B and C dials are each equipped with a stationary marker hand, or "telltale," enameled red, which can be set at any predetermined point corresponding to that number of kilowatt-hours of energy consumption which may be selected as the limit of inspection of any particular part of the equipment. This setting is simply the kilowatt-hours equivalent of the car mileage inspection interval. The dials also are equipped with meter-driven hands which make one revolution for 5,000, 15,000 and 30,000 kw.-hr. for the A, B and C dials respectively.

In practice the inspection interval markers are so set that the kilowatt-hour intervals on the B dial are multiples of those on the A dial, and those on the C dial are multiples of those on the B dial. Thus the cars are brought in for inspection in accordance with the coincidence of the moving and stationary hands. This brings about the occurrence of ends of two or three inspection intervals at the same time, with the result that cars are not housed so frequently as they otherwise would be. After an inspection has been made the meter-driven hands which announced the inspection are turned back to a stop pin at zero. To do this a key must be inserted in a lock which releases the reset plungers, one for each dial, at the bottom of the meter case; withdrawal of the key interlocks the reset plungers and prevents unauthorized movement of the inspection dial hands. This dial and the reset function independently of the cyclometer type dial, which registers the car-energy consumption.

The mechanical department of the railway has worked out an inspection and maintenance schedule utilizing the dials which is covered in a series of instructions issued to inspectors. These are reproduced on pages 358 and 359. When the inspector checks up the conductors' registers at night he also checks on a form like that shown in Fig. 8 the numbers of cars due for A, B or C inspection. This information is turned over to the carhouse foreman, who orders the cars in as they can be spared. The rolling-stock department records daily inspections by the meter dials on the form shown in Fig. 9.

In the Callowhill Depot there are the following different types of cars: (1) Near-side cars, equipped with modern motors; (2) the Hog Island cars, equipped with modern motors and type H L control; (3) the pay-within cars, equipped with an old type of motor and type K control. Both the near-side and the Hog Island type cars are equipped with slack adjusters, while the pay-within type is not.

At the present time the setting for the A dial in-

(*See continuation on page* 360)

LINE Overbrook Arch
DIVISION Callowhill
ROUTE NO 44

MILEAGE DATA FOR ECONOMY METERS

FROM ↓ / TO →	1 Overbrook Tr.	2 63rd & Lansdowne	3 60th & "	4 52rd & "	5 Girard & Lancaster	6 43rd & "	7 33rd & Sp.Garden	8 25th & "	9 Broad & Arch	10 9th & "
1 Overbrook Tr.	*									
2 63rd & Lansdowne	.67	*								
3 60th & "	.96	.28	*							
4 52rd & "	1 61	.94	.66	*						
5 Girard & Lancaster	2.25	1 58	1.20	.64	*					
6 43rd & "	4 81	2.14	1 86	1 20	.56	*				
7 33rd & Sp.Garden	3.99	3 32	3 04	2.38	1.74	1 13	*			
8 25th & "	4 59	3.92	3.61	2.98	2 34	1.78	.60	*		
9 Broad & Arch	6.10	5.43	5.15	4.49	3 85	3 29	2 11	1.51	*	
10 9th & "	6 56	5 89	5 61	4 95	4 31	3 75	2.57	1 97	.46	*
11 Front & "	7.23	6.56	6.28	5 62	4.98	4 42	3.24	2 64	1 13	.67
12 9th "	7.95	7.28	7.00	6 34	5.70	5 14	3.96	3 36	1 85	1 39
13 Broad & "	8.41	7.74	7.46	6.80	6 16	5 60	4 42	3.82	2.31	1 85
14 25th & Sp.Garden	9.03	8.26	8.08	8.32	7.68	7.12	5.94	5.34	3 84	3.37
15 33rd & "	10 53	9.86	9.58	8.92	8 28	7 72	6 54	5 94	4.47	4 01
16 43rd & "	11.71	11 04	10.76	10.10	9.46	8 90	7.72	7 12	5.65	5.19
17 Girard & Lancaster	12 12	11 61	11 26	10.70	10 06	9 42	8.27	7.67	6 25	5 79
18 52rd & Lansdowne	13.01	12.24	11.96	11.30	10.66	10 09	8 87	8.27	6 85	6 39
19 60th & "	13.57	12.90	12.62	11 96	11 32	10 75	9 53	8.93	7 51	7 05
20 63rd & "	13.85	13 18	12.90	12 24	11 60	11 03	9.81	9 21	7.79	7 33
21 Overbrook Tr.	14.52	13.85	13.57	12 91	12.27	11 70	10 48	9 88	8.46	8 00
22					1					
23 Depot										
24										
25										
26										
27										
28										
29										
30										

FROM ↓ / TO →	11 Front & "	12 9th & "	13 Broad & "	14 25th & Sp.Garden	15 33rd & "	16 43rd & Lancaster	17 Girard & Lancaster	18 52rd & Lansdowne	19 60th & "	20 63rd & "
1 Overbrook Tr.										
2 63rd & Lansdowne										
3 60th & "										
4 52rd & "										
5 Girard & Lancaster										
6 43rd & "										
7 33rd & Sp.Garden										
8 25th & "										
9 Broad & Arch										
10 9th & "										
11 Front & "	*									
12 9th "	.72	*								
13 Broad & "	1.18	.46	*							
14 25th & Sp.Garden	2.70	1 97	1 51	*						
15 33rd & "	3 30	2 57	2.11	.60	*					
16 43rd & "	4 48	3.15	3 29	1.78	1 18	*				
17 Girard & Lancaster	5.08	4.35	3.89	2.38	1.78	.60	*			
18 52rd & Lansdowne	5 68	4.95	4.49	2.98	2.38	1.20	.60	*		
19 60th & "	6 31	5.51	5.15	3 64	3.04	1.26	1.26	.66	*	
20 63rd & "	6.62	5 89	5.43	3 92	3.32	2.14	1.54	.94	.28	*
21 Overbrook Tr.	7 29	6 56	6 10	4 59	3.99	2.81	2.21	1.61	.95	.67
22										
23 Depot										
24										
25										
26										
27										
28										
29										
30										

FROM ↓ / TO →	21 Overbrook Tr.	22	23	24	25	26	27	28	29	30
1 Overbrook Tr.										
2 63rd & Lansdowne										
3 60th & "										
4 52rd & "	D	To	1	1 66	Miles					
5 Girard & Lancaster	1	To	D	1 87	"					
6 43rd & "	D	To	5	1 24	"					
7 33rd & Sp.Garden	D	To	3	71	"					
8 25th & "	3	To	D	92	"					
9 Broad & Arch	D	To	X	6 32	"	(Via Girard)				
10 9th & "										
11 Front & "										
12 9th "										
13 Broad & "										
14 25th & Sp.Garden										
15 33rd & "										
16 43rd & "										
17 Girard & Lancaster										
18 52rd & Lansdowne										
19 60th & "										
20 63rd & "										
21 Overbrook Tr.	*									
22		*								
23 Depot			*							
24				*						
25					*					
26						*				
27							*			
28								*		
29									*	
30									*	*

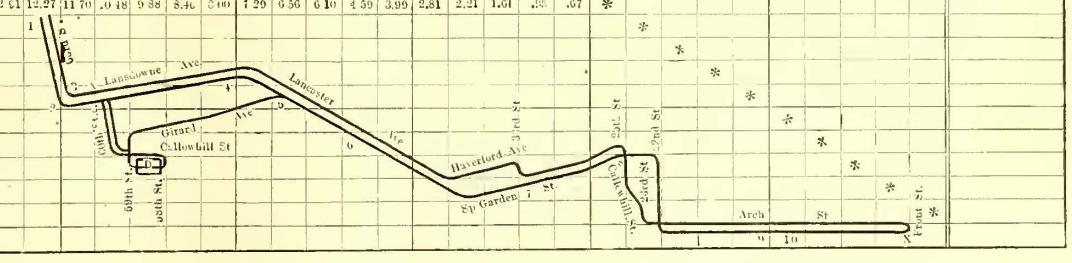


FIG. 4—CHART USED FOR COMPUTING MILEAGE FOR ENTRY ON METER CARDS

Instructions for Inspection of Equipment*

Inspection by the A Dial

(ITEMS 1 TO 10)

1. *Trolleys.*

Examine trolley wheels to see that contact springs are in good condition, and that there are enough washers between wheel and contact springs, that the wheel is not flat, and that its diameter is not below the condemning gage. Be sure that trolley catchers and rope are in good condition.

2. *Controllers.*

Replace all controller fingers and segments which are worn to the scrapping point. Blow dust from the controller, after which wipe all grease and dirt from fingers and cylinder, and make a very light application of lubricant. Operate the P C type controllers by power from the master controller (after the main switch has been opened) to determine whether all points are made correctly. Examine contactor tips for wear and put a trace of lubricant on the cams.

3. *Circuit Breaker and Line Breaker.*

Examine circuit breakers and line breakers to determine wear and adjustment of contacts. Note should also be taken of the location of the power-breaking adjustment.

4. *Brakes.*

Replace any shoes that are worn to the condemning point and see that all shoes are properly equipped with keys and that heads are tight. Be sure that slack adjusters, if any are installed, are functioning properly, and that adjusters which are working incorrectly are reset or replaced. On cars not equipped with adjusters make the necessary adjustments with turnbuckles, and make sure that jamb nuts are properly tightened so as to prevent brakes from becoming prematurely slack. See that all brake pins are in good condition, provided with cotter keys and well lubricated, and that the air governor cuts in at 65 lb. and out at 75 lb. Apply a small quantity of grease to side bearings of the slide type.

5. *Fenders.*

Trip fenders from the platform and with the tripping gate, and reset from the platform to determine whether in good working order. Replace broken slats and apply lubrication if needed. Examine screens under the platform on cars of the near-side and Public Service type to see that they are in good condition.

6. *Sanders.*

Examine sand pipes as to alignment with the rail and apply sand to insure that it is flowing freely.

7. *Motors.*

Examine motor brushes for chipping and wear, brush springs for weakness and breakage and commutator for flashover. Any evidence of flashover should be reported to the chief inspector. Apply a wrench to all gear-case and motor bolts to insure their tightness.

8. *Journal Boxes.*

Examine journal boxes for loose lids and have necessary repairs made.

9. *Trap Doors.*

Remove any dirt that has accumulated around trap doors.

10. *Air Compressors.*

Examine air compressors for brush-spring tension and brush wear.

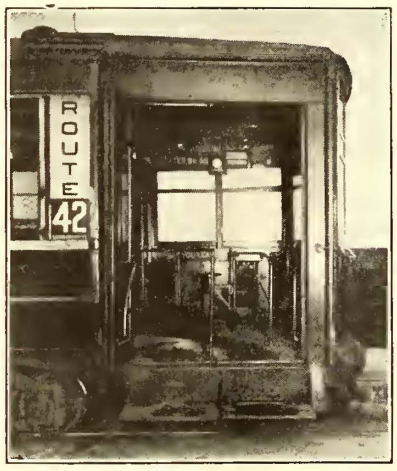
Inspection by the B Dial

(ITEMS 11 TO 24)

Items 11 to 16 like Items 1 to 6 above except for additions as indicated.

13. *Circuit Breaker and Line Breaker.* (Same as Item 3 with the addition below.)

Gage line breaker contactor finger



FRONT PLATFORM OF CAR SHOWING POSITION OF METER

to determine if contact pressure is sufficient.

16. *Sanders.* (Same as Item 6 with the addition below.)

Examine valves and piping for leaks.

17. *Wheels.*

Gage wheels for thin flanges and report thin flanges to the shop foreman.

18. *Journal Boxes.* (Same as Item 8.)

19. *Motors.* (Same as Item 7 with the addition below.)

Fill armature and axle bearing with oil to the point indicated by the gage or with the measure provided for the purpose. Examine motor leads closely for poor insulation and properly tape any that are found in bad condition. Wipe carbon dust off brushholders, insulators and yokes carefully.

20. *Trap Doors.* (Same as Item 9.)

21. *Doors.*

Examine doors and steps for adjustment. See that steps are completely up when doors are closed and entirely down when doors are open. Properly lubricate all moving points such as tracks, levels, slides, guides and crank-pins. On doors which are operated by an overhead engine carefully wipe out all waste, oil and grease which have accumulated in the engine box. Examine doors which are operated by air engines for speed, and if they are too slow or too fast adjust them.

22. *Engineer's Valves.*

Try engineer's valves and lubricate them if they are not working freely.

23. *Air Compressors.*

Examine air compressors for brush spring tension and brush wear. Oil them if necessary.

24. *Air Governors.*

Examine air governors as to condition of tips and leads, and for air leaks.

Inspection by the C Dial

(ITEMS 25 TO 49)

25. *Trolleys.* (Same as Item 1 with addition below.)

Examine trolley bases for adjustment, *i.e.*, that ball bearings are not becoming too loose, and apply a small quantity of oil to the bearings. Tighten trolley base terminals if loose. Take trolley pole tension with the spring balance or weights provided for the purpose. Examine links and pins for wear. Paint pole and base if necessary.

26. *Controllers.* (Same as Item 2 with addition below.)

Examine cable connections carefully. Replace cylinders which are partly short-circuited across insulators.

27. *Circuit Breakers and Line Breakers.* (Same as Item 13 with addition below.)

Blow out breakers with bellows or dry air from the reservoir, after which apply a very small quantity of oil to the contactor hinge pin. Examine covers of line breakers carefully and make necessary repairs and painting if necessary.

28. *Fenders.* (Same as Item 5.)

29. *Sanders.* (Same as Item 16.)

30. *Brakes.* (Same as Item 4 with addition below.)

Put all release springs in good condition, and replace bent beams, worn heads and worn hangers and hanger brackets subject to the decision of the chief inspector. Apply hand brakes from both ends of the car and make all necessary repairs and adjustments. Examine brake pistons for leaks and give them a quarter turn to distribute wear. Repack slack adjusters with grease provided for that purpose and thoroughly clean threads. Replace slack adjuster rocker arms and fingers that are worn excessively. Thoroughly lubricate the radial bar rollers and all rub plates and replace them if necessary.

31. *Wheels.*

Gage wheels for thin flanges, and also for limit wear of treads, and call the attention of the shop foreman to conditions found.

32. *Journals.*

Examine journal boxes for loose lids and make necessary repairs. Examine them also to see that they have a sufficient quantity of waste well saturated with oil.

*The inspection and repair must be such that, in the opinion of the foreman, the car will stay in service until the next inspection.

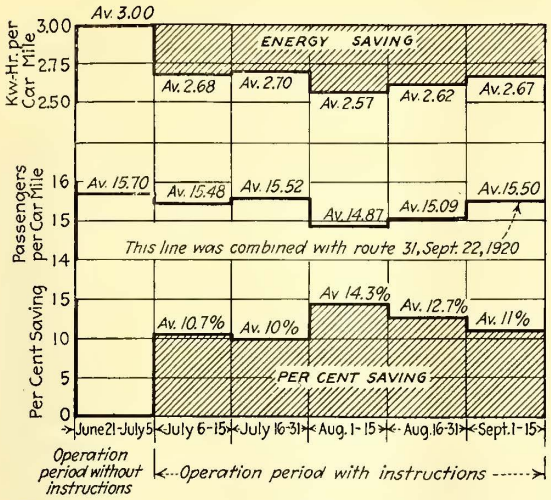


FIG. 5—GRAPHIC PRESENTATION OF POWER OPERATING DATA TO SHOW RESULTS OF USE OF METERS

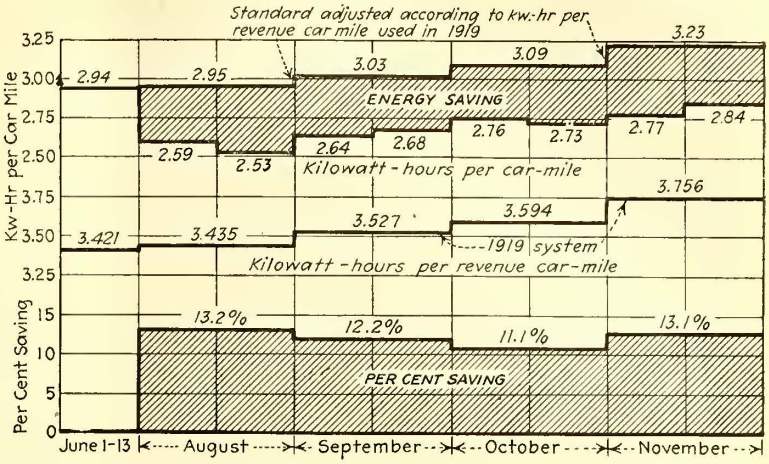


FIG. 6. GRAPHIC RECORD WITH ALLOWANCE FOR SEASONAL VARIATIONS IN ENERGY CONSUMPTION PER CAR-MILE

33. *Trucks.*

Tighten all truck bolts if loose and replace lost bolts. Examine truck frames for bends and breaks and elliptic springs for breaks and cracks. Examine coil springs also. Raise the car body sufficiently to permit the application of a small quantity of grease to center bearings and to side bearings of the slide type.

34. *Drawbars and Couplers.*

Inspect drawbars, drawheads, Tomlinson couplers, and all parts pertaining thereto to see that they are in good working order.

35. *Motors.* (Same as Item 19 with addition below.)

Remove waste from motor oil boxes and replace with new any waste that is in bad condition. Use the waste removed from armature boxes in axle boxes if not damaged from overheating. Examine all oil-box lids as to hinges and springs and axle bearings for wear. Lubricate gears and pinion with the grease provided for this purpose, and in the quantities prescribed by the chief inspector. Examine pinions to ascertain if any are loose or worn to the condemning point. Tighten axle collars if loose, and adjust them if necessary. Examine also suspension bars, springs and bolts. Take armature clearance with the gage provided therefor. Blow out all motors with dry air, after which wipe holders, yokes, commutators and string bands carefully with cloth. Do not use "two-ways" or splice motor leads. Renew leads which are in bad condition.

36. *Trap Doors.*

Remove any dirt that has accumulated around trap doors and make all necessary repairs.

37. *Doors.* (Same as Item 21 with addition below.)

Replace badly worn parts, examine door engines for leaks and repack with grease if necessary.

38. *Engineer's Valves.*

If engineer's valves are not in prime condition take them apart and clean and pack them with grease provided for this purpose.

39. *Air Compressors.*

Examine air compressors for brush spring tension and brush wear. Oil them if necessary. Test compressors for time required in pumping from zero to 75 lb. to determine condition of valves and piston rings. Blow-dust from motor, after which wipe brush-holders and commutator with cloth.

40. *Air Governors.*

Include in the air governor inspection test to determine the pressure at which the governor cuts in and out and make all necessary repairs and adjustments.

41. *Emergency Valves.*

Examine emergency valves, such as used on S. K. and S. P. C. cars, to determine if they function properly by applying engineer's valve to emergency position and noting the quick action of the brake and the time required for full release. If valves are sluggish take them apart and thoroughly clean and properly lubricate them.

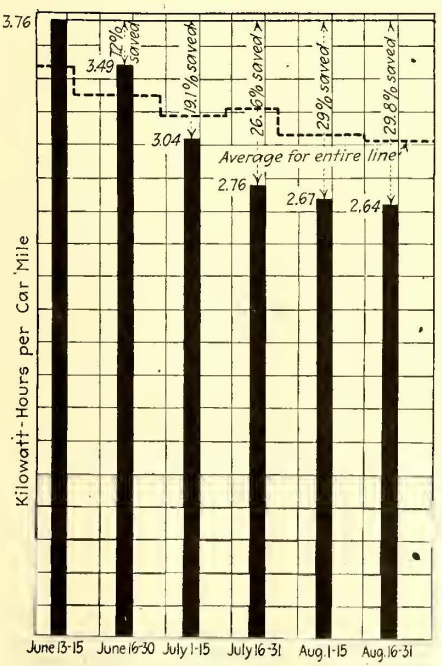


FIG. 7—GRAPH SHOWING EFFECT OF CARE ON PART OF MOTORMAN IN REDUCING ENERGY CONSUMPTION

42. *Gongs.*

Examine gong plungers and clappers for wear and replace if needed and tighten floor plates if loose.

43. *Fuse Boxes.*

Lubricate fuse binding screws if necessary. Examine leads for bad insulation and corrosion at terminals. Paint box if necessary.

44. *Rheostats.*

Examine rheostats for loose or warped grids, loose terminals and hanger bolts, bad leads and connections and make replacements where necessary.

45. *Glass.*

Include in glass inspection all glass in car, such as headlight lenses, red and green light lenses, vestibule windows, door glass, side windows, deck glass and air gage glass. Replace any glass that is cracked or broken and make necessary repairs to all that is loose.

46. *Seats.*

In inspection of seats include a thorough examination of cross-over seat mechanism as well as cushions and backs of all seats. Make replacements and repairs where needed.

47. *Car Body Fixtures.*

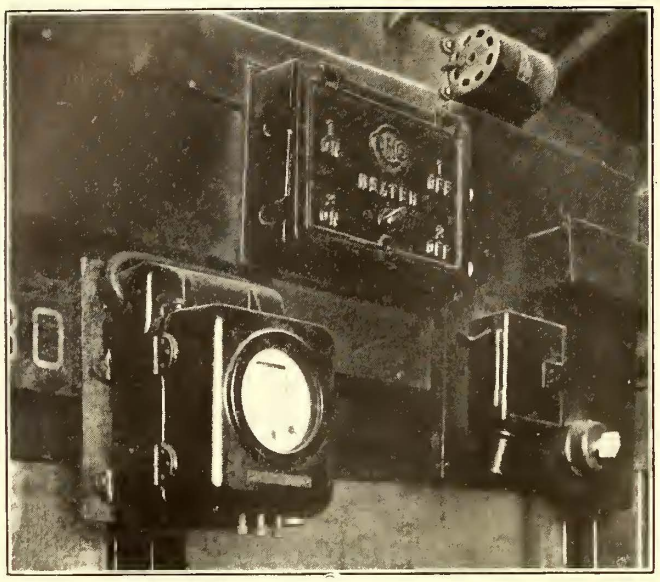
Include in the inspection of car body fixtures the register backs, signal bells, pulleys, push buttons and buzzers, grab handles and hand straps, window screens, signs and heaters. Make all necessary repairs, replace broken parts and tighten loose parts. Examine emergency jacks and lubricate and repair them if necessary.

48. *Switches.*

Include in this item the inspection of all switches, such as air, light, heat, drum, power and all other auxiliary circuit switches, to see that they are in proper working order.

49. *Bus-Line Couplers.*

On cars which are operated in trains or which pull trailers, examine the bus-line couplers to see that the insulation is in good condition. Examine carefully also the supporting springs and attachments and make necessary repairs.



KILOWATT-HOUR METER IN POSITION SHOWING A, B AND C DIALS USED FOR DETERMINING LENGTH OF INSPECTION PERIOD

spection on the near-side cars is 1,500 kw.-hr., for the B dial 6,000 kw.-hr. and for the C dial 12,000 kw.-hr. The setting on the Hog Island cars is, A dial 1,690 kw.-hr., B dial 6,750 kw.-hr. and C dial 13,500 kw.-hr. The setting on the pay-within cars is, A dial 875 kw.-hr., B dial 4,375 kw.-hr. and C dial 13,125 kw.-hr.

Thus it is seen that the interval between A inspections on the cars with the slack adjusters is greater than it is on the pay-within cars, which are not equipped with slack adjusters.

Procedure in Carhouse Routine

Roughly, the plan is to divide the work at the carhouse into units of approximately 100 cars each. In other words, there are three inspection gangs, each of which is in charge of one "inspection leader." Each gang consists of approximately seven workmen, who as nearly as possible are all-round men. The leader is in reality a working foreman and, of course, is responsible for the work of his gang. He is the only one authorized to reset the inspection hands after the work of inspection is completed.

The general plan is to put all the cars due for A inspection in one bay, all due for B inspection in another bay and all due for C inspection in a third bay. If during the work of inspection any part of the car is condemned so that it cannot be readily repaired in the bay it is shifted to what is called the shop bay, where there are facilities such as cranes, etc., for doing various kinds of heavier repair work.

Results Secured

As shown by the comparison chart for 1920 as compared with 1919 the saving at the car induced by the meters has averaged 12 per cent in actual energy consumption of power distributed from the several substations feeding the West Philadelphia district. The mileage operated within the district fed by a certain group of substations was determined for the months affected both in 1919 and 1920. The reduction in energy consumption at the car for September as compared with May amounted to 8.8 per cent. The corresponding reduction at the substations for the West Philadelphia district was 5.9 per cent. As the mileage operated out of the Callowhill Depot was 31.3 per cent of the total for the district the saving for the Callowhill Division, which is equipped with meters, can be estimated at 19 per cent. The actual saving at the substation board was, of course, somewhere between 8.8 and 19 per cent. To be conservative the company estimates it at 10 per cent.

When operating on the kilowatt-hour inspection basis there is also a saving in maintenance labor due to the reduced number of times the cars come in for inspection. For example, in the semi-monthly period from Oct. 1 to 15 the average number of cars operated was 219. Under the former procedure these would have been inspected every day, a total of 3,285 inspections. Under inspection on the kilowatt-hour basis, the inspections actually made totaled but 602, of which 398 were for items called for by the A dial, 135 for those called for by the B dial and 69 for those called for by the C dial. The average interval between inspections was thus lengthened from one day to five and one-half days.

The reduction in cost of inspection under the new method is estimated at about 6 cents per meter per day. As the energy saving is about 19 cents per meter per day there is a total saving of approximately 25 cents per car per day. This is the net saving after deducting interest and depreciation on the cost of the meters installed, clerical work and overhead which accompany a general reduction in car-energy consumption.

As to the maintenance of the meters, up to the time this article was written no time had been spent on the inspection of the meters. Arrangements are now being made, however, to overhaul them, and this will be done annually hereafter. The total time necessary for the inspection will be about two hours per meter.

PHILADELPHIA RAPID TRANSIT COMPANY
ROLLING STOCK AND BUILDINGS DEPARTMENT
METER INSPECTION DIAL READINGS

192

CAR NO.	C DIAL	B DIAL	A DIAL	CAR NO	C DIAL	B DIAL	A DIAL	CAR NO	C DIAL	B DIAL	A DIAL	CAR NO	C DIAL	B DIAL	A DIAL

MARK "X" IN COLUMN OF DIAL ON WHICH MOVING HAND HAS REACHED OR PASSED STATIONARY HAND

Readings taken by

FIG. 8—FORM USED IN REPORTING READINGS ON METER INSPECTION DIALS

PHILADELPHIA RAPID TRANSIT COMPANY
ROLLING STOCK AND BUILDINGS DEPARTMENT
DAILY REPORT OF CARS INSPECTED BY METER DIALS

Car House No. ..... Date 192

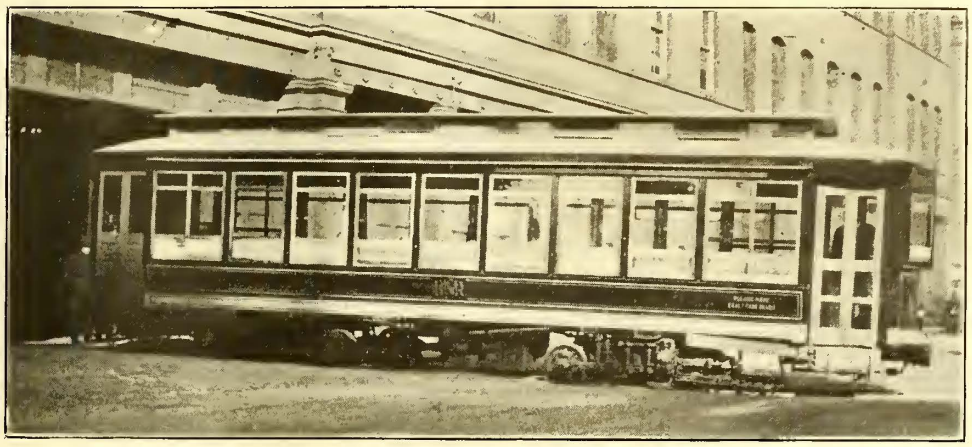
CAR NOS	DIAL	METER READING	CAR NOS	DIAL	METER READING

INSPECTOR

FIG. 9—FORM USED FOR SUMMARIZING RECORDS OF CARS INSPECTED DAILY

One-Man Cars Made from Open Type

Second Avenue Railroad, New York City, Is Reconstructing Some of Its Obsolete Open Cars Into a Particularly Attractive One-Man Type, with Comfort of Passengers a Great Consideration—The Reconstructed Cars Are Provided with Removable Sash So that These May Be Replaced by Screens During the Summer Season



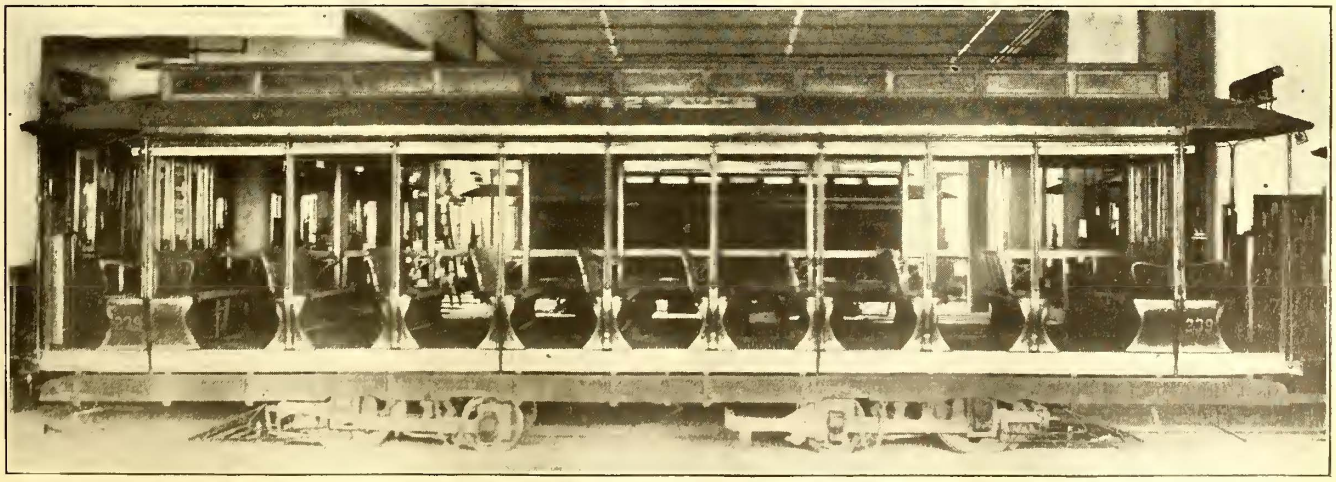
DOUBLE-TRUCK ONE-MAN CAR OF SECOND AVENUE RAILROAD

THE Second Avenue Railroad, New York City, had 100 open cars with twelve benches each which could be operated only in summer, and even then at great operating expense and danger from the multiplicity of accidents inherent to this type of car. The company was in need of more rolling stock of a modern character and decided to remodel these cars for one-man operation. Several have now been reconstructed and the enthusiasm with which they have been received by the patrons of the railway, together with the small cost of their reconstruction, has made the officials of the railway feel that they are an unqualified success. Accompanying illustrations show the process of reconstruction, starting with an open car as it was originally and leading up to the finished cars now in service.

In making this reconstruction the first operation is to remove all of the cross seats, part of the bulkhead, the running board and attachments at the sides, the old-type lighting fixtures and the various routing and destination signs. With the car thus stripped of its seats and operating equipment the reconstruction is carried out by using old parts wherever possible.

To provide for entrance to the platforms with a single folding step the platforms are dropped from their original position a distance of 7 in. For this purpose the side sills are cut off immediately in front of the bulkhead, and the center sills are cut down and reinforced to help support the new platforms. The side sills formerly consisted of oak, 7 in. x 4½ in., reinforced on each side with steel plates, the outside plate being 8 in. x ⅜ in. and the inside plate 6 in. x ½ in. This construction is not changed along the center portion of the car, but at the ends two new oak side sills are added, 8 in. x 3 in. x 9 ft. long. In the reconstruction the platforms are lengthened 4½ in. at each end, making the total length of the reconstructed car 38 ft. 2 in.

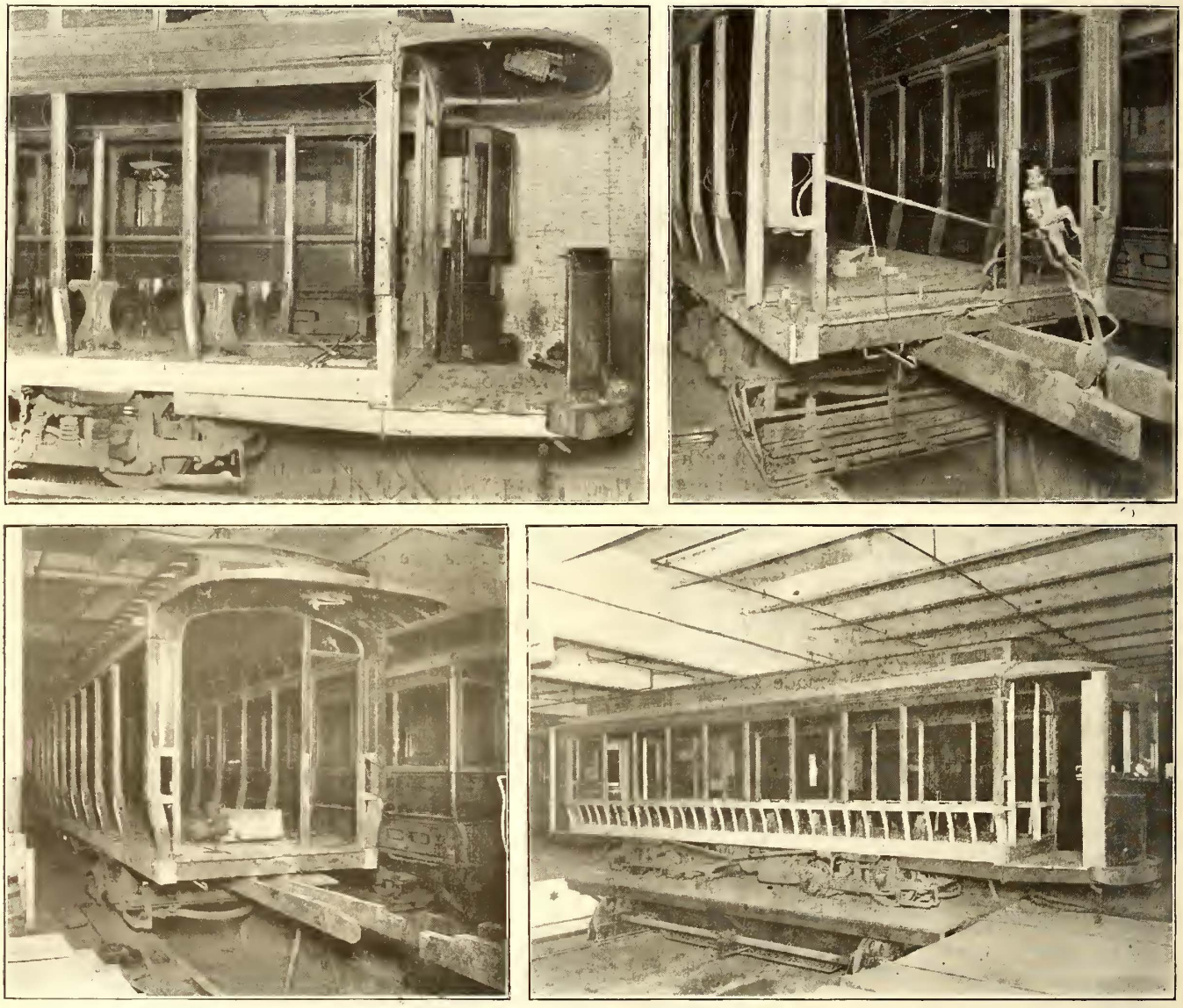
The platforms are, of course, entirely inclosed, the construction used being the same as is standard on other types of closed cars for this railway. Folding doors and steps operated by National Pneumatic Company's



OPEN CAR BEFORE RECONSTRUCTION

door engines are installed so as to give a door opening of 30 in. In the construction a number of the corner posts were found to be considerably rotted at the lower ends, and these ends are replaced or reinforced to provide a strong construction. A concave bottom belt panel is installed along the entire length of each side and above this the opening between the original upright posts of the open car is filled in with natural-finish oak panels, the tops of these coming just to the tops of the seats. Above these panels sash are installed for the entire width of the openings between the original uprights of the open cars. These sash are arranged to drop a distance of 7 in. to provide for ventilation and are also constructed so that they can be entirely removed without difficulty and can be replaced by screens during the summer. The remodeled cars will thus be of a one-man convertible type, which apparently are the first of this type placed in service by any railway.

The revised seating arrangement provides eight cross seats for two passengers each, eight cross seats for one passenger each, and four longitudinal seats, one at each corner of the car, to seat two passengers each, making a total seating capacity of thirty-two. All seats are made from the old cross seats, the end castings and other fixtures being used also. The inside end of each of the cross seats is provided with a grab handle made of cast iron and arranged for direct attachment to the end seat fixture. The seating arrangement provides a very roomy car, as the distance from center to center of the cross seats is 35 in. and the aisle width is 25 in. To provide for the aisle width selected seats for but one passenger were necessary. These are installed on opposite sides of the car in the two halves so as to provide a seating arrangement for balancing the load. The larger cross seats are 36 in. long and the smaller ones 19½ in.



AT TOP, LEFT, RECONSTRUCTED DROP PLATFORM. TOP, RIGHT, END FLOORING AND PART OF BULKHEAD REMOVED AND CUTTING OF SIDE SILLS STARTED. AT BOTTOM, LEFT, SIDE SILLS CUT OFF AT ENDS AND CENTER SILLS TRIMMED TO ALLOW FOR DROP PLATFORM. FRAMING FOR BULKHEAD IN PLACE. BOTTOM, RIGHT, FRAMEWORK FOR CONCAVE BOTTOM BELT PANEL IN POSITION

LEG ROOM MORE NECESSARY THAN SEATS

It is evident from a consideration of these dimensions that several additional seats could be added if the same seating arrangement as that used in the Birney cars was employed, but C. E. Chalmers, receiver for the road, who is responsible for the design employed, says that he was a passenger on the cars of this road

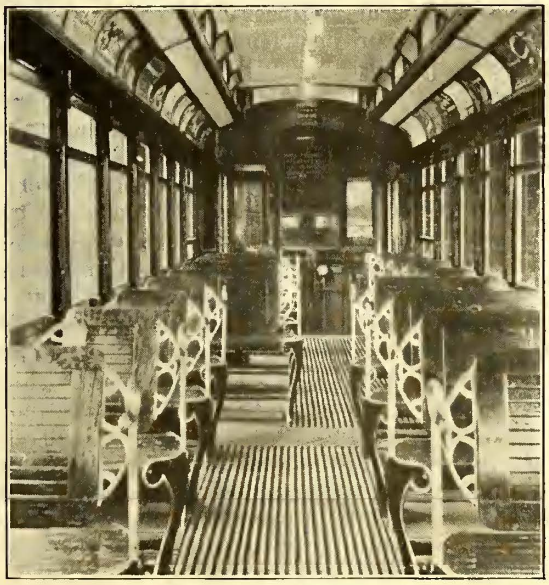
long before he was connected with its operation and that he has a lasting impression of uncomfortable seats and limited leg room. He considers the good will and comfort of the traveling public a far greater consideration than the addition of a few more seats to the cars, and in this reconstruction every attention has been paid to providing a neat, attractive car with as comfortable an arrangement as possible within the limitation of funds available for this reconstruction.

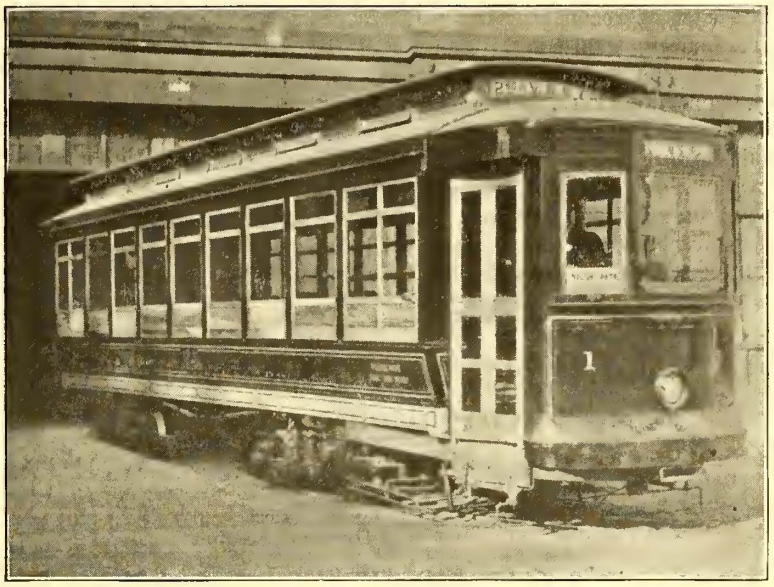
The floors as arranged in the first cars reconstructed have longitudinal floor strips in the aisles and cross floor strips between seats. It is the intention, however, in other cars which are to be constructed to use an Insulite-Mastic floor. This will be carried up a short distance along the sides of the car and at the corners, and will be rounded so as to provide for sanitary cleaning. With this arrangement it will be possible to flush out the interior of the car by turning on a hose without danger of damaging any equipment.

The heating equipment consists of sixteen Gold two-coil cross-seat heaters. These are of special design, as it was necessary to have a short heater for the single cross seats, and in order to make the equipment uniform the same type of heater was used throughout the installation. In the old cars sand boxes were installed under the end seats. In the remodeled cars, to provide for the bulkhead, these sand boxes were moved to a position under the longitudinal seats at the ends of the car. The original sand boxes were foot operated, but the new ones are arranged for air operation.

The original lighting arrangement used in the open cars consisted of three five-light clusters on the inside of the car with an additional circuit of five lights distributed on the platform and in the headlights, so that a total of twenty lamps were burning at one time. In the reconstructed lighting arrangement but half this number are burning at one time. A single row of six lights is installed down the center of the car and two additional lights are located on each platform. There is one light in each of the illuminated destination sign boxes and one light in each of the headlights. This makes a total of ten 23-watt lamps which are burning at one time.

The arrangement of the signs has been improved and made to correspond with the standard for the railway. The front glass at each end of the clearstory is lettered "2nd Ave. R.R. Co." In the original open cars an end advertising sign rack prevented light from passing through the end glasses of the clearstory. This has been done away with, so that as at present arranged the lights on the interior of the car illuminate these signs and also provide an attractive car which can be seen a long distance at night. An illuminated destination sign of a roller type, standard with the company, is installed over the front vestibule window and an additional sign reading "Enter at the Front" is placed in the side vestibule windows adjoining the entrance doors. The side panels just to the rear of the entrance doors are lettered "Please Have Exact Fare Ready." The additional lettering used on the car has been made as simple as possible and still is arranged to provide an attractive appearance. A monogram has been substituted for the lettering of the name of the company, which previously extended along the side of the car. The number of the car is placed directly beneath the monogram on the sides and at each end of the car on the right-hand side of the dasher.





INTERIOR AND EXTERIOR OF RECONSTRUCTED CAR IN SERVICE

The signal installation consists of a push button installed on the upright post between each pair of windows along the sides, with two additional push buttons at the ends of the car. This makes a total of eighteen buttons. Buzzers are provided for signaling the operator. The entire signal installation is of the Consolidated line-voltage type.

In painting the car particular attention has been given to making it attractive and clean. The outside of the car is finished with Pullman green and white, with natural finished oak panels underneath the windows. The interior is finished in cherry and white, with some additional gold striping to improve the appearance. The bird's-eye headlining has been refinished with white enamel. This provides better lighting and also gives an attractive appearance. The seats are finished with a cherry stain, and in fact all of the other interior woodwork and fittings are finished with this cherry stain. Even the cover of the controller, which is of wood, has this. The seat castings, which receive the roughest usage of any part of the equipment, are

painted black with gold striping. The floor is painted green.

The original open cars were provided with air brakes, so that the same air-brake equipment has been retained, as well as the original control equipment. In the rewiring of the car it was found possible to use the same cable for the length of the car, as this was long enough to drop down underneath the lower platform and still reach the controllers.

The control is interlocked with the doors, so that the car cannot be started until the doors are closed. The National Pneumatic door engine is installed over the top of the doors and is operated pneumatically from a valve just to the left of the motorman's brake valve. In order to give greater platform space and provide room for the entrance and exit of passengers a drop brake handle is used. On entering the passengers deposit their fares in a Johnson farebox, which is located just to the right of the entrance opening and within easy reach of the operator.

The cars as reconstructed are 38 ft. 2 in. long and weigh approximately 25,000 lb. completely equipped. The cost of reconstructing the first cars has been approximately $800 each. At present the Second Avenue line of this railroad is completely equipped with one-man operated cars, which operate between the Harlem River and Tenth Street and Broadway. A four and one-half-minute headway is maintained during the greater part of the day with a two and one-quarter-minute headway during the rush-hour period. The reconstructed cars are proving very popular with the public, and the number of passengers carried by this line is increasing rapidly.

A. I. E. E. Holds Ninth Midwinter Convention

A Number of Important Papers on Power Distribution Were Read, and Motion Pictures of Circuit Breakers, Switches, Current Transformers and Fuses Under Short Circuit Were Shown at Opening Session

AS THIS issue of the ELECTRIC RAILWAY JOURNAL goes to press the American Institute of Electrical Engineers is in session in New York City at its mid-winter meeting, a convention which has come to occupy an important place in the organization's activities. The program included several papers covering matters which have application particularly in electric railway power distribution. These represented part of the work of the Institute's technical committees which handle the highly specialized subjects in the several divisions of the field of electrical engineering.

The convention opened on Wednesday evening with the presidential address of A. W. Berresford, vice-president Cutler-Hammer Manufacturing Company, Milwaukee, Wis. Preceding the opening session the delegates spent the afternoon in visiting local power plants and other points of engineering interest.

In his address President Berresford noted first the tendency of specialists toward segregation, and said that if the A. I. E. E. had not previously been formed it would have been organized at this meeting due to the necessity for conference on technical problems. He then defined the real professional engineer as one who has caught the vision of the value of achievement for its own sake, of the importance of the work done rather than its return to the worker. The standing of electrical engineering as a profesion, he said, is illustrated by the devoted work of the A. I. E. E. committees.

Papers on Circuit Breakers and Switches

The papers of Wednesday evening had been prepared and were presented under the auspices of the protective devices committee, D. W. Roper, superintendent street department Commonwealth Edison Company, Chicago, Ill., chairman. H. R. Woodrow, Stone & Webster, Inc., Boston, Mass., presented the report of the sub-committee on oil circuit breakers and switches. This embodied the results of a questionnaire on oil switch requirements, and covered rated voltage, rated continuous current-carrying capacity, rated momentary current-carrying capacity and rated interrupting capacity. The committee made suggestions as to design under these heads.

Remarkable Motion Picture of Switches and Fuses in Action

Following the reading of Mr. Woodrow's paper, Philip Torchio, chief electrical engineer New York Edison Company, read a paper on "High-Current Tests on High-Tension Switch Gear." This was accompanied by motion pictures of the apparatus "under fire," the switches being clamped in the closed position and subjected to short-circuit currents of great magnitude. The tests, which covered several varieties of circuit breakers, fuses, etc., had been conducted during 1918 and 1919 by the Edison company engineers with the active co-operation of manufacturers. In the tests, for the first time a synchronized motion-picture machine and an oscillograph were coupled to reproduce the coincident actions of the apparatus tested and the variations in voltage and current in the circuit.

The most striking feature of the exhibit was that considerable arcing of the closed switches occurred under short circuits, which was caused by the opening of the main and arcing contacts due to the mechanical force resulting from the high current.

In the discussion which followed the reading of the papers, the characteristics of fuses and circuit breakers were pointed out, one speaker telling of a fuse in which the fusible wire is in part inclosed by cement blocks distributed along its length, with intervening exposed sections of the wire. This was said to operate successfully, the exposed wire going first and the inclosed wire later, the metal of the latter being absorbed by the cement. The carbon tetrachloride fuse was also mentioned. One speaker traced briefly the history of the circuit breaker, showing how the rapid increase in power-plant capacity had imposed severe requirements upon this vital element of the equipment.

On Thursday a number of papers relating to power cable problems were read. Some of these will be abstracted in a later issue of the ELECTRIC RAILWAY JOURNAL.

It is now possible to obtain from the Bureau of Standards bulletins Nos. 395, 396 and 397 in its series of scientific papers. These cover respectively the relation of the high-temperature treatment of high-speed steel to secondary hardening and red-hardness, the thermal and physical changes accompanying the heating of hardened carbon steels and a study of the relation between the Brinell hardness and the grain size of annealed carbon steels.

American Engineering Council Reports Progress

L. W. Wallace Elected Permanent Executive Secretary at Meeting at Syracuse on Feb. 14—Committee Organization and Assignments Crystallized—President Hoover Outlines Industrial Survey

AMERICAN Engineering Council held its second regular meeting at Syracuse on Monday, Feb. 14, at which time considerable progress was made in perfecting the organization of the committees and committee work. Also the appointment of the permanent secretary was agreed upon.

In the evening a Hoover dinner was given at the Onondaga Hotel to the members of American Engineering Council, of the Council of the A. S. M. E. and of the Technology Club of Syracuse.

The permanent committee on the elimination of waste in industry as appointed by President Hoover consists of the following members: J. Parke Channing, mining engineer, New York, vice-president American Engineering Council and member A. I. M. & M. E., chairman; Dr. Ira N. Hollis, president Worcester Polytechnic Institute, past-president A. S. M. E.; L. W. Wallace, Baltimore, member A. S. M. E., member and president Society of Industrial Engineers, secretary American Engineering Council; H. R. V. Scheel, assistant treasurer Brighton Mills, Passaic, N. J., member A. S. M. E.; L. P. Alford, editor *Management Engineering*, New York, vice-president A. S. M. E., director Society of Industrial Engineers; George D. Babcock, Peoria, Ill.; F. G. Coburn, Bethlehem Shipbuilding Company; Morris L. Cooke, consulting engineer, Philadelphia, member A. S. M. E., Taylor Society and Society of Industrial Engineers. Harrington Emerson, consulting engineer New York, member A. S. M. E. and Society of Industrial Engineers; E. E. Hunt, New York, member Taylor Society; C. E. Knoeppel, industrial engineer, New York, member A. S. M. E. and Society of Industrial Engineers; Robert Linton, mining engineer, Montana, member A. I. M. & M. E.; Fred J. Miller, past president A. S. M. E.; J. H. Williams, New York, member Taylor Society; Robert B. Wolf, New York, vice-president A. S. M. E.

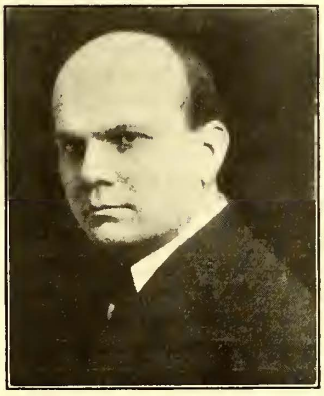
Mr. Hoover, president of American Engineering Council, is also a member of the committee. Mr. Hoover is a member A. S. C. E. and A. S. M. E. and president A. I. M. & M. E. The committee has already started work and will put into operation from the New York and Washington headquarters of the council a nation-wide plan of study. This is probably the most ambitious movement in the solution of economical problems which has ever been undertaken by American engineers.

The council has adopted a definite program encouraging the development of local engineering organizations, and in line with this policy will expect local organizations to take a good deal of responsibility in their localities in the various pieces of work which American Engineering Council undertakes.

The council is also working toward a worldwide coordination of the engineering associations. It has changed its committee on Russian affairs into a committee on international relations.

One important piece of work was the election, by unanimous vote, of Lawrence Wilkerson Wallace to be secretary of the council. Mr. Wallace succeeds L. P. Alford of New York, who has been acting secretary since the formation of the council last November.

Mr. Wallace was born in Austin, Texas, August 5, 1881. He was graduated from the Agricultural and Mechanical College of Texas in 1903 with the degree of B.S. in Mechanical Engineering and received the degree of M.E. from Purdue University in 1912. From 1903 to 1906 he served a special apprenticeship with the Santa Fé Railway and was a member of the Purdue faculty from 1906 to 1917, becoming head of the department of railway and industrial management. During this period Mr. Wallace conducted researches and did consulting work in railway mechanical engineering and factory management. For several years he investigated fire losses from locomotive sparks and gave expert testimony in many fire cases.



L. W. WALLACE

Mr. Wallace is an author of technical works and his volume on "Car Design" is used as a textbook as well as generally by designers. He also has written special instruction books for railway educational departments and papers on engineering and management topics before railway and management societies. He was formerly assistant general manager in charge of production of the Diamond Chain & Manufacturing Company of Indianapolis. More recently he has been director of the Red Cross Institute for the Blind in Baltimore.

Mr. Wallace is a member of the American Society of Mechanical Engineers and the vice-chairman of the society's management section. He is now serving his third term as president of the Society of Industrial Engineers.

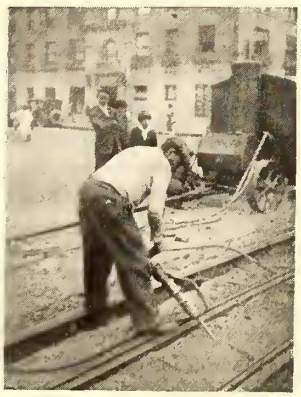
The temporary headquarters of the council in the Engineering Societies Building, New York City, will soon be transferred to Washington, where the council has established permanent national headquarters in the McLachlen Building.

The council gave formal approval to the action of the committee on procedure requesting that President Harding put an engineer on the Interstate Commerce Committee. The committee was authorized to name six qualified engineers when requested to do so. Activity in behalf of a National Department of Public Works will be continued by the council through the public affairs committee. It was recommended that engineering efforts be extended to the whole question of government reorganization.

The plan for the registration of engineers as presented in the council's report was indorsed and the appointment of another committee was authorized. The Russian affairs committee was made a new committee on international relations.

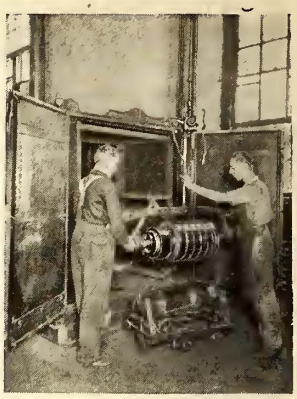
The council decided to recommend to President Harding that an engineer be appointed assistant secretary of war. No action was taken relative to the national civic federation, fuel conservation or merchant marine committee appointments. The committee on public affairs was authorized to recommend the congressional appropriation to investigate deeper waterways.

At the dinner in the evening President Hoover delivered an address outlining his ideas on the work of the committee on the elimination of waste in industry.



Shop, Track, Power and Line

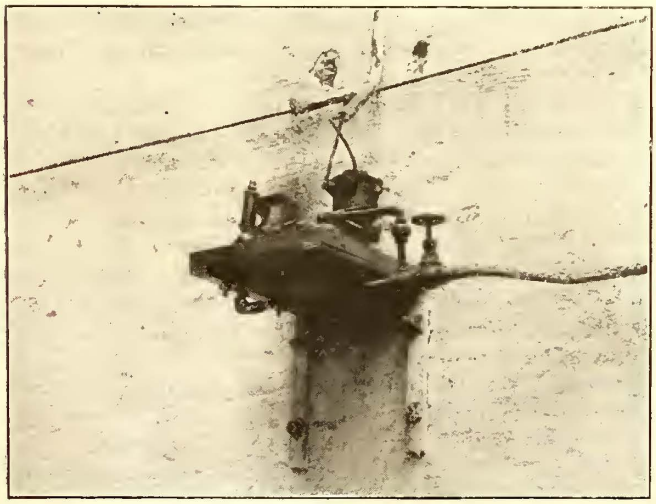
These Articles and Ideas Are from Men on the Job Who Find Special Applications and New Methods an Incentive for Greater Effort — If You Have Something Good Pass It Along



Convenient Shop Call System

WHEN a call comes for a shop foreman while he is attending to some duty in the inspection shop, overhauling shop, storage yard or other place connected with his department the problem of locating him is sometimes a serious one. Many railway shops use a loud-sounding gong or whistle as a signal and sound a different number of blasts or signals to designate different department heads and indicate that their presence is required in the office. With such a system the person signaled must go to the office to learn what is wanted, and as a loud alarm is necessary to reach all parts of the shops or yards this disturbs workmen and distracts them in the performance of their duties.

The Third Avenue Railway, New York City, has a shop call system in its Sixty-fifth Street shop that has proved very satisfactory for such service. Telephones have been located at various convenient points throughout the shop and small whistles electro-pneumatically operated are scattered throughout the building. These whistles are operated from the telephone switchboard by pressing a key. As they are connected in parallel, they all sound the same signal and the person called can find out what is wanted or can answer any outside call by going to the nearest telephone. By this arrangement the signaling whistle can be made very small so as not to prove a disturbing factor for other workmen.

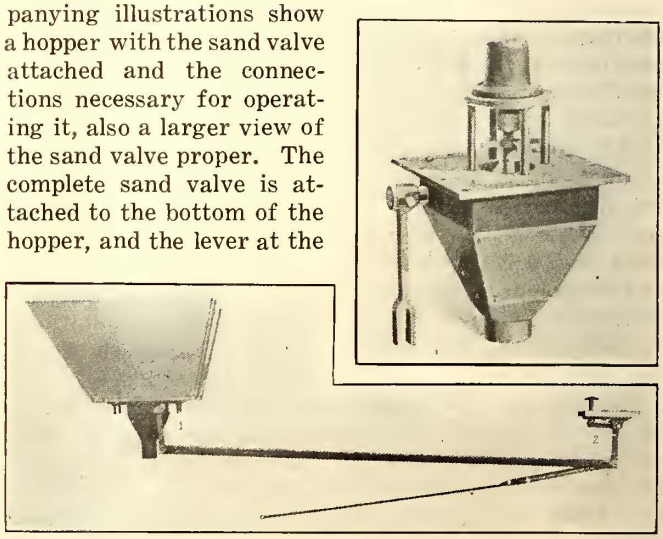


WHISTLE AND MAGNET VALVE FOR SHOP CALL SYSTEM

The mechanism for operating the various whistle signals consists of a magnet valve taken from an old electro-pneumatic switch group and connected to the whistle. When this magnet valve is energized electrically air is admitted to the whistle pipe and so sounds the signal. The magnet valve, together with the whistle and piping, is mounted on a bracket high up on the wall so as to be out of reach of employees and in a location where the signal will be easily heard. With this system in use a man need no longer be tied down to his desk. If his work takes him on frequent visits to other departments he can go with an easy mind, knowing that if he should be needed he can be readily located and that he can communicate with the office without making it necessary to walk the entire length of the yards and shops to find out what is required.

Mechanical Sander for Safety Cars

A FOOT-OPERATED mechanical sander has been put on the market by the Nichols-Lintern Company, Cleveland, Ohio, which advocates its use as a safety feature on the safety car, to insure the sanding of the track even if the air pressure fails. Accompanying illustrations show a hopper with the sand valve attached and the connections necessary for operating it, also a larger view of the sand valve proper. The complete sand valve is attached to the bottom of the hopper, and the lever at the side is pulled by the action of the pedal. Through a cam it causes a vertical movement of the valve which is attached to the threaded stem, thus making an opening for the sand to flow through. The pronged part of the valve, through its up-and-down movement, prevents bridging of the sand. A strong spring is located under the top cap. This spring closes the valve when the foot



SAND HOPPER WITH FOOT-OPERATED SAND VALVE MECHANISM

pressure is released. The working mechanism is completely inclosed within the valve and the cam is within the sand hopper, protected from any outside influence, thus insuring against the rusting of the moving parts.

Fighting Snow in Winnipeg

SOME of the snow-fighting equipment used by the Winnipeg Electric Railway, Winnipeg, Man., is shown in the acompanying illustrations. Snow conditions in Winnipeg are rendered especially trying due to the extremely low temperatures encountered and the dryness of the climate. Heavy winds usually accompany the low temperature and the snow, which is light and dry, drifts readily. This makes it very difficult to keep the tracks clear of snow and as a result it is necessary to operate the sweepers more miles per year than in cities where climatic conditions are more favorable. While the snowfall in Winnipeg is not as heavy as at other points in Canada, yet the sweeper mileage is considerably greater than on most systems of the size of the local railway.

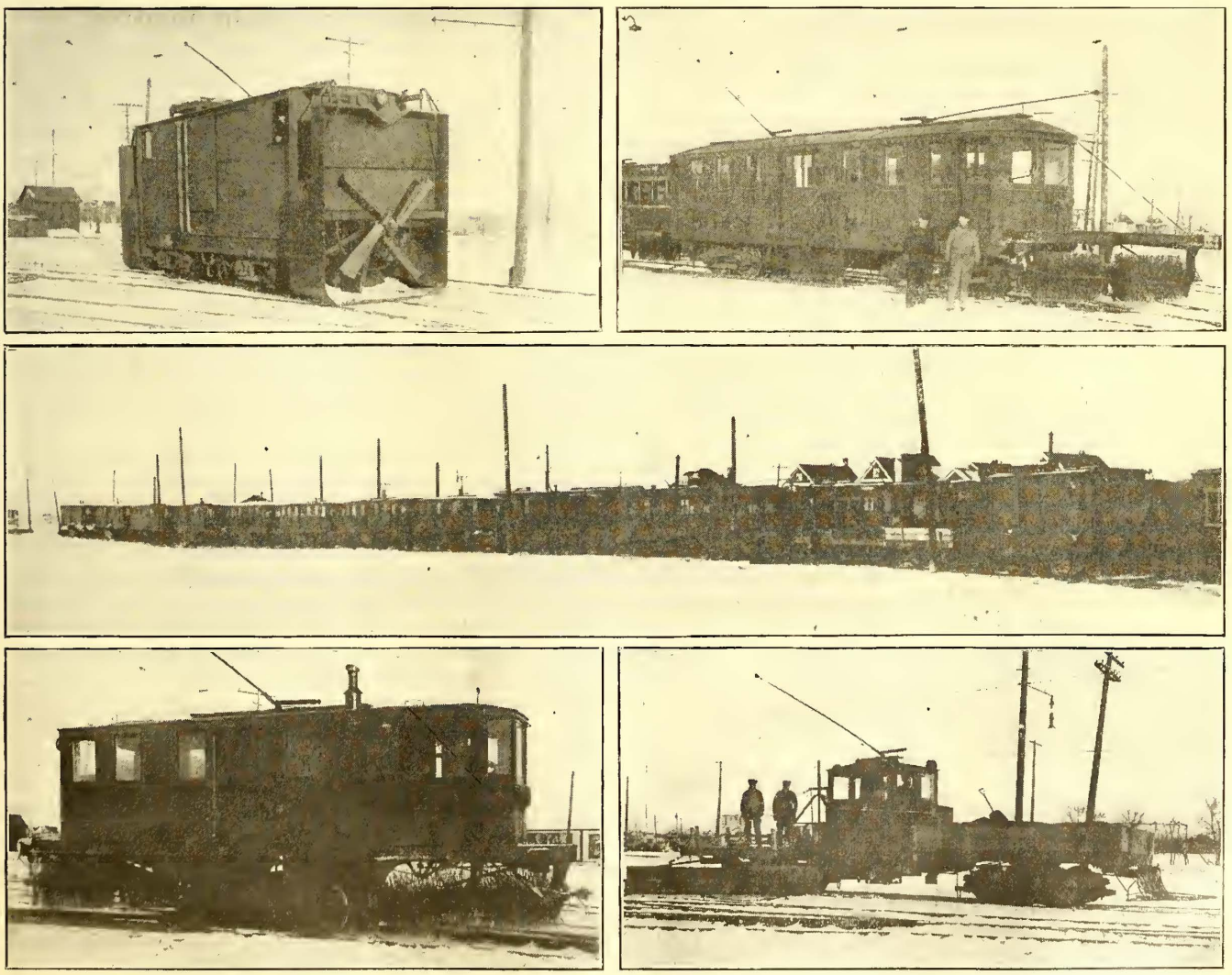
The snow-fighting equipment proper used in Winnipeg consists of one rotary plow, one large double-end sweeper and nine double-end single-truck sweepers. This equipment is all of McGuire-Cummings make, imported from the United States. In addition to this equipment the company also has some auxiliary equipment made in its own shop. This consists of one work car, which is equipped with a 14-ft. wing and is operated by air control for clearing back the snow. This wing as attached to a flatcar is shown in one of the illustrations. Other cars operating on suburban lines are equipped with 14-ft. nose plows attached to the trucks and arranged for lowering and lifting by the motorman from his cab.

Life of Track Files Increased by Acid Sharpening

FILING new rail joints on the lines of the United Railroads of San Francisco has been done for many years with Vixen files, a type whose manufacture was recently discontinued. Inquiry developed the fact that the nearest substitute for these files would cost $18 each.

Some experiments were thereupon made with the acid sharpening process for reclaiming the dulled Vixen files on hand. It was found that if the dulled files were soaked in dilute sulphuric acid for eight hours, the cutting edges would thereby be sharpened to the extent that the file was good for about 30 per cent of the amount of service that could be obtained from a new file.

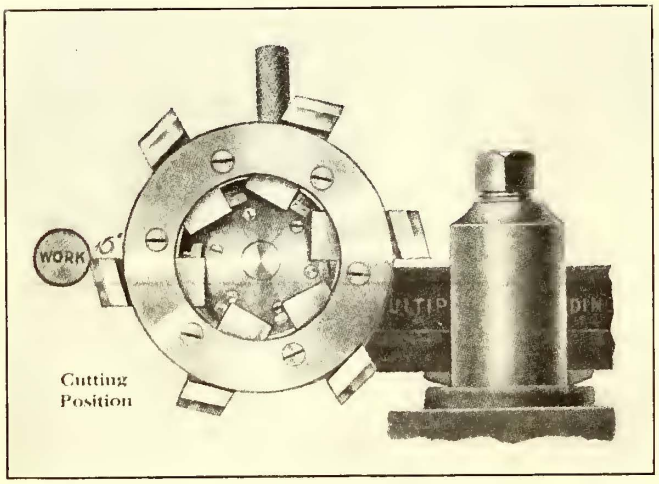
The acid used for the purpose was chemically pure sulphuric acid diluted with twice its volume of pure water. Watertight redwood boxes were found to be the most convenient containers in which to immerse the files.



TOP, LEFT, LARGE ROTARY SNOWPLOW. TOP, RIGHT, DOUBLE-TRUCK, DOUBLE-END SWEEPER. CENTER, A LINE OF SNOW-FIGHTING EQUIPMENT IN THE STORAGE YARDS. BOTTOM, LEFT, SINGLE-TRUCK, DOUBLE-END SWEEPER. BOTTOM, RIGHT, WORK CAR WITH 14-FT. WING ATTACHED

New Type Threading Tool

THE Cruban Machine & Steel Corporation, New York, N. Y., is placing on the market a new type of multiplex threading tool. This consists of a cutter turret, in which are mounted six cutting tools arranged so that as the turret is rotated each succeeding knife takes an additional depth of cut, and one complete rotation of the turret is sufficient to cut any thread up to No. 12 pitch without additional adjustment. The



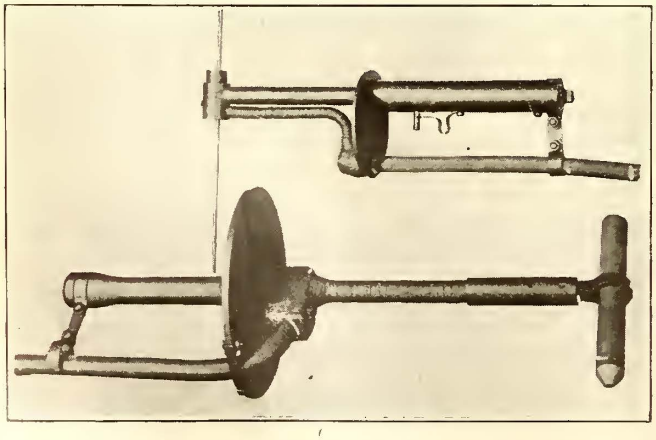
MULTIPLEX THREADING TOOL

cutter turret is attached to a cross-slide which is fastened to the toolpost of the lathe. Should additional depth be necessary, this can be taken care of by adjusting this cross-slide. The turret is provided with a pin handle and at the end of a cut a pull on this handle disengages the cutting knife from the work and sets the succeeding knife in proper position for taking the additional depth of cut necessary. Each knife is held firmly by a locking screw at the bottom of the knife.

Convenient Electrode Holders

OF THE two forms of electrode holders illustrated, the upper is designed for metallic electrodes while the lower is for graphite electrodes. In each the cable which conducts the current to the electrode is carried outside the handle, so that a small-sized cable can be used without causing the handle of the holder to become heated to an uncomfortable temperature. The metallic electrode is held by means of a plunger which passes through the tubing and is actuated by springs. The stub end of the electrode can be released by pulling on the trigger shown immediately under the handle of the electrode holder.

The graphite electrode can be readily removed and replaced by rapping the two jaws, which are merely slipped back into the tubing. These jaws consist of two pieces of cold-rolled steel bent into proper curved shapes to fit the electrodes and are forced back into the tubing, which clinches them together, causing them to hold the electrodes securely. If these jaws should become burned while in service they can be quite readily replaced by forming up a couple of jaws from steel or iron.



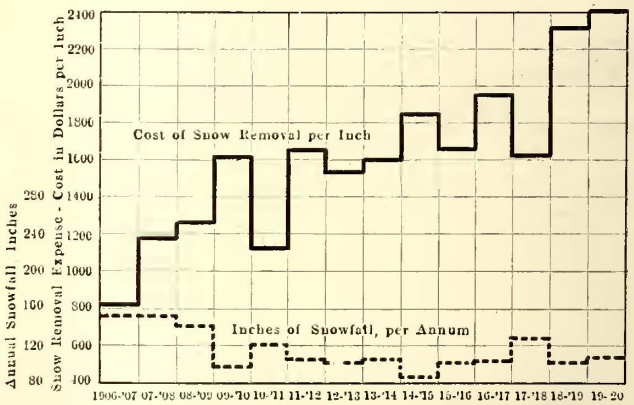
HOLDERS FOR METALLIC AND GRAPHITE ELECTRODES

Registers Replace Ticket Agents

THE Brooklyn Rapid Transit Company has purchased fifty Rooke automatic registers for use in collecting fares on the rapid transit lines running between Sheepshead Bay and the Stillwell Avenue terminal at Coney Island. During the winter season shuttle service is used between these two points and the ticket agents at stations intervening that are ordinarily required have been done away with through the use of these registers. The fares are collected by collectors who board each train as it leaves the terminal and collect all fares while in transit. This method is working out very satisfactorily.

Snow-Removal Costs in Montreal

COL. J. E. HUTCHESON, general manager Montreal Tramways, in his paper on "Practical Operation of a Service-at-Cost Contract," presented on Jan. 31, 1921, at the seventeenth annual convention of the Canadian



SNOWFALL DATA FOR MONTREAL, QUE.

Electric Railway Association, included among other operating costs some figures on the cost of snow removal from the company's right-of-way for the past fourteen years. These figures form the basis of the accompanying chart. During the period covered the average snowfall per season was about 115 in. and the average cost of removal per inch was $1,615.

In investigations made in England with regard to the loss in weight of overhead electric railway contact systems by corrosion and wear it has been found that the heaviest corrosion was on a section of the line over which both steam and electric trains were worked. There the loss averaged approximately 0.82 per cent per year. On a line where there was no steam travel tests indicated that the loss by wear was closely proportional to the density of electric train traffic over the line, and in spite of the very heavy service over this line the wear averaged but 0.3 per cent per annum.

Tendencies in Safety Car Design

Comments on a Previous Article, Outlining Changes in Construction that Have Been Made, Show Diversity of Opinion Regarding Their Desirability—Other Articles on the Same Subject Follow the Letters

SEVERAL letters and other short articles relating to the safety car having been scheduled for publication in this issue of the ELECTRIC RAILWAY JOURNAL, they are gathered together under the above general caption for the readers' convenience.

Letters to the Editors

J. G. BRILL COMPANY

PHILADELPHIA, PA., Feb. 5, 1921.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 15, 1921, page 127, there is published a staff article on the "Trend of Safety Car Construction" which is not only misleading to those unfamiliar with the entire question of the standardized Birney safety car, but is also liable to create such erroneous impressions as will be detrimental to both the manufacturers and the railway operators themselves.

Since the standard Birney safety car was designed there have been many suggestions made which, in the opinion of those making them, would improve the standard construction, but in most cases the increased weight would more than offset any advantages which might be obtained. In some cases when safety cars are ordered the specifications are made to read "standard Birney safety cars, except ——," but it must be borne in mind that where the weight of the car was increased the saving in power, increased acceleration and other advantages of the standard car suffered. Of the twenty-three changes or departures from the standard Birney safety car reported, most of them were included in a few cars and all were not included in all of the cars purchased by half the companies sending in reports, as might be construed from the article in question. Also, an analysis of these departures or changes from the standard specifications reveals that at least 50 per cent of the changes are either now included in the standard car or are essentials determined by climatic conditions which could not very well be retained as a standard. Take, for instance, the heaters. It is illogical to expect that a standard number of heaters could be furnished in Birney safety cars regardless of the climatic conditions. Then, again, in severely cold regions double floors or storm sash may be necessary and should be furnished, but they would involve superfluous weight in warmer climates.

As to the heavier truck, this was adopted some time ago and is adequate for the service. The light-weight truck was designed to carry a limited load, but after a time it was considered advisable to provide a truck with greater carrying capacity than the limited load of the lighter truck.

It is to be expected that the standard Birney safety car will from time to time show progressive improvements in the way of refinements, which will be incorporated at such times that the advantages of quantity production and standardized parts will not be lost. Some refinements have been made, but the general plan, length, width and other dimensions of the standard car remain the same as originally designed after an exhaustive study of the requirements of street railway transportation. The statement in the sub-heading of the article referred to, that "A review of the more recent changes in safety car design points toward the development of a type with increased capacity, etc.," is not borne out by the facts, which are recognized in the last paragraph of the article by the statement, that the "most general feeling in regard to standardization on this particular car seems to be that the present general dimensions of length, width, height and general capacity are satisfactory." I know that you desire to present the standard Birney safety car to your readers with the correct perspective, and for this reason the publication and spirit of this letter will be appreciated.

W. H. HEULINGS, JR.,
Vice-President and General Manager of Sales.

MEDFORD, MASS., Jan. 27, 1921.

To the Editors:

I have been interested in the articles which have recently appeared in the ELECTRIC RAILWAY JOURNAL with reference to the tendencies in design of safety cars. From the expression of these articles it is apparent that a number of street railway men do not give sufficient regard to the conditions which confront the street railway today.

The basic consideration in car design should be that the electric railways no longer have a monopoly of the urban passenger business. The successful car must be designed to meet the competition of the bus.

Barring infrequent stop service over reserved right-of-way passenger transportation may be carried out in two ways, viz.: (a) By transporting passengers in small groups at frequent intervals at moderate speeds, or (b) by transporting passengers in large groups at less frequent intervals at slower speeds. Service (b) is often called mass transportation.

I look forward to the time when, by the equalization of paving and tax burdens, adjustments of fare, and other means, service (b) may be offered to the public at rates which will in themselves take the majority of riders from competing buses, just as service (a) by its frequency and speed is taking riders from its competitors. But in the larger cities service (a) and service (b) cannot be given at the same time over the same tracks. It is obviously impossible to run a 9 or 10 mile-per-hour safety-car schedule over tracks which carry a number of large cars or trains operating at 7 or 8 miles per hour.

It is, therefore, imperative that car design be preceded by a decision as to the service in which the proposed car is to be used. Is the car to be used for mass transportation at slow speeds or is it to be used for service with small units at moderate speeds? Mass transportation requires large cars, trailers or multiple-unit trains. Moderate speed service requires buses, trackless trolleys or cars with speed characteristics at least equal to those of the present safety car.

The ability of the standard safety car to operate at

bus-competing speeds is the result of a high ratio of motive power to car-weight and a low ratio of stops to car-miles. Any increase in the weight of the standard car will require larger motors than are now used. To operate the larger motored car at the better schedule speeds of the present car will increase operating expenses and fixed charges more than $1,000 per car per annum; a prohibitive amount. The increased weight will thus force a decreased schedule speed, which in turn will increase platform expense and investment in cars while driving business to our competitors, and we will head back toward the condition of heavy cars and empty seats, which we hope is forever behind us.

Let us devote our energies rather to reducing the weight of the present standard car, for which effort we will be rewarded by decreasing ratios of operating expenses and investment to gross earnings.

The case against increasing the capacity of the safety car is a strong one. The wisdom of Mr. Birney's selection of thirty-two as the seating capacity of the safety car has been borne out by experience. Observant operators know that independent of congestion within the car an increase in the maximum safety car load beyond about fifty passengers reduces the number of passengers carried per car-mile. The larger loads increase the number and duration of stops, thus decreasing the schedule speed and trips per car by an amount more than sufficient to offset the increased car loading. It should be remembered that even with the roomy platforms of large prepayment cars the time taken by each passenger to board or alight increases as the number of passengers boarding or alighting exceeds three or four per stop.

If one must carry more passengers per car than can be carried comfortably by the present safety car he may use a larger car, but the increase in car capacity which must be made to secure an increased loading per car-mile is so great that the service given by the larger car will be slow-speed, mass-transportation service instead of moderate-speed, safety-car service.

A SAFETY CAR FAN.

Safety Car Construction in Canada

Cars Embodying Many Changes from the Standard Birney Type of Construction Are Exhibited at the Car Works of the Ottawa Car Manufacturing Company, Ltd.

AT THE convention of the Canadian Electric Railway Association held in Ottawa, Ont., on Jan. 31 and Feb. 1, safety cars formed one of the principal topics of discussion and many of the attendants took advantage of the close proximity to the Ottawa Car Manufacturing Company's works to inspect some new safety cars which this company has under construction. Some of the changes for Canadian conditions which are embodied in these cars and others being considered were outlined by W. H. McIntyre, general manager, in a circular letter distributed at the convention. The following is an abstract of this letter:

Since the introduction of the Birney safety car there have been certain changes and improvements which our engineers have taken into consideration. These provide for increased safety to the public, reduced maintenance, improvement in appearance of the car, and changes to meet the climatic conditions of Canada. Our company is constructing a one-man car which we feel will be more suitable for Canada than the one now built in the United States. Improvements embodied include:

1. Increased strength of various structural parts.
2. Increased thickness of side sheathing.
3. Double floors with lining between.
4. Agasote headlining.
5. Agasote waist coating belt rail to floor.
6. Storm sash.
7. Wheels 26 in. in diameter.
8. Rubber cushion between underframe and truck.
9. Brake levers provided with safety jaws, not clevices as now used.
10. Additional heaters.
11. Seating arrangement changed.
12. Leather covered seats with the Ottawa flat spring, eliminating all coil springs.
13. Automatic spring bumper.
14. Safety panels for switches.
15. All air-brake piping installed inside the car where practicable.
16. New lighting arrangements.

Other features which are being considered for adoption on our Canadian safety car will increase capacity, provide greater comfort and convenience and additional safety. We have what we term a heavyweight one-man safety car which weighs 24,000 lb. This car is designed for use where existing headways are three minutes or less and where traffic is heavy. The design of this car includes a longer platform at the front, the use of double doors for entrance and exit of passengers, the employment of platform railing to separate incoming from outgoing passengers, the use of longitudinal seats at the ends, including all safety features with the National Pneumatic Company door engine. The equipment is so arranged that the motorman can operate the doors and steps singly if desired. This car has been constructed along the lines described in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 15, 1921, page 130, for a one-man car of somewhat larger proportions and seating capacity than that of the standard Birney car. This car was designed by the Ottawa Car Manufacturing Company a few years ago and there are now fifteen such cars in use.

We believe this is an opportune time for the railway managers of Canada to consider the standardization of street railway cars in Canada, which in the past has been overlooked.

Manager Prefers Single-Door Safety Car

Experiment Showed that Fares Are Lost in Rush Hours with Two-Door Type of Car—Also that Convenience of Passengers Renders Use of All Cross Seats Best

IN CONNECTION with an article in the Jan. 15, 1921, issue on "Trend of Safety Car Construction," in which a variety of changes made or suggested were discussed, the following experiences and conclusions of one safety car user are pertinent:

The first safety car run by this railway, which operates in a small city, but with some very dense intermittent traffic, was of the standard single-door type. Following some experience with this car the management thought it would be an improvement if the front platform was provided with both entrance and exit doors. Consequently a car of the double-door type was installed. It was not long before the company found that the theory of the double door was not working out in practice. Many fares were lost in the busy hours by reason of both doors being open, one for entrance and one for exit. Before the operator could close the exit door on the departure of the last passenger boarding passengers would force their way in through the exit aisle and seat themselves without paying fare. The operator, of course, would go back and try to get all missed fares. This meant the loss of three or four minutes of valuable time, annoyance to those who had already paid fare and several fares lost in any event.

The company next tried the plan of opening the entrance door only after the exit door had been closed. This proved to be an even greater waste of time than the first method. Finally, after timing the loading and

unloading of passengers on both types of safety cars, the management learned that the single door was faster than the double doors, with the further advantage that the single-door car allowed no fares to slip by. The company now operates with the single-door system only.

Another interesting experience was in regard to the seating plan. One car had longitudinal seats in the corners to minimize congestion at the ends, while the other car had cross seats throughout. It was noted that passengers on the longitudinal-corner-seat car found it altogether too easy to crowd within the well formed by these seats. On the other hand, the very fact that it was not so convenient to stand near the bulkhead line of the cross-seat car led passengers to go back. The operator also had a greater inducement to remind passengers that they should move backward, for it did not take much of a standing load at the front end to crowd him uncomfortably. Hence the management concluded that the all-cross-seat car was the better in practice after all.

Moralizing a bit upon his experiences, the manager of this company says: "It seems to me that many companies are losing sight of the principle on which the safety car was designed, namely, that a large number of small cars on short headways should replace a small number of large cars on long headways. It seems to be the tendency to try to increase the size of the car and its carrying capacity, which will spoil the very principle for which the car was designed. The safety car is supposed to handle fifty persons as a full load. When the traffic is dense enough to exceed this load more cars are necessary. I believe that it has been proved that even on the congested lines in big cities two Birneys can replace one double-truck car and handle 30 per cent more people in less time. I think that if the various companies would bear in mind the principle on which the safety was designed there would not be so much inclination to enlarge the car and make other changes."

Heavy Short Circuit Kinks Third Rail

A RECENT derailment on the Northwestern Elevated Railroad, Chicago, resulted in a short circuit so violent that it threw the third rail out of alignment for a considerable distance from the point of derailment. Some work was being done on one of the express tracks and both express and local trains were being routed over the local track. In order to provide adequate feeder capacity for this track, therefore, four feeder sections had been tied together solid. When the train derailed the truck of the forward car grounded not only the third rail but the feeder cables, having a combined current setting in the substation of 30,000 amp. Following regular operating practice, the operator of the substation into which these cables lead tried three times to close the circuit breakers, each time throwing his machines off the line. Apparently the current rush through the third rail and feeders was so tremendous that the third rail was stretched out and kinked or buckled in varying amounts all along the line. In at least three places it was kinked and thrown over beyond the middle of the track, tearing loose or breaking the third rail insulators. The most remote of these points of maximum displacement was ¾ mile away. More than an hour after the accident, at this distant point, the third rail was still hot to the touch.

Association News

Prudence in National Affairs Urged

Reduction in Excess Profits Taxes and Income Surtaxes Necessary—Duty on Imports Should Be Made on Current Exchange Rates—Unnecessary Expenses Keep Cost of Living Up

ONE of the speakers at the midyear dinner of the American Electric Railway Association, held Feb. 10, 1921, in Chicago, was Hon. John W. Weeks, ex-Senator from Massachusetts. His address was not available prior to delivery and could not be included in the issue that contained a full account of the conference. Senator Weeks, while not speaking directly on railway matters, did touch upon several things that bore on the cost of railway operation, such as taxes and the cost of living.

Revision of Tax Laws

On the necessity for a revision of the tax laws, he said that before the war about half of the government revenue, outside of post office receipts, came from the tariff and the other half from internal revenue receipts. Because these two sources were insufficient to carry on the war, the government imposed an excess profits tax, modified somewhat from European practices, but still with many irregularities that produced extravagance. When the armistice was signed it was apparent that prices would react. An excess profits tax cannot be collected, he said, when people are losing money, and for that reason as soon as the war was over this form of tax should either have been repealed or greatly modified.

As for the income tax, the surtaxes are too high, not because the person taxed has to pay too much, but because they have led to large investments in non-taxable government securities, with the result that many of the richest men in the country do not pay a single dollar in income surtaxes.

Protective Tariff on Imports

In 1914 and 1915, when it seemed that the country was on the verge of difficult times and business was bad, the import duty averaged less than 6 per cent. Twenty years ago it was 23 per cent. Today, with the depreciated rate of exchange, the average duty is 5.75 per cent. If the exchange rate was the same as when the law became effective, the amount of duty collected would be twice what it is. Senator Weeks suggested a provision to be made in the law permitting a change in the rate of duty when there was any material modification in the rate of exchange, and stated that the rate of duty on importation must be as reasonable as possible, not only to protect our own market but to enable the people on the other side to get on their feet. Based on the $4,000,000,000 estimate as the cost of governmental operation, import duties should pay, he said, $750,000,000, or 18.5 per cent. This would be a reality today if the duties now assessed were based on normal rates of exchange.

The inheritance tax, Senator Weeks stated, was not revenue in the ordinary sense of the word, but a

symbol of property, and every dollar collected should be used to pay off the national debt and not current running expenses.

Economy of Government

The party that comes into power on March 4 is going to carry out its campaign pledge for economy of government, but people have no conception of how difficult it is to reduce expenditures, even though Congress is the most conservative part of our government. For the last twenty years, with but two exceptions, it has appropriated less money than asked for by bureau officers. Congress is now cutting the life out of a great many appropriations and should have real encouragement from the people at home when it tries to economize.

Present Condition Natural

In conclusion Mr. Weeks stated that the condition that now exists in this country is perfectly natural. He agrees that we are inflated, that we may look healthy, but in reality are not healthy and will not be until we get back to normal conditions. However, he is optimistic enough to believe that we are tending toward those healthier conditions, but as it takes patience to bring about a state of normalcy such as should exist, every man should have courage. Let him look into his own affairs first and see if he is no worse off than at the beginning of the war. What is needed is courage and ordinary prudence in government and other affairs, and all will go well.

Heavy Traction Experts Confer

A MEETING of the Engineering Association committee on heavy traction met in New York City on Feb. 16, with Chairman Sidney Withington, New York, New Haven & Hartford Railroad, presiding. Present also were A. H. Armstrong, General Electric Company; L. S. Billau, Baltimore & Ohio Railroad (representing J. H. Davis); J. C. Davidson, Norfolk & Western Railway; C. H. Quereau, New York Central Railroad; J. R. Sloan, Pennsylvania System (representing the Association of Railway Electrical Engineers), and L. S. Wells, Long Island Railroad.

The committee first considered the definition of the term "heavy traction," and assumed that for the purposes of its investigations the term would cover roads operating trains of three cars or more or electric locomotives weighing 80 tons or more, or both. By committee assignment Mr. Armstrong and H. W. Cope, Westinghouse Electric & Manufacturing Company, are to compile a list of heavy traction roads for use in making a canvass for data and also to outline a questionnaire on electric locomotive practice that will bring out information supplementary to that contained in the reports of the 1920 and preceding conventions.

Mr. Withington, with other local members of the committee, will compile data on multiple-unit cars. The committee also considered the desirability of adding to its report a bibliography on heavy traction and a summary of what the heavy traction committees of other associations have been doing during the year. The desirability of getting together with electrification committees of other associations was also discussed and a sentiment in favor of a movement to this end was expressed. The meeting adjourned to reconvene probably early in May.

Claims Subjects Chosen

AT THE time of the midyear conference in Chicago last week a joint meeting was held by the Claims Association executive committee and its committee on subjects. Those in attendance at this meeting were: John J. Reynolds, claims attorney Boston Elevated Railway; W. F. Weh, superintendent of accident department Cleveland Railway; R. E. McDougall, general manager New York & Harlem Railroad; W. G. Fitzpatrick, general claim attorney Detroit United Railway; E. L. Lindemuth, claim agent Wilkes-Barre Railway; S. B. Hare, claim agent Altoona & Logan Valley Railway; J. S. Kubu, claim agent New York State Railways; Wallace Muir, claim agent Kentucky Traction & Terminal Company; W. H. Hyland, claim agent Fonda, Johnstown & Gloversville Railway.

The topic of greatest interest to both the industry and the public was considered to be safety. It was therefore decided to have one day of the October convention designated as "Safety Day," and on that day there should be a joint meeting with the T. & T. Association, the entire meeting being devoted to the subject of safety.

The second subject selected for consideration is "What Should Be the Method of Claim Departments in Handling Accidents and Claims." The purpose of this selection, as the title implies, is to bring forth what appears to be, or is believed to be, the most efficient mode of handling accidents and claims without regard to the size of the property or the location thereof.

The third subject chosen was "Constructive Arguments as Opposed to Destructive Contentions in Accident Investigation and Adjustment." This will be considered under the following subdivisions:

1. Refusal to give signed statement, by claimant or witness.
2. Refusal to permit medical examination.
3. Refusal of reasonable settlement without the advice of an attorney, or a threat to employ a "shyster" or a professional negligence attorney.
4. Refusal of claimant to disclose witnesses or attending doctor.
5. Request for company's witnesses.
6. Request by claimant for copy of description of occurrence.
7. Request that claim department repair damaged property.
8. Allegation that unfair advantage is taken of claimant.
9. Contention that any person injured in car accident is entitled to damages.
10. Request for adjuster to make frequent return calls.
11. Refusal to call at claim department offices for discussion.
12. That the company is liable or would not call upon claimant.
13. That settlement with driver for injury indicates liability for property damage.

This subject, it is hoped, will develop a psychological method of procedure in claims work.

The fourth subject will also be considered in a number of subdivisions. The topic is "Essential Points to Cover in Accident Investigation," and the subdivisions follow:

1. Boarding and alighting.
2. Collision with person.
3. Collision with vehicle.
4. Passenger assaulted; ejected; arrested; etc.
5. Passenger struck by passing car.
6. Passenger struck by standing vehicle or obstruction.
7. Vehicle wheel catching in switch or special trackwork.
8. Unreported accidents.
9. Falling in car.
10. Falling off car.
11. Riding on fender, bumper, etc.

12. Doors closed upon person or passenger.
13. (a) Car derailed.
    (b) Runaway car.
    (c) Car straddling switch.
    (d) Collision of cars.
    (e) Electrical disturbance in controller or motors.

The object of the fourth subject is, of course, the efficient training of the investigator with reference to the points that he should cover in making his investigation of a given accident. It is hoped so to treat this, educationally, as to have it furnish a practical code for guidance in such work.

As the fifth subject it was decided to have a "Free-for-All Discussion" on the following topics:

1. Value of publicity in claims work.
2. Best method of handling hospital cases.
3. Automobile hazard.
4. Using the mails to obtain witnesses' statements.
5. Claims by company for damage to its equipment and how such claims are handled.

It is proposed on this subject to have a series of oral discussions, limited to ten minutes, and this, it is believed, will afford ample scope for the exposition of mature views on the various sub-titles covered.

Employees Send Gavel to President

AN EMBLEM of authority was sent by his Charleston shop employees to President P. H. Gadsden of the American Association for use at the midyear conference at Chicago and thereafter. This gavel is their own handiwork. The following letter came with it to Chicago and explains the how and why of its construction:

CHARLESTON, S. C., Feb. 1, 1921.

P. H. GADSDEN,
President Charleston Consolidated Railway & Lighting Company, Philadelphia, Pa.

DEAR SIR: Doubly "Our President," as the executive head of the Charleston Railway & Lighting Company and president of the American Electric Railway Association, we, your loyal employees and admirers who have known your worth for long, feel a just pride in the fact that the profession has seen fit to honor you by electing you as its head. We feel that the association in doing this has also honored itself by electing to this high position in the profession one who so richly deserves all the honors which they can bestow as a testimonial of their appreciation of your valuable services to the industry during the trying period of the great war, as well as your tireless efforts at all times to bring their true condition to the attention of the public.

In token of the high regard which we hold for you we therefore ask that you accept this "Emblem of Authority," which is the handiwork of your shop employees of the railway department. This is in no sense of the word a common gavel, as each piece of wood in its composition has, through long years of association, a meaning which we feel that you will appreciate. The dates which it bears, 1897-1921, as well as the twenty-four pieces of mahogany, cherry and maple which form its head, are emblematic of the years of service which these pieces of wood have done for you and the company as parts of the twenty-one old cars which were recently scrapped.

The mahogany parts and case are from the original interior finish of the Jackson and Sharp cars and the cherry strips are from the little Laclede single-truck cars with which the first electric railway service in Charleston was performed. The hickory strip in the handle is from a grab handle of one of the Brill single-truck cars and the maple is from the original flooring of the Jackson and Sharp cars.

We hope that this gavel may reach you in time to be used when you preside at the midwinter meeting of the American Electric Railway Association at Chicago on Feb. 10 and that you will honor us by using it. We also trust that it may be used at the great annual meeting of the association next October.

We therefore ask that you accept it as a token of esteem from

YOUR RAILWAY SHOP EMPLOYEES,
by F. H. HARRIS,
Superintendent of Equipment.

How to Keep the Hired Help on the Job

AS A PART of the publicity service now being carried on by the association it has reprinted in leaflet form the seven points laid down by Paul P. Haynes of the Indiana Public Service Commission in his recent address before the Indiana Public Utility Association, mention of which was made in the issue of this paper for Jan. 22, page 181.

These leaflets can be obtained in any quantity upon application to the secretary's office. A supply of 250 will be furnished gratis, but for quantities in excess thereof a nominal charge will be made.

Central Electric Accountants' Meeting

THE Central Electric Railway Accountants' Association met in annual convention at Dayton, Ohio, on Jan. 21 and 22. The principal subjects which came up for discussion were the cost of production of power and the distribution cost, the establishment of a freight astray bill, the adoption of a scheme for the minimum amount of collections on freight and passenger interline settlements and the use of the unit way bill as compared to the blanket way bill. A definite settlement of none of these questions was reached. The morning session on Jan. 22 was devoted to a round-table discussion of problems confronting individual properties.

Four new members were elected to the association, as follows: W. G. Bell, auditor Springfield (Ohio) Terminal Railway & Power Company; P. A. Hommel, auditor Dayton (Ohio) & Western Traction Company; Miss E. H. Smith, auditor Cleveland, Alliance & Mahoning Valley Railroad, and J. W. Anthony, freight auditor Interstate Public Service Company.

At noon on Jan. 21, as mentioned in the issue of this paper for Feb. 5, the members present were taken to the plant of the Ohmer Fare Register Company, where luncheon was served to them, after which a trip through the plant was made. The Indiana-Ohio Bowling championship was then decided, the score being slightly in favor of Indiana. Dinner was served at the Elks' Club, following which the association went to a theater party as the guests of Mr. Ohmer.

The following officers were elected for the ensuing year. President, A. R. Baxter, auditor Indianapolis & Cincinnati Traction Company, Rushville, Ind.; first vice-president, Irwin Fullerton, general auditor Detroit United Lines, Detroit, Mich.; second vice-president, F. O. Reed, auditor Western Ohio Railway, Lima, Ohio. R. H. Ewan, auditor Toledo, Fostoria & Findlay Railway, Fostoria, Ohio, and H. F. McColgin, auditor Indianapolis & Louisville Traction Railway, Indianapolis, were elected to membership on the executive committee for a two-year period.

Paving Burden Attacked Abroad

IN ENGLAND, as in the United States, according to C. J. Jewell, electrical engineer Yorkshire (England) Electric Tramways, the question of the track paving burden is a live subject. As a means of relief, he suggests that it might be possible to apportion a part of the mechanically propelled vehicle tax to the maintenance of the railway strip paving. Because the tramcar is rail-borne, he believes, it is impossible for it to cause wear of the road surface, and it seems unfair that the expenses for paving maintenance between the tracks and 18 in. outside should be placed on the patrons of the tramway.

New England Railwayans Meet at Boston

St. Lawrence River Power Project and Equipment Maintenance Featured in New England Street Railway Club Meetings; House Chairman Worrall Also Addressed Meeting Informally

ONE of the most successful groups of meetings in the recent history of the New England Street Railway Club was held at the American House, Boston, Feb. 3, when Henry I. Harriman, president New England Power Company, discussed the St. Lawrence River power project; House Chairman George M. Worrall of the Massachusetts legislative committee on street railways spoke informally on experiences in traction legislation, and W. D. Wright, superintendent of equipment the Rhode Island Company, led a round-table discussion on equipment maintenance. I. A. May, president of the club, occupied the chair at the evening meeting, which followed the usual dinner, and before Mr. Harriman's address five new members were elected. The annual banquet of the club is scheduled for March 22, at the Hotel Copley-Plaza, Boston, and it is hoped to have a member of President-elect Harding's cabinet address the club at that time, and the names of other prominent speakers will be announced later. Dinner will be served at $6 per cover.

Mr. Harriman reviewed the St. Lawrence project comprehensively and emphasized the great benefit it would bring to New England railroads, public utilities and industries through electrification and the distribution of low-priced hydro-electric energy. He pointed out that the scheme would yield about 26,000,000,000 kilowatt-hours per year, assuming development on both sides of the river. The estimated cost is $300,000,000 and about ten years would probably be required to complete the development. A saving of about 30,000,000 tons of coal per year would be secured in this way, releasing the labor of about 100,000 men for other work. Only 2 mills per kilowatt-hour would be required to pay all interest charges and amortize the total cost of the project in thirty-five years. The savings resulting from the use of this latent hydro-electric energy would suffice to pay 4 per cent annually on the entire capitalization of all the railroads of New England. The commercial advantages of the project include the benefits to the transportation world from the construction of a navigable way permitting through water shipments between the New England coast and Great Lake ports.

Mr. Worrall spoke informally about his observations and experiences as a member of the Legislature who has sat for about eight years on the street railway committee.

Equipment Men Show Sustained Interest in Safety Cars

Beginning with a discussion of safety measures as indicated in the recent ruling of the Massachusetts Department of Public Utilities, the equipment conference, participated in by about forty men during a two-hour afternoon session, interchanged experiences and emphasized continuing interest in safety-car practice, headlight work and devices for impelling energy saving on cars.

In discussing safety cars the point was made that it is desirable that a valve easily reached by passengers be located within the car so that, in case the motorman is overcome when resuming speed after a stop, the doors can be unlocked and the brakes applied by those within the car, the power also being shut off. Evidence was introduced to show that little or no safety-car equipment has ever been abandoned after going into service. The composition of this equipment, especially in relation to automatic features, embraces the use of well-tried devices long successful in air-brake work and having an extremely high percentage of reliability.

Several speakers emphasized the excellent record safety cars of the single-truck type have made in snowy weather, as compared with the larger double-truck cars, especially where the latter are provided with but two motors. The use of snow scrapers in northern climates was shown to be vitally essential to the best service from single-truck safety cars in heavy snows. Also, the use of both trolley wheels under sleety conditions has been found helpful in some cases in keeping the cars moving, the forward wheel acting as a sleet cutter for the rear wheel. It was brought out in the discussion that it would probably be feasible for the manufacturers of motors to design a motor of say 40-hp. rating for safety-car service, in case the weights of such cars are carried above 16,000 lb. Such a motor, it was said, might weigh about 500 lb. more than the present 25-hp. equipment. An intermediate size of motor might also be developed if a market for such a motor should materialize.

A short discussion occurred on the location of car rheostats, and the advantages of placing these within the cabs of large snowplows were touched upon. The possibility of locating rheostats of compact design on car roofs in passenger service was also brought forward. Recent improvements in rheostat insulator design have given operating men much satisfaction from the standpoint of trouble reduction.

Use of Devices for Impelling Economical Use of Energy on Cars Is Favored

Measuring apparatus, designed to record the energy consumption of car equipment, the amount of time spent in coasting, the time power is on the car, etc., were freely discussed. It was generally agreed that great improvement in the work of motormen followed the installation of such equipment, provided care was taken to secure the co-operation of employees by clearly explaining to them the objects sought in these installations. Several members testified their appreciation of the cordial co-operation given in the introduction of these devices by representatives of employees' unions and individuals, emphasis being laid upon the appeal to the personal interest of the employee in co-operating to save power and reduce brakeshoe wear and indirectly to better his own prospects through the institution of economies in the operation of the railway system of his company.

The meeting closed with a brief discussion of the possible use of oil in place of grease for gear-case lubrication, although the wisdom of the practice was questioned.

The American Engineering Standards Committee has approved revised specifications and tests for Portland cement, as agreed upon by the appropriate committee of the American Society for Testing Materials and the government departmental committee on cement. Copies of the specifications may be obtained from the standards committee, 29 West Thirty-ninth Street, New York City, or from the A. S. T. M. at a nominal price.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Albany Building New Force

United Traction Determined in Its Stand Against Men Who Rejected Wage Cut

Riot and blizzard have combined to defer the restoration of normal service on the strike-bound trolley lines of Albany, N. Y. Despite the efforts of the management of the United Traction Company, very few cars were operated on the lines during the first week of the strike. Aided by a number of strikebreakers the company has now succeeded in opening up most of the routes. Harry B. Weatherwax, vice-president and general manager, has announced that the railway will soon begin the recruiting of a new operating force to replace the strikers.

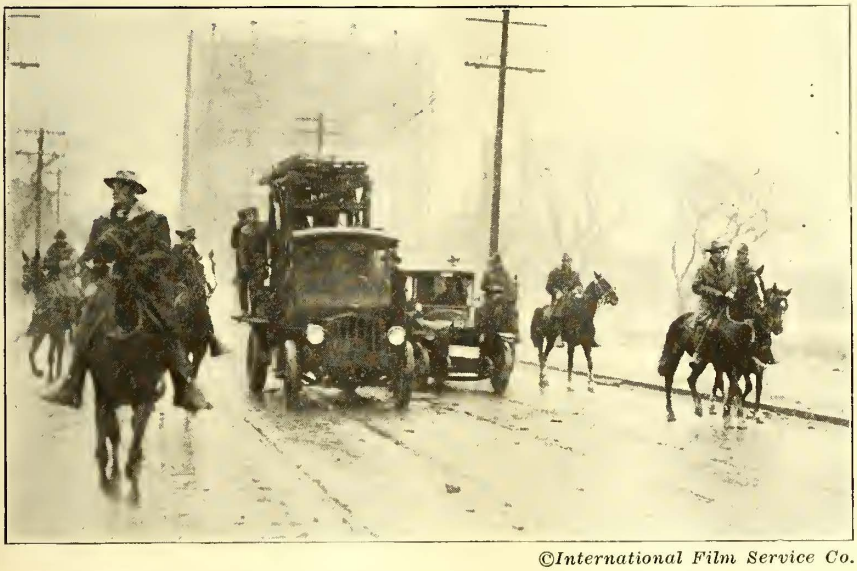
All attempts at settlement of the dispute between the railway and its employees have failed. The walkout was precipitated by the announcement that, beginning Jan. 28, wages would be reduced 25 per cent. This would bring the maximum wage down from 60 cents to 45 cents an hour, or to the scale in effect prior to July 1 last. This cut was made necessary by the refusal of the Public Service Commission for the Second District to grant the railway an increase in fare from 7 cents to 10 cents. The commission authorized an 8-cent fare in Albany, but refused an advance in Troy and directed a return to 5 cents in Rensselaer.

The men, who are members of the Amalgamated Association, demanded that the matter of reducing wages be submitted to arbitration. This proposition was flatly rejected by the management on the ground that payment of even the 45-cent scale would result in a considerable loss. The men thereupon walked out, tying up service in Albany, Troy, Rensselaer and other cities.

The Public Service Commission on Feb. 2 directed the company to resume operation not later than Tuesday, Feb. 8. In an attempt to comply with the order the company manned several cars with strikebreakers. The appearance of the cars provoked the wrath of the strikers and their sympathizers. Switches were blocked with dirt and snow. The cars were stoned. Numbers of guy wires were cut.

Governor Orders Police Service

When the first repair wagon left the carhouse it was followed by a large crowd of men and women, and was guarded by six mounted policemen.



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MOUNTED MEN OF TROOP K, N. Y. STATE POLICE, GUARDING LINEMEN REPAIRING WIRES ON UNITED TRACTION LINES

To reinforce the ranks of the city police Governor Nathan L. Miller ordered more than 100 state police to Albany. The state troopers soon succeeded in restoring order. Under the protection thus afforded the company set about to repair the damage to its equipment. For several days "dummy" cars were run on a few lines.

The situation was complicated on the night of Feb. 10 by a six-inch fall of snow. The force of strikebreakers was unable to cope with conditions. The work of clearing the tracks was a matter of days. Meanwhile all vehicular traffic was tied up. The jitneys which had been operating since the "electrics" stopped were snowbound.

Seattle Payroll Met

Private Bank Comes to Aid of Municipal Railway Employees Paid in Future Warrants

The problem of meeting the payroll of the trainmen on the Seattle Municipal Railway lines has been solved temporarily at least by the offer of the Marine National Bank, Seattle, to cash pay warrants of the employees for salaries. The offer, made in view of the "critical situation which would arise in event employees were not able to cash the pay warrants," as the bank explained, will avert the crisis which has developed since Feb. 1, when the city treasurer began setting aside all receipts of the railways to meet $404,000 due in interest on outstanding bonds, chiefly on the $15,000,000 in bonds paid by the city in the purchase of the Stone & Webster lines.

The bank, in making its offer, stated that while problems not contemplated when the city purchased the lines had developed recently it considered the matter as a civic duty, adding that the offer was made "with the hope that upon payment of the employees in cash full attention and time can be given to constructive measures and the ultimate solution of the perplexing problems of the railway system itself." The bank states that cashing of warrants will continue after Feb. 10 "until further notice."

City Treasurer E. L. Terry sets forth that the income of the railways is approximately $17,500 a day and will be available for warrants after Feb. 24, the first twenty-four days' receipts being required for interest charges. The treasurer estimates that eight pay days—four months—need to be met in the manner arranged, each semi-monthly payroll carrying about $135,000. Besides, each month there will be bills of about $150,000 for materials and supplies. The city treasurer states that the fund should be on a cash basis again about June 15.

The payroll crisis is only one of the problems of the railway. The city must now turn its attention to raising $713,000 for interest and principal on the railway bonds by June 15. While the city treasurer stated the system would be back on a cash basis by June 15, Mayor Caldwell states that he evidently did not contemplate setting aside $140,000 a month to meet the September interest charges and the principal retirement to begin March 1, 1921. This item of interest and principal, along with $83,000 owed by the railway to the general fund, would amount to $713,000 by the time the system is on a cash basis again.

New York Transit Bill Introduced

Governor Miller's Program Calls for Revamped System, Release of City's $250,000,000 Investment and Protection for Investor

Governor Miller of New York on Feb. 14 made public a summary of the rapid transit bills to be submitted to the Legislature containing his recommendations for securing statutory relief for the railways in New York City. One of the measures is an amendment to the Public Service Commission law and provides for two commissions. One is to be a Statewide commission with power over all utilities, excepting transit, in New York. The second commission will handle exclusively the metropolitan transit problem. The first commission will have five members; the city commission three, with five year terms.

THE State's police power to modify rates, either by way of increase or decrease, is provided "upon terms, conditions, safeguards or readjustments of franchise or contract rights or obligations."

Sufficient return from operation of the new unified transit system to exempt from the debt limit the city's investment in transit lines is the only specific provision made in the bill on the subject of rates. The whole question is one of adjustment. It is left with the commission to decide.

Home rule is guaranteed to the metropolis in a measure. If, however, the Board of Estimate of New York City is unable or unwilling to co-operate, or unable to decide its own policy, then the commission may conclude an agreement without the approval of the board.

The ideas behind the bills were, perhaps, set forth best by the Governor in a letter to Oliver B. Bridgman, New York, who said that he found quite a few people who had been hesitant about the Governor's program because they had no information with regard to the work the commission would be expected to undertake when it was appointed by the Governor should the Legislature comply with the Governor's recommendation. The plan as outlined to Mr. Bridgman follows:

1. The value of the physical property used in the public service, without reference to present capitalization, should be determined. The data for such valuation of many of the lines must already be in the possession of the present commission. It should not take long to make a valuation of the others.
2. Eliminate all outstanding inter-company leases.
3. Retire outstanding securities except such underlying liens as cannot readily be retired, for which provision looking to eventual payment must be made.
4. Vest in the city title to all lines not already owned by the city, free and clear of all incumbrances, except such underlying liens.
5. Make a lease to a new company, which shall provide for amortization of the determined valuation and for adequate reserves for depreciation, contingencies and the like.
6. Mortgage such lease to an amount approved by the commission, and issue stock and bonds not in excess of the valuations determined by the commission, in exchange for the securities retired.
7. To promote prompt reorganization and revamping of lines without assessing security holders, defer interest and dividends for one or two years, as might be determined by the commission, and at the end of such period prescribe a rate of fare sufficient to pay all charges provided for in the lease.
8. As an incentive to efficient management provision could be made for increased return on capital as fares are decreased, and a reduced return as they are increased.
9. Looking to the eventual transfer of general regulatory powers to the single Statewide Public Service Commission, provision could be made for a board of control, on which the city and the company should have proper representation. The alternative to that would be representation by the city on the Board of Directors of the company. The board of control plan is probably preferable, and that board might well have the powers of the present Transit Construction Commission.
10. As all approved charges will adequately be provided for under the plan, the provisions of the dual contracts for preferential payments could be eliminated and such other changes made as will fit these contracts into the plan, and as may appear to be in the public interest.
11. Provision for the imperative and immediate needs of the city for further transit facilities should be made promptly.
12. Determine what further relief, if any, can be given by legislation.

This outline was suggested merely for the purpose of discussion. The Governor said that a readjustment of the present deplorable situation in New York by any plan that may ultimately be decided upon should have these results:

1. To the public, a revamped and rehabilitated transit system that can and will give adequate service; assurance that the exploiting of the public for stock-jobbing and other purposes is really an evil of the past, and a new set-up that will insure efficient operation of the system at a fair return for service really and fully performed. This would mean an end of the present intolerable conditions which endanger the comfort, the health and even the life of the traveling public.
2. To the city, the ownership of the greatest transit system in the world; the freeing of its present frozen investment in the subways, so that approximately $250,000,000, including the amount for which the city is already obligated, will be released for new subways and extensions, schools and other badly needed municipal improvements, and adequate participation in, and control of, the new system.
3. To the investor, the full protection of the real values in the present transit systems, and the protection and stabilization of the new securities so as to render them an attractive field for investment.

The transit bill embodying the ideas of Governor Miller was introduced in the Senate on Feb. 16 by Senator John Knight, Wyoming, chairman of the public service committee of that body and in the Lower House by Simon Adler, majority leader. No extra copies of the legislation were available on its introduction. This provoked considerable discussion. It was decided that hearings on the bill in New York City would serve no useful purpose. A public hearing will, however, be held at Albany on March 2 before the public service committee of the Senate and judiciary committee of the Assembly.

Power Project a Five-Year Undertaking

Application for water-power development on the Colorado River in Mojave County, Ariz., which, producing 480,000 hp., will make possible the electrification of 500 miles of the Atchison, Topeka & Santa Fé Railway, and irrigation of approximately 500,000 acres of land, has been filed with the Federal Power Commission by E. L. Beyard of Seligman, Ariz. This project is backed by Kansas City and Philadelphia financiers in a corporation capitalized at $6,000,000. In this project it is proposed to construct eight dams, the first of which will be located about 25 miles due north of Needles, Cal., and the last of which will be built inside Grand Canyon National Park.

Dorchester Program Outlined

Alternative Plans Suggested Costing from $20,635,000 to $7,100,000 for their Completion

A comprehensive report, dealing with estimates of investment required and probable operating costs of various plans for increased rapid transit facilities in the Dorchester district of Boston, has been presented to the Massachusetts Legislature by a joint board consisting of the Massachusetts Department of Public Utilities and the Transit Department of Boston.

The several plans discussed are of particular interest in that they involve comparisons of costs by extension of an existing tunnel with costs of operating rapid transit trains on new tracks built on existing steam railroad rights-of-way, and also costs of high-speed surface cars on reserved spaces in public highways. The report also brings out the fact that the Washington Street and Park Street Station facilities of the Cambridge-Dorchester tunnel are already congested, and are not capable of meeting the demands which the proposed extensions of this rapid transit line would impose.

The report shows that to accomplish the generally desired result of relieving the Dorchester traffic situation, the following plans are under consideration, with estimated costs as shown:

Extension of Tunnel, Investment about	$20,635,000
Daily operating deficit	$ 4,649
Use of Midland Division, N. Y. N. H. & H. R.R., Investment about	$10,300,000
Daily operating deficit	$ 2,178
Use of Shawmut Branch, N. Y. N. H. & H. R.R., Investment about	$ 7,100,000
Daily operating deficit	$ 1,200
Complete circuit, using two sections, Investment about	$15,900,000
Daily operating deficit	$ 2,567
Complete circuit, using Shawmut Branch above and surface cars in reserved spaces in streets for balance of circuit. Investment about	$15,900,000
Daily operating deficit	$ 2,233

The investment estimates, and daily operating deficits were computed on present-day costs and traffic densities. The Joint Board gave as its opinion that the wisest course would be to consider the development of only some one part of any of these several plans for the present, and stated that even that would still be subject to acceptance by the trustees operating the Boston Elevated Railway. The latter are now said to be studying the report of the joint board, which meanwhile has recommended to the Legislature the necessity for authorizing a continuance of its study of this subject.

Budgets and Economy Urged

Governors Deal with Electric Railway Problems—Blue-Sky Legislation Also Recommended

Electric railway problems received special attention this year from the Governors of New York, Connecticut and Illinois in their messages to the Legislatures. As a matter of fact the Governor of New York has made the traction problem the subject of a special message. In Connecticut, as noted previously, the Governor addressed the Legislature at length on this matter and transmitted a special report by a committee appointed to consider the entire subject. In Illinois Governor Small urges the creation of a transportation district in furtherance of the recommendations contained in the report made to Mayor Thompson by his special commission.

The messages of the Governors elsewhere indicate a realization on the part of all of them of the need for economy. In fact, practically all the Chief Executives urge closer adherence to the budget system. Another subject to which many of the Governors called attention is the need for stringent laws governing the sale of securities to the public. Workmen's compensation being pretty generally in effect, recommendations on this matter were confined very largely to the strengthening and the modification of the laws already in existence. Other matters that receive attention are water power development and the conflict in authority between state and government over intrastate rates.

Gov. Henry J. Allen, Kansas, said that the Court of Industrial Relations was meant to be a court of human relations, not a court of public utilities. Because of the desire to save the cost of an additional body the Industrial Court was authorized to administer the old public utilities law. He said, however, that if the court was to work out the big, real purpose of its existence, it would need to be relieved of the burden of public utility regulation. He has since sent a special message to the Legislature on this subject.

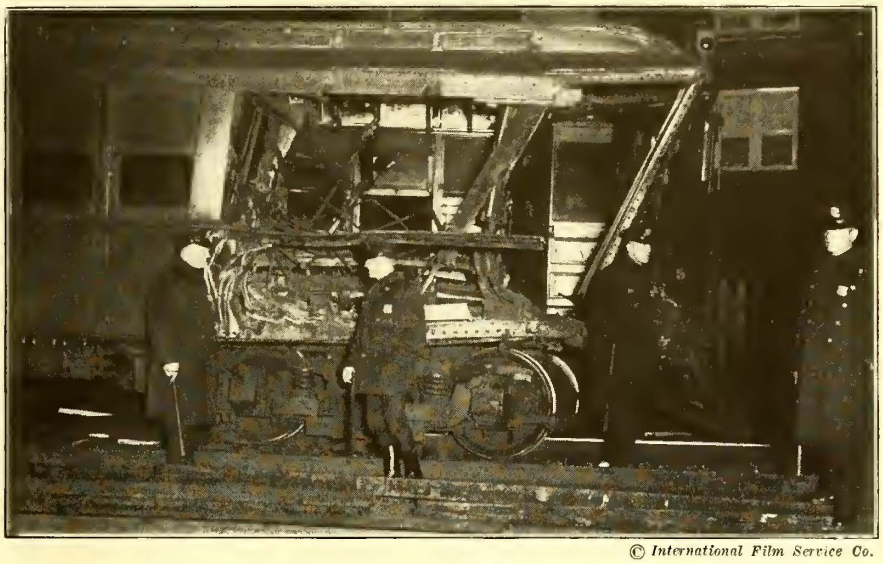
Urges Abolition of Utilities Commission

Gov. Leslie Small, Illinois, urges the General Assembly to repeal the state public utilities law and thereby abolish the State Public Utilities Commission. He further urges the passage of a law giving to all cities in Illinois the right of home rule in the regulation and control of their public utilities. He feels, however, that there should be some state body or agency exercising governmental authority over such properties with powers and jurisdiction similar to the Railroad & Warehouse Commission, which was supplanted by the present Public Utilities Commission. He wants the General Assembly to give this subject immediate attention. He also urges the Assembly to enact legislation to permit the citizens of Chicago and vicinity, if they so elect, to establish an independent transportation district and "to provide for people's ownership and operation of local transportation systems" under the plan advocated in the recent report on transportation to Mayor Thompson of Chicago.

Twenty-six Persons Injured on Long Island Railroad

Twenty-six persons were injured in an accident on the Long Island Railroad at 9:40 p.m. on Feb. 13 at Crescent Street, Brooklyn, on the Atlantic Avenue division. It is at this point that the four-track line from Jamaica is reduced to two tracks which continue into the Brooklyn terminal. Up to the afternoon of Feb. 14 the investigation of the accident by the company had not yet been completed.

The testimony of witnesses of the accident, however, indicates that the accident was caused by Motorman Edward Costello, in charge of local Train No. 3653, running past a signal and through the main track switch, which was set against him.



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DAMAGE SHOWN AS DONE BY EXPRESS RAMMING LOCAL

Motorman Thomas Moore, of Train No. 2755—a westbound express from Hempstead—was running on the middle or express track, and had a clear block. He applied the emergency brakes as soon as he realized that the local was occupying the main track, but was too late to stop his train. The express "side-wiped" the local train, partly turning over the first two cars of the local, and derailing one of the cars of the express. The tracks and interlocking device at the Chestnut Street tower were badly damaged.

Motorman Costello, who was arrested, charged with responsibility for the accident, was an experienced man. He entered the service of the Long Island Railroad on May 25, 1906, as a fireman, and was promoted to engineman on May 6, 1912.

Normal train operation in and out of Brooklyn was resumed at about 10 a.m. on Feb. 14.

Counter Plan by City

Municipality Would Seek Authority to Purchase Certain "Day-to-Day" Lines of Detroit United

An ordinance proposed by the Board of Street Railway Commissioners for presentation at the April election provides for the purchase of approximately 25 miles of lines operated by the Detroit United Railway under the so called day-to-day agreements. The measure has been read twice by title in the Council, ordered printed and laid on the table for future action.

The proposal of the Detroit United Railway, which will also be on the April ballot, is the initiative ordinance providing for unified operation of all lines by the Detroit Service-at-Cost Railway under regulation by the city. The Detroit United Railway would receive 6 per cent on the value of its property.

The Street Railway Commission sets forth in a resolution that it has caused to be constructed approximately 18 miles of single track of the Municipal Street Railway system authorized by the electors of the city of Detroit on April 5, 1920, and is now operating cars on part of these lines and desires to add to the operating unit certain other trackage and property authorized to be acquired under the proposition of April 5, upon which certain streets the Detroit United Railway has constructed lines under the terms of day-to-day resolutions passed by the Common Council.

The Commission is advised by the Corporation Counsel that the contracts of purchase need to be approved by the electors of the city before all or any part of the street railway property in question can be purchased.

The question to appear on the ballots is: Shall the city of Detroit and the Board of Street Railway Commissioners be authorized and empowered to purchase at cost thereof less depreciation, all or any part of the street railway property of the Detroit United Railway

construction upon the streets, alleys and public places of the city of Detroit, under the terms and conditions set forth in certain day-to-day resolutions or contracts between the city of Detroit and said company.

Payment for these lines is to be made out of the proceeds of the public utility bonds authorized to be issued at the April 5 election. Under the existing agreements in case the city and the Detroit United Railway fail to agree on the price to be paid for the lines, a board of arbitrators will be selected consisting of three members to determine the price to be paid.

Injunction Again Invoked at Detroit

Another restraining order was secured by the Detroit (Mich.) United Railway against the city of Detroit when Judge Denison of the United States Court of Appeals at Cincinnati granted the company's petition for an injunction to prevent the city from interfering with the company's tracks on Harper Avenue between Gratiot Avenue and Montclair. A hearing has been ordered for Feb. 19. Judge Denison was appealed to in the absence of Federal Judge Tuttle from Detroit and the State.

The action is the company's answer to the City Council's action in passing a resolution instructing the street railway commission to notify the company to remove its tracks from Harper Avenue.

In the recent resolution of the Council it is claimed that the Detroit United Railway has partly constructed a concrete base with ties and tracks along Harper Avenue and along the route in question but has never completed it for the operation of cars. The present condition of this construction is held by the commission to be a menace to the public in addition to preventing the city from extending its tracks along Harper to Gratiot Avenue.

The city claims that under the terms of the resolution of May 27, 1919, it was expressly provided that in event of the revocation of the resolution, the company would forthwith remove from the streets, the property to be permitted to be placed therein.

The Council, in the resolution just passed which resulted in the issuing of the restraining order, directed the Commissioner of Public Works or the Street Railway Commission or such other municipal authority as might be necessary to remove the property, in default of the company complying with the city's demand.

Under the terms of the day-to-day agreement now in force between the company and the city, the city claims the right to buy from the Detroit United Railway at any time at the cost of the lines less depreciation. The company maintains that the city's action constitutes an impairment of contract and disputes the city's right to purchase in this case.

Indiana Commission Attacked

Lively Hearing Before General Assembly on Bill to Abolish Commission —Many Commission Defenders

The bill before the General Assembly of Indiana to repeal the law creating the Public Utilities Commission has been reported out of committee and now is on its third reading. In Indiana the law provides that bills shall not be printed until they have been reported out of the committee and passed by a second reading. The forces favoring the bill used the argument that the legislature members who were fighting the bill should at least wait until it had been printed and distributed in order that it might be more thoroughly digested by the individual members who before had no direct connection with the progress of the bill.

Report on Commission's Services Needed

The minority members of the Assembly are hailing with delight the first real division that has stirred the very heavy Republican plurality in both House and Senate. Those opposed to the repeal of the present utilities law declare they have a majority in the House of about seventeen votes, all of which will be cast against the present bill.

A hearing held in the House on Jan. 27 crowded the chamber to overflowing. Those favoring the retention of the present law were overwhelmingly in the majority. Members of the Public Service Commission were present at the hearing, but none of them vouchsafed any information except when incorrect statements were made concerning the work of the commission. B. R. Inman, manager of the Chamber of Commerce of Indiana, called attention to the fact that the alleged expenses of the commission were being used by those opposed to the commission as propaganda to prevent the people from knowing the facts. He said that a statement of facts relative to the service rendered by the commission was more to be desired in connection with the hearing than any opinion that he might express as to the merits or demerits of the proposed bill.

Claude A. Smith, one of the authors of the bill, attacked the commission in a short talk. He pointed to several utility companies which had gone through the duration of the war without a rise in rates.

Large Attendance Present

Among those who spoke before the committee advocating the retention of the commission were Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company; Mayor Charles Jewett, of Indianapolis; Henry A. Barnhart, president of the Indiana Telephone Association; Dick Miller, president of the City Trust Company; E. Vernon Knight, president of the New Albany Veneering Company; Joseph Kebler, vice-president of the Indianapolis Board of Trade, and Joseph E. Bell, former Mayor of Indianapolis. Many men prominent in the gas industry were present, but they did not take the floor.

Wisconsin Railroad Commission Attacked

For the first time since the Wisconsin Railroad Commission was created, its members have been summoned before the State Legislature to explain a decision. The immediate cause of this action was the granting by the commission of a 20 per cent increase in gas rates to the Milwaukee Gas Light Company.

Under the Wisconsin law the Legislature may interpellate the commission, provided a sufficient number of the members sign the petition and not more than a certain proportion of them are members of one political party. The commission has been asked to produce all records in the case and to explain the basis of its orders and the extent of the investigation made into the financial status of the company.

A petition has also been filed with the Legislature by the Federated Trades Council of Milwaukee asking for the abolition of the commission. A bill to that effect has actually been introduced in the Assembly. It seeks the repeal of all the commission laws and provides for the regulation of public utilities by local authorities.

The commission will be interpolated on Feb. 24. Meanwhile it has ordered a public hearing in Milwaukee on Feb. 18 on the question of reopening its decision in the gas rate case.

Anti-Traction Bills Introduced in Illinois

The bill which would create a transportation district and pave the way for people's ownership and 5-cent fares in Chicago was introduced in the upper house of the Illinois General Assembly on Feb. 8. The following day bills were introduced to repeal the public utilities act and to grant home rule in the regulation and control of public utilities.

The indications are that these bills will be vigorously pushed with the idea of having them passed by the Legislature in time to place them before the people for referendum at the April 5 election. Unless affirmative action is secured by Feb. 23, however, the matter cannot be included in the April election.

The bill which would create a transportation district is identical with that formulated by Mayor Thompson's traction commission and approved by the Chicago City Council.

A counter municipal ownership proposition was also introduced in the Lower House by Representative Church, and by Senator Evans in the Upper House. This bill would provide for municipal ownership by raising the municipal tax limitations from 5 per cent to 15 per cent where the excess is to be used exclusively for the purchase of utility properties.

Still the Road Was Permitted to Die!

Residents of Providence and Danielson, R. I., mourn the loss of the Providence & Danielson Railway, authorized recently to be scrapped. The thing these people feared has come upon them. Despite all that the road did for them, these people have suffered the line to decay and die. The funeral oration as delivered by the Danielson *Transcript* showed ingratitude, the marble-hearted fiend, at its worst. That paper said:

The road is dead. Its life has been a beneficent one. It served a previously isolated country. It turned a worthless wilderness into greenbacks. It doubled and trebled real estate values. It brought the farmer nearer to the city markets, and gave the merchant a quick freight. It gave an impetus to village growth and improvement. The city and country folks came and went and knew each other better. There was greater homogeneity.

Educational privileges were enchanced and multiplied. The city newspaper came out daily where before it was unknown. Scores of bright Rhode Island boys and girls came up to our Killingly High School, or further down the line attended the city schools.

Churches were benefited. Religious gatherings and conventions were better attended. There was a more frequent interchange and intermingling of the pastors and congregations of different churches. Country churches were often served by city pastors. Thus was fraternal feeling and better acquaintance made possible.

Healthful and pleasant recreation and enjoyment were promoted. Picnics, Old Home Days, fairs, etc., multiplied along the line, and an ever helpful and courteous management catered to the pleasure of its patrons.

The road was always popular with summer tourists, who were seeking a day's outing and were delighted by the transition from the lowlands, the smoke and the smells of the city to the fresh breezes of the western highlands. During its brief life of less than twenty years it transported more than 20,000,000 people.

With unfeigned sorrow and many regrets we see our old friend handed over to the merciless undertaker of the junk heap. The hand of local progress has moved backward along the dial even beyond the time of the stage coach days of genial John Richards and William Stone. Providence is again a distant city.

Service-at-Cost Legislation for Milwaukee

The Common Council of Milwaukee, Wis., in special session on Feb. 1, 1921, adopted a resolution authorizing the City Attorney to co-operate with the committee on acquisition of public utilities in formulating legislation, which if passed would enable the city to negotiate with the Milwaukee Electric Railway & Light Company for the operation of Milwaukee's railway system on a "service-at-cost" basis.

The resolution was previously unanimously endorsed by the Council's joint committee on finance and legislation. The action was asked of the Council by the committee on acquisition of public utilities, an official body, which for about a year has been investigating the question of municipal ownership of public utilities in Milwaukee, particularly of the electric railway system.

F. S. Hunt, chairman of the committee, is reported to have said recently:

If the valuation of the property can be decided on, the committee, I believe I can say, would report in favor of a "cost of service" plan for the operation of the railway lines. This would be similar to the plan now in effect in Cleveland with one addition.

Removal of New Jersey Commissioners Sustained

The Court of Errors and Appeals of New Jersey on Feb. 15 by a vote of seven to six sustained the action of Governor Edwards in removing from office the four members of the Public Utilities Commission for alleged misconduct and neglect of duty. This confirms the decision of the Supreme Court, which also upheld the "ouster" in quo warranto proceedings brought by the Attorney General to test the right of the ousted members of the board to continue in office.

The decision of Feb. 15 removes all question as to the legal status of the commissioners removed from office by the Governor last September. The Board, however, continued to function until the Supreme Court decision affirming the "ouster" was rendered on Dec. 27.

Chief Justice Gummere in his opinion on Feb. 15 said the court was justified in assuming that the Governor had found all the members guilty of some of the charges of neglect or misconduct and that that afforded justification for his action.

Immediately upon receipt of word that the Court of Errors and Appeals had upheld Governor Edwards in ousting the commissioners serving under the old law the Republican leaders rushed through the Legislature the Walworth bill for a new Public Utilities Commission.

News Notes

Decision Against One-Man Cars.—The City Commission of Port Huron, Mich., has refused permission to the City Electric Railway to operate the one-man type of car in the city of Port Huron.

Brooklyn Shops on Short Shift.—Lindley M. Garrison, receiver for the Brooklyn (N. Y.) Rapid Transit Company, announced on Feb. 11 that the general repair shops of the company will be shut down one week this month and one week next month and that the inspection shops will be operated five days a week instead of six, as heretofore. The reason, the receiver said, is that work, which had piled up in the shops since the strike, has become normal again, and this means is taken to avoid the alternative of laying off a considerable number of employees. The order will affect about 1,500 persons. Since the first of the year, Mr. Garrison added, 300 employees have been laid off, largely in the surface repair shops, because of decrease in the amount of work, due to the discontinuance of a number of the surface lines.

Programs of Meetings

American Association of Engineers

A national engineering conference on public information will be held in the Congress Hotel, Chicago, on Feb. 25 under the auspices of the American Association of Engineers. Among those who will address the sessions are Richard H. Waldo, general manager of the Inter-Racial Council, and State Chief Engineer Mack of Wisconsin. F. W. Feiker, vice-president of the McGraw-Hill Publishing Company, and Ivy L. Lee, director of publicity for the Interborough Rapid Transit Company, will present papers. R. W. Crumm of the Iowa Engineering Society will tell of the publicity work which his society has done in Iowa. The purpose of the conference is to discuss the question of engineering publicity from every possible angle and reach decisions upon the effectiveness of various publicity methods. Among the round table discussions will be such subjects as "Technical News Service," "A National Clipping Service," "How Publicity Helps a Community" and "Engineering Publicity from Standpoint of the Public."

Wisconsin Electrical Association

The thirteenth annual convention of the Wisconsin Electrical Association will be held at the Hotel Pfister, Milwaukee, Wis., March 23 and 24. A joint session with the Wisconsin Gas Association will be held on the afternoon of March 23, at which time an address on safety will be given by Charles B. Scott, manager the Safety Bureau, Chicago, an address on "Public Utility Associations," by R. V. Prather, secretary, Illinois Electric Railway Association and of the Great Lakes Geographical Division N. E. L. A., and a third address on the work of the Wisconsin Public Utilities Bureau by Frantz Herwig, director.

On March 24 the following papers will be heard:

"Induction Regulators," by Frank Hershey, General Electric Company; "Electrical Merchandising," by C. E. Michel, sales manager, Union Electric Light & Power Company, St. Louis, Mo.; and a "Symposium on One-Man Car Operation," by B. W. Arnold, Eastern Wisconsin Electric Company; H. A. Mullett, the Milwaukee Electric Railway & Light Company; R. M. Howard, Wisconsin Railway, Light & Power Company; Dudley Montgomery, Madison Railways Company, and C. R. Phenicie, Wisconsin Public Service Company.

Other papers will deal with the subjects of "Street Railway Rate Schedules," by W. H. Sawyer, president East St. Louis & Suburban Railway; "Power Factor—Methods of Correction, Measurement and Application to Rates," by F. A. Coffin, sales manager the Milwaukee Electric Railway & Light Company; and "Customer's Demand as a Factor in Rate-Making," by L. B. Andrus, American Public Utilities Company.

Financial and Corporate

$1,073,020 Deficit in Seattle

Preliminary Accounting for Municipal Railway Shows Serious Situation —Revenues Now Increasing

According to a summary issued by City Comptroller H. W. Carroll the Seattle (Wash.) Municipal Railway shows a deficit of $1,073,020 for the year 1920, $677,178 of this sum being charges for depreciation. The statement showing passengers carried notes a decline in traffic beginning in February, 1920, and continuing throughout the year.

While cash fares slumped when the first fare increase was adopted there was a marked increase in the number of "deadhead" rides, the year's total showing an increase of 363,297 rides by policemen, firemen, mail carriers and railway employees, or about one-third more than in 1919. The railway is reimbursed for all this riding, except that done by railway employees.

At the same time there was a decrease of 9,114,648 in the number of cash rides during the year, as compared with 1919. While $61,777 is charged to loss on property retired from service a footnote explains that other losses from property retirements, amounting to approximately $165,000, are being accounted for, but that exact figures are not yet available.

The total revenue for the year was $5,463,393, of which $5,410,764 was from fares. The total expenditures were $6,536,413, including $865,660 in interest on bonds and warrants.

At the end of December, 1920, the cash deficit of the railway system was $95,318, and there were warrants outstanding of $19,205. This showing is against a cash balance on hand of $208,064 on Jan. 1, 1920. The comptroller's office, in issuing the figures for the year, estimated that the system would be back on a cash basis by May 1.

It is announced that since Jan. 9, when the 8½-cent fare went into effect, the revenues have mounted to an average of $18,550 a day. This includes tokens purchased but not used, the actual fares received and earned being about $17,500 a day. The increase in revenue is said to be about $2,800 a day.

Increase of $228,310 in Texas Electric Net Earnings

Stockholders of the Texas Electric Railway held their annual meeting at Dallas, Texas, recently. The officers were re-elected.

In his report J. F. Strickland, president of the company, gave the gross earnings from operation for the year as $3,454,615, an increase of $503,104, or 17 per cent over the previous year. Operating expenses and taxes totaled $2,013,072, an increase over 1919 of $274,794, or 15.8 per cent. Net earnings from operation were $1,441,543, an increase of $228,310, or 18.8 per cent over those of the previous year.

The report cited that regular dividends have been paid at the rate of 7 per cent on the first and second preferred stocks and other regular dividends on the common stock. The sum of $210,000 has been set aside from the surplus into the renewal and replacement reserve, to be used for purposes of maintenance and upbuilding the company's property, it was stated. The surplus of the company has increased $356,914 during the year.

The report pointed out that the company is "being called upon constantly to make additional investments in the various communities which we serve," on account of paving work programs along the various lines. In this connection it says:

> We would again point out that if these local railway systems are to be a successful, growing part of the rapidly growing communities which are served by them, some sort of relief such as increased fares, reduction of taxes or abolition of paving charges, or possibly all of these, must be worked out.

United Railways, St. Louis, Appraised at $48,936,805

The Missouri Public Service Commission has placed a value as of Jan. 1, 1919, of $48,220,316 on the properties of the United Railways, St. Louis, including the Florissant Construction, Real Estate and Investment Company and the St. Louis County Street Railway and $716,497 on the Missouri Electric Railroad. This total value of $48,936,805 covers both carrier and non-carrier property. Conforming to the practice of the Missouri Commission the items of promotion and going value have been omitted, not that they have no place in a valuation but for the reason that it is the practice of the commission to make due allowance for these items at the time of fixing the fair present value of the property.

The par value of securities outstanding on Dec. 31, 1920, including $4,200,000 of receivers certificates, amounted to $95,581,000. The total market value of these securities at that time was $30,136,221.

Bankers Study New Orleans Problem

A number of bankers of New York and Philadelphia conferred on Feb. 14 with Receiver O'Keefe, of the New Orleans Railway & Light Company, at New Orleans relative to straightening out the affairs of the railway. Among those who took part in the conference were M. M. Buckner, president of the New York Trust Company; G. M. Dahl, vice-president of the Chase National Bank, New York; Joseph Wayne, president of the Girard National Bank, Philadelphia; George M. Reilly, Reilly, Brock & Company, Philadelphia; Clarence Harper, Harper, Turner & Company, Philadelphia; J. A. Caldwell, Philadelphia.

A survey of the company's lines was planned by the bankers for Feb. 15 with the view of determining what is needed to put the lines in good working condition. It was expected that following the inspection a formal statement would be given out to the press.

New Charter Proposed

British Columbia Electric Railway Seeks to Place Company Under Railway Commission of Canada

The British Columbia Electric Railway, Vancouver, B. C., has applied for a Federal charter under the name of Vancouver, Fraser Valley & Southern Railway, the name of one of its existing interurban lines. The intention is to have the Vancouver, Fraser Valley & Southern Railway, under its new charter, take over the whole of the company's properties consisting of city and interurban lines in Vancouver, North Vancouver, New Westminster and Victoria, and its light and power systems with the exception of its power plants. The company's gas properties would not be included under the new charter. It is proposed also to change the name of the Vancouver, Fraser Valley & Southern Railway back to the British Columbia Electric Railway or a similar name.

The object of this move is to place the company under the jurisdiction of the Board of Railway Commissioners of Canada, a Federal body, and by that means obtain the stability as regards fares and rates which will enable the company to raise new capital. At the present time the company is temporarily under that commission, having been taken under Federal control in 1919 by an Act of Parliament not intended to operate on electric railways.

The Parliament of Canada, at its last session passed an amending Act returning the British Columbia Electric Railway to provincial jurisdiction about July 1, 1921. Owing to the abolition of the Provincial Public Utilities Commission, this would thrust the company back on its original franchises which call for a 5-cent fare although a 6-cent city fare and a 7-cent suburban fare are the rates now charged.

The alternatives before the company are the negotiating of new franchise rates with half a dozen cities and municipalities, or obtaining authority from a separate commission. The latter course has taken the form of an application for Dominion Charter in the absence of a Provincial Commission. The company is pointing out that new capital will be urgently required during the next year or two and that it will be impossible to obtain it if its fares are not on a stable basis.

Holding Company and Leases Scrapped

Rhode Island Properties Simplify Financial Structure and Secure State Aid—Jitneys Eliminated

Direct ownership by a new company of the electric railway properties at Providence, R. I., is provided in place of the former involved system of holding companies and leases under the plan for the reorganization of the railways there as approved by the joint reorganization committee. This committee consists of Michael F. Dooley, Stephen O. Metcalf and Samuel P. Colt. The existing securities to be readjusted by the plan consist of $13,998,000 of bonds and $8,000,000 of stock. The new securities provided by the plan will consist of $12,598,200 of bonds and $7,999,800 of stock, making a reduction in the capitalization of $1,400,000.

A FEATURE of the plan is that the board of directors of the United Electric Railways, the successor company, shall consist of nine members, five elected by the stockholders, one appointed by the trustee under the general and refunding mortgage, two appointed by the Governor by and with the advice and consent of the Senate and one appointed by the Mayor of Providence.

The charter of the new company limits to $22,000,000 the par value of the stocks, bonds or other evidences of indebtedness which may be issued in payment for the lines and properties which it is proposed to take over. A comparison of present capitalization of the United Traction System and the proposed new capitalization follows:

(*a*) Amount of existing Securities to be readjusted by the plan:		
Bonds	$13,998,000	
Stocks	8,000,000	$21,998,000
(*b*) New securities provided by the plan in lieu of existing securities:		
Bonds:		
Prior lien Series B 4s	$1,999,200	
General refunding mortgage Series A 5s	8,100,000	
General refunding mortgage Series B 4s	2,499,000	
Total	$12,598,200	
Stock	7,000,800	20,598,000
(*c*) Reduction		$1 400,000

In addition to these securities there will also be an issue of $1,000,000 of prior lien, Series A, 7 per cent bonds, which will be sold for cash.

The plan and agreement of reorganization contemplate the acquisition and operation of the railway lines and properties included in the reorganized system by the United Electric Railways. The charter of this company was granted by the Rhode Island General Assembly at its 1919 session and amended at the 1920 session. Under it the United Electric Railways is authorized to acquire the lines and property of the Union Railroad, Providence Cable Tramway, Pawtucket Street Railway and Rhode Island Suburban Railway (formerly leased to the Rhode Island Company and controlled by the United Traction & Electric Company), the lines and property owned by the Rhode Island Company, and the lines and properties formerly leased to the Rhode Island Company by the Sea View Railroad and the Providence & Danielson Railway. The consent of the Attorney-General of the State of Rhode Island is required if less than the whole of the foregoing properties are acquired.

As stated previously, the charter limits to $22,000,000 the par value of the stocks, bonds or other evidences of indebtedness of the new company which may be issued in payment for the lines and properties mentioned, and limits to 6 per cent the dividends which may be paid upon the capital stock of the new company, except that a deficiency in any year may be made good in a subsequent year or years.

The General Assembly at its 1920 session passed acts exempting the new company from all taxes except taxes imposed by cities or towns upon its land, buildings or other tangible property, freeing it from certain paving and street improvement obligations imposed upon electric railways by the Rhode Island laws, and making all town and city ordinances affecting it subject to review by the Public Utilities Commission.

The city of Providence has also recently passed an ordinance regulating jitneys and motor-buses. This it is believed will prevent in large measure the unfair competition to which the railways have heretofore been subject.

The allocation of bonds and stocks of the new company is shown in the accompanying table.

In the opinion of the several committees representing the security holders, the plan presents the following advantages:

1. It provides at least $1,000,000 cash for rehabilitation, of which there is present need.
2. It reduces the fixed charges upon the United Traction System to $654,928. The amount which the Rhode Island Company was required by its leases to pay upon the same properties as fixed charges was $1,050,000.
3. It reduces the aggregate capitalization to an amount which, although much less than the estimated cost of reproduction of the property, should be representative of just expectations of income return under ordinary future conditions.
4. It obtains the benefit of the yearly exemption from taxation and limitation of paving and other obligations which will result, it is estimated, in an annual saving of more than $500,000.
5. It substitutes the direct ownership by the new company of the entire properties for the former involved system of holding companies and leases—a result which will undoubtedly be beneficial from the point of view of organization and will remove a source of public misunderstanding.
6. It secures the control of the Public Utilities Commission over the issue of securities by the new company, the limitation in the charter upon the capitalization and dividends of the new company, and the representation of the State and the city of Providence upon its board of directors;—all of which will, it is believed, be conducive to the interests of the security holders as well as of the public.

TABLE SHOWING ALLOCATION OF BONDS AND STOCK OF NEW COMPANY AT PROVIDENCE

New Company Bonds and Stock		For $4,708,000 Rhode Island Suburban Railway First 4% Bonds	For $247,000 Pawtuxet Valley Street Electric Railway First 5% Mortgage Bonds	For $43,000 Cumberland Street Railway First 6% Mortgage Bonds	For $9,000,000 United Traction & Electric Company First Mortgage 5% Bonds	For $8,000,000 United Traction & Electric Company Capital Stock	For Cash	Totals
Prior Lien Mortgage	Series A 7%	.....	.....	.....	.....	.....	$1,000,000	$1,000,000
Twenty-five Year Gold Bonds	Series B 4%	$1,883,200	$98,800	$17,200	.....	.....	.....	1,999,200
General and Refunding	Series A 5%	.....	.....	.....	$8,100,000	.....	.....	*8,100,000
Mortgage Thirty Year Gold Bonds	Series B 4%	2,354,000	123,500	21,500	.....	.....	.....	2,499,000
Capital stock		470,800	24,700	4,300	900,000	$6,600,000	.....	†7,999,800
Totals		$4,708,000	$247,000	$43,000	$9,000,000	$6,600,000	$1,000,000	

* An additional amount not to exceed $500,000 general and refunding bonds Series A are reserved for issue to provide for the acquisition of such of the Rhode Island Company Properties as the joint reorganization committee may determine to acquire.

† Additional capital stock may be issued in the discretion of the joint reorganization committee for the purposes of the plan to the amount permitted by the Rhode Island Public Utilities Commission.

City Joins Rental Appeal Case

The City of Philadelphia, Pa., and the Public Service Commission have filed petitions in the State Supreme Court asking for an allowance of an appeal to that tribunal from a decision of the Superior Court which relieved the underlying companies of the Philadelphia Rapid Transit Company from the necessity of obeying a commission order directing them to answer complaints about rentals paid.

The decision of the Superior Court was referred to in the ELECTRIC RAILWAY JOURNAL for Dec. 25, page 1303.

Following the decision of the Superior Court the United Business Men's Association filed a petition for an appeal in the Supreme Court. In this proceeding the city and the Public Service Commission have now joined. The Supreme Court will hear the case in Philadelphia on April 18.

Brooklyn Receiver Asks Instructions

Petition of 120 Pages to Court Contains Statement of Earnings and Summary of Debt

Facts about the conduct of the Brooklyn (N. Y.) Rapid Transit Company under the administration of Lindley M. Garrison as receiver are contained in a 120-page petition by Mr. Garrison to the court, making a report as to the affairs of the company and seeking instructions of the court. In general the petition says that it seems too clear to require elaborate statement that the transportation problem in Brooklyn should be treated as a whole and that it is impossible satisfactorily to deal with it piecemeal.

THE petition points out that while under existing conditions there is no centralized authority capable of dealing with the situation as an entirety, and while it is not suggested that the court, under existing conditions, can deal as adequately with the question presented to it as it could if there were such a centralized authority capable of dealing with the situation as a whole, it is nevertheless important in the opinion of the receiver to consider the necessities of the situation as a whole with a view to meeting it as fully as existing law permits.

Limitations of space prevent more than an indication of the general contents of the report. Separate figures of operation are presented for the various companies included in the system from Jan. 1, 1919, to Nov. 30, 1920, for the five months to Nov. 30, 1920, and for November, 1920, together with detailed statements of the obligations of the various companies, interest in default, taxes and other claims unpaid, facts about changes in fares such as the changing of an extra 5 cents on certain lines, results with one-man cars, etc.

The comparative income statement of the Brooklyn Rapid Transit Company for the periods previously referred to, as condensed by the ELECTRIC RAILWAY JOURNAL, is shown in the accompanying table.

The separate statement of the Nassau Electric Railroad for the five months to Nov. 30, 1920, includes strike expenses of $342,246 in the item total street railway operating of $2,390,699. The similar statement of the Brooklyn, Queens County & Suburban Railroad includes strike expenses of $101,621. The statement of the Coney Island & Brooklyn Railroad includes $127,981 for strike expenses. Similar figures for the New York Consolidated Railroad are $1,271,543, making the total direct strike loss $1,847,393. Indirect losses are estimated at $720,000 additional. These are exclusive of the Brooklyn City Railroad, returned to its owners.

The detailed statement as to the bonded indebtedness (including bank loans secured by bonds) of the Brooklyn Rapid Transit Company and the interest in default thereon shows that there is an outstanding indebtedness against the property company of $73,255,000, excluding indebtedness to constituent companies aggregating $6,427,437 (and interest due thereon of $648,579). All of this indebtedness is in default and, as of Dec. 31, 1920, there is interest in default on the said indebtedness of $11,652,358. Foreclosure proceedings have been brought by the trustees of all of the several mortgages of the Brooklyn Rapid Transit Company.

In addition to the foregoing bonded indebtedness, there is also the indebtedness created by the receiver's certificates, of which at the present time $5,000,000 in principal amount are the sole indebtedness of the receiver.

COMPARATIVE INCOME ACCOUNT OF BROOKLYN RAPID TRANSIT CO.

	From Jan. 1, 1919, to Nov. 30, 1920	Five Months to Nov. 30, 1920	Month of November, 1920
Total revenue	$30,380,838	$6,505,821	$1,339,383
Total operating expenses	26,867,980	5,238,490	1,082,127
Revenue over operating expenses	$3,512,858	$1,267,331	$257,256
Total taxes	469,156	104,784	20,961
Revenue over expenses and taxes	$3,043,700	$1,162,546	$236,294
Total income deductions	*1,999,170	*641,716	*128,341
Surplus	$1,044,530	$520,830	$107,952

*Does not include interest on any bonded indebtedness.

The statement of bonded indebtedness and notes and bills payable of the Brooklyn Rapid Transit Company is shown in the accompanying table.

There are also claims against the company for debts arising prior to the receivership under contract (exclusive of bank loans, notes, bonds and intercompany claims) by 522 creditors for an aggregate amount of $775,181, upon which there is an admitted liability of $749,382, and liability for the balance of $25,798 is in question. No claims have been filed against the company for tort damage.

The application shows that the Nassau Electric Railroad receiver has suspended in whole or in part the operation of the following lines:

Ocean Avenue (in part).
Rogers Avenue.
Church Avenue.
Seventh Avenue.
Park Avenue.
39th Street-Coney Island (in part).
Hicks Street.

The Brooklyn, Queens County & Suburban Railroad receiver has suspended in whole or in part operation of the

Metropolitan Avenue line (in part).
Wyckoff Avenue line.
Ralph Avenue shuttle line.

The Coney Island & Brooklyn Railroad receiver (in conjunction with the Nassau receiver and the Brooklyn City Railroad) has ceased operating the experimental Park Slope Line.

The application shows that the following additional lines are failing at the present time to earn even their direct operating expenses:

Wilson Avenue line.
Ralph-Rockaway line.
Eighth Avenue line.
Vanderbilt Avenue line.
West End Avenue line.
Eighty-sixth Street line.
Ocean Avenue line.
Broadway line.
Jamaica Avenue line.
Reid Avenue line.
Broadway-Ferry shuttle.
Metropolitan Avenue line.
Utica Avenue line.
Franklin Avenue line.
Smith Street line.

The application shows that having, under the order of the Public Service Commission and the Supreme Court, purchased seventy-three safety cars and having paid on account thereof in cash the amount of $170,703, the Nassau receiver, for lack of funds, has had to default on his car lease warrants issued for the remaining installments of purchase price which amount to $299,647, and that he is in danger of having the cars taken away from him, losing both the cars and the money.

The application shows that there has been a 35 per cent increase in wages since the appointment of the receiver; adding approximately $4,700,000 to the cost of operation during receivership.

In addition to wage increases the cost of operating during receivership was increased by the advance in the price of coal from $3 per ton to $9 per ton and substantial advances in other prices.

INDEBTEDNESS OF BROOKLYN RAPID TRANSIT COMPANY

Nature of Debt	Issued	Owned	Pledged	Net Outstanding	Annual Interest
First mortgage 5 per cent bonds	$7,000,000	$5,000	$25,000	$6,970,000	$348,500
First refunding mortgage 4 per cent bonds	27,621,000	5,092,000	17,329,000	5,200,000	208,000
Consolidated mortgage 6 per cent bonds	29,000,000	291,327	28,708,672	.....	.....
Total bonded indebtedness	$63,621,000	$5,388,327	$46,062,672	$12,170,000	$556,500
Three-year 7 per cent gold notes	$57,230,000	.....	.....	$57,230,000	$4,006,100
Six-year 5 per cent gold notes	505,000	.....	.....	505,000	30,300
Bills payable, banks and trust companies	3,350,000	.....	.....	3,350,000	201,000
Total notes and bills payable	$61,085,000	.....	.....	$61,085,000	$4,237,400
Grand total	$124,706,000	$5,388,327	$46,062,672	$73,255,000	$4,793,800
Exclusive of bills payable to constituent companies					6,427,437
Interest thereon to Dec. 31, 1920					648,579

The application points out that the property of each individual company in receivership and the income therefrom must be separately administered for the benefit of each company's particular creditors so that neither the funds nor the property of any one receivership can be used for the benefit of any other receivership.

The petition of Mr. Garrison to the court was heard by Judge Mayer on Feb. 14. At that time two new phases of the railway situation were disclosed. One was the suggestion that the 5-cent fare should be confined to surface lines operating within the borders of the old city of Brooklyn and the other that Mr. Garrison had prepared papers in an action against the city for approximately $20,000,000 for losses incurred because of the city's delay in completing the dual system, a part of which the Brooklyn Rapid Transit Company is to operate under Contract 4. The discussion lasted for more than three hours.

The suggestion that the area of the old city of Brooklyn before consolidation should constitute one 5-cent fare zone and all of the numerous towns that make up the present Brooklyn Borough another 5-cent fare zone each came in a flurry of argument of how to keep in operation fifteen surface lines that could not support themselves.

Financial News Notes

Refunding Issue Offered.—Tucker, Anthony & Company, New York, N. Y., are offering at 96¼ and interest to yield about 7.30 per cent $914,000 of 7 per cent first refunding mortgage sinking fund gold bonds of the Manchester Traction, Light & Power Company, Manchester, N. H. The bonds are dated Aug. 1, 1917, and are due Aug. 1, 1952. The purpose of the issue is to refund a like amount of consolidated mortgage 5 per cent bonds due April 1, 1921. After April 1, 1921, the refunding mortgage sinking fund gold bonds now being offered will be a first lien on the property.

Road Saved from Scrap Pile. — The Carlisle & Mt. Holly Railroad, Carlisle, Pa., has purchased from McGovern & Company, New York, the 7-mile electric railway between Carlisle, Pa., and Mt. Holly, Pa. This road was formerly operated by the Cumberland Railway, which sold all its track and rolling stock to the McGovern Company. Mention of this sale was made in the ELECTRIC RAILWAY JOURNAL for Dec. 18, 1920. The line between Carisle and Newville, Pa., will be torn up and sold for scrap in the spring. Thomas MacDonald is president of the new company. H. M. DeLone is secretary and treasurer.

Additional Defendants in Restitution Suit. — The suit brought by Ella Van Deusen against the Maumee Valley Railways & Light Company, which resulted in the company being placed in the hands of Raleigh D. Mills, as receiver, was enlivened when Thomas H. Tracy, one of the defendants named in the original suit, asked in a cross petition that seventeen additional defendants be brought into the suit. The suit is a test to determine whether the original stockholders can be made liable for $900,000 of debts including matured bonds and for money due under the double liability clause in stock subscriptions.

E. A. McNutt a Barcelona Director. —Following the regular annual meeting of the stockholders of the Barcelona Traction, Light & Power Company at Toronto, Ont., a special general meeting ratified a new by-law of the directors removing the compulsory feature which had been provided for the redemption of a certain amount of preferred stock each year. The change was made coupled with the provision that the company may redeem preferred shares at 110 at any time it sees fit. E. A. McNutt, of the Sun Life Insurance Company, Toronto, replaces T. B. Macauley, president of the Sun Life, as a director of the utility at the latter's request.

Senate Modifies Valuation Measure. —Court review of the valuation to be fixed by the engineering firm engaged by the New Jersey Valuation Commission is provided for under the Senate Mackay bill adopted by the New Jersey Senate. Senator Parry, of Essex County, fought the bill, urging his measure, which would not make mandatory the valuations fixed by the appraisers. Mr. Parry argued that the engineers' report on the value of the Trenton & Mercer County Traction Corporation and the Public Service Railway should only be considered by the Public Utility Commission as an element in arriving at a basis of fares. The Mackay measure would make the valuation mandatory.

Extension of Time for Readjustment. —The depositors of the first mortgage 5 per cent sinking fund thirty-year bonds of the Albany Southern Railroad, Hudson, N. Y., who had entrusted their securities with the Bankers Trust Company, New York, have been notified that the time in which the plan for the financial readjustment of the company may be declared operative has been extended to June, 1921. This extension applies also to the privilege of depositing bonds under the plan. It is also announced that the first refunding bonds to be issued under the amended plan will bear interest from March 1, 1921. Payment of the coupon due on that date on the bonds on deposit with the Bankers Trust Company will be made by the company to registered holders of certificates of deposits.

Treasurer Unaware of Sale Negotiations.—The Watertown (N. Y.) *Standard* said, in a recent issue, that according to a rumor in circulation in that city the Northern New York Utilities, Inc., was negotiating for the purchase of the property of the Black River Traction Company. It was said that the utilities would purchase the railroad and extend it to Carthage through Black River, Felts Mills, Great Bend, Deferiet and Herrings, thus linking up this chain of small industrial villages between Watertown and Carthage and paving the way for the development of the section. Richard Krementz of Krementz & Company, Newark, N. J., treasurer of the Black River Traction Company, asked by the ELECTRIC RAILWAY JOURNAL to confirm the report contained in the *Standard*, said it was all new to him.

Operating Organization Provided by Court.—Approval of a contract entered into between Henry C. Paul, receiver for the Fort Wayne, Van Wert & Lima Traction Company and the Indiana Service Corporation, whereby the latter is to supply officials for the maintenance and operation of the Fort Wayne, Van Wert & Lima Company for the next six months, or as long as the receiver deems necessary, was made by Judge A. B. Anderson, in Federal court at Indianapolis recently. Mr. Paul, in his petition to the court, alleged that the Fort Wayne, Van Wert & Lima Traction Company is now and has for some time been operated by the Ohio Electric Railway under a lease, and had not left any officials in charge and in order to continue the operation of the road it would be necessary for these officials to be selected. He says the Indiana Service Corporation has offered the interurban the service of its general manager, engineer of maintenance, superintendent of transportation and engineer of distribution.

Duluth Company Reports to City.— Herbert Warren, vice-president and general manager of the Duluth (Minn.) Street Railway, has filed with the city auditor the report of the company for the year ended recently. The total revenue derived from transportation last year was $1,477,912. By far the largest portion of this, $1,476,145, was derived from fares paid, and the balance came from mails, chartering cars and other sources. The total revenue from other railway operations is listed at $8,140. This makes the total operating revenue $1,486,053. Added to this is non-operating revenue of $19,924. The total revenue of the company for 1920 is shown as $1,505,977. The total operating expense of the company, including taxes, interest of funded debt and miscellaneous debits, was $1,419,466. The reports shows that $86,511 is available for sinking funds, additions to property and distribution. The sums of $60,000 for dividends and $18,946 for expenses was transferred to the Duluth-Superior Traction Company, which controls the local lines in Duluth. The capital liabilities of the company are $3,942,643, included in which are $1,200,000 of stock and $2,516,590 of bonds.

Traffic and Transportation

Fares Before Referee

Railway at Fort Worth Wants to Retain Seven-Cent Rate—Asks Ten per Cent Return

The Northern Texas Traction Company, Fort Worth, Tex., is combatting the city's order to reduce fares from 7 cents to 6 cents. The city charter of Fort Worth and the franchise granted the Northern Texas Traction Company, permit the company to raise fares without authority from the city government, but the city has the right to investigate and determine the reasonableness of the fare. This the city is now doing.

The city issued an order directing the company to reduce its fares to 6 cents. Upon the refusal of the company to comply with this demand the city, after negotiations with the company, appointed N. A. Dodge, Fort Worth, as referee to conduct an investigation and hear testimony from both sides and to determine the reasonableness of the 7-cent fare. He has been conducting hearings bearing on the valuation of the company's property, the earnings, operating costs and other factors that enter into the question of reasonableness of the fare charged.

Ten per Cent Return Sought

In its opening statement the company's attorneys admitted the right of the city to regulate fares and to see that they permit only a reasonable amount of return. This right, however, counsel maintained, is limited by the Constitution of the United States which guarantees protection against confiscation through the imposition of an unreasonable rate, and that the right of protection extends not only to the title of the property itself, but also to a fair and equitable rate of return on the invested capital.

The "fair rate of return" asked by the traction company's counsel in this instance was 10 per cent, and it was declared that "any rate fixed by the public authorities so low as to yield insufficient revenue to pay operating costs and leave for the owner a fair return on the value of the property devoted to the public service, is not only unfair and unreasonable, but is also confiscatory."

The attorneys declared that they would show that anything less than a 7-cent fare would not yield a fair return and would in effect be confiscatory.

H. P. Gillette, expert for the company, taking the 1915 appraisement as a basis and adding to it the cost of additions since made, declared the historical value of the property to be $6,182,468. Its reproduction value as of Jan. 1, 1921, taking the Interstate Commerce Commission table of items as a basis, he placed at $11,575,513.

Counsel for the city took issue with Mr. Gillette as to the reproduction theory of fixing valuation for rate-making purposes, and Mr. Powell declared that such theory did not afford a fair rate-making basis.

George H. Clifford, vice-president and general manager of the company, declared that at no time in the history of the company had it earned a fair return. Starting with 1917 he declared there had been a big increase in the company's expenses, due to the rise in wages and the cost of materials, yet despite this no increase in fares had been made until May, 1920.

Referred to Referee

When the hearing was concluded, Mr. Dodge, the referee, took the matter under consideration.

Dime Fare in Worcester

An order dated Feb. 4, has been issued by the Massachusetts Department of Public Utilities authorizing an increase in fares on the Worcester Consolidated Street Railway. The increase affects both the city of Worcester and outlying lines. The order also abolishes certain transfer charges heretofore collected. The new rates took effect on Feb. 6.

The order provides for a 10-cent flat fare in the city, abolishing the former two-zone system in which 7-cent fares were charged in each zone. Free transfers are established throughout the new flat-fare area which includes the whole area formerly divided into two zones. The order also establishes 7-cent fares on all suburban lines where the fare was formerly 6 cents. Transfer charges are abolished on lines operated from Beacon Park and from North Village through the center of the town of Webster to Perryville.

Proposals were made by Mayor Sullivan of Worcester to reduce fares in the city zones to 5 cents for the first zone and 3 cents for the second zone, on the ground that increased riding would result in greater revenue to the company at no addditional expense. This proposition was subjected to analysis by the commission, which concluded that even though additional riders could be carried without additional cost, it would require an increase of 37 per cent in the actual number of passengers carried to even equal the revenue received during the past year. In that year 38,045,575 revenue passengers were carried in one zone and 6,713,926 in the second zone. It was established that the Worcester Consolidated Street Railway would require a minimum of $199,274 additional revenue to meet its expenses during the present year, without any allowance for depreciation or profit to the road.

Five Cents Suggested

Bridgeport Committee Wants This Basic Fare — Desires Railway's Obligations Be Reduced

The special transportation committee appointed some time ago by Mayor Clifford B. Wilson of Bridgeport, Conn., presented a comprehensive report to the Common Council on Feb. 7. The recommendations made will be referred to the legislative committee of the Council for presentation to the Legislature. The committee recommends a return to the 5-cent fare by the Connecticut Company as the best solution of Bridgeport's trolley tangle.

In submitting its report the committee explains the failure of the 10-cent fare either to increase the company's revenue or to restore the good will of the car patron. It believes that under a zone plan with a basic 5-cent fare and "harmonized" zone transfers the problem could be settled profitably for the company in increased revenue and for the public in better service. The committee approves of a 6-cent cash fare or a ticket plan whereby twenty tickets are sold for $1. The ticket system is urged both as a matter of safeguarding the company's revenue and as a measure of safety and expedition in the operation of one-man cars.

Results of Intensive Study

The committee has studied carefully the subject of bus competition, taxation, etc. It concluded that:

1. The 5-cent fare should be restored between city center and city limits, with a compulsory ticket system under which 20 tickets could be purchased for $1.
2. The recommendations of the Public Utilities Commission should stand in regard to division of the Connecticut Company into complete operating and accounting units.
3. The State should be divided into five regions grouped about the large cities in which electric railway business centers; these regions center about Hartford, Waterbury, Norwich, New Haven and Bridgeport.
4. A deputy should be appointed by the Public Utilities Commission to supervise all railway and bus traffic within each region and be amenable to the authority of the Public Utilities Commission only. This supervisor should make reports twice a year to the Public Utilities Commission.
5. The recent suggestions of the Public Utilities Commission should be put into effect regarding removal of street paving and highway bridge obligations from the railways.
6. The recent recommendations of the Public Utilities Commission should be put into effect in regard to taxing railways on net earnings and making the same demands upon bus companies as on railways in regard to taxation, financial reports, etc.
7. The street railways should be permitted to operate buses.
8. The Public Utilities Commission should grant bus lines franchises for interurban routes and that the city should grant franchises for city bus lines only after public hearings, with the right of appeal to Public Utilities Commission within thirty days if permit is rejected.
9. Public motor bus lines must furnish protection for passengers through liability assurances carried by the operators.

The committee explains that it is not intended to imply that the 5-cent unit fare should cover the same zones as were in effect originally. It suggests rather that the zones be arranged to conform to the value of the fare paid and to centers of traffic like the city center and to important industrial locations. It suggests working out these zones under the plan of supervision which the committee itself recommends.

Bus Injunction Held Unwarranted

Application of Public Service Railway of New Jersey for Relief Called Groundless in Report of Vice-Chancellor

No ground exists for the granting of an injunction to restrain the operation of jitneys competing with the Public Service Railway of New Jersey, according to an opinion filed in the State Court of Chancery by Vice-Chancellor Griffin on Feb. 10. The Vice-Chancellor held that under the cases bearing on the subject matter of the controversy the Public Service Railway has no cause to enjoin competing carriers from using the public streets. He accordingly advised that a decree be handed down dismissing the railway's petition. The railway on June 3 last instituted legal proceedings to halt ruinous jitney competition with its lines. Thirty-six bus operators and a number of municipalities, including the city of Newark, were named in the action as defendants. The railway contended that the buses were operating in violation of the Kates act regulating vehicular traffic and that their operation should be discontinued in the interest of both the railway and the community.

IN THE suit the complainant made no point of the use made by jitneys of its tracks, but based its right to relief on the sole ground that the defendants are illegally operating jitneys in the streets of Newark and other communities, to complainant's "great loss and damage," and that "this illegality gives it a right to an injunction."

Two Questions Involved

The proposition thus presented the Vice-Chancellor divides into two questions:

1. Has the defendant a lawful right to carry on the business of a common carrier of passengers for hire in the public streets?

2. If the defendant is without such right may the complainant maintain its bill to restrain on the ground that the competition is unlawful and complainant is suffering an irreparable injury therefrom?

Complainant, he says, contends for the negative on the ground that the defendant has not the consent required under the Kates act, and that the consent granted by Newark is null and void because it was not granted in the manner provided by the Kates act and also by the limited franchise act.

Merritt Lane, counsel for the defendant, contended that the consents from the municipalities are valid, even though not granted in the manner directed by the limited franchise act. He argued further that even if the consents were not lawfully granted the complainant had no standing to object.

In the view he takes of the case, the Vice-Chancellor says, it was not necessary to determine the validity of the consents, because the case could be decided upon the second proposition.

Kates Act in Public Interest

Of the Kates act the Vice-Chancellor says it is quite clear that it was passed "for the protection of the public, and for revenue. And it nowhere appears that it was enacted in any manner for the benefit of street railways." "This," the Vice-Chancellor says, "leads to the question whether, if the consent be invalid, the complainant may for its own advantage assert this invalidity." The opinion follows in part:

> The right of the people to use the public highways of the State freely and without hindrance, subject only to proper police regulations, unless the Legislature should otherwise ordain, is unquestioned, and in the exercise of this right the people are not exercising a franchise.
>
> Thus persons complying with the Kates act do not acquire a franchise to use the public highways. The act is prohibitive in that it takes away rights formerly possessed; and permissive and regulative in that it authorizes the use upon complying with the terms of the act. The plain purpose of the act was primarily not to license, but to regulate and control the operations of these vehicles in the crowded streets of cities for the public benefit and safety, and for revenue. It was not passed for the benefit of street railways.

Highways Public Property

> The franchise of the complainant is as to its tracks and ways, and gives it the exclusive use thereof as against competing carriers, in the manner indicated in Camden Horse Railroad against Citizens Coach Company. It has no grant outside of the tracks and ways, and, therefore, when it seeks to enjoin competing carriers from using a highway in a manner declared lawful . . . I feel bound, following Elizabethtown Gas Light Company vs. Green, . . . to hold that it has no standing in this court to ask for injunctive relief.
>
> This conclusion is reached regardless of whether the defendant is operating his auto buses without having the consent required under the Kates act, and is guilty of a misdemeanor.

One-Man Cars in Boston

The first double-truck one-man cars ever operated in the city of Boston made their appearance on Sunday, Feb. 6, when the Eastern Massachusetts Street Railway inaugurated this service on the Woodlawn-Chelsea-Scollay Square line. The normal week-day service consists of four of these cars on twenty-minute headway, while rush-hour schedules call for eight cars.

Another novel feature of this service, so far as Boston is concerned, is the adoption of the pay-leave system on outbound trips of these one-man cars. As the in-town terminus is at Scollay Square, in the old subway, where the prepayment system has not been adopted by the Eastern Massachusetts Street Railway, and as other heavy loading points are also found outside the subway, it was decided to try the pay-leave system, and reports thus far received indicate that it is entirely successful.

The double-truck one-man cars in use are former two-man cars converted in the company's own shops. Although these are the first to go into service on lines in Boston the Eastern Massachusetts Street Railway has been converting double-truck cars for a considerable period, and already has about 300 in operation on various parts of its system. It has already operated about 2,000,000 car-miles with this type of converted double-truck one-man car. These cars are equipped with a special device, approved by the Massachusetts Department of Public Utilities, to enable the operator or any passenger in an emergency to open the rear doors by pulling on a cord, similar to the ordinary bell cord, running the entire length of the car.

Nine Cents in Cincinnati

New Rate Goes Into Effect March 1—City Street Railway Commissioner Planning Protest

Fare on the lines of the Cincinnati (Ohio) Traction Company will be raised another half a cent, to 9 cents, effective March 1. Walter A. Draper, vice-president of the company, following several conferences with officials and lawyers of the company made this announcement, saying it was the intention of the company to increase the fare because of an existing deficit.

The deficit for the months of December and January, the traction company announced, is approximately $100,000. The accumulated deficit of the company to date is about $650,000.

Under the franchise the 9-cent fare will be in operation from March 1 to May 30. Should the receipts for March and April show a deficit the company has the right under the franchise to advertise a further increase of half a cent on May 15, making the fare 9½ cents effective on June 1. A fare of 10 cents would be reached on Sept. 1, providing the reports showed a deficit for the months of June and July.

Suit Now Pending

City Street Railway Director W. C. Culkins, following a conference with the city solicitor and Mr. Draper, said:

> I have placed before City Solicitor Saul Zielonka certain information which, I believe, shows that the increase in fare to 9 cents announced by the traction company is not warranted.

Mr. Zielonka stated after studying all the information Mr. Culkins supplied him that he will determine whether he would be warranted in bringing a suit to enjoin the fare increase.

A suit now pending in the courts would, if decided in the city's favor, obviate the necessity of a fare increase. This action was brought at the request of Mr. Culkins, who demands an accounting from the Cincinnati Traction Company, the Ohio Traction Company and the Cincinnati Car Company, of transactions among them in which it is charged the latter two companies benefited at the expense of the first named to the extent of $350,000.

Mr. Culkins questions the deficit of the traction company saying:

> I am not prepared to admit that any deficit exists if proper adjustments are made by the company.

Louisville Goes to Seven Cents

In a signed statement issued in announcement form on Feb. 16 the Louisville (Ky.) Railway, over the signature of President James P. Barnes, announces that starting at 4 a.m., Feb. 21, fares will be increased from 5 to 7 cents.

This announcement followed advice of Federal Judge Evans in an opinion in the case of the Louisville Railway vs. the Mayor and City Attorney, to prevent interference with an increase in fares, the company having asked for an injunction in the Federal Court.

Judge Evans held that a restraining order could not be issued until the need becomes actual instead of abstract, and advised the plaintiff to put the increase into effect immediately so that action may be taken. The original bill for relief included the Common Council in its citation, but was amended to take in the City of Louisville, the Mayor and the City Attorney.

One-Man Cars on All Lines

One-man cars were recently placed in operation on the Hillyard line of the Washington Water Power Company, Spokane, Wash. This change marks the passing of the two-man car on the Washington Water Power System. Seventeen of the big cars formerly used have been converted to the one-man type. The near-side stops have replaced the far-side stops. The company was one of the first electric railways in the country to adopt the one-man car for general use. The first cars were converted about five years ago. Since that time the company has steadily pushed the conversion until last year all its cars except those on the Hillyard line were in charge of one man each. The Hillyard cars are the largest of the system and are believed by company officials to be among the largest one-man cars operated anywhere in the country. It has been the experience of the management that the larger cars are more economical in operation than the smaller ones.

Ten-Cent Fare Asked in Denver

E. Stenger, receiver for the Denver (Col.) Tramway, on Feb. 11 petitioned the United States District Court, District of Colorado, for an advance in fares from 6 to 10 cents for adults and from 3 to 5 cents for children. Arguments on the petition will be heard by Judge Robert E. Lewis on Feb. 16.

The petition sets out that the company is laboring under a burden of high costs of operation, struggling with inadequate and worn out equipment in an attempt to render satisfactory service to the public, with the possibility of confiscation of the property unless fares are advanced and that the company is carrying a tremendous load of debt which is constantly expanding.

While agreeing that the city under its police powers has the right to regulate the rate of fare the receiver contends that it must not force the company to charge a fare that is confiscatory. Permission is asked of the court to give up the franchise obtained in 1906 for a period of twenty years, declaring it to be worse than useless to the company. Franchises granted the company in 1885 and 1886 without time limit, accord the company practically the same privileges as the 1906 franchise.

Transportation News Notes

Fare Election Declared Illegal.—The election held in Shreveport, La., last May authorizing the Shreveport Traction Company to increase its fare from 5 cents to 6 cents to remain in effect until Dec. 31, 1923, has been declared illegal by Judge J. R. Land of the Circuit Court at Shreveport. The 6c. fare had been in effect for several months.

Interurban Wants More.—John E. Zimmerman of the firm of Day & Zimmerman, Philadelphia, Pa., recently appeared at a public hearing in Alexandria, Va., to explain the need for increased rates on lines of the Washington-Virginia Railway. The company has applied to the Interstate Commerce Commission for permission to increase its rates. The railway wishes to retire its 25-trip ticket book and to increase the price of a fifty-two-trip book between Washington and Alexandria from $4.46 to $5.58. Other proportionate increases have been asked.

Court Ends More Transfers.—Federal Judge Hough recently signed an order restraining officials of the city and state of New York from seeking to prevent the Fifty-ninth Street Crosstown Railway from discontinuing the exchange of transfers with the Sixth, Seventh, First, Second and Lexington Avenue lines. The company is part of the Third Avenue Railway system. The court stated that to compel the company to continue the transfer system would violate the law, because it would be confiscatory, and stated that the company received only 2 cents from each transfer passenger and that it cost 3.96 cents per passenger, to say nothing of more than half a cent additional needed to meet interest on borrowed money.

Would Retain 7-Cent Fare.—Officials of the Indiana Service Corporation, Fort Wayne, Ind., recently appeared before the State Public Service Commission at a hearing on the company's application for authority to continue to charge a 7-cent fare on the Fort Wayne city lines. The 7-cent fare took effect on Sept. 15 last. The rate was formerly 5 cents. Figures were submitted to the commission showing that during the months of October, November and December, with the 7-cent fare in effect, a total of 3,914,895 passengers were carried on the Fort Wayne city cars. This was a decrease of 6,331 from the number carried in the same period of 1919. Passenger revenue during the three months totaled $248,810, which was an increase of $52,805 over the corresponding three months of 1919. An increase of 58,985 car-miles was shown. Operating expenses amounted to $211,296, an increase of $62,738. Data were also submitted showing that the average return on the investment for the last three months of 1920 was 6.75 per cent. During January, 1921, the number of passengers carried was 146,917 less than during January, 1920, while passenger revenue dropped $9,996.

Ten Cents in McAlester.—The Oklahoma Corporation Commission granted permission to the Pittsburgh County Railway, McAlester, operating city and interurban lines, to increase its rates, effective Feb. 15. The rate for the McAlester city lines and for territory west of the city to the state penitentiary is fixed at 10 cents single fare or three rides for 25 cents. A 5-cent fare is granted for students traveling to and from public or Sunday schools. Twelve tickets will be sold for $1 good between any two points on the interurban lines where the regular cash fare was 10 cents. A complete new set of rates is also made for interurban traffic and for express and baggage shipments. The commission found, in making its order, that present owners had never made sufficient profits to pay operating expenses and taxes, provide for depreciation and earn a reasonable return upon the capital invested. It also found that the cost of coal and electric current used for power had increased more than $25,000 per annum.

Railway Defendant in Suit.—Alleging breach of contract and claiming that the 7-cent fare has worked irreparable injury to the development of its land the Ortega Company recently filed an injunction in the Federal Court for the Southern District of Florida to restrain the Jacksonville Traction Company from maintaining a 7-cent fare. The Ortega Company, which built the line, states that when it sold the franchise to the Jacksonville Traction Company, it was on the condition that a 5-cent fare would be the maximum fare charged. The company, being engaged in the development of land in the section served by the traction company, and since it was for the purpose of furthering the sale of these lands that the 5-cent fare was contracted for in the agreement, claims that the railway has broken its contract even though the Railroad Commission authorized the increase in fares. Receiver Triay as defendant has filed a motion for dismissal of the proceedings alleging that under the Supreme Court's decision instructing the Railroad Commission to assume jurisdiction, no binding contract can be made with a municipality or individual by a railroad or common carrier. It is also contended in the receiver's motion for dismissal that private contracts and obligations must yield to the welfare of the public.

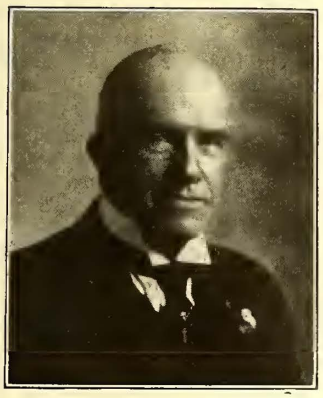
Personal Mention

Operating Skill Recognized

G. B. Anderson Appointed Manager of Transportation Los Angeles Railway —F. H. Van Vranken Promoted

For the second time within one year promotions have come to George B. Anderson and F. H. Van Vranken of the Los Angeles (Cal.) Railway. Under the new plan of organization recently announced by G. J. Kuhrts, general manager, Mr. Anderson, who has served as manager of service, is made manager of transportation, while Mr. Van Vranken, general superintendent of the railway since May 1 of last year, becomes assistant to the general manager.

The position of manager of transportation supersedes that of general superintendent and gives Mr. Anderson direc-



G. B. ANDERSON

tion of the entire operating department. Mr. Anderson joined the Los Angeles Railway forces three years ago as director of public relations. Since that time he has advanced rapidly. He has the unique record of having been more than fifty years old when he entered the electric railway industry and of having had no previous experience in any phase of the transportation business. He established the merit system, under which trainmen receive credits and demerits according to their grade of service rendered. These marks are the basis upon which a yearly bonus is paid.

Mr. Van Vranken, who becomes assistant to the general manager, was born in Schenectady, N. Y., in 1865. At the age of nineteen years he became a brakeman with the Southern Pacific. He served that road successively as brakeman, freight conductor, yardmaster and passenger conductor. In 1902 he was appointed division superintendent of the Pacific Electric Railway, continuing in that capacity until 1911, when he resigned to join the Los Angeles Railway as assistant superintendent. Two years later his title was changed to assistant to the general superintendent. He continued to serve in that capacity until his promotion to general superintendent last May.

Several other changes in the operating personnel have been announced by General Manager Kuhrts. R. B. Hill continues as superintendent of operations. Mr. Hill has held this position since Oct. 1, 1919. R. R. Smith is made assistant superintendent of operations. Mr. Smith entered the employ of the railway in 1904 as a motorman. Three years later he was transferred to the instruction department, and was appointed chief instructor on Jan. 1, 1919.

The position of chief instructor now rests with R. A. Pierson. Mr. Pierson joined the Los Angeles Railway seventeen years ago. Starting as a motorman, he was soon made a dispatcher, and for the past seven years has been in the instruction department. He will be aided by Daniel Healy, who has been given the title of assistant chief instructor. Mr. Healy has been in the service of the railway for the past sixteen years.

Guy D. Wheelock has been appointed superintendent of schedules. Mr. Wheelock was formerly chief dispatcher.

W. J. Van Valkenburg has been made efficiency statistician. Mr. Van Valkenburg has been in the office of Mr. Anderson, now manager of transportation, for several months past.

A. K. Plummer continues as traffic director. A change will be made in the work of the traffic supervisors by dividing the city into three districts, with a supervisor in charge of each district and certain men assigned regularly to each zone. These three district superintendents are J. G. Owen, J. A. Bodley and W. H. Snyder.

Changes in Alabama Road

J. H. Bowles, master mechanic of the Anniston Division of the Alabama Power Company, has been transferred from Anniston to occupy a similar position with the Gadsden Division. M. D. Payne, superintendent of the Gadsden Division, has been placed in charge of transportation and maintenance of way. These changes come as a step toward a reorganization of the operating end of the street railway in Gadsden as announced by the Alabama Power Company. Division Manager Barry, of Anniston, and J. S. Sutherland, of the main office at Birmingham, will spend several weeks there to personally superintend the work and to study the problems that confront the management.

E. M. Graham, President

Youthful Maine Operator Chosen President of the Bangor Railway & Electric Company

Edward M. Graham was elected president of the Bangor Railway & Electric Company, Bangor, Me., at a meeting of the board of directors on Feb. 9. Mr. Graham has filled the position of vice-president and general manager of the railway, and will continue as general manager. Herbert L. Clark, of Philadelphia, was elected vice-president and E. C. Ryder, the former president, will act as general counsel.

When in 1915 Mr. Graham succeeded his father, the late John R. Graham, as the active operating head of the Bangor Railway & Electric Company the Bangor Power Company, the Orono Water Company and the Bar Harbor & Union River Power Company he was only twenty-six years of age and was one of the youngest general managers in the country to have charge of so extensive a property. The younger Mr. Graham gained his practical knowledge of railway and central station man-

E. M. GRAHAM

agement through an experience of several years under his father.

He began his career with the Eastern Massachusetts Street Railway, at that time the Bay State Street Railway, which he served in various capacities. At the age of twenty-two years he was made superintendent of the Portland & Brunswick Street Railway and a little later became assistant to the general manager of both the Lewiston, Augusta & Waterville Railway and the Cumberland County Power & Light Company, these being among the large public service corporations of Maine.

Mr. Graham went to Bangor in 1913 as assistant to his father, then the president and active head of the utility properties centering in that city. He has been with the company there ever since. The companies of which Mr. Graham is now president and general manager operate electric railway lines in nine municipalities, in addition to providing sixteen cities and towns with light and power and six with water.

Manufactures and the Markets

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

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Lower Prices on Pole Line Hardware

Present Demand Light, but Manufacturers Are Hopeful of Good Business Ahead—Prompt Shipments

Following price reductions of 5 to 15 per cent on pole-line hardware that went into effect during December and early January, as mentioned in last week's issue, prices have further declined. General reductions on the entire line, ranging from 5 to 7½ per cent, were put into effect by leading manufacturers on Feb. 15. It is hoped that this reduction will have some effect upon consumers in the way of inducing them to buy, as until the present time demand has been very light. With the closer approach of spring, however, manufacturers are hopeful that the program of extensions on the part of utilities will result in a better market.

In anticipation of this producers are continuing production so as to accumulate reserve stocks. These have been rather low in the past, but should now build up in good shape. Deliveries are considered entirely favorable, being from stock in most instances. In others shipment is not longer than ten days to two weeks.

Insulation Market Remains Quiet

Price Reductions Since First of the Year Have Not Helped Buying—Manufacturers Not Stocking

Little increase has been noted in the buying of fabric insulation and compounds, etc., during the year up to date. Although it is stated that the number of orders which manufacturers are receiving is about normal, at the same time the amount of each order is still disappointingly small. A normal number of bills are sent out each month, but for small figures. Factory production is down pretty near the 50 per cent mark.

Cotton webbings are moving slowly, although recent price decreases of about 18 per cent have been applied. There is some distributer stocking of this class of insulation, as it is thought the bottom price has been reached. Cotton sleeving has undergone several price reductions since the first of the year and is now said to compare favorably with pre-war prices. Compounds of finishing insulated wires are moving fairly well and sales have increased in February over January. Shellacs and varnishes are going slowly.

Varnished silk has little call at present, and its price has held steady since the revisions reported in January. Varnished-cambric tape and cloth are about 10 per cent lower than last quotations made the latter part of January, and the demand is not well sustained. There is little manufacturing for stocks beyond what is deemed necessary to supply immediate future needs. That is, no future production on a large scale is being attempted even with a good outlook for summer business.

Further Decrease in Price of Overhead Line Material

Several Manufacturers Drop Prices 10 per Cent Following General Reductions Made Last Month

Still further price reductions have been made on trolley ears, crossings, splicers, hangers, etc., by several manufacturers. The latest decrease is 5 per cent, effective Feb. 15, and follows reductions ranging from 5 to 15 per cent that were made by almost all manufacturers during the first two weeks of January. Not all producers of overhead line material have announced a new decrease in price, but it seems more than likely that these others will fall in line shortly too.

The market for this class of material remains quiet on the whole, orders being mostly for current maintenance work rather than for the purpose of accumulating stock. Some manufacturers are experiencing a fair current business nevertheless. Deliveries are about all that can be desired.

Charters Granted for Traction Construction in Japan

According to advices from the Guaranty Trust Company of New York, charters have been granted for rail and tramway construction as follows: To the Kanaiwa Electric Tramway for an electric tramway between Ono and Kanaiwa, Ishikawa prefecture; to the Fukutake Electric Tramway for a line between Fukui and Takefu, to the Mito Kaihin Electric Tramway for a line between Mito and Isohama, to the Seto Electric Railway for a line between Nagoya and Seto, to the Motegi Automotive Railway for a line between Nagasaki and Motegei. The Tamagawa Electric Railway has received permission to build a new section between Tamagawa-mura and Kinutamura.

The Yokohama Electric Car Company has applied for permission to extend the electric car line by a double track from Honmoku to the Yawatabasi terminus.

Stock Deliveries Can Be Made on Wood Ties

Demand Is Light as Railroads Are Concerned Over Existing Contracts at High Prices

About the middle of last summer it was stated in these columns that timber owners were loath to cut their trees for railroad ties when so much higher prices could be obtained for board lumber. At the same time labor was comparatively scarce in many tie camps because of the more attractive wages that could be earned at lumber mills. These conditions are now changed materially. The price of board lumber has undergone a considerable decline, while quotations for wood ties cut locally along rights of way remain unchanged. There has been some reduction in prices by large producers who stock and sell ties commercially, it is true, but this reduction is slight and applies where lowered water freight rates have reduced costs. More labor is now available than can be used, but wages, it is stated, have undergone very little reduction.

Price Sheets Keep Down Demand

One reason why prices of ties have not declined commensurate with drops in lumber, is because the price sheets issued by the large steam railroads, stating what prices they will pay for ties delivered along the right of way, in many cases cover long term contracts. This factor has aided in cutting down demand as consumers are not anxious to buy ties while quotations are thus artificially maintained.

The market on the whole is extremely quiet just now, but starting this spring producers expect to see a brisk return of buying. They are encouraged in this belief by the large potential need that is known to exist for ties on the part of both steam and electric lines. During the war and since the armistice, buying of wood ties in this country has fallen far below the normal quota that it is estimated must be purchased each year to keep roadbeds in good repair.

The price now in effect, which one of the large steam roads is paying for wood ties delivered along the track, quotes standard white oak ties at from $.95 to $1.85 each depending upon the grade, and chestnut ties from $.75 to $1.50 each. Southern yellow pine ties covering three grades delivered at New York are quoted by a large producer at from $1.10 to $1.65 each.

Deliveries at present are favorable as shipments from storage points in many cases can be made from stock; although

the current surplus stocks are kept rather low. For this reason more than one producer is advising its regular customers not to wait until spring before placing orders, as demand coming all at once at that time may very possibly lengthen deliveries.

Lightning Arresters Drop Ten per Cent

Railways Are Not Entering the Market to Cover Spring Needs—Good Stocks and Prompt Deliveries

Price decreases of 10 per cent on railway lightning arresters have been announced by several of the large manufacturers, effective about the middle of this month.

As yet electric railways are not placing orders to cover their spring needs though one large manufacturer states that the volume of inquiries received indicates that they will do so before long. Other producers report an absence even of inquiries, and are not looking for buying to start until thunderstorms are actually a factor to be reckoned with. Good stocks have accumulated at the factories and deliveries can be made promptly at the present time.

Brill Profits Show Gain in 1920

Total Sales Also Surpass High Mark of 1918, When Company Operated Under Large War Contracts

For the year 1920 the sales value of the combined output of J. G. Brill Company's four plants amounts to $17,537,293, according to the annual report of the company just issued. This is a record figure, as it exceeds both the $14,210,622 total sales of 1919 and the previous high mark of $16,761,154, recorded in 1918, when the company was working under large government war contracts. Profits for the past year, after deducting the sum of $964,090 for depreciation, maintenance and repairs, were $1,415,321, from which must be further subtracted $240,000 to cover unassessed federal income and excess profits taxes, and $150,000 against any possible decrease in assets. This makes the net profit for the year $1,025,321, surpassing both $831,869 in 1919 and $916,509 in 1918. The inventory of all raw material on hand was priced at cost or at the prevailing market price at the end of the year, whichever was lower.

The value of unfilled orders on hand as of Feb. 1, 1921, is $3,670,310, which does not compare very favorably with $6,904,792 and $8,204,448 of unfilled orders on the same date in 1920 and 1919 respectively. In view of the present depressed condition of the market, however, this volume of business to start the year seems by no means unfavorable. In fact, regarding the outlook for the present year the tone of the report, which points out the present great necessity for street railway equipment, is optimistic.

Independent Steel Production on Low Basis

Recent Price Cuts of from $3 to $7 of Many Independent Mills Have Not Acted as Stimulus to Buying

With recent recessions in price of from $3 to $5 and even $7 per ton below the Industrial Board's schedule, made by most of the independent steel mills, there has resulted to date little stimulation to buying. Mills are operating at a very unsatisfactory capacity, down as low as 25 per cent being reported in several instances. The leading interest is reported as operating at about 80 per cent, but there is a feeling in the trade that this capacity will be even lower in the very near future.

In the independent field reductions in wages at mills and fabricating shops are becoming common, from 10 to 20 per cent lower pay being quite general. In many instances this has been done without reducing the hours of labor, while in other instances the working time has been cut sometimes to four days a week while keeping the rate of pay the same. The rate of pay at the mills of the corporation has not been changed and reports assert a holding to published prices.

Most of the price changes seem to affect the semi-finished steel products rather than finished products on which there is a relatively great amount of labor. Steel plates are being quoted on a 2.40-cent base, f.o.b. mill, 25 cents below Industrial Board prices. Structural shapes have declined about $4 a ton to a 2.25-cent base. Reductions have been reported up to $7 a ton on blue annealed sheets, while on the black sheets the drop has been about $3. Galvanized holds better.

Consumers are buying only as it is absolutely necessary. While the unstable conditions remain in the price market, there is a current of opinion that this buying will remain light. There is a tendency to expect a recession in price by the leading producer, in which event it is felt that the market will again come to a more stable level. But with operations on a 75 or 80 per cent level it is reasonable to expect a holding in price as long as production can be maintained probably within twenty points of these figures.

Price Cuts Announced on Electric Railway Material

In addition to the price drops on various apparatus announced by the General Electric Company in last week's issue, there have been other reductions by this company on material in the electric railway field. The reduction, which is dated Feb. 9, is approximately 10 per cent and includes railway motor gear cases, brushholders, carbon brushes, car-type circuit breakers, and car-type fuse boxes.

The Westinghouse Electric & Manufacturing Company, it is stated, has also made slight reductions in price on all the above material within the past two weeks with the exception of carbon brushes, but the specific date and amount are not available.

Rolling Stock

Cairo Electric & Traction Company, Cairo, Ill., states that it expects to purchase three single-truck cars.

Concord (N. H.) Electric Railways announces that it has purchased new H. L. control for six interurban cars.

Brockton & Plymouth Street Railway Company, Plymouth, Mass., reports that it expects to purchase eight fare boxes within the next few weeks.

The Hydro-Electric Power Commission of Ontario, Canada, it is learned, contemplates the purchase of new cars for the city of Windsor, Ont., Canada, and is interested in prices immediately. The estimated amount to be expended is placed at $25,000. A. McGill of Windsor is superintendent.

The City of Philadelphia, Pa., mentioned in the Jan. 8 issue as calling for bids on 100 steel passenger cars for the Frankford Elevated Railway, has awarded the contract to J. G. Brill Company. Only fifty cars are ordered at the present time, with the privilege of ordering as many as fifty more later. The motor control, couplers and draft gear and door operating mechanism will be covered by separate contracts and have not yet been awarded. The remainder of the equipment is as follows:

Number of cars ordered	50
Date, bids opened	Feb. 1, 1921
Delivery to be begun by July 1, 1921 and completed by Sept. 30, 1921	
Builder	J. G. Brill Company
Type	All-steel Motor Car
Seating capacity	52
Weight, total	65,000 lb.
Bolster centers, length	38 ft. 0 in.
Length over all	55 ft. 0 in.
Truck wheelbase	6 ft. 8 in.
Width over all	8 ft. 10 in.
Height, rail to top of roof	12 ft. 0 in.
Body	All-steel
Headlining	Agasote
Roof	Arch
Air brakes	Electro-pneumatic
Axles	Quenched and Tempered Carbon Steel
Bumpers	"Hedley"
Signal system	Bell with rope
Center and side bearings	"Stucki"—Side bearing
Couplers	Automatic Car, Air and Electric
Curtain fixtures	None
Curtain material	None
Door operating mechanism	Pneumatic
Gears and pinions	Gen. Elec.
Hand brakes	Brill
Heater equipment	Electric
Journal bearings	M. C. B. plain
Journal boxes	M. C. B. type
Motors, type and number	General Electric 259 inside hung
Seating material	Rattan
Trucks	Brill
Wheels	34 in. Wrought Solid Carbon Steel

Franchises

Hydro-Electric Power Commission, Ontario, Canada.—Since the Ontario Hydro-Electric Power Commission has refused to consent to a renewal for five years of the franchise of the Grand River Railway on Water Street, in Galt, Ont., the company has served notice that it will discontinue the freight service for manufacturers after March.

2. The City Council of Galt is endeavoring to have the Hydro Commission change its decision, as the loss of the freight service will be a serious blow to the city's industries.

Track and Roadway

Lafayette (Ind.) Service Company.—It is proposed to build a new curve to the tracks of the Lafayette Service Company in the southeast part of Lafayette and have the interurban cars of the Terre Haute, Indianapolis & Eastern Traction Company go down South Ninth and Kossuth Streets. Excavations for street improvements in East Main Street have resulted in the railway tracks being undermined and it is over these tracks that the cars of the Terre Haute, Indianapolis & Eastern Traction Company run.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Trenton & Mercer County Traction Corporation will expend $300,000 for maintenance and replacement during the coming year, according to President Rankin Johnson. The company will have 15,000 new ties placed, 300 tons of new rails, 300 poles and ten miles of new trolley wire. Considerable special work will be installed at West State and Prospect Streets.

Orleans-Kenner Traction Company, New Orleans, La.—Officials of the Orleans-Kenner Traction Company have been ordered to remove the spur track in the roadway of Rampart Street. Commissioner Maloney has informed the president of the company that the franchise for the use of the spur track expired two years ago.

Claremont Railway & Lighting Company, Claremont, N. H.—The Claremont Railway & Lighting Company expects to rebuild 1 mile of old track substituting A. S. C. E. 70-lb. rail with Weber joints for old 56-lb. rail with angle bars.

Oklahoma Union Railway, Tulsa, Okla.—The Oklahoma Union Railway, extending from Tulsa to Keifer, is planning to build an extension to Okmulgee as soon as financial conditions improve, according to I. F. Crow, of Tulsa, secretary and general manager of the line. The proposed extension will pass through Beggs and the Beggs oil district. It will be about 50 miles in length.

Texas Electric Railway, Dallas, Tex.—The Texas Electric Railway, which owns and operates the street car system in Waco, Tex., has installed a block signal system on one of its lines as a measure of safety in operation, and announces it will so equip other lines in the city. The block signal system has proved most effective in preventing accidents and making for absolute safety in operation.

Toronto, Ont. — The transportation commission of Toronto will ask the Ontario legislature for power to construct street railway extensions as local improvements and charge the cost to the properties benefited by such extensions. According to this plan adjacent townships would also be called upon to bear their share of the expenditure.

Citizens Railway, Clarksville, Tenn.—The Citizens Railway within the next month will extend its tracks a distance of 2 miles, and in this work 65 to 80 lb. rail will be used.

Burlington (Vt.) Traction Company.—The Burlington Traction Company expects to reconstruct 2 miles of its track in the early summer. Seventy-lb. rail has been ordered for May delivery.

Power Houses, Shops and Buildings

Cairo Electric & Traction Company, Cairo, Ill.—The Cairo Electric & Traction Company will purchase in the near future a motor generator set and rotary converter.

Claremont Railway & Lighting Company, Claremont, N. H. — The Claremont Railway & Lighting Company has purchased and is now installing two 300-kw. rotary transformers.

Charlottesville & Albermarle Railway, Charlottesville, Va. — The Charlottesville & Albermarle Railway within the next month will build an addition to its power plant for installing substation equipment and switchboards.

Concord (N. H.) Electric Railways.—The Concord Electric Railways has purchased new H. L. control for six interurban cars. Complete equipment has also been purchased for one 300-kw. motor generator set.

Brockton & Plymouth Street Railway, Plymouth, Mass.—The Brockton & Plymouth Street Railway will build a substation at Kingston and will purchase one 22,000-volt oil switch.

Evansville & Ohio Valley Railway, Evansville, Ind.—The Evansville & Ohio Valley Railway, has leased the building adjoining the one it now uses as a station at Rockport, Ind., and will remodel, enlarge and convert the building into a suitable station.

Trade Notes

The Alloy Metal Wire Company, 154 Nassau Street, New York City, has filed notice of increase in capital stock from $100,000 to $200,000.

The American Steel & Wire Company, Chicago, is planning to build a three-story addition to its plant in Worcester, to cost about $150,000.

The American Insulated Wire & Cable Company, Chicago, has recently purchased a one-story building at Twenty-second and Fisk Streets, containing 40,000 sq.ft., which will be remodeled and used as a copper-wire rod mill. New equipment to cost about $250,000 will be installed.

The Atlas Valve Company, 282 South Street, Newark, N. J., announces that the company has acquired by purchase from the Ideal Automatic Manufacturing Company the sole patents and rights to manufacture the Ideal automatic pump governor. This rounds out the company's line of valves, pump governors, regulators, etc.

The Cleveland Belting & Machinery Company, 1504-24 University Road, Cleveland, manufacturer of engines and boilers, generators, motors and belting, has enlarged its storage space by an addition 65 x 320 ft. The company says that its business is beginning to improve and expects it will continue to increase from now on.

The Jeffery-Dewitt Insulator Company, Huntington, W. Va., has just put into operation a new kiln which with its supporting accessories will double the insulator capacity of the plant. In addition, in order to have a continuous source of raw material and to be independent of the market for feldspar, the company has purchased its own feldspar mine.

The Acorn Insulated Wire Company, 73 Richards Street, Brooklyn, N. Y., has acquired the plant of the Davis Oil Company on Ninth Street, extending to the Gowanus Basin bulkhead, for a new plant for the manufacture of insulated wire and other products. The property is 146 ft. x 380 ft., improved with five-story buildings, and has been held at about $150,000.

The Black & Decker Manufacturing Company, Towson Heights, Baltimore, Md., announces the opening of a new branch office and service station at 75 Fremont Street, San Francisco. This office will have jurisdiction over the entire Pacific Coast territory and will be in charge of M. A. Johnson. At this address there will be a complete stock of parts carried and a factory-trained mechanic will be on hand.

New Advertising Literature

Metal.—"Monel Metal" is the title of a twenty-eight-page booklet published by the International Nickel Company, 43 Exchange Place, New York City.

Foundry Ladles.—The Whiting Corporation, Harvey, Ill., has issued catalog No. 156, superseding No. 147, covering its foundry ladles.

Electric Rivet-Heating Forge.—The United States Electric Company, New London, Conn., has issued bulletin No. 5, on its electric rivet-heating forge.

Transformers.—The Wagner Electric Manufacturing Company, St. Louis, Mo., has issued bulletin 124, covering its different types of transformers.

Cords and Fixtures.—The Inland Electric Company, 15 N. Franklin Street, Chicago, has issued a folder on Steelite armored portable extension fixtures.

Transformers.—The Esterline Company, Indianapolis, Ind., is distributing a four-page leaflet describing its new portable multi-range current transformers rated at from 25 amp. to 800 amp.