

Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 52

New York, Saturday, November 16, 1918

Number 20

Income and Outgo Figures Are the Best Publicity

OF THE several trenchant proposals made by Chairman Gadsden of the War Board in his address of Nov. 1 at the conference of the Association, one of the most suggestive was that urging all companies to publish monthly their income and outgo statistics in order to keep the local public informed as to the actual condition of its utility. He pointed out that if the national tabulations of the War Board had had such a powerful effect on the lay public, still more could be expected from what we might term "neighborhood" data. It is significant that in harmony with Mr. Gadsden's suggestion, H. G. Bradlee, president of Stone & Webster, gave out full and frank figures on safety-car economies and traffic gains—the one bright spot in the present financial blackness. Indeed, both speakers were in accord with the spirit of our Nov. 9 editorial on "Tell Your Gains as Well as Losses." They indicated thereby a departure from the old and harmful policy of secrecy that has given the public so deep-rooted a misconception of electric railway finance. We are sure that in scores and scores of instances the people will be astounded to learn that the 5-cent or even 6-cent flat fare no longer is sufficient to pay for the service.

The Universal Car Not Necessarily Uniform in Equipment

IF WE JUDGE correctly from several inquiries that have come to us in connection with the universal type of car recommended by the A. E. R. A. War Board to the Bureau of Industrial Housing and Transportation, there is an impression in some quarters that the board not only recommended a specific type of car but also undertook to specify the use of certain equipment details to the exclusion of all others. This is not the fact. Reference to our article in the issue of Oct. 26 will disclose a complete absence of specific trade names and designations. The war board has very properly not tried to dictate or suggest any specific trade articles, but has simply set forth the nature of the service to be fulfilled.

On this occasion it is pertinent to state that the use of a universal or standard car does not necessarily imply exact duplication of all apparatus. The fundamentals of such a car are that it should be of a specific length, width and height; that it should have certain post spacings, seat centerings, aisle widths, platform lengths, door and step locations; that the motors should always be hung in exactly the same way; that the control and other platform equipment should be located uniformly on all cars; that there should be standard positions for the trolley bases, the headlight mountings

and catcher and retriever sockets; that the ventilator openings should be standardized in number and spacing, etc. In the case of such a car, it is quite conceivable that the individual railways may exercise their choice of any items that will do the work within the general limitations noted. Within such limitations the race for the car equipment specialties should be a "free for all."

Rehabilitating the Physical Equipment of the Electric Railway

THERE is no question but that on its physical side the average electric railway in this country is very much run down. Even before the United States went into the war prices were so high and money, labor and materials were so scarce that comparatively little maintenance work had been done for a long time. The end of the war will put new hope into engineers and master mechanics, for they know that in due time they will be able to get the track, the line, the rolling stock and the power plant into "85 per cent new" condition, which the valuation experts would consider, we believe, as excellent maintenance.

Electric railway operation in war-time has furnished an impressive exhibition of the way in which deterioration in one part of the equipment reacts on other parts. Bad track and special work are the cause of motor and truck troubles. Defective wheels, in turn, wear out the track. Poor power supply overloads motors, and thus run-down power-plant generators, turbines, boilers, etc., not only eat into the heart of the coal pile by operating at low efficiency, but affect the useful life of the car motive apparatus. Never in the history of the industry has rehabilitation work been more sadly needed than at present, and thanks to the work of the boys at the front this work is now going to be done.

However, we do not delude ourselves into the belief or hazard the hypothesis that this is going to be done all at once. It will take years to get back to normal shape. But there is ground for hope, first because money must be spent on the physical equipment if service is to be maintained; second, because there is prospect of more nearly adequate income, and third, because men and materials are going to be available in due course. All of this means that there should be laid out now a definite and comprehensive "rejuvenation" program for each property, covering several years to come. Especially should the methods which are to be followed be selected with care and the necessary tools and other equipment provided. Old-fashioned rule-of-thumb procedure should be discarded.

As we have pointed out before, now is the golden opportunity of the American Electric Railway Engineering Association. The recent strenuous years have shown

us what can be done in the way of maintenance, or alleged maintenance, even when the three M's (men, money and materials) have been lacking. What a splendid chance there is for railway engineers, by which term we include all those responsible for the physical equipment, to get their heads together, to plan to make every maintenance dollar do one hundred cents' worth of work, and to pull as a unit in the tug-of-war against the effects of wear-and-tear.

Don't Save at the Spigot and Lose at the Bung Hole

AT THE recent hearing before the Senate committee on taxation, a question asked of one of the witnesses who had testified to the poor financial condition of the electric railway companies was whether the salaries of the presidents of those companies had been cut down to help reduce operating expenses. The answer was that so far as the witness knew this had not been done, but that presidents of electric railway companies did not, as a rule, receive large salaries.

The colloquy would not be mentioned here except that the amounts paid as salaries to the chief executive officers of a railway company are often brought up in rate hearings by the counsel opposed to any increase in rates. Where this is done the inference which the questioner usually intends or seems to intend to convey is that if a company comes to the public and asks to be permitted to earn a larger net, it should first reduce the pay of its higher salaried officials to show that it is doing all that is possible for it to do to keep its operating expenses down.

Such a course in many cases would be simply suicidal. The business of conducting an electric railway enterprise, like that of conducting any other important enterprise, requires executive ability no less now than at other times; in fact, in many respects the business is more complicated now than during prosperous years. We have no doubt that the majority of electric railway executives, owing to the personal interest which they take in their companies, are making many personal sacrifices. But the higher cost of living affects them as well as other people. Active operating railway officials and heads of railway properties are usually dependent upon their salaries for the support of themselves and their families and generally are not interested financially in any large way in the properties with which they are connected. During the past few years a number of such officials have left the electric railway field to enter other lines of work and have benefited themselves financially by doing so, while others have received but have refused tempting offers from outside enterprises.

A few thousand dollars which in some cases might be saved on the salary of the president or general manager by the engagement of a man of mediocre ability in place of one of superior attainments would mean an almost negligible saving when measured in a percentage of the company's entire operating expenses. At the same time, it would be a highly expensive undertaking for the company if it should involve, as it very likely might, the commission of errors which could easily cost the company ten times the amount of salary "saved."

Cutting the Gordian Knot In the Present Rate Situation

HAS the War Labor Board power to increase electric railway rates sufficiently to permit the payment of its wage awards to the railway employees? The Kansas City Railways is justified in raising this question, in view of the complications of its rate situation. The company is confronted with a wage award conditioned upon its financial ability to pay, in accordance with the stipulation agreed to by the men when the question of wages was submitted to the War Labor Board. To meet the wage award made, an 8-cent fare would be needed, it is said, but in Missouri the 6-cent fare granted several months ago by the commission is being fought in the State courts on the ground of the inviolability of a franchise rate, and the 1-cent increase is impounded. At the same time in Kansas the commission has not even got around to a decision in the 6-cent fare case before it.

The Kansas City Railways is attempting to cut the Gordian knot of this situation by appealing to the United States District Courts in Kansas and Missouri for a settlement of the rights of all parties. It is the company's contention that the sovereign war power of the War Labor Board to fix wages carries the authority and creates the duty to do all things to enable its mandate to be carried out, and restrictions by lesser authorities should be disregarded. Hence the federal courts are asked to take all steps necessary to see that the suggested award of the War Labor Board is made effective at once.

The proposal is essentially just and should have the support of all who recognize the purpose of President Wilson in creating the War Labor Board. If state commissions or city authorities cannot or will not do their part to enable electric railways to meet wage awards made in the nation's interests, some means must be found to remove all obstructions to justice for both the employees and the companies.

The federal and state courts in Illinois, in the Illinois Traction Company and the Alton, Granite & St. Louis Traction Company cases, have already been prompt to recognize the confiscatory nature of the state 2-cent maximum fare law and either to disregard it or to order the Public Utilities Commission to do so. It is easily conceivable that in like manner the federal courts may remove all local barriers to the enforcement of the wage awards that have been granted by the War Labor Board.

But why should electric railways be obliged to go to the federal courts for rate relief on account of wage awards? In public utterances various responsible leaders in Washington have emphasized their appreciation of the value of the electric railway industry and the necessity of its preservation and development, but as yet federal regulation of such carriers has been one-sided in its application to wages only. If federal supervision of labor is to continue during the period of demobilization, as it has been intimated from Washington is the intention, why should not the federal authorities take some definite action to insure an increase in electric railway rates commensurate with the recommended wage increases? The coming of peace will not automatically solve this electric railway problem.

What Have the Railways to Expect During Reconstruction?

NOW that the war is over we must begin the work of reconstruction, and we refer here not to the reconstruction which must be undertaken abroad or in this country in other lines of work but to the adaptation of the electric railways in this country to the new conditions brought about by the surrender of Germany. It will be hard to adapt our minds, at least at first, to this change, because during the past two years and even longer we have been thinking of the world as well as our own industry in terms of war and not in terms of peace. We must go back to thinking in terms of natural and not unnatural conditions, but we hope not exactly as we did before the war. In fact, it will be impossible for the electric railways to go back to the old conditions, certainly at present, even if it would be desirable. The effects of the war on our industrial structure will continue for a long time to come.

Certainly for the present, government expenditures will have to be on a very largely increased scale as compared with the pre-war period. This will mean higher taxes, which means also higher costs of materials because the manufacturers will have to add the taxes which they pay to the selling price of their products. In the second place, at least for the present, there will be a scarcity of labor throughout the world, owing in part to the reconstruction work here and abroad which will have to be done, in part because the working force of the world has been diminished by death and decreased in efficiency through casualties, and in part because forces of occupation will have to be maintained for some time in Germany. There should be some relaxation in the labor market as a result of the decrease in the manufacture of munitions and the release of part of the men engaged in waging war, but it will probably be a long time before the effects of the war in this respect disappear.

These and other conditions produce the various problems of internal reconstruction to which the nation is about to turn its attention. Such problems are not for politicians alone to solve; the best business brains of the country should be consulted, just as has been done in many cases during the days of war. And where these reconstruction problems closely concern the electric railway industry, the opinions of its duly authorized spokesmen should be sought. Had this course been followed heretofore, the government would have been spared some of its mistakes in dealing with the electric railway situation.

As regards conditions peculiar to electric railways, the war has brought clearly to the foreground certain definite facts.

One of these is that the communities served by these roads have a large interest in the maintenance of good electric railway service as well as a responsibility for

its maintenance. This has been shown by actions of the commissions in increasing fares to compensate, or to compensate in part, for the increased expenses of operation. Another advantage gained by the war is that communities have not only recognized their responsibility for the maintenance of good service but they have learned the habit of co-operating with the railways in securing it, not only by accepting increased fares but also by co-operating in other public movements, such as by the skip stop, and to a less extent by staggered hours.

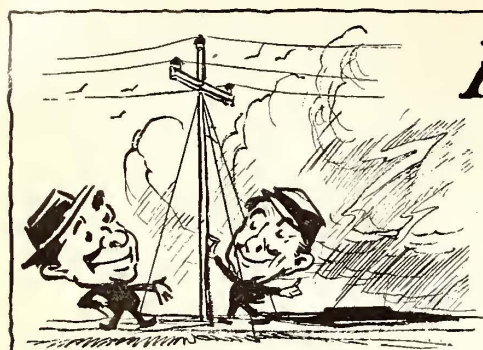
The railways themselves have learned a number of things from the fiery ordeal through which they have passed. Included in this category are the advantages of the economies already mentioned as well as those of safety cars and women conductors. Some of these economies will undoubtedly be retained. The railways have also made progress in the consideration and adoption of logical fare systems and franchise conditions, and further progress along these lines should be made as knowledge is acquired of the practical working of new service-at-cost and other novel working agreements now in use. A great step forward was made when the fallacy of an inflexible fare under all circumstances and for all lengths of rides was finally demonstrated. But independent of the plan adopted or whether there is an increase or an abatement of federal control over intra-state electric railways, we consider that they are on a more solid basis than ever before.

In the first place, it has been amply demonstrated that in case of war city and interurban transportation is a necessity and that the railways are warranted in charging a fair price for transportation. If that is so in the case of war, it applies certainly in the case of peace. With this principle established, there should be no danger that the companies cannot raise money for new and necessary construction, although the money may have to be raised in a different way and the profits may not be so large as in the past. We believe also that regulation will continue, but are firmly of the opinion that it should be and will be more flexible than it has been in many cases in the past. There is wider recognition of the necessity that the time required between the development of a symptom of trouble and relief should be less.

The greatest danger now, in our opinion, is that the lessons taught by the past few years may be forgotten. This would be a calamity for both the railways and the public. While the most serious troubles of the railways did not develop until after the war began, the causes were there and were bound to show their effect sooner or later. Neither through ultra-conservatism nor indifference on the part of either railway owners or the public should the railways be allowed to slip back to the old conditions and all the lessons learned during the war be forgotten.

Further Discussion on Public Ownership

Last week this paper printed part of the results of a canvass of electric railway officials made for the purpose of bringing out the present sentiment regarding Mr. Mortimer's New York Conference resolution favoring public ownership. The discussion is continued this week on page 891.



"Don't Worry—that Line's Braced
Against any Storm"

Details of Line Construction— with Particular Reference to Guying and Anchors

By

Charles R. Harte

CONSTRUCTION ENGINEER THE CONNECTICUT COMPANY,
NEW HAVEN, CONN.

A Continuation of the Author's Article in the Sept. 21 Issue, page 490. The Present Article is a Practical Discussion of the Most Economical Methods of Keeping a Line "Put," and Providing Against Emergency Strains

WE HAVE SEEN that a pole must carry the dead load of half of each adjacent span, the unbalanced portion of the pull of the conductors along the line, and the cross-strains resulting all along the line from the wind, and at the angle points from the conductors; further, under special conditions it may have a vertical pull downward, or more rarely, upward. If the soil is firm the poles of the average line will carry these strains, but the possibility—and in most instances the probability—of ice storms or of heavy winds, if not both together, make wise the use for insurance if they are not actually necessary, of some form of additional support on the tangents as well as at the corners, and this is usually obtained by braces or by guys attached to some form of anchorage.

The Old Reliable "Deadman" Is Widely Used

The oldest and one of the best forms of anchor is the good old deadman, which has been in use for various purposes for a long time. In its simplest form it is buried in a T-shaped trench, the stem pointing at the pole to be guyed. The head trench, from 4 ft. to 6 ft. long, is cut vertically to a depth of from 4 ft. to 8 ft. depending on the length of the anchor rod and its angle when in place. The stem starts at the head with a depth about 1 ft. less, and slopes up on the angle of the finished guy to meet the surface. The "deadman," a log, tie, concrete or stone bar, or a platform of plank lies in the head trench with the anchor rod passed through its center and pointing in the line of the guy. Where the material is available the deadman is first covered with heavy pieces of stone and then the rest of the excavation filled and well rammed. In those cases where existing obstructions or the liability of disturbance from adjacent excavation make the T-form inadvisable the deadman is laid parallel to the pull. In this case it is particularly important that the refilling be well done; the material should be puddled in and allowed to drain out before the anchor is used.

By far the commonest form of deadman is a log which is usually from 4 ft. to 6 ft. long and from 6 in. to 1 ft. in diameter, although for railroad lines the use of a half or a whole tie is quite general. If sound when installed these, even without preservative treatment,

will last indefinitely in wet ground, and elsewhere they usually will outlast the anchor rod. Treatment, however, is not expensive and is good insurance. The "real thing" in the way of a permanent deadman is a cross-bar of the proper size, of stone or of reinforced concrete. If the anchor rod is properly protected also, the construction is probably as nearly absolutely permanent as can be had, but while such treatment may be warranted for the anchors of flexible towers or for poles of the Gibbs-Hill type of electrification, the increased insurance over a wood anchor is rarely worth the higher cost in the case of ordinary lines. In very soft ground or in water, however, a concrete anchor which depends upon its own weight rather than that of the material above it may be absolutely necessary.

For moderately heavy service short lengths of creosoted plank are often used. The telephone standard is 2 ft. long, 1 ft. wide and 1 in. thick with a central hole; two lengths, held at right angles to each other by two ten-penny nails, being used together. For heavy service, when logs of proper diameter cannot be had, a narrow log is sometimes made effective by placing such planks across and in front of it.

The log, plank or other more elaborate form of deadman, is connected with the guy by means of an anchor rod, $\frac{3}{8}$, $\frac{1}{2}$ or 1 in. in diameter and 6, 8 or 10 ft. in length, with nut and heavy washer. The latter is usually 3 in. by 3 in. and $\frac{3}{16}$ in. thick for the first two diameters of rod, and 4 in. x 4 in. and $\frac{1}{2}$ in. thick for the 1-in. diameter. The upper end is an eye. All parts are galvanized or sherardized. There is on the market a rod $\frac{1}{2}$ in. in diameter, but while this when intact has sufficient strength for most services, a little corrosion reduces its capacity to a dangerous point and the small saving in first cost is soon lost. In the case of a concrete or stone deadman the washer and nut should be covered with at least 1 in. of concrete, and the rod should be cased in concrete to a point at least 6 in. above the ground.

The strength that a given deadman will develop depends upon the character of the soil, the angle of pull, and the care with which it has been installed. With a directly upward pull the tendency of a buried log is to lift a chunk of earth consisting of a wedge-shaped body with half cones at the ends. The body has the

same length as the log and the sides slope out at an angle, depending upon the character and condition of the soil. It is customary to assume a vertical pull, although this rarely is imposed, but so far as the writer is aware there have been no experiments to determine the effect of the inclination of the anchor rod which where practicable should be 45 deg. from the horizontal, but is more often greater.

On the supposition that the wedge slope would have 1/2 ft. of base for each foot of depth, that the log is 1 ft. wide, and that the earth weighs 100 lb. per cubic foot, we get, for various sizes and depths of burial of the log, the capacities set forth in Table I.

The American Telephone & Telegraph Company has standardized on five guy materials known by their nominal breaking capacities as: 4000-lb. wire, 4000-lb. strand, 6000-lb. strand, 10,000-lb. strand and 16,000-lb. strand. The anchor system of this company is based on the last three of these guy materials as in Table II. The Western Union Telegraph Company has a very similar practice, but lists more log sizes and includes for use with them anchor rods of 1/2 in. and 3/8 in. diameter. Comparing these figures with the data of Table I, we have the data of Table III.

As the telephone practice has long proved its sufficiency, it is very probable that anchors in average soil will develop at least the strengths given by Table I, but in view of the importance of an anchor, and, in most cases of the small additional cost of another foot of burial it is altogether wise to be liberal in allowances.

In the case of very heavy strains care must be taken that the deadman has sufficient body to prevent breaking at the rod, and that the washer area is large enough to prevent crushing the log. In all cases it is essential that the washer be seated on hard wood so that it will not "crush in" under the first strain and put slack in the guy.

Some Ingenious Anchors Have Been Devised

The installation of a deadman involves quite a little excavation, which in turn requires labor. The disturbance resulting frequently furnishes grounds for objection to a location, particularly in those unhappy cases where the right-of-way is too narrow and the abutter is not enthusiastic over the opportunity to assist the company. To obviate these difficulties a number of patent anchors have been developed. These are of various grades of excellence, all having been devised to secure installation with a minimum of disturbance and to utilize the fact that undisturbed soil has far greater holding power than that which has been disturbed.

Of the several types the screw form, which is one

TABLE I—HOLDING POWER OF LOG DEADMEN

Depth of Log Below Surface, Ft.	Length of Log in Feet—									
	1	2	3	4	5	6	7	8	9	10
5	5,600	7,400	9,100	10,900	12,600	14,400	16,100	17,900	19,600	21,400
6	9,000	11,400	13,800	16,200	18,600	21,000	23,400	25,800	28,200	30,600
7	13,400	16,500	19,700	22,800	26,000	29,100	32,300	35,400	38,600	41,700
8	19,100	23,100	27,100	31,100	35,100	39,100	43,100	47,100	51,100	55,100
9	26,200	31,100	36,100	41,000	46,000	50,900	55,900	60,800	65,800	70,700
10	34,800	40,800	46,800	52,800	58,800	64,800	70,800	76,800	82,800	88,800

of the oldest, is a section of a helix on a rod which is screwed into the ground by means of a handle detached after the anchor is in place. In ordinary soil it starts without coaxing. In hard soil it is wise to make a leading hole by driving a crowbar in the direction the rod is to go and then pulling it out. The workman should stand on the blade until it has entered the soil.

In dry soil a little water poured in the leading hole is a great help. Anchors of the harpoon type have wings which lie along the shank while the device is driven down with a sledge and are then opened by a pull on the shank. Like those of the screw types these require no digging, but they are open to the criticism that unless they are fully opened they may complete the movement later and put slack in the guy.

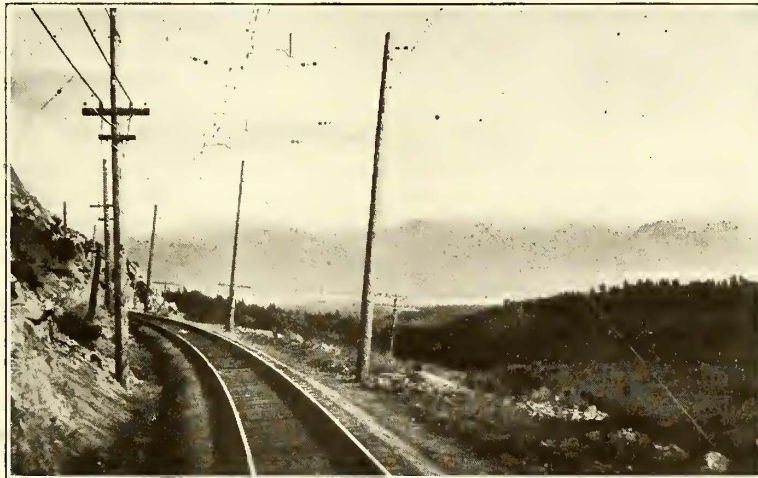


FIG. 1—EXAMPLE OF LONG-LEAD GUYING, C. M. & ST. P. ELECTRIFICATION NEAR THREE FORKS, MONT. SLOPE OF GUY, 1 TO 1

The Bierce, Miller, "Everstick," "Hercules," "Never-Creep" and similar types require the excavation of a hole, but so small that it can readily be made by an earth auger or a special tool. The Bierce anchor is an inverted cone which, under pull, expands the broken stone immediately over it into the walls of the hole after the fashion of an expansion bolt. The Miller

TABLE II—A. T. & T. CO. GUY ANCHOR DATA

No. of Guys per Rod	No. of Rods per Anchor	Kind of Strand	Anchor Rod	Kind of Anchor	Dimension of Log	Depth of Log
1	1	6,000	3/8 in.	Plank, log, or patent Log	5 ft. x 10 in.	6 ft.
2	1	6,000	1 in.	Log	{ 6 ft. x 15 in. or } { 7 ft. x 13 in. }	8 ft.
1	2	6,000	3/8 in.	Log	{ 6 ft. x 12 in. or } { 6 ft. x 10 in. }	6 ft. 7 ft.
1	3	6,000	3/8 in.	Log	{ 6 ft. x 18 in. or } { 8 ft. x 12 in. or } { 10 ft. x 12 in. }	6 ft. 7 ft. 6 ft.
1	1	10,000	3/8 in.	Plank or log	{ 6 ft. x 12 in. or } { 6 ft. x 10 in. }	6 ft. 7 ft.
2	1	10,000	1 in.	Log	{ 6 ft. x 15 in. or } { 7 ft. x 13 in. }	8 ft.
1	2	10,000	3/8 in.	Log	{ 6 ft. x 18 in. or } { 8 ft. x 12 in. or } { 10 ft. x 12 in. }	6 ft. 7 ft. 6 ft.
1	1	16,000	1 in.	Log	{ 6 ft. x 15 in. or } { 7 ft. x 13 in. }	8 ft.
1	2	16,000	1 in.	Log	{ 8 ft. x 15 in. or } { 9 ft. x 13 in. }	8 ft.

TABLE III—COMPARISON OF A. T. & T. CO. DATA WITH THOSE OF TABLE I

A. T. & T. Co. Practice Log Size	Capacity by Safety Table I	To Hold
6 ft. x 12 in.	6 ft. 2 at 6000 lb. or 1 at 10,000 lb., say, 12,000 lb.	21,000 lb. 1.75
8 ft. x 12 in.	7 ft. 3 at 6000 lb. or 2 at 10,000 lb., say, 20,000 lb.	35,400 lb. 1.77
10 ft. x 12 in.	6 ft. 3 at 6000 lb. or 2 at 10,000 lb., say, 20,000 lb.	30,600 lb. 1.53

anchor consists of a metal plate, hinged at its center to the rod, which is set in a hole the upper part of which has a diameter equal to the width of the plate while the bottom is bored out by a special tool to take the plate lengthways. The latter is pushed down lying parallel to the rod and is then turned at right angles when in place. The "Everstick" anchor is of the expanding type, but the blades move at right angles to the stem, eliminating the backward pull of the harpoon type, but on the other hand requiring a hole, which the harpoon does not. The three types just described have the hole in the line of pull; the "Hercules" and "Never-Creep" anchors have the hole at right angles to the line of pull. In the first form the rod takes its position in a channel cut from the main excavation. In the latter form the rod at the proper angle is driven from the surface until it projects into the hole. Then the plate, which has an enormous keyhole in it and is held by a special carrier rod, is slipped over the rod and down till the narrow part of the keyhole locks against the head.

All of these patent anchors have certain advantages over the deadman, and all have their faults, some more than others. Their one absolutely necessary requirement for successful installation is a soil reasonably free from large stones. An occasional "bone" can be dodged by shifting the location, but where such shifts are frequent it pays to set deadmen. The large trench necessary gives opportunity to deal with any kind of rocks that may be encountered nearer the surface than the proper position for the log. If small, such rocks can be removed; if they are of sufficient size, however, the obvious procedure would be to use them as anchors by installing "rock bolts."

If the rock is tough, a suitable "rock bolt" would be a pair of wedge-shaped side pieces with bolt holes at the top, which are dropped into a tapered hole in the line

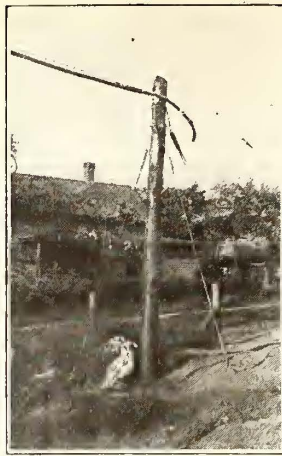
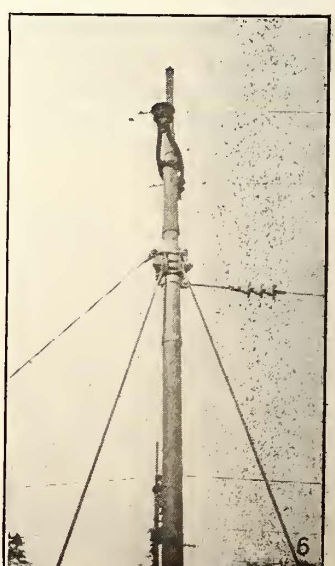
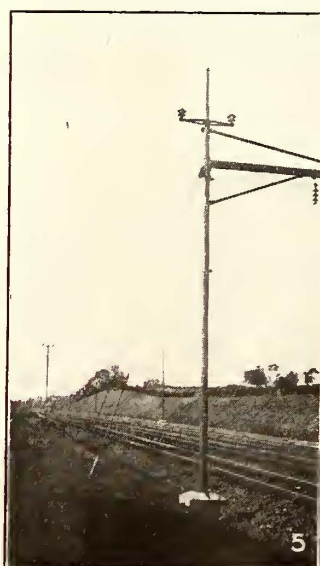
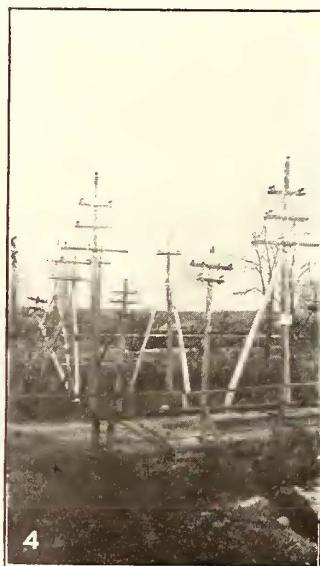
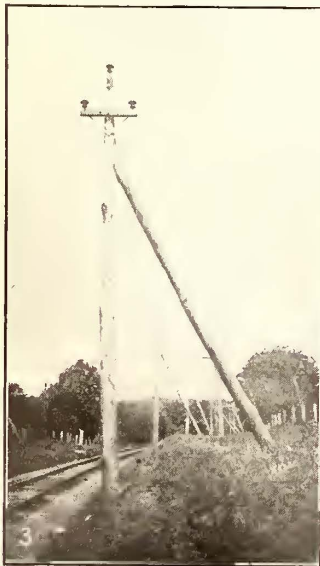


FIG. 2—SHORT-LEAD GUYS ON HEAVY WORK N. Y., N. H. & H. R.R. NEAR NEW HAVEN, CONN. Note guy plates and guy hooks at pole

of the pull of the guy and are held against the walls of the hole by a key fitting between them. This in turn is prevented from working out by a bolt through the tops of the wedges, to which bolt the guy is attached. The extra work of making the bottom of the hole larger than the top is more than offset by the fact that its depth is but 6 in. as against 15 in. for the other type. Although a standard article the wedge bolt is comparatively little used even in rock which, having the necessary strength to withstand its splitting tendency, is, by reason of that same fact, particularly costly to drill for the commoner type. The common type of rock bolt is a rod 1 in. in diameter, with an eye in one end. Although sometimes made with roughened sides, or with the lower end split to take a wedge which rests against the bottom of the hole and jams the parts of the

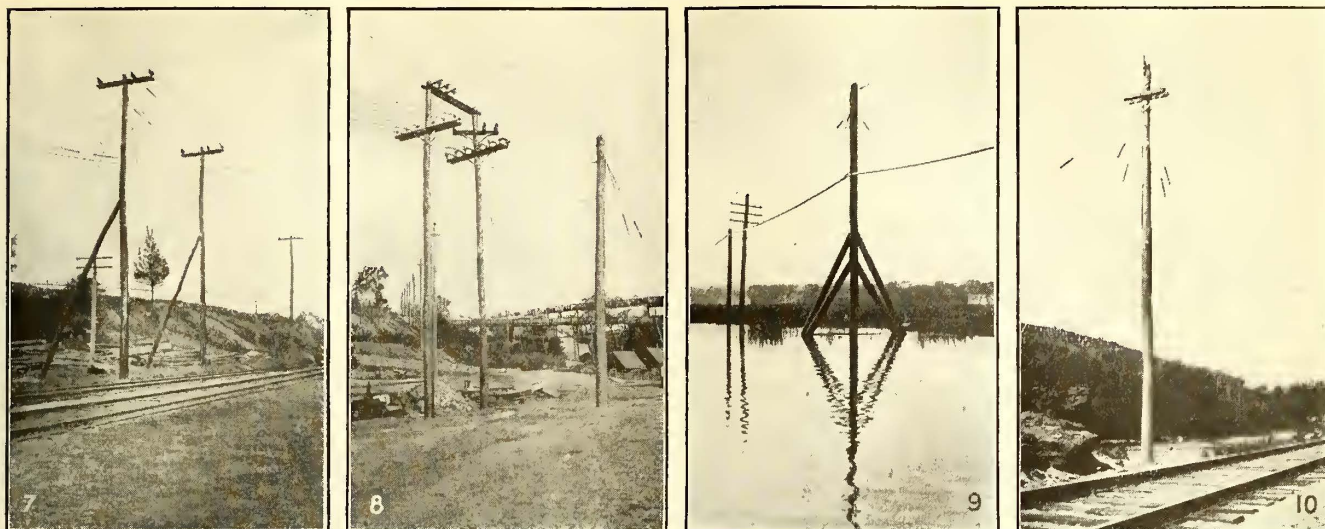
shank against the sides of the hole when the bolt is driven down, the standard form, which is 18 in. long over the eye, is perfectly plain. As the bolt is set at right angles to the pull of the guy, the sulphur, lead or cement used to secure it in place really has very little strain to meet. If sulphur or lead is used, it must be melted at the hole, requiring some form of heater. Care must be taken that there is at least $\frac{1}{8}$ -in. clearance between the bolt and the sides of the hole all around. The material must be poured at as high a temperature as is safe; in fact, it is a good plan to also heat the shank of the bolt but not enough to injure the protection on the portion which will be exposed. This is to prevent the filling from "freezing" before it has completely filled the space. Incidentally, it is exceedingly important that the hole be dry, for a very little moisture, to say nothing of water in any quantity, trapped under the hot material, will blow out the latter in every direction, with very good chances of putting an eye out of business. Cement grout of the consistency of thin cream, is free from these disadvantages, requires no apparatus other than



EXAMPLES OF SPECIAL SOLUTIONS OF BRACING AND GUYING PROBLEMS

Fig. 3—A push brace—good angle but poor framing. Fig. 4—A study in bracing—replaced later by tower structure. Fig. 5—Heavy rod guys with turnbuckles and special casting for attach-

ment to pole, P. R.R., Philadelphia-Paoli electrification. Fig. 6—Special fitting for guy attachment, Philadelphia-Paoli electrification.



GUYING AND BRACING POLES TO TAKE CARE OF UNUSUAL CONDITIONS

Fig. 7—Brace and guy work to prevent crossing railroad with guys. Fig. 8—Stubs to give driveway clearance, New Milford, Conn. Fig. 9—Marsh work, braced bog shoe and guys, N. Y.

N. H. & H. R.R. signal cable, New Haven. Fig. 10—Guy insulation wood strains on 11,000-volt line, involving the use of one 15-in. strain per guy.

a tin can in which to do the mixing, and holds as well as the others. Further, the hole can be practically the same diameter as the bolt.

The best method of installation is to pour enough grout (2 in. or 3 in. depth being enough in most cases) in the bottom of the hole and then slowly to force the bolt down into place. Undue haste in this process is apt to produce a fountain of grout which, while not so dangerous as melted sulphur or lead, is not calculated to please the fellow who is hit. The only disadvantage of this method is the occasional difficulty in getting water, which may have to be "packed in." It is hardly necessary to point out that the grout should be made in the open and then put into the hole, although the writer has been told of an instance where a series of rock bolts were put in their holes, dry cement was packed around them, and then a little water was poured on top in the expectation that it would set up the entire packing. As a matter of fact, although only the very top of the cement did set, the bolts held all right and the peculiarities of the method were learned of only long afterward. In this case the pull of the guys was at a little more than a right angles to the holes, so the tendency was to pull the bolt in rather than out. In any such case a sharp sand filling reasonably well tamped in would have served as well. Indeed, if the pull is against the hole, no filling at all would have served as well as the cement, and would save its cost, but it is hardly the best treatment.

The guy itself is attached to the anchor rod, whatever the type of anchor, by an eye formed around a galvanized or sherardized thimble. At one time the usual method of securing this attachment was by wrapping the

end around the standing part (which as all know is the part of a rope or strand on the side of a loop opposite to the end) strand by strand, unlaying one strand down to the eye and then wrapping it tightly around the rest of the end (which is held parallel and close to the standing part) and the standing part; then unlaying another strand down to the wrapping and wrapping it on in turn, and so continuing until the last strand wraps around the standing part alone. While this, the "close tie," is considered by many as less likely to slip than the three-bolt clamp tie, this belief is due largely to the action of clamps of poor design.

Properly made, the latter tie, which is now the standard of the telegraph and telephone companies, the N. E. L. A., and the A. E. R. A., will hold "until the cows come home." With it, even if the clamp is not properly bolted up either through carelessness or a faulty clamp, the resulting slip tends to twist the latter and kink the strand, so stopping the slip, although the appearance of the guy is spoiled. Such slips, aside from failures to bolt up properly, are usually due to weak section, allowing the sides to buckle without putting sufficient pressure on the strand, or to the use of too large or too smooth grooves in the clamp. Proper distribution of the metal will prevent the first, while the second is overcome, at least for use with ordinary strand, by making the grooves wavy or of variable width. If extra strength strand is used, however, special grooving to fit the twist is usually necessary to develop the full strength.

The three-bolt clamp is of low cost as compared with the material with which it is used, but it is a pretty important member of society. It has been well standardized, and the product of any of the responsible makers of line

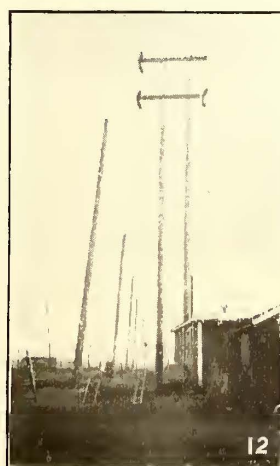
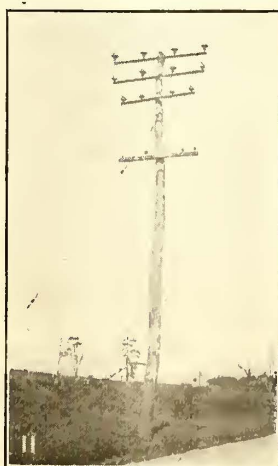


FIG. 11—GUY INSULATION, PORCELAIN STRAINS, DOUBLE. FIG. 12—GUY MARKERS ON 11,000-VOLT LINE, C. M. & ST. P. ELECTRIFICATION, THREE FORKS, MONT.

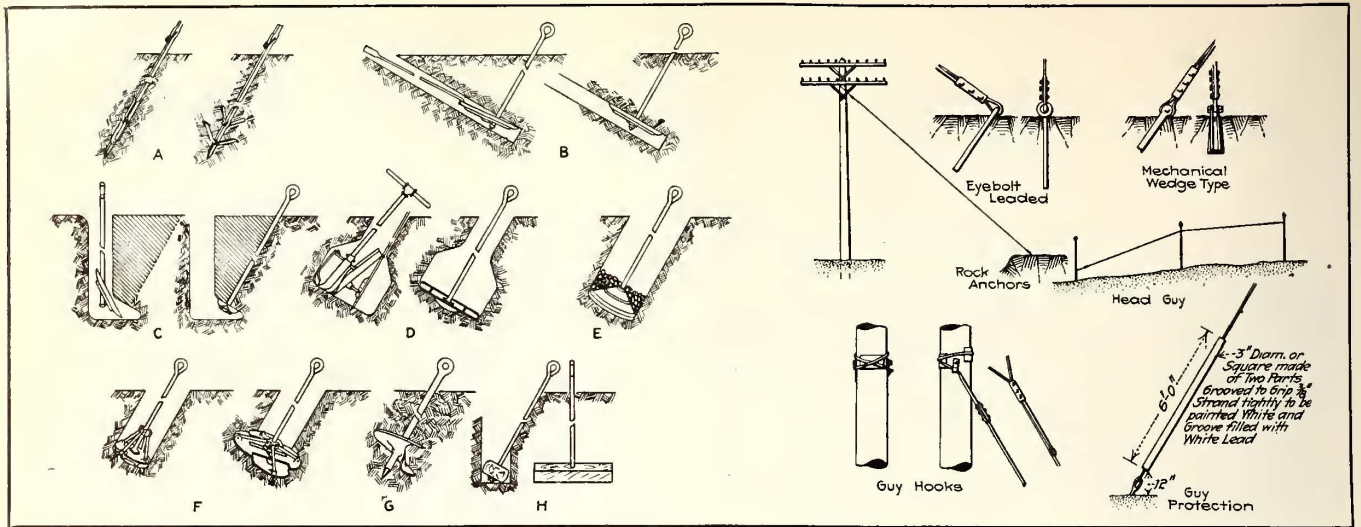


FIG. 13—TYPE OF GUY ANCHORS

A, Harpoon anchor; B, "Never-Creep" anchor; C, "Hercules" anchor; D, Miller anchor; E, Pierce anchor; F, "Ever-Stick" anchor; G, screw anchor; H, deadman anchor (deadman ready for filling of hole). Drawings at right are self-explanatory.

hardware can be depended upon fully. There is, therefore, little excuse for buying any of the nameless material which unfortunately is on the market at a price just enough lower than reliable material to attract a thoughtless purchaser—and later cost his overhead men their piety. The tie itself is made by bringing the end parallel and close to the standing part, installing the clamp close up if on a thimble end, or about 15 in. away from a pole, stub or similar large attachment, and securing the end, which should extend about 1 ft. beyond the clamp, by some ten or twelve turns of No. 12 wire about 1 in. from the extreme end.

Most clamps are variations of the standard three-bolt clamp, but there are two which are quite different. The Crosby clip, two short spirally-scored drop forgings clamped together by a U-bolt, is sometimes used for light work, but it is not often employed otherwise. The equivalent in "Crosbys" to a three-bolt clamp is at the very least two, with four parts and four nuts to adjust as against two parts and three nuts for the clamp. The other type is the Matthews boltless clamp, a malleable sleeve with tapered grooves, and a similarly grooved wedge-shaped key of easy taper which is driven home after the end has been threaded through the sleeve, around its attachment, and back again. It is claimed that it is much easier to install or adjust than other clamps, and that it has at least the capacity of the corresponding size. It certainly has fewer parts, and is said to be very satisfactory in service.

For the guy itself there are several grades of material which is almost universally known and spoken of as "strand," although strictly speaking it should be called

stranded wire. To the electric railway men it is known by its diameter; to the electric light men by both diameter and breaking strength; and to the telephone and telegraph people the two smaller sizes are known by their breaking strengths, while the two larger sizes are rated at their breaking strengths when one strand has been cut. While this at first thought may seem peculiar, "there's a reason." The center wire is straight; the outside wires, because of their twist, are longer, and under strain they yield, throwing the load on the center one, thus tending to break it or to stretch it beyond the elastic limit of the material. By rating the "strand" at the strength of the remaining six wires this weakness is allowed for. The usual "strand" is generally known as "standard." Its strength is sufficient for ordinary work and it is soft enough to be made up by hand even in the half-inch size. Siemens-Martin strand has about 50 per cent more capacity; "high strength" is about twice as strong, and extra high strength about three times as strong as the same sizes in "standard." While this extra strength is very desirable in many cases, the material is very springy and stiff, and it is chiefly used for messengers, ground wires, long spans and similar purposes which do not require much bending, extra strength in guys when required being obtained by using two or more "standard" strands. Whatever grade is used it should always be "extra galvanized," as due to its form it tends to hold moisture and facilitates corrosion.

Strand can be had in practically any sizes between 1/8 in. and 3/4 in. diameter, but the standard sizes and their strengths are as given in Table IV. As yet the "extra strength" has been standardized by no one.

TABLE IV—DIMENSIONS AND PROPERTIES OF STRAND STEEL WIRE

Diameter	No.	Wires Size B.W.G.	Standard with	Known as	Strength in Pounds				Weight per 1000 lb. "Standard"
					Breaking "Standard"	Siemens- Martin	High Strength	Extra High Strength (7,600)	
1/8 in.	7	14	A. E. R. A.	1/8 in. (with grade)	2,300	3,060			125 lb.
1/8 in.	7	14	N. E. L. A.	1/8 in. 2,300 lb.	2,300				
1/8 in.	7	13	A. T. & T. and W. U.	4,000 lb.		4,000		(10,900)	
1/8 in.	7	12	A. E. R. A.	1/8 in. (with grade)	3,800	4,860	6,000	(12,100)	210 lb.
1/8 in.	7	12	A. T. & T. and W. U.	6,000 lb.		6,000			
1/8 in.	7	11	A. E. R. A.	1/8 in. (with grade)	5,000				
1/8 in.	7	11	N. E. L. A.	5,000 lb.	5,000	6,800	11,500	(17,250)	295 lb.
1/8 in.	7	9	A. T. & T. and W. U.	10,000 lb.		11,500			
1/8 in.	7	9	A. E. R. A.	1/8 in. (with grade)	6,500	9,000	18,000	(22,500)	415 lb.
1/8 in.	7	+9	A. T. & T. and W. U.	16,000 lb.		18,000			

A guy takes up a pull, usually at an angle to it, in which case the pole is the strut which resists the tendency of the two forces to come into a straight line. If we consider the first force to be horizontal, and applied at the same point on the pole as that to which the guy itself is attached, the pull on the guy, the thrust on the pole, and the force guyed bear the same relation to each other as do the sides of a triangle in which the angles are the same as those made by the forces. The distance from the foot of the pole to a point at the same level on the guy is called the "lead" of the guy; the distance vertically from the foot of the pole to the point of attachment of the guy is called the "height." If we let L stand for the lead, H for the height, and G for the length of guy between point of attachment to pole and the level of the foot of pole, if the pole itself is vertical G is the hypotenuse of a right-angled triangle with L as the base and H as the height, so that:

$$G = \sqrt{L^2 + H^2}$$

and the ratio between G and L is:

$$\frac{\sqrt{L^2 + H^2}}{L} \text{ or } \sqrt{1 + \frac{H^2}{L^2}}$$

Since the forces act in lines parallel to the sides of this triangle, the pull on the guy is in the same relation to the pulling force as the relation between G and L , that is

$$\text{Pull on guy} = \text{Horizontal force at attachment} \times \sqrt{1 + \frac{H^2}{L^2}}$$

For a raked pole, L must be decreased or increased, according as the pole rakes toward or from the anchor, by the distance from the foot of the pole to a perpendicular dropped from the point of guy attachment. If the pole leans so that this point is not in line with the anchor and the foot of the pole the value of L is the

TABLE V—DIMENSIONS OF THIMBLES AND WASHERS

Thimbles		Washers			
For 1-in. Rod	Other Service	For Bolt or Rod	Outside Dia. Round	Thickness D Round	E Dia. Hole F Sq. Round Sq. U.S.Ga.
Ac	3 3/8 in.	3 in.	3/8 in.	1 in.	14 in. 1/8 in.
Bd	1 1/2 in.	1 1/2 in.	1/2 in.	1 1/2 in.	12 in. 1/8 in.
em	1 1/2 in.	1 1/2 in.	1/2 in.	1 1/2 in.	10 in. 1/8 in.
Dm	3/8 in.	3/8 in.	1/4 in.	2 in.	9 in. 1/8 in.
Eb	3/8 in.	3/8 in.	1/4 in.	2 1/2 in.	8 in. 1/8 in.
F1	1 1/2 in.	1 1/2 in.	1 in.	2 1/2 in.	4 in. 1/8 in.

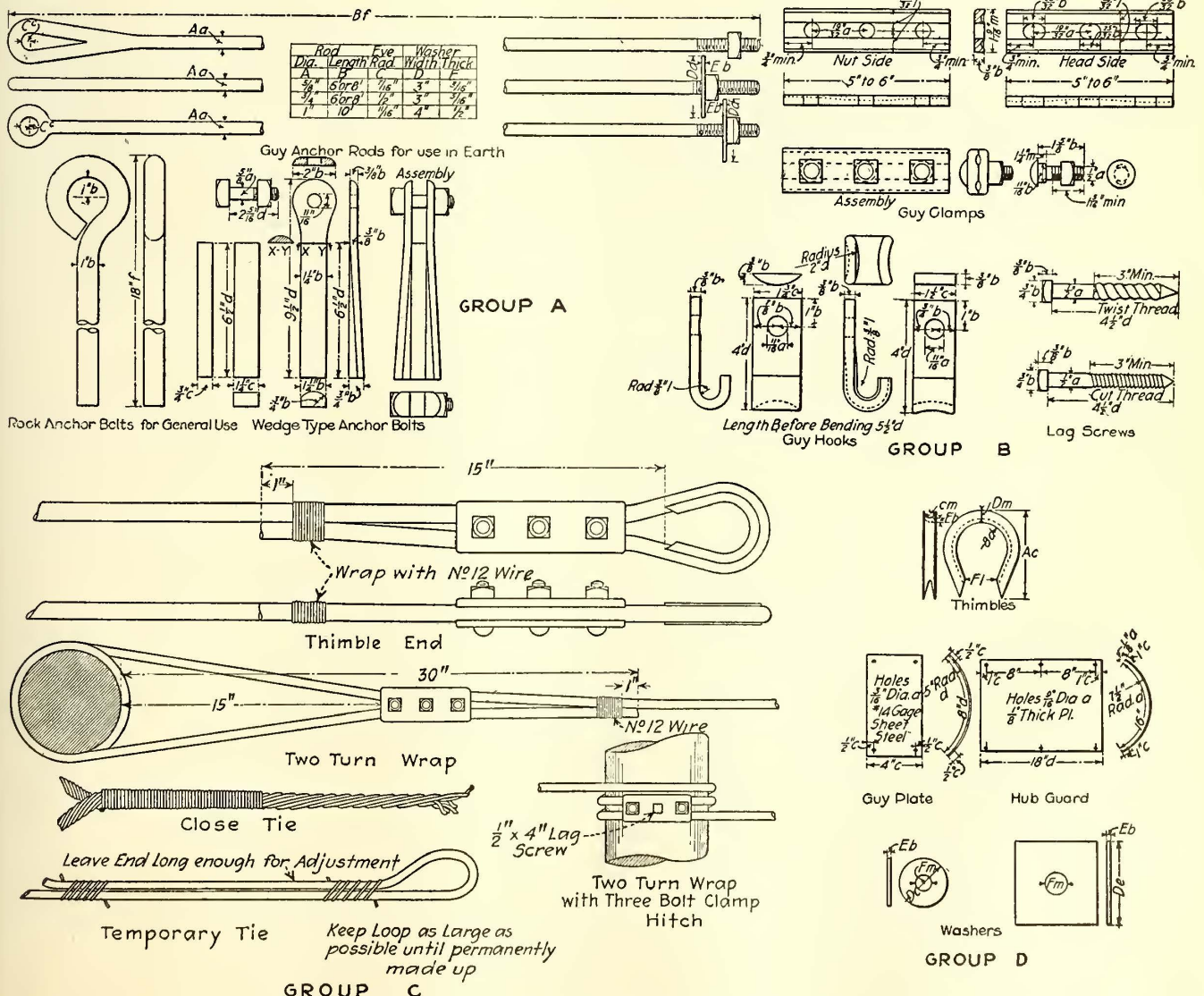


FIG. 14—FURTHER DETAILS OF GUY CONSTRUCTION (FROM ENGINEERING MANUAL)

Group A, anchor rods and bolts. Group B, guy clamps, hooks and lag screws. Group C, details of method of making span and guy-wire attachments. Group D, guy plate, hub guard, thimbles and washers. (See table of dimensions above.)

distance between the perpendicular and the guy at the level of the foot of the pole.

In practice it often happens that the force to be guyed is not applied at the same point as the guy or there may be several forces at different points; further, one or more may not be horizontal. In the first case if we multiply each force by the distance from the pole foot to where it pushes (or pulls) the pole, we get its moment at the ground. Adding the moments together and dividing by the distance from the ground to the point of attachment of the guy gives the amount of force which at that point would have an equal moment; in other words the amount of the resultant of the forces. In case there are two or more guys with different points of attachment their resultant is similarly determined by taking the sum of their moments at the ground line and dividing by the distance from the ground line to the point at which it is desired to consider the resultant applied.

Splitting an Inclined Force into Vertical and Horizontal Components

If any force is not horizontal, the equivalent horizontal is readily found from the fact that any force can be separated into two or more forces operating in the same general direction, the relations to each other being the same as the relations of the sides of a triangle the angles of which are the same as those made by the original force with the two or more components. In our case the triangle is right angled. Knowing the inclination of the force, the ratio of the horizontal to the hypotenuse can be found, and by multiplying the inclined force by this ratio the horizontal component is found. All these and any similar problems are very readily worked out for an approximately accurate answer (and the answer can be had very accurately if the drawing is carefully done) by drawing a line the length of which as measured by some scale is equal to the amount of the force which is known, and by drawing from the ends of this line other lines making the same angles with the first that the lines of action of the forces they represent make with the line of action of the first. Their lengths measured on the same scale, are equal to the amounts of the forces they represent.

Clearly the more nearly a guy is in the direct line of the pull it is to resist, the more nearly will the strain upon it approach the amount of the force to be held. It is rarely practicable, except in the case of a guy parallel to the line, to make the lead greater than the height of the guy. The American Electric Railway Association specifications call for such equality if practicable, thus giving a guy stress which is 1.42 times $\sqrt{1 + H^2/L^2} = \sqrt{1 + 1/1} = \sqrt{2} = 1.42$ the horizontal pull at the point of attachment. The Western Union permits on light lines a minimum lead of one-fifth the height (5.10 ratio) with a "required" lead of one-fourth (4.12), with one-third as the minimum (3.16), and three-fourths (1.67) "required" on the heavy fifty-one to eighty-wire trunk lines.

In the case of a light line the strain on the guy is rarely heavy enough to cause it to slip, but with the heavier lines it is customary to protect the pole from any crushing tendency on the part of the guy by means of a guy plate, a sheet of No. 14 gage steel 8 in. long by 4

in. wide, which is nailed to the pole at the point of attachment of the guy. To insure that the latter stays on the plate, guy hooks are used on either side, being held in place preferably by a through bolt, although the use of lag screws for this purpose is common. The American Association calls for strain plates "behind guys the strain on which would otherwise cause material damage to wood poles" and for guy hooks where the lead is less than one-fourth the height, "or where as with guy plates the guy must be held in particular position."

Where Shall the Guy Be Attached to the Pole?

The point at which a guy is attached to the pole should be as nearly at a point which would balance the forces against it as may be practicable; conditions of clearance, however, may compel attachment almost anywhere, but the method is standard. The strand is wrapped completely around the pole twice and the end is held by a three-bolt clamp about as far from the pole as the diameter of the latter when the guy is at right angles to the pole, the end being fastened as for the usual three-bolt hitch.

Where a line is on private way a guy is often fastened at the base of an adjacent pole, thus obviating the necessity for an anchor. If there is passage between the poles, however, the attachment, which in any case is by a two-turn wrap, must be at least 8 ft. above the ground, and the resultant pull on the pole serving as anchor makes this treatment usually undesirable.

The question of passing guys is often serious. On the company's own property they may be brought to earth close to a path and made prominent by a piece of board, a wood molding wired on, or a section of pipe slipped over the strand, this marker being then painted white. The pipe, which can be a piece of old boiler tube or other scrap, is best for a new guy, as in the case of an existing one the hitch must be opened. The wood forms are usually employed in such latter cases, and the portion in contact with the guy, and that portion of the guy itself, should be heavily white leaded to prevent corrosion. Where such treatment is not sufficient the guy is often carried to the top of a stub of sufficient height, on the opposite side of the way, and then led down to an anchor further outside. The stub should be set at least five ft. in the ground, and should have a rake of about 4 in. to the foot; if the strain is heavy the guy is often attached to the top of the stub by a three-turn wrap, and two anchor guys carried from there to the ground, these last making angles of about 30 deg. with the line of the main guy. The stub is usually under heavy load, and for that reason should be a stocky stick, with top dimension not less than that of the pole it is used with.

Special Cases Have Often to Be Met

Where the clearway required is not more than 10 ft., and the guy strain is not too heavy, a strut may be set horizontally against the pole about its length below the point of attachment of the guy, and the latter led over its end and then vertically down to the anchorage. The pull on the latter is the same as for a "height" equal to the distance of the strut below the point of guy at-

tachment, and a lead equal to the length of the strut itself. The latter acts as a column, and must have both the stiffness to prevent buckling and such protection at the end as will keep the guy from crushing into and splitting it.

It not infrequently happens that a guy cannot be placed against the pull to be resisted, but that room is available on the wrong side. In such case the situation is usually met by installing a "push brace," which is a pole which should be as heavy as the pole it is to reinforce and which is set with the same lead that would be given if it was a guy. The butt should go at least 3 ft. below the surface, and in any case below the depth to which frost is at all likely to penetrate. If the soil is very firm it may be set directly against the earth; but as a rule it is better to have it thrust against planking or a large rock to insure sufficient bearing to prevent any yield. If there is any likelihood of a pull coming on it, as is sometimes the case at an angle, where normally the stress is in one direction, but a heavy wind in the opposite direction may reverse it, a short section of pole or its equivalent should be bolted to the bottom. The upper end should be cut to fit snugly against the pole; whether the latter should also be notched is in question. The telegraph and telephone companies say "No," and it is obvious that a deep notch at this point would weaken the pole. It would seem, however, that a light notch, not heavier than a gain, would have little more weakening effect than the latter, and it certainly materially assists the through bolt, which is used so to tie brace and pole together that they will act as a single structure.

Modern Method of Car Painting

After Four Years' Experience With It, the Author
Has Become an Enthusiastic Advocate of
Enamel for Car Painting

BY W. W. BUNNELL

Foreman Painter, Texas Electric Railway, Dallas, Tex.

IN MY OPINION the old method of painting cars in railroad and electric railway shops has been relegated to the scrap heap for all time to come. The former slow, cumbersome methods have given place to a more rapid and simpler procedure.

When I first went into the car shops, our program was this: Apply primer, two or three coats of lead and five or six coats of "rough stuff," putty and "plaster" between coats, apply guide coat, rub to a perfect surface with rubbing stone and water. We then put a couple of coats of color in japan, did a great amount of ornamentation with gold leaf, applied a coat of rubbing varnish, and lastly gave the body a couple of coats of finishing varnish. This process was very expensive and the long-drawn-out method involved nothing less than several weeks of retirement of a car from service. But we have been making a steady advancement in car painting as well as in other lines in car work, and to-day I use an oil enamel.

The method which I use in applying an oil enamel on a new or burnt-off car is this: Apply a coat of primer; when this is sufficiently dry, follow with a knifing coat, sand to a surface and apply a coat of oil enamel. In twenty-four hours I apply another coat of

oil enamel, and in forty-eight hours letter and stripe with oil enamel. This method of painting cars cuts the cost of painting 40 per cent over the old method and reduces the time the car is out of service about 75 per cent. Further, the oil enamel wears longer and looks better than varnish.

To refinish a car when the under coatings are in fair condition and the car does not have to be "burnt off," but at the same time when the surface is a little porous, I give it a coat of primer, pretty "long" on oil (raw), putty the large holes and bruised places and follow with two coats of oil enamel, as on a new car. Where the surface is very good and the car does not need a priming coat, I simply give it two coats of enamel.

The sash and doors are the first to wear on a car, especially street cars, therefore I use and can recommend the use of oil enamel, mahogany color or whatever other color is desired. The manufacturers of one of the enamels that we are using put it up clear; that is with no color ground in it. There are many cases in which I apply one coat of it in color and then one coat in the clear. This applies especially where I am laying gold or aluminum leaf, the coat of clear being put on after the leaf.

I advise using the oil enamel on the inside of cars as well as the outside, and where cars have metal roofs I certainly would use it on the roof, omitting the knifing coat. I also advocate using a pure white oil enamel on headlinings, especially on street cars, because white does not soil nearly as quickly as a dark color and flies will not alight on a white surface if there is any colored surface near for them to alight upon. After using the oil enamel one will never have any "alligatored" headlinings.

Another good feature of using the white headlining is that it increases the illumination in the car. For instance, take a car with the headlining a dark green color where twenty lamps are burned. By changing the headlining to a snow white, one can remove about half the lamps and still have the same intensity of light.

In my opinion the use of gold and aluminum leaf for lettering and striping coaches is just about played out. Since our government has taken over the railroads, I do not think it will much longer allow the use of gold for that purpose, because gold used in that way can never be reclaimed. All manufacturers of paint are now making an imitation gold in paint that looks so nearly like gold leaf that it takes an expert to tell the difference 40 ft. from the car.

In conclusion, I believe that enamel is the paint of the future for all car painting, and it may possibly be the paint for all buildings and outside exposures. I believe it would have been used long ago if it had not been for the prejudice of the painters, and their prejudice is caused largely by the fear that they would have runs and "sags." I will say, however, that after they have used it on one car they will find there is no more danger of sagging or running than there is in varnish. In appearance it very much resembles a good, heavy finishing varnish. I have used it for four years and consider it past its experimental and "fad" stage. As a painter of twenty-three years' experience, I consider it the most efficacious and most economical product in the maintenance and upkeep of cars in spite of the fact that I was at one time much prejudiced against it.



"It's a Tough Proposition, but Rapid Acceleration with a Low-Speed Motor Will Solve It."

Saving Coal at the Gear and Wheel Tread

By

C. W. Squier
ELECTRICAL ENGINEER

The Writer Discusses the Losses in Gearing, Shows How Correct Gear Ratio with a Low Armature Speed will Save Power, and Compares Gearless and Geared Motors and Two and Four-Motor Equipments

THERE is no other motive power that can compare in reliability with that produced by the modern direct current railway motor. This has resulted from its method of development from a crude machine requiring frequent inspection and repairs to the motors of modern types which run for weeks and months without attention. In early designs rugged construction was given more attention than electrical characteristics. The great point was to get motors big enough and strong enough to stay in service. Up to 1895 the selection of motors was more or less a matter of guesswork. During the succeeding two years tests were conducted by manufacturers to determine the service characteristics of different motors so as to be able accurately to predetermine the best motor for a specified service and to place the selection of motor equipments on a scientific basis. The results have been most satisfactory and today manufacturers are able to guarantee the performance of their motors within very close limits.

In selecting a motor nowadays the operating engineer considers economy in operation as the first essential. This requires correct speed and torque characteristics.

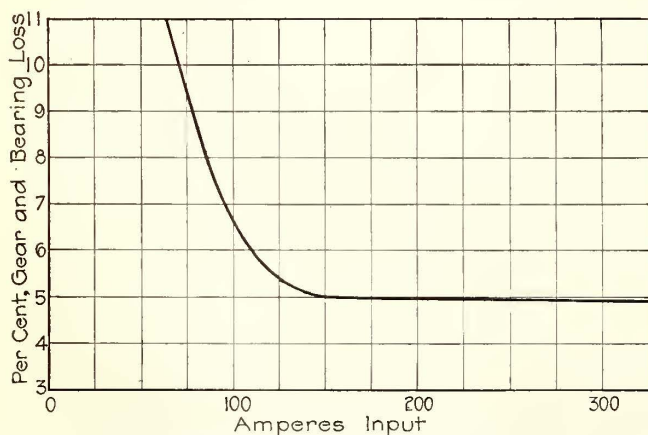


FIG. 1—LOSSES IN GEARS AND BEARINGS OF A 150-HP. MOTOR

In preceding articles I have shown that for city service the essentials for maintaining schedules most economically are rapid acceleration and braking. The accelerating period, in which energy is stored in the car, is the one in which the motors are in action and which will

determine their selection. With the same gear ratio a motor with low armature speed, taking the same current, will give a higher rate of acceleration than the motor of higher r.p.m. or, stating it another way, the motor with low armature speed will produce the same acceleration with less current. To obtain this low armature speed it is necessary to increase the size and weight of the motor. In choosing a motor, then, these two factors should be balanced against each other. It will be found that with a low-speed armature and proper gear ratio it is possible to save from 15 per cent to 20 per cent in power. The saving due to reducing weight, if a higher-speed motor were used, would not be more than 5 per cent. The greatest saving then will be determined by the armature speed.

Proper gearing and armature speed should be considered together, as the resulting economies will be greatest with a correct relation between the two. In my article in the April 20 issue of the *ELECTRIC RAILWAY JOURNAL* the service requirements which we have been considering were discussed. The data given showed that 37 per cent of the total mileage is in business sections, necessarily congested, where the average schedule speed is but 7.3 m.p.h.; 38 per cent of the mileage is in sections where 8.7 m.p.h. is the average schedule speed obtained, and only the remaining 25 per cent is in sections where a schedule speed of more than 10 m.p.h. is possible. In the typical run studies which I have made in this series of articles it is seen that even on the longest runs of 1200 ft. the maximum speed of the cars is not reached. It would then be a serious error to provide gearing for a speed so high that there is no opportunity to reach it.

In a recent study which I made for choosing some new equipment two motors were considered, both being tapped-field motors of the same horse-power rating. The gear ratios necessary to give the same balancing speed were different, being 2.46 and 2.65 respectively. Many curves showing speed and power consumed in the various classes of service were calculated. The motor with gear ratio 2.46 showed an energy consumption of 18 watt-hours per ton-mile less than the other, but its cost and weight were somewhat greater. A discussion with the manufacturer's engineers led to the redesigning of the motor with 2.65 gear ratio so as

to make it as efficient and economical as the other motor. This was done by decreasing the speed of the armature and by increasing the gear ratio to 2.77, and that this motor was finally adopted for the service.

Gear and Bearing Losses from 5 to 10 Per Cent

The gear losses between the motors and the car axle have been a continual source of discomfort to equipment engineers, and much time has been given to endeavoring to develop a gearless type of motor for railway service. Many tests have been made to determine the magnitude of these losses. The curve shown in Fig. 1 gives the gear and bearing losses for a 150-hp.

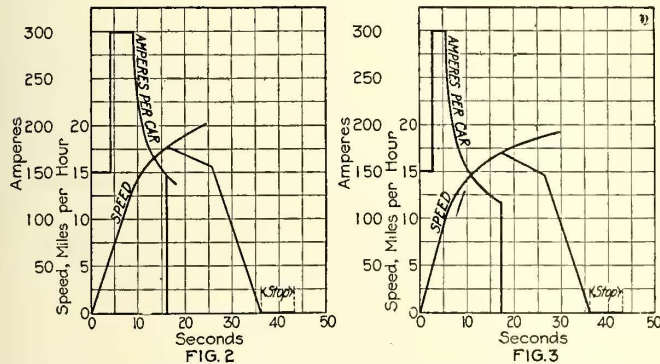


FIG. 2—SPEED-TIME AND CURRENT GRAPH WITH HIGH-SPEED ARMATURE. FIG. 3—SPEED-TIME AND CURRENT GRAPH WITH LOW-SPEED ARMATURE

motor. These vary from 9.5 per cent at 75 amp. to 5 per cent at 180 amp.

Up to the present time gearless motors have not been applied with success to motor cars. For heavy locomotive service they have proved an unqualified success, but for lighter equipment the excessive weight of the combined truck and motor, the increased cost and the increased power input necessary has made them unattractive to a large degree. Sample motors which have been built and tested in city service have shown a power consumption 10 per cent greater than geared motors suitable for the same service. The maximum gear reductions with geared motors vary from 3.5:1 to 5:1 depending on the service and the size of motor, and armature speeds at the 500-volt rating vary from 500 to 650 r.p.m.

As a further illustration of the effect of armature speed and gear ratio on the power input let us compare the short runs shown in Figs. 2 and 3. Operation with a low-speed motor is shown in Fig. 3. The accelerating current has been kept the same in both cases and the rates of acceleration are 1.5 m.p.h. per second for the high-speed motor against 1.8 m.p.h. per second with the low-speed motor. The reduction in power input in favor of the low-speed motor is 11 per cent. This reduction is due to the falling off of the accelerating current sooner due to the higher rate of acceleration and, as these curves are plotted with the same amount of coasting, the speed at which braking is begun is lower, therefore the braking losses are less. It is also evident that the heating of the high-speed motor will be greater. These curves also serve to illustrate the effect of gear ratio, as the high-speed motor corresponds to the low-speed motor with a gear reduction of 4.43 to 1.

The figures given show the saving effected at the car

and will be further increased when the complete system is considered. Many generating and distribution systems are already loaded to their full capacity and, where additional cars are necessary to take care of increased traffic, the problem is a serious one. The reduction in power necessary with low-speed motors would permit the operation of more cars without increasing the generating and substation capacity, so the question of proper gearing and armature speed is an exceedingly important one.

Two-Motor Equipments Produce Largest Economies

The determining factor in a choice between two and four-motor equipments is the adhesion between wheels and rails at which the wheels will slip. With four-motor equipments all wheels, being driving wheels, are available for adhesion, while with two-motor equipments only half are available. Many roads have severe grades, short-radius curves and bad rail conditions, and here the use of two-motor equipments is not feasible. In these days of low-floor cars, four-motor equipments have also been used as a means of keeping the floor level down. Where conditions are favorable, however, two-motor equipments possess advantages in weight, power consumption and low maintenance cost that render their use advantageous. On grades greater than 5 per cent and in climates where snow, sleet and ice are common, four-motor equipments have proved most satisfactory.

Any reduction in the weight of the equipment will manifestly produce a decrease in the cost of operation. The graphs shown in Fig. 4 indicate the relation between horse-power and weight for two and four-motor equipments. These graphs have been worked up from data furnished by several manufacturers and correspond very closely with the conclusion arrived at by the committee on equipment of the American Street & Interurban Railway Engineering Association as published in the ELECTRIC RAILWAY JOURNAL for Oct. 13, 1910.

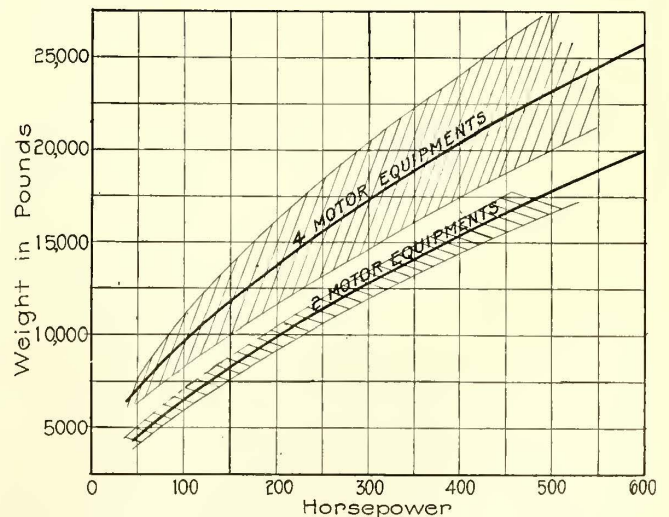


FIG. 4—COMPARISON OF WEIGHTS OF TWO AND FOUR-MOTOR CAR EQUIPMENT

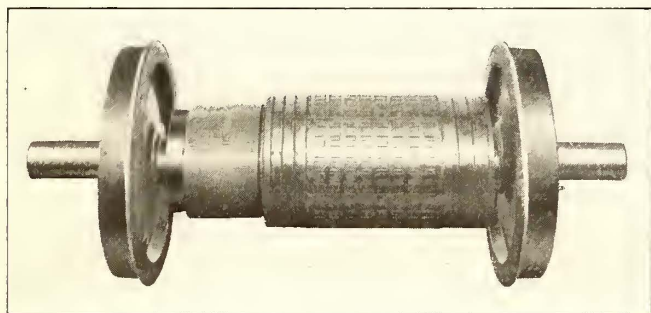
From these graphs it is evident that two-motor equipments average from 7 per cent to 30 per cent less in weight per horse-power than quadruple equipments. The control apparatus is lighter and less car wiring is necessary. A further gain in weight is also made in

the trucks, as the weight of two trunks should be less for two large motors than for four smaller ones. In the report of the committee on equipment just referred to, the electrical equipment is given as constituting about 28 per cent of the total weight of the car, so that a saving of 25 per cent in the weight of the electrical equipment would amount to about 7 per cent of the total car weight.

The total weight of the car which we have been considering is 39,000 lb. This is divided as follows: Car body complete but without electrical equipment, 15,000 lb.; two trucks, 8746 lb.; two motors, 5454 lb.; other equipment, 9800 lb. Maximum-traction trucks are used, in which the load is divided 68 per cent on drivers and 32 per cent on trailing wheels. We thus have 26,520 lb. with a light car available for traction. With a coefficient of adhesion of 25 per cent each motor could exert a tractive effort of 3315 lb. before the wheels

holders, replacement of brushes, adjustment of brush tension, cleaning and blowing out with compressed air, oiling of bearings, and inspection of motor leads and connections take as much time for small motors as for large ones. The various operations carried out in the overhauling shop also do not vary with the size of motor. The cost of the material used for repairs and replacement parts will be somewhat less for a small motor. It is thus evident that the maintenance costs for two-motor equipments will be less than for equipments with four motors. Various operating engineers have considered this to be in the neighborhood of from 25 per cent to 35 per cent less. I have found the higher value more nearly approaches the saving on systems with which I have been connected.

The necessary power input will be less for a two-motor equipment of the same capacity than for a four-motor equipment due to the decreased weight and to the higher electrical efficiency that the larger motors will have. In the service which we are considering this should amount to from \$200 to \$300 per year per car.



GEARLESS RAILWAY MOTOR ARMATURE MOUNTED ON AXLE

would slip. In the typical run-graphs used for selecting the motor best adapted to the service, an acceleration of 1½ m.p.h. per second was assumed on level tangent track. With a light car this would require a tractive effort of 1700 lb. per motor with full field and, when changing to short field, this would jump momentarily to 2700 lb. To start a light car on a 5 per cent grade would require about 1250 lb. tractive effort per motor. After the car is started it could be accelerated on this grade at a rate of 1.5 m.p.h. per second with a tractive effort of 2700 lb. per motor on full field. All these values are within the slipping point of the wheels, so a two-motor equipment is satisfactory for operation.

In the inspection and overhauling of motors most roads consider the number of men necessary as directly proportional to the number of motors maintained. Operations such as inspection and repair to brush-

Testing Heater Motor Armatures Before Installation

BY H. C. EBELING

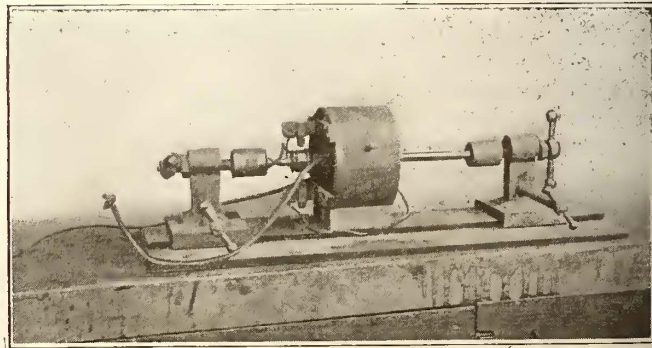
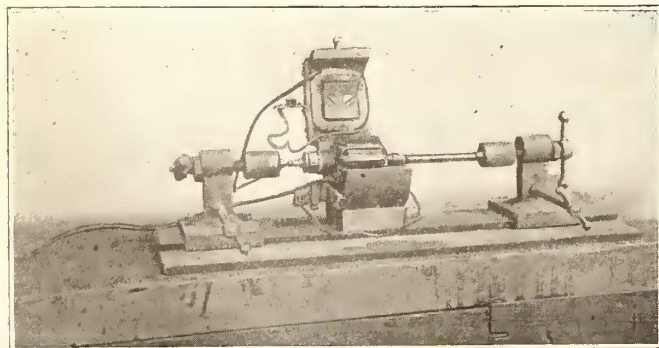
Engineer, Cleveland (Ohio) Railway.

THE simple device for testing stove motor armatures shown in the accompanying photographs is the result of our efforts to eliminate unnecessary work in replacing armatures which were really defective but which did not break down until operated under actual conditions. In testing running conditions are approximated.

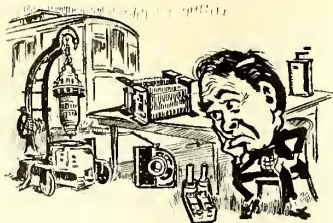
The apparatus consists of two adjustable standards mounted on the base plates and containing ball-bearing supported centers made to engage the armature-shaft.

At the position corresponding to the regular field frame of the motor a split magnet frame containing the field coils is mounted. This frame is divided on the horizontal diameter and hinged at the back, one field coil being located in each half. Brushes are mounted at the proper position, and the whole outfit is wired like a standard motor. Full-load conditions are duplicated by mounting a fan on the shaft.

The operation of testing a motor with this device consists simply in inserting the armature between the centers, swinging down the upper half of the magnet frame and applying current. Armatures in good condition will run without sparking and some are found defective which test out satisfactorily when lying still.



DEVICE FOR TESTING HEATER MOTOR ARMATURES.—AT LEFT, FIELD FRAME OPEN FOR INSERTION OF ARMATURE. AT RIGHT, FIELD FRAME CLOSED READY FOR APPLICATION OF CURRENT.



Some Mysterious Car Ailments

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

CONTRIBUTIONS ARE INVITED FROM THE FIELD

Motors That Flashed Over on Cold Mornings

ON A CERTAIN line of an electric railway reports of motors flashing over were continually being received. The number of cases of trouble was also found to be greater during cold weather. The shop foreman reported that the motormen on that line were a reckless lot and operated their cars at a much higher speed than on other lines and that this must cause the trouble.

The equipment engineer realized that in most cases such trouble was the result of poor commutation, and that as the current taken by the motors is less at high speed it should be easier to commutate than the current at low speed. He arranged accordingly to watch the commutation of these motors in service, and under ordinary operating conditions found it to be better than in most motors. When running at full speed over rough track with a frozen roadbed the motors would sometimes flash when a bad rail joint was encountered. It was evident that the flashing was due to the brushes being knocked off the commutator due to the rough track conditions. The brush tension was increased and a different type of brush-holder spring was tried, with the result that the flashing entirely disappeared.

600-Volt Fuses Gave Trouble on Low-Voltage Battery Circuits

“CAR DEAD, control will not notch up” is the report turned in by the motorman. “Weak batteries” replied the terminal inspector, so the car was shopped to have the batteries charged. Tests by the battery man showed the batteries to be in good condition and fully charged. The general man was then called in and this is what he found:

The battery fuses, which were 1-amp., 600-volt fuses, were blown but the telltale or indicator on the fuses remained in good condition, so to all external appearances the fuses looked “O.K.” The telltale was a very fine wire of high resistance connected in parallel with the fusible element and when used on a 500 or 600-volt circuit would have burned in two as soon as the fuse blew and exploded the powder spot on the fuse. With the 14-volt battery circuit, however, its resistance was so great that sufficient current to blow the telltale could not get through and so it remained intact. This extra high resistance also cut down the current so that the control equipment would not operate properly and it behaved exactly the same as with weak batteries.

To prevent a recurrence of the trouble the telltales

on all fuses in battery circuits were cut and the fuse manufacturer was asked to furnish a fuse with a telltale that would open on the low-voltage circuits. As a result he developed a new type of fuse that operated satisfactorily.

Controller Explosions Sometimes Result from Equipment Conditions Rather than from Poor Design

A FEW YEARS ago a large railway system began to experience serious trouble with platform controllers. Most of these controllers had been in service for ten years or longer, and had been giving excellent satisfaction. The trouble which developed and increased at an alarming rate consisted of controller explosions. Severe arcing took place at the contacts and short-circuits occurred between adjacent parts and to ground, which burned up parts of the controllers and caused panics among the passengers, who frequently jumped through windows and off the cars while in motion.

An extended investigation as to the causes was instituted by the engineers of the company, assisted by the engineers of the controller manufacturer. At the beginning it was assumed that the service requirements had increased to such an extent that the controllers were of insufficient capacity and that a more efficient blow-out was necessary for the heavy current-carrying contacts. The manufacturing engineers worked out new designs for improvements which could be readily applied to the existing equipment and constructed a sample controller for inspection and test.

In the meantime the railway company's engineers had been conducting a series of tests to determine what maximum values of current were being obtained in service and what the actual capacity of the controllers was. These tests showed that the controllers were capable of handling currents two or three times as great as should occur in regular operation, but that on certain cars there appeared to be an excessive leakage of current through the wiring. Tests to determine the insulation resistance of the car wiring showed that much of this was in a very bad condition, and that its replacement was desirable. The rewiring of all such cars with a high grade of weatherproof wire was started at once. At the same time the method of wiring was brought up to the latest practice. As the rewiring progressed the explosions decreased and when all cars were rewired the explosions ceased entirely.

Circuit-Breaker Action that Made Residents Think They Were at the Battle Front

SEVERAL motormen operating trains on a certain line with cars equipped with multiple-unit control and arranged for automatic acceleration reported the circuit breakers on some cars as "blowing" while passing a certain point. Inspection of the cars reported showed that on certain ones the motors had flashed over. Others showed no signs of trouble. As the cars reported gave no trouble while operating on other parts of the line, and as no apparent trouble was found with the operation of the equipment of these cars when inspected at the shops, it was evident that there must be some peculiar condition in the line at the point of trouble. Inspectors sent to determine the cause reported that the trouble was occurring near a passenger station where there was a short gap in the third-rail. There was a crossover at this point which made this gap necessary. The blowing of the circuit breakers occurred on certain cars as the train was pulling out of the station.

The control equipment of the cars was arranged for automatic acceleration by means of a series current-limit switch and the control equipment was dropped off by the action of a line relay which opened whenever the line circuit was interrupted. The problem for the "Sherlock Holmes" of the engineering department was to determine why the trouble occurred only on certain cars and what conditions of third-rail or operation led to the trouble.

CAUSE OF THE TROUBLE

The first morning that operation was watched carefully but one car blew its breaker. This occurred at the instant that contact was re-established with the third-rail while passing through the gap. This showed that the control equipment on that particular car did not drop off while passing through the gap. Tests on this car at the shop showed that the line relay was a trifle sluggish but with the usual method of testing its operation would have been considered satisfactory. Further investigation at the point of trouble disclosed the fact that on cars which tripped their breakers not only did the control fail to drop off but it actually notched up two or three steps while the circuit was broken, so that when power was restored the grid resistors were cut out of the circuit and a rush of current took place which tripped the breakers and in some cases caused the motors to flash over.

The reason for the notching up of the control equipment was that when the circuit was broken the current limit dropped and as the line relay did not open promptly the control equipment notched up rapidly with nothing to retard its operation. As the gap in the third-rail was near the station it caught the trains while accelerating and before the grid resistors were entirely cut out of the circuit.

PREVENTIVE MEASURES NECESSARY

To provide against repetition of this trouble the gap in the third-rail was lengthened somewhat so as to give a slightly longer time for the line relays to operate. A more careful inspection of line relays was also inaugurated at the inspection shop. The time interval for the dropping of the line relays was so short that a

satisfactory shop method for timing this operation was not practicable. The same object was accomplished, however, by making sure that the line relays dropped at a certain minimum voltage. After this value had been decided upon by the use of a voltmeter connected across the relay a suitable resistance was made to be placed in circuit and give the required drop in voltage while testing the relay. All line relays were then adjusted so that they would drop when this resistance was cut in.

The Multiple-Unit Control That Wouldn't Behave on Cold Mornings

DURING the cold days in winter some rather unusual trouble was experienced with the control apparatus on cars which operated both inside and outside a subway. In the morning when trains went into service everything was apparently working "O.K." Yet when they reached the point where they entered the subway, certain cars of trains were reported as "going dead." Bad operation with only part of the cars working would continue until the trains reached the downtown section. From there on to the end of the trip the cars would work all right. When the cars were ordered into the shop for inspection to determine the cause of the trouble nothing could be found out of the ordinary and the cars were continually being reported by inspectors as "found O.K."

A special investigation was made on cars in service to determine, if possible, the cause of the trouble and it was found that when the outside temperature was below 18 deg. Fahr. certain large contact parts, which were made of brass, were chilled to such a low temperature that when they entered the moist air at a higher temperature in the subway these cold brass contact parts condensed the moisture in the air and caused a layer of frost to accumulate. The tension of the fingers on the contact parts was not sufficient to penetrate this insulation of ice and the low voltage of the battery (14 volts) was not sufficient to break down this insulation. An open circuit resulted in the control connections, so that the car would be "dead."

Continued operation in the subway where the temperature is warmer would heat up the large brass parts in time and melt the layer of frost to such extent that operation would again be satisfactory. When the cars made their return trip out in the open air the parts were again chilled and the same conditions resulted on the next trip.

The remedy that was found effective for overcoming this trouble was to prick punch the contact parts so as to raise sharp points on the contacts. These points were sharp enough so that any layer of frost would be punctured by the contact pressure and good contact resulted. Of course, it was necessary to make certain that sufficient contact surface was available for regular operation.

It is reported that an extensive network of electric railways is planned for the industrial district of Merseburg, Germany, where recently very important industries have been established. The length of the railway lines is to be about 42 miles and the cost of construction will be about \$2,500,000.

Short, Timely Articles

FOR THE

Way, Mechanical and Electrical Departments

Electric Snow Melters Keep Switches Clear in Severe Weather

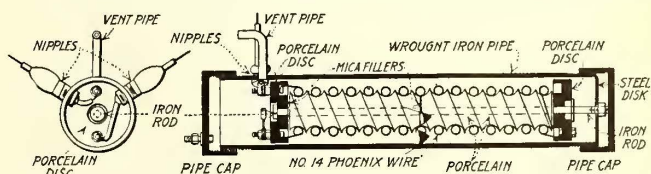
Trials Made on the New York Central Electrified Lines Show That Satisfactory Results Can Be Obtained

THE snowfall for the last three winters has been from 8 in. to 15 in. above the average. This taken together with the extremely cold weather experienced last winter has led railway operating engineers to consider the necessity for some form of apparatus that will aid in keeping switches and special work at important points free from snow and ice. The cost of snow removal at points like the Grand Central terminal in New York, where tracks run long distances between high walls, may run from \$1 to \$3 per inch of snowfall per mile of track. Of course, this figure is absurdly high for lightly traveled lines through the open country. Here, there are few switches and the snow is mainly removed by snowplows and flangers, and at switches by the crews before they operate them. But on all lines the costs due to delays caused by storms and blizzards aggregate large sums. The actual cost is difficult to calculate, as it embraces not only detentions and the tying up of passenger, freight, mail and express service, but also the decrease in travel due to poor service.

In an endeavor to help solve such conditions an electric heater has been developed under the direction of Francis Boardman, division engineer New York Central Railroad. This is now being placed on the market by the Q & C Company of New York. The heater units consist of resistance wire wound about a porcelain tube with much the same construction as is used in electric car heaters. The tubes and coils are enclosed in 3½ in. wrought-iron pipes, 20 in. long, with pipe caps and waterproof connections for bringing out the leads. This construction provides watertight and moisture-proof units which can be connected in series and placed between ties under switches, or at other points where a clear track is essential. With connections from these units to a switch located at any convenient point, the current can be turned on as soon as a snowstorm starts. Results obtained during a three-year

trial with these heaters show that a temperature rise of about 100 deg. C. is obtained at the heater in the first half hour and about 135 deg. C. above the outside temperature at the end of one hour. The heat obtained will not set fire to any combustible material but is sufficient to melt snow and ice rapidly and to keep the frost out of the ground so that proper drainage is provided.

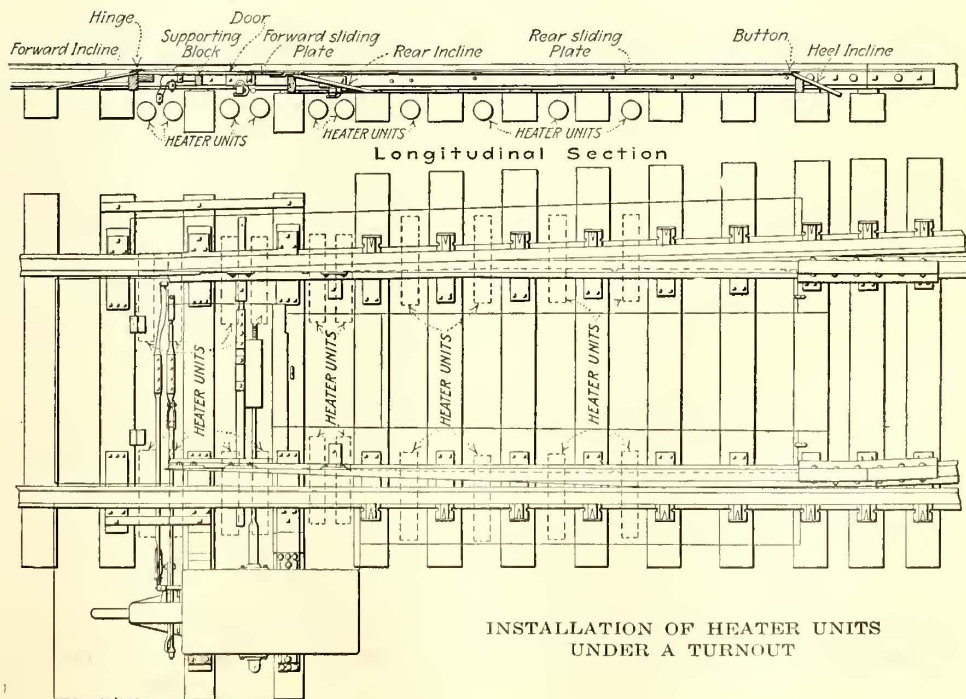
During the three years but one case developed where



DETAILS OF HEATER UNIT

the heaters could not melt the snow as fast as it fell. In this particular case the snow was accompanied by a strong wind parallel to the track which drove it between the switch point and the rail. To prevent a recurrence of such condition a covering was placed over the tie rods, and on either side of the main track rail and the adjacent switch point. Heaters were placed under this protection so that the heat was confined at the most vulnerable point. This housing was made of wood to prevent rapid radiation of the heat and the plate which moves with the switch point was kept warm to prevent an accumulation of snow or ice upon it.

As at present designed these heater units take 11 amp. with a voltage of 36½ across each unit. For a turnout



INSTALLATION OF HEATER UNITS UNDER A TURNOUT

with 15-ft. switch points eighteen heaters were used to provide for the voltage of the system with a total power consumption of 7.26 kw. for each turnout. Where current can be obtained at 1 cent per kilowatt-hour the cost of operation for a turnout would be 7½ cents per hour. This amount is not excessive because current need be used only while snow is falling and there is no time lost in calling men. Most roadmasters are influenced, in deciding on their winter force, by the emergencies



SWITCH WITH ELECTRIC SNOW MELTERS INSTALLED IN BALLAST

which snow conditions require. If they do not have to provide for clearing switches they feel safer with a much smaller force, particularly since the use of telephones, motor cars and the like makes it easy to bring gangs from headquarters promptly.

Since these electric heaters have been developed, various other uses have been found for them. They are completely effective for taking frost out of the ground. Where the track has heaved so as ordinarily to require large shims above the shoulder of the tie plate and to necessitate slow movement of traffic, the condition has been remedied by placing these heaters in the ground so as to remove the frost and thus allow the track to drop back to its normal place. The heaters can also be used under pipe runs, signal mechanisms, turntable pits, ash-carrying devices and the like.

German Tramway Conditions Serious

GREAT as have been the difficulties in obtaining material by the electric railways in this country, they would appear to be mild as compared with those which have to be faced in Germany. The *Elektrotechnische Zeitschrift* says in a recent issue that tramways and secondary railways in Germany have given large quantities of metal to the government which has been removed from their cars and overhead lines.

The encroachments on line materials have necessitated replacement of at least equal quantities of substitute metals which were very difficult to obtain. As a result the railway companies in Germany have made great efforts to find substitutes and this is exemplified in their attempts to replace contact shoes formerly made of zinc carbon and electro-metal and trolley wheels of copper by cast iron and other metals.

Self-Contained One-Man Kerosene Furnace

A NEW torch known as the "Vulcan one-man kerosene furnace," which is being distributed in the electric railway, lighting and power fields by the Economy Electric Devices Company, is being used very efficiently in electric railway service. This furnace is entirely self-contained, no hose or other flexible connections being necessary. The fuel tank has a capacity of 3 gal. of kerosene, a quantity sufficient for three hours' burning with a flame approximately 18 in. to 20 in. long. A simple valve arrangement within the intake pipe permits the furnace to be burned in any position and no auxiliary means for starting is necessary. The design is such that, with from 10 to 20 lb. pressure in the tank, the kerosene gradually becomes

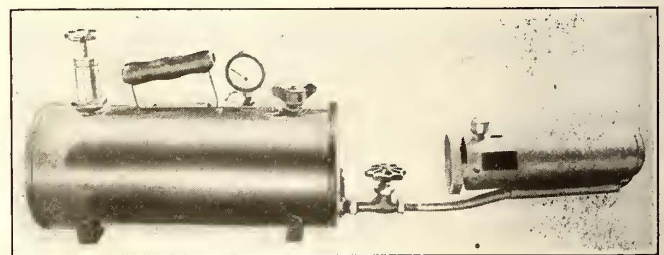


KEROSENE FURNACE BEING USED TO PRE-HEAT A THIRD RAIL BEFORE BONDING

heated as it is lifted through the inlet valve to the generator, where it is changed to a vapor and issues from the orifice and is burned as a superheated vapor. Pressure is produced by hand pump and a gage is provided to indicate its magnitude.

This furnace has been used for several years by steam railroads, but has very recently come into use on electric roads. On these it is used for melting ice, sleet and snow around switches and signal apparatus, for thawing drain pipes, frozen coal cars, ash cars, frozen air pipes, for melting ice on car steps, etc. In the summer it can be used to burn weeds in the ballast and to pre-heat rails and other materials before bending.

Last winter the Chicago Elevated Railroads used one



ONE-MAN KEROSENE FURNACE

of these furnaces in thawing out and keeping clear the several interlockers on the business loop. It was found that, with its aid, one man could accomplish the work of eight men equipped with the burning saturated waste previously used. Seven additional furnaces have since been used for thawing out frozen water pipes, burning grease from pipe carriers, thawing out switch points and for heating rails for bending. The flexibility, low cost of operation, simplicity and effectiveness of this equipment appealed to the management of the Elevated Railroad and it is expected that a still further extension of its use will follow.

An Announcing System Speeds Up Car Boarding

Electrically-Operated Destination Signs Direct Traffic in a Transfer Station of the Boston Elevated Railway

THE Forest Hills terminal of the Boston Elevated Railway was formerly the scene of much confusion during the rush-hour period. This was due to the fact that from six to eight elevated trains operating on from one to two-minute headway delivered their passenger loads to distributing surface cars at this point without adequate provision for directing the traffic during the transfer period. In this station the surface cars are loaded from an island platform on the street level which is connected with the larger elevated platform by means of two stairways. The transportation problem that presented itself was that passengers would land on the elevated platform, rush down the nearest stairway and then find, in all probability, that the car that they desired was waiting at the other end of the station. As a result there was much confusion on the narrow loading platform due to two streams of passengers trying to move in opposite directions at the same time.

To relieve this situation the lower platform was divided into car berths and each berth was indicated by a conspicuous marker hung above the stopping point for the car entrance. Figures were used to mark the berths on one track and letters those on the other. Also, guide posts were installed on the upper platform indicating which stairway should be taken to reach a given car berth. An electrically-operated annunciator sign, illustrated in Fig. 1, was installed on the upper platform midway between the two stairways. This sign is operated from a suitable plug switchboard installed in a



FIG. 1—ELECTRICAL ANNUNCIATOR ON ELEVATED PLATFORM

booth, shown in Fig. 2, at the entering end of the surface car station. In order to inform the motorman of an incoming car of his proper stopping place an additional contact was mounted on the back of the plug board and connected to a signal lamp mounted as one of a vertical group at the entrance to the station. This group of signals is shown at the right in Fig. 2. The lamps are mounted behind disks, the latter being simply plain ground glasses marked 1 to 8 respectively, for

one track, and from A to H for the other. Thus the insertion of a plug by the booth operator gives simultaneous notice both to the passengers on the upper platform level and to the motorman of the approaching car.

At the top of the group of motorman signals is mounted a common red lantern, and the electrical connections are such that if the entrance of a car to the station has not been anticipated by the placing of the plug for the desired berth, the red light automatically signals



FIG. 2—STATION ENTRANCE SHOWING OPERATING BOOTH AND MOTORMAN'S SIGNAL

the car to remain outside until its berth signal is illuminated. By means of specially designed relays and a lever switch connected to the trolley, each car as it enters the station extinguishes its own number on the motorman's signal only and leaves the next number for the following car, thus when the last car for which there is room in the station enters, the red light automatically comes into play and prevents another car from entering until given a berth number. To give the proper indications when an articulated car or motor car with a trailer enters the station a double or twin plug is used in plugging up the connection in the operating booth. One contact of this plug is long enough to reach both of the jack contacts, thus lighting both the passenger and motorman's signals while the other is long enough to reach only the jack contact which is connected to the passenger signal.

This method of car announcing is used only during rush hours and has been found greatly to facilitate the dispatching of cars from the terminal as well as to decrease congestion and therefore the liability to accidents on the lower platform.

The Columbus, New Albany & Johnson Traction Company, Columbus, Ohio, has added to its equipment two motor trucks of 1- and 2-ton capacity respectively. One has a freight body, the other a combination freight and passenger body. The trucks supply practically an extension of the railway service, and they have developed a considerable passenger and express service. Milk is shipped into Columbus via motor truck and electric car, and merchandise is shipped from Columbus to the towns served.

TABLE I—FEEDER COMBINATIONS ANNEALED STRANDED COPPER CABLE RESISTANCES AT 68 DEG. FAHR.

Sizes	Area, Circ. Mils	Ohms per 1000 Ft.	Volts-Drop per 100 Amp. per 1000 Ft.	Pounds per 1000 Ft.		Sizes	Area, Circ. Mils	Ohms per 1000 Ft.	Volts Drop per 100 Amp. per 1000 Ft.	Pounds per 1000 Ft.	
				Bare	T.B.W.					Bare	T.B.W.
0000	212,000	0.0499	4.99	653	800	0000	1,712,000	0.0062	0.62	5283	6368
250,000	250,000	0.0423	4.23	772	985	500,000					
300,000	300,000	0.0353	3.53	926	1174	1,000,000	1,924,000	0.0055	0.55	5936	7168
400,000	400,000	0.0265	2.65	1240	1553	0000					
0000	424,000	0.0250	2.50	1306	1600	500,000	2,000,000	0.0053	0.53	6180	7348
0000	500,000	0.0212	2.12	1540	1894	1,000,000					
500,000	500,000	0.0176	1.76	1850	2235	1,000,000	2,150,000	0.0049	0.49	6650	8049
600,000	600,000	0.0173	1.73	1893	2353	400,000					
0000	612,000	0.0173	1.73	1893	2353	750,000	2,212,000	0.0048	0.48	6833	8148
0000	636,000	0.0167	1.67	1959	2400	1,000,000					
0000	700,000	0.0151	1.51	2160	2650	0000	2,424,000	0.0044	0.44	7486	8948
0000	700,000	0.0149	1.49	2193	2694	1,000,000					
0000	712,000	0.0149	1.49	2193	2694	1,000,000	2,500,000	0.0042	0.42	7720	9242
0000	750,000	0.0141	1.41	2320	2822	0000					
0000	750,000	0.0132	1.32	2470	2992	1,000,000	2,712,000	0.0039	0.39	8373	10,042
0000	800,000	0.0125	1.25	2612	3200	1,000,000					
0000	848,000	0.0125	1.25	2612	3200	500,000	3,000,000	0.0035	0.35	9270	11,022
0000	924,000	0.0115	1.15	2846	3494	1,000,000					
0000	962,000	0.0110	1.10	2973	3622	1,000,000	3,212,000	0.0033	0.33	9923	11,822
0000	1,000,000	0.0106	1.06	3090	3674	1,000,000					
0000	1,000,000	0.0106	1.06	3090	3674	1,000,000	3,500,000	0.003	0.30	10,810	12,916
0000	1,150,000	0.0092	0.92	3560	4375	1,000,000					
0000	1,150,000	0.0092	0.92	3560	4375	1,000,000	4,000,000	0.0026	0.26	12,360	14,696
0000	1,212,000	0.0087	0.87	3743	4474	0000					
0000	1,212,000	0.0087	0.87	3743	4474	1,000,000	1,000,000	0.0026	0.26	12,360	14,696
0000	1,362,000	0.0078	0.78	4213	5175	1,000,000					
0000	1,362,000	0.0078	0.78	4213	5175	1,000,000	1,000,000	0.0026	0.26	12,360	14,696
0000	1,424,000	0.0074	0.74	4396	5274	1,000,000					
0000	1,424,000	0.0074	0.74	4396	5274	1,000,000	1,000,000	0.0026	0.26	12,360	14,696
0000	1,500,000	0.0071	0.71	4630	5568	1,000,000					
0000	1,500,000	0.0071	0.71	4630	5568	1,000,000	1,000,000	0.0026	0.26	12,360	14,696
0000	1,612,000	0.0066	0.66	4983	6027	1,000,000					

TABLE II—TROLLEY AND FEEDER COMBINATIONS—SINGLE TRACK
Starred Trolley; Not Marked Stranded Cable

Sizes	Area Total Circ. Mils	Ohms per 1000 Ft.	Volts Drop per 100 Amp. per 1000 Ft.	Pounds per 1000 Ft. T.B.W. (Cable) Bare (Trolley)		Sizes	Area Total Circ. Mils	Ohms per 1000 Ft.	Volts Drop per 100 Amp. per 1000 Ft.	Pounds per 1000 Ft. T.B.W. (Cable) Bare (Trolley)	
				Bare	(Trolley)					Bare	(Trolley)
00*	133,079	0.0800	8.00	403	403	2-00*	666,158	0.0159	1.59	2046	2359
0000	345,079	0.0307	3.07	1056	1203	400,000					
00*	533,079	0.0199	1.99	1643	1956	2-00*	766,158	0.0139	1.39	2346	2700
0000	533,079	0.0199	1.99	1643	1956	500,000					
00*	633,079	0.0168	1.68	1943	2297	0000	978,158	0.0108	1.08	2999	3500
0000	633,079	0.0168	1.68	1943	2297	500,000					
0000	845,079	0.0125	1.25	2596	3097	2-000*	335,610	0.0318	3.18	1016	1016
500,000	845,079	0.0125	1.25	2596	3097	2-000*					
000*	167,805	0.0635	6.35	508	508	0000	547,610	0.0194	1.94	1669	1816
0000	379,805	0.0280	2.80	1161	1308	0000					
000*	567,805	0.0187	1.87	1748	2061	2-000*	735,610	0.0144	1.44	2256	2569
0000	567,805	0.0187	1.87	1748	2061	400,000					
000*	591,805	0.0179	1.79	1814	2108	2-000*	835,610	0.0127	1.27	2556	2910
0000	591,805	0.0179	1.79	1814	2108	500,000					
000*	667,805	0.0159	1.59	2048	2402	2-000*	947,610	0.0112	1.12	2909	3369
0000	667,805	0.0159	1.59	2048	2402	400,000					
000*	779,805	0.0136	1.36	2401	2861	2-000*	1,047,610	0.0101	1.01	3209	3710
0000	779,805	0.0136	1.36	2401	2861	500,000					
0000	879,805	0.01205	1.20	2701	3202	2-0000*	423,200	0.0252	2.52	1282	1282
500,000	879,805	0.01205	1.20	2701	3202	2-0000*					
0000*	211,600	0.0503	5.03	641	641	0000	635,200	0.0167	1.67	1935	2082
0000*	423,600	0.0250	2.50	1294	1441	0000					
0000*	611,600	0.01735	1.73	1881	2194	2-0000*	823,200	0.0129	1.29	2522	2835
0000*	611,600	0.01735	1.73	1881	2194	2-0000*					
0000*	635,600	0.0167	1.67	1947	2241	0000	847,200	0.0125	1.25	2588	2882
0000*	635,600	0.0167	1.67	1947	2241	0000					
0000*	711,600	0.0149	1.49	2181	2535	2-0000*	923,200	0.0115	1.15	2822	3176
0000*	711,600	0.0149	1.49	2181	2535	500,000					
0000*	823,600	0.0129	1.29	2534	2994	2-0000*	1,035,200	0.0102	1.02	3175	3635
0000*	823,600	0.0129	1.29	2534	2994	400,000					
0000*	923,600	0.0115	1.15	2834	3335	2-0000*	1,135,200	0.00935	0.93	3475	3976
0000*	923,600	0.0115	1.15	2834	3335	500,000					
0000*	1,211,600	0.00875	0.87	3731	4315	2-0000*	1,423,200	0.00745	0.74	4372	4956
0000*	1,211,600	0.00875	0.87	3731	4315	1,000,000					
0000*	1,711,600	0.00620	0.620	5271	6209	2-0000*	1,923,200	0.00552	0.55	5912	6850
0000*	1,711,600	0.00620	0.620	5271	6209	500,000					
2-00*	266,158	0.0400	4.00	806	806	0000	2,135,200	0.00497	0.50	6565	7650
2-00*	478,158	0.0222	2.22	1459	1606	1,000,000					
0000						2-0000*	2,423,200	0.00438	0.44	7462	8630
						1,000,000					
						2-0000*	2,923,200	0.00363	0.36	9002	10,524
						500,000					

(For description of these tables see article by H. E. Davis on opposite page)

Special Wire Tables Facilitate Feeder Calculations

Tables of Combinations Prove of Value On the New York State Railways—Other Combinations Can Be Tabulated as Needed

By H. E. DAVIS

Electrical Engineer, New York State Railways, Utica-Syracuse Lines, Syracuse, N. Y.

IN CONNECTION with his work dealing with the design of distribution circuits the writer has found the tables on page 884 of great value from the standpoints of convenience and labor saving. It is, of course, out of the question to include in tables of this kind all possible combinations but those given cover the principal wire and cable sizes in common use and include all of the combinations used on the New York State Railways, Utica-Syracuse Lines.

In both tables the order of arrangement is that of total area of the combination expressed in circular mils. This order is more convenient than one based on a system of classification according to individual conductor sizes. To find any required combination it is only necessary to consult the table with the approximate total circular mils in mind. The table may also be entered in a similar manner with either the resistance or the voltage drop per 100 amp. per 1000 ft. of track. The figures in the last two columns are the weights per 1000 ft. for bare and triple-braid weatherproof insulated conductors.

Ground Connections for Motor Leads

A Loop In the End of the Lead Is Better than a Terminal and Less Expensive

By EDWARD D. RANSOM, B.E.

THE old smooth-faced brass terminal generally used for motor ground connections is a source of continual trouble unless kept tight at all times, and even then at best it is troublesome. One flat surface against another, even though tightened carefully, is sure to loosen when subjected to vibrations such as are met with on railway motor trucks.

The manner of soldering the lead into the usual type of terminal leaves the strain on a few strands of wire and they soon break due to the twisting motion caused by the truck while rounding curves or passing over poor track joints. The result is either a poor ground connection or an open circuit which invariably shows up in motor trouble, fires and delays to service.

A ground lead developed by one of the larger properties to do away with these troubles, and the method of attaching it to the motor shell by a tap bolt, are shown in the accompanying illustrations. No separate terminal is used but the end of the ground lead is formed into a loop of proper size to fit over the tap bolt. The leads, of proper length for each type of motor, are made up in the electrical department. After the loop is shaped it is carefully wound with copper wire and then thoroughly tinned, thus making a thoroughly solid terminal.

Attention is particularly called to the short section of insulation left on the end of the lead which is solidly clamped to the lead proper by means of a figure-8 metal clamp. This arrangement places the strain or

twist on the solid part of the cable, taking all strain off the strands and preventing breakages. The metal clamp is bell-mouthed slightly around the lead to prevent cutting the insulation and to give a better distribution of the strain.

The tap bolt in Fig. 2 was developed to take the place of a plain square-head bolt, with flat and lock washer, which was simply placed through the old terminal and supposedly tightened down. In time the threads became partially stripped or rusty, and the holes "burred up" due to constant removal for the soldering on of new

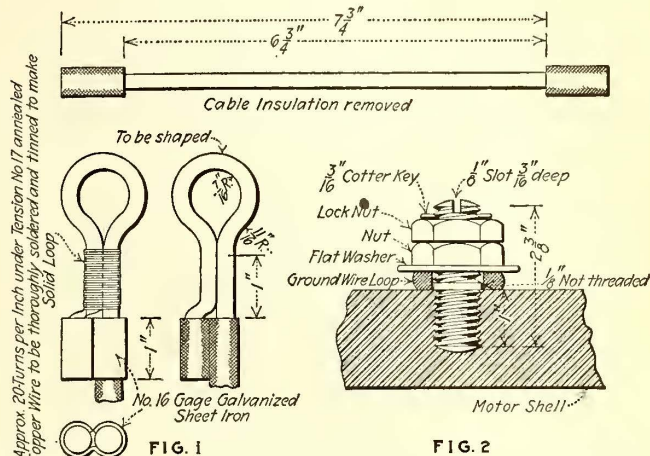


FIG. 1—END OF CABLE LOOPED TO FORM A TERMINAL. FIG. 2—METHOD OF ATTACHING LEADS TO MOTOR SHELLS

leads. With the present arrangement the tap bolt is firmly screwed into the motor shell and there it stays, doing away with the burring of holes from frequent removal. The ground loop is placed over this bolt, directly against the face of the shell. A thin nut is tightened on it until it is partially flattened down and almost welded into the motor shell, becoming a part of it, the rough strands biting in. On top of this first nut is placed a second one which locks the whole outfit firmly and solidly in place. A cotter key is then placed through the bolt end.

Experience with leads of this type has shown that when once installed they will remain permanent and solid for the ordinary life of the cable. After that a new lead can be quickly and easily installed without the necessity of removing the bolt from the shell.

Instruments Needed for Efficient Boiler-room Equipment

In listing the instruments needed in the modern boiler room, in connection with a paper presented at a recent meeting of the Detroit section of the American Society of Mechanical Engineers, R. H. Kuss, consulting engineer, Chicago, Ill., stated that while few instruments are needed for an ordinary plant these must be regularly used and the records reviewed and studied. Every boiler setting should have a draft gage, or draft-gage system, capable of instant and constant indication of boiler uptakes and furnace drafts. There should also be accurate water-measuring and coal-measuring apparatus. Each chief engineer of a plant of, say, 600 h.p. should possess a standard Orsat or gas-analyzing set and an indicating pyrometer.

Caring for D. C. Aluminum Car Arresters During the Winter

Practical Points Which Experience Has Shown to Be Desirable in Keeping Arresters in Prime Condition

By R. T. WAGNER

General Electric Company, Schenectady, N. Y.

WHETHER or not the direct-current aluminum type of car arrester should be removed from service during the winter months depends upon the local prevalence of lightning storms during that period. In some parts of the Far South where the period of freedom from lightning is very short, or in localities where there is no part of the year altogether without lightning, the arresters should be kept in service continuously. In the North, where lightning is very infrequent after September, the arresters should generally be removed from the cars in the fall and stored for the winter.

PROCEDURE WHEN ARRESTERS ARE LEFT IN SERVICE

It is sometimes desirable to leave the arresters in service during the winter to gain the benefits of protection against disturbances other than lightning, such as electromagnetic surges produced by the operation of the motors and the control equipment. These may produce commutator flashovers or motor damage. It is impossible to predict whether the arresters can be satisfactorily operated during the winter in all cases, as this is entirely a matter of temperature. The danger involved is the possible breaking of the glass jars due to freezing. The electrolyte freezes to the form of a soft slush at about 25 deg. Fahr. To cause it to freeze solid requires a lower temperature maintained for several hours. It is probable that if a car were used every day, so that current flowed through the cells and the balancing resistances, the arrester would not freeze harmfully even though it were kept at night in the practically outdoor temperature of the usual carhouse. During the winter of 1913-1914 thirteen jars filled with electrolyte were placed out of doors and observed carefully, temperatures being determined by means of a recording thermometer. The winter was severe and on three occasions, at least, the temperature was as low as minus 20 deg. Fahr. None of the jars broke. It might happen that under the more severe conditions of service operation some breakage would occur. There has been at least one case of successful operation through the winter in a cold climate. About a year ago W. C. Klein, now superintendent of equipment Lehigh Valley Transit Company, then master mechanic of the Easton (Pa.) Transit Company, after a particularly successful season of protection during the summer, hesitated to remove the arresters from service and decided to operate through the winter. In the spring he wrote as follows:

We have left all aluminum-cell arresters in service on revenue cars. The arresters are located in the vestibule of the car on the hood above the motorman. Temperature of cars throughout the day is approximately 45 deg. Fahr.

At night the cars are stored in carhouse at outdoor temperature with trolley poles removed. In a few rare cases the jars have frozen solid, but in no case have we had jars broken. The writer has observed an arrester, which had cloudy electrolyte prior to being frozen, become very clear after thawing out. Regarding flashovers, grounded cord bands and commutation troubles, have observed same have been practically eliminated. We have been able to maintain our regular service throughout this entire severe winter, which is very good evidence that arresters have afforded some protection. It is our intention to wash the cells thoroughly and refill with new electrolyte and new transil oil before the summer season sets in.

It is thus evident that the arresters may be operated during the winter, but it is inadvisable to do so, unless conditions indicate that this is necessary on account of the useless deterioration of the cells that this involves.

When the arresters are left on the cars, it is simply necessary to follow the same scheme of inspection as is followed during the summer. The best plan is to inspect them at the time of regular car inspections, usually at intervals of two weeks or less. A particularly close inspection should be made in the spring just before lightning storms may be expected. The inspection should cover the points given below. This list might give the impression that many troubles occur in the operation of these arresters, which is not the case as the points enumerated include every kind of trouble that may be met.

QUESTIONS AND COMMENTS FOR THE INSPECTOR'S GUIDANCE

1. Are there loose connections?
2. Is the electrolyte at the proper level, i.e., $\frac{1}{8}$ to $\frac{1}{4}$ in. above the top of the slots in the outside plate?

It is important that this point be checked as early instructions on this type of arrester provided for a higher level which caused wear of the plate lugs. If the electrolyte of either jar is more than half gone it is evident that the cell has been overheated. This may have been caused by numerous heavy discharges, defective resistors or poor film. The cell should be cleaned, refilled and tested for proper film conditions. The balancing resistors should be checked as outlined in Item 5.

3. Is the fuse blown?

If no spark appears when the circuit is opened and closed through the arrester, the fuse should be tested to see if it is blown. If found blown the cells and circuits should be checked to see that no short-circuit exists and the arrester re-fused if circuit conditions are correct. In event of the fuse blowing again, the cells should be cleaned, refilled and tested out with series lamps. A good film condition is indicated by a bright, snappy spark on closing the circuit.

4. Are the positive (outside) plates worn off at the surface of the electrolyte?

If so, the cells should be replaced.

5. Do the cells sparkle?

Sparking is due to over-voltage being applied to the cell. If the arrester is not used beyond its rated voltage this could only occur because the voltage across the cells has be-

come unbalanced. It is, therefore, evident that the balancing resistors have become defective and should be replaced. The balancing resistors are used to divide the voltage equally across the two cells. To test the resistance it is necessary to merely place the coil or section of a coil to be checked across the trolley circuit in series with a voltmeter suitable for the circuit. This is the series voltmeter method of measuring a resistance. An open resistor will give no reading on the voltmeter, while a "shorted" tube will show full circuit voltage on the meter. The individual resistance units in any arrester should give very closely the same voltage reading. On any circuit with voltage from 450 to 650, and with a voltmeter of the usual resistance for a 600-volt or 750-volt instrument, the balancing resistors are in satisfactory condition if the readings do not differ by more than 10 volts.

6. Are any cells hot?

A hot cell, that is, one quite warm to the touch, is taking more than its share of the voltage due to either a defective balancing resistor or to poor film condition. If the resistance tests are satisfactory, the cell should be removed for cleaning and testing.

7. Is the electrolyte badly discolored?

If it is only slightly discolored, so that the plates can still be plainly seen, it is satisfactory. If it is so badly discolored that the plates can be seen only with difficulty or not at all, the electrolyte should be replaced, the old electrolyte being thrown away. The best policy with regard to electrolyte renewal is to replace the solution once a year, or at least every two years, as standard practice. This will insure the best possible operating condition as regards this very vital factor in the efficiency of the arrester.

8. Is there a sludge or sediment in the bottom of the cell?

If there is sufficient to touch, or nearly to touch the bottom of the cell plates, the cells should be emptied, cleaned and refilled, and films should be tested out.

As a suggestion for a convenient method of removing cells or balancing resistors from arresters in active service for testing and overhauling, as required in any of the various cases referred to, the following scheme is recommended: A few spare pairs of cells and some spare resistance units, the number depending upon the number of arresters in service, should be kept at some convenient location where they can be kept connected to the trolley circuit and at a moderate temperature. Facilities should also be available at this point for cleaning and reforming cells, and for testing cell films and resistance units. When cells of arresters in service are found on inspection to indicate a condition that calls for overhauling, the complete pair or pairs of cells involved should be removed and replaced from the stock of spares. The same procedure can be followed with the balancing resistance units. The questionable units can then be overhauled and repaired at leisure by some person especially responsible for this work. Such a scheme insures minimum delay in car schedules and obviates the necessity of allowing the car equipment to operate for a time without protection.

CARING FOR ARRESTERS OUT OF SERVICE

When it is decided to remove the arresters from service the cells only should be taken from the box. The oil and electrolyte should be poured out of the jars and the jars thoroughly cleaned. If the plates are in good condition it is not necessary to remove them from the porcelain covers. The plates should be washed with clean gasoline, or ivory soap and hot water, and rinsed in clear, hot water. The plates should be handled with care so as not to scratch the film. Washing powders, sand paper, etc., should under no circumstances be used. When the jars, plates, ring and gaskets have been thoroughly cleaned, the plates should be stored in the empty jars for the winter.

Electrolyte which is badly discolored or which has a sediment at the bottom should always be thrown away. If it is only slightly discolored, it may be kept in the carboy in which it was originally shipped. Clean glass carboys or bottles should be used. They should be filled to the neck, tightly corked and kept in a place of moderate temperature. By spring the oil will have risen to the top and the electrolyte can be siphoned out. One company that has a large number of arresters pours the electrolyte into a large earthenware vessel with a draw-off at the bottom. When the oil has sufficiently separated, the electrolyte is drawn off into carboys and bottles and the oil into separate containers. As the oil cannot be completely separated from the electrolyte, and as electrolyte that has been in service has naturally deteriorated, used electrolyte and new electrolyte should not be mixed. Mixing them would result in contamination of the fresh electrolyte. In refilling cells each pair should be filled with either new or old electrolyte, never with a mixture. Never should one cell be filled with old and the other with new electrolyte. Corroded cell plates, torn gaskets, cracked jars and cracked covers should be discarded.

The balancing resistors should then be tested for open circuits and "shorted" resistances. As stated above, the balancing resistances should check quite closely, showing not more than 10 volts difference by the series voltmeter method or not more than 10 per cent variation in actual resistance values in a single arrester. The wooden box should be examined also. If it has been in service for two or three years it may need repainting. A record of necessary repairs should be kept and these should be made during the winter. A list should be made of all parts necessary to put the arresters in good operating condition. These should be ordered in time to have them on hand when it is desired to put the arresters back into service. It is particularly important this year that the ordering of new parts be not delayed too long, not only on account of probable delays in transportation, but also because of difficulties in obtaining materials to manufacture the electrolyte and the aluminum parts.

Railway Electrical Engineers Meet

THE tenth annual convention of the Association of Railway Electrical Engineers was held at the Hotel La Salle, Chicago, Oct. 29 to 31, with about 150 delegates in attendance. The program included committee reports on data and information, illumination, electrical equipment and practice for ore and coal docks, electric headlights, train lighting equipment and practice, shop practice, electric welding, conservation of equipment and methods for increasing efficiency, layout for engine terminals, shop-yard and classification-yard lighting, care and maintenance of railway stationary power plants and electrical organization.


The following officers were elected for the ensuing year: President, J. E. Gardner, Chicago, Burlington & Quincy Railroad; first vice-president, L. S. Billau, Baltimore & Ohio Railroad; second vice-president, L. C. Hensel, Frisco Lines; secretary-treasurer, Joseph A. Andreucetti, Chicago & Northwestern Railroad; executive committee, Ernest Lunn, Pullman Company, and F. J. Hill, Michigan Central Railroad.

Philadelphia Rapid Transit Company's co-operation in combating the influenza epidemic, by focusing attention on means of prevention



By the use of this and other publicity matter the company rendered material aid in stamping out the disease

FIRST DASH SIGN USED—OTHERS WERE USED LATER



EPIDEMIC INFLUENZA
THE CO-OPERATIVE ASSOCIATION
OF
THE PHILADELPHIA RAPID TRANSIT COMPANY

Appeals to all citizens to assist in stopping the Spitting in streets and public places.
 4,596 citizens died here last week—63 of our fellow workers died since October 1st.

P. R. T. IS DOING ITS PART
DISINFECTING CARS ALMOST HOURLY—KEEPING VENTILATORS OPEN
as directed by Dr. Krusen.

Dr. Pepper, U. of P., asked Street Sprinkling Contractors October 12th to put more water on the streets as a further preventive.
 Sprinkling Contractors borrowed P. R. T. sprinklers and are working day and night, including Sundays, to keep the dust down. (OVER)


STREET SPRINKLING HAS BEEN MORE THAN DOUBLED
POLICE ARE ARRESTING 50 SPITTERS DAILY
MAGISTRATES ARE FINING THESE SPITTERS

What are you doing MR. CITIZEN to help stamp out this death dealing epidemic?

The Co-operative Association hereby promises that its membership of more than **6700 P. R. T. EMPLOYES** will do their utmost to stop this Spitting and will call the attention of Police Officers to every Spitter they see spreading death and desolation amongst our people.

WON'T YOU HELP, MR. CITIZEN?

Attest: By Order of the General Committee,
 C. B. Fairchild, Jr., Secretary. F. W. Johnson, Chairman.
 October 23, 1918. (OVER)



FRONT AND BACK OF CARDS HANDED TO PASSENGERS ON OCT. 25

LISTEN—MR. CITIZEN!

Dr. Krusen Says Spittle Becomes Dust and Blows About Causes Infection

EPIDEMIC INFLUENZA

IT'S SERIOUS 4596 CITIZENS DIED HERE LAST WEEK! **STOP THE SPITTER**

THE FIRST BULKHEAD SIGN USED IN THE CAMPAIGN

DO-U-NO—MR. CITIZEN!

WE ARE DISINFECTING OUR CARS ALMOST HOURLY
 WE ARE KEEPING VENTILATORS OPEN BY DIRECTION OF DR. KRUSEN

EPIDEMIC INFLUENZA

IT'S SERIOUS **STOP THE SPITTER**
PROTECT 2,000,000 CITIZENS CARRIED DAILY

SECOND BULKHEAD SIGN USED IN CAMPAIGN

BE JUST—MR. CITIZEN!

STREET SPRINKLING HAS BEEN MORE THAN DOUBLED
 POLICE ARE ARRESTING AND MAGISTRATES ARE FINING

THE SPITTERS

IT'S SERIOUS **WON'T YOU HELP** **STOP THE SPITTER**

THIRD BULKHEAD SIGN IN PHILADELPHIA CAMPAIGN

YOU DID IT—MR. CITIZEN!

YOU, THE CITY GOVERNMENT AND P. R. T. EMPLOYES
MADE

SIDEWALKS CLEANER

KEEP AT IT **CO-OPERATE** **DON'T SPIT**

FINAL BULKHEAD SIGN IN ANTI-SPITTING CAMPAIGN



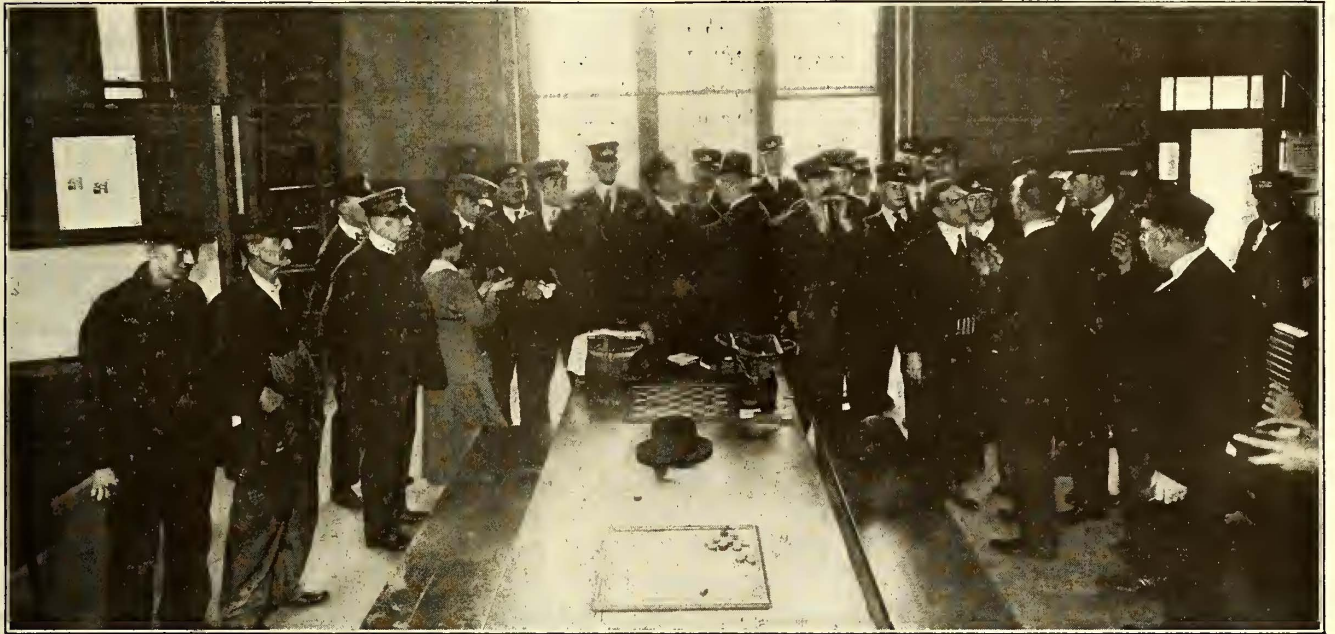
THE BULKHEAD AND OTHER SIGNS WERE PLACED IN PROMINENT POSITIONS



THE COMPANY'S STREET SPRINKLERS WERE PUT AT THE DISPOSAL OF THE CITY

Influenza Crusade in Philadelphia

Active Anti-Spitting Campaign of Philadelphia Rapid Transit Company,
Extending Over Ten Days, Undoubtedly Greatly Assisted in
Reducing the Influenza Epidemic in Philadelphia



PHYSICIANS AND NURSES EXPLAINING USE OF NASAL APPLICATORS AT CAR HOUSE

CONTINUING the campaign against the spread of epidemic influenza, the preliminary steps of which were described on page 705 of the issue of this journal for Oct. 19, the Philadelphia Rapid Transit Company on Monday, Oct. 21, launched one of the most drastic anti-spitting crusades ever undertaken.

On Monday, Oct. 21, the general committee of the co-operative association of the company's employees met in special session and enthusiastically indorsed a letter, which among other items recited the dire effects of the epidemic and urged upon their fellow employees the most cordial co-operation with the company and with the city government in stopping the spitting menace. This letter was mailed to the homes of the employees. It was signed by F. W. Johnson, chairman, and C. B. Fairchild, Jr., secretary, of the general committee of the co-operative association and said, in part:

There have been seventy-five deaths among the employees since Sept. 1, twenty-two of which were non-members; two were members of the old Beneficial, and the families were promptly paid the \$150 and the \$500, as was formerly done. Fifty-one employees had duly made application for membership in the new co-operative association and their widows or their beneficiaries became immediately entitled to the payment of \$1,000 in death benefits. \$38,000 has already been paid by the Metropolitan Life Insurance Company on this account and the remainder is being paid as rapidly as proofs of deaths can be supplied.

The epidemic influenza is doing its terrible work; our fellows are dying at a rapid rate—sixty-three since Oct. 1. What shall we do about it? Dr. Krusen, health department director for the city, and Dr. Pepper, dean of the medical department, University of Pennsylvania, both say that spitting is doing it. The spittle dries up and blows into peoples' faces, spreading the infection and causing many deaths. They say it is criminal to spit now, and if we must

spit, to spit into our handkerchiefs. Don't spit, and keep the card we are sending you inclosed with this constantly on your person. Be governed by its instructions and prove yourself a real co-operator in this emergency of life and death.

On Tuesday morning, Oct. 22, there appeared upon the front dash of each of the 2000 cars operated by the company, a sign reading "Don't Spit," in block letters, 8½ in. high, on a white background and legible half a square away. Simultaneously, there appeared on the interior bulkhead over the door of each car, the first bulkhead sign shown. By noon, the cars had carried the "Don't Spit" message to fully three-quarters of the population in Philadelphia and the surrounding territory reached by the lines of the Philadelphia Rapid Transit Company. By nightfall, the crusade was the talk of the town and the good work was on.

The campaign reached its climax Friday, Oct. 25, when various things happened in quick succession. Beginning at daybreak, there appeared on the rear of every car a sign reading, "Spit Spreads Death," in large black letters corresponding to, and supplementing, the "Don't Spit" sign on the front dash. During the night these two signs had also been posted on the electric light poles throughout the entire business section. At the same time a new interior bulkhead sign, reproduced herewith as the second bulkhead sign, was displayed in all the cars.

A meeting of the transportation department co-operative committee had been called the previous day, at which the utmost effort of the conductors and motormen as well as of other employees had been pledged to help stop the spitting.

On Friday morning the conductor of each car was supplied with a large market basket filled with cards, of which both sides are reproduced. The conductor handed one of these cards to each passenger entering the car, and by nightfall 2,000,000 of the cards had been so distributed.

Throughout the day a special detail of 500 plain-clothes men from the police department, augmented by 2000 members from the Home Defense Reserve, in plain clothes, were spread throughout the city with strict orders from the police officials to arrest all persons found spitting on sidewalks or other places prohibited by the act of the Assembly against spitting. Hundreds of arrests were made, and through the co-operation of the committing magistrates, each offender was fined the full penalty of \$2.50.

PHILADELPHIA RAPID TRANSIT COMPANY

EXECUTIVE OFFICE

Philadelphia, November 1, 1918

To all Employees:

Epidemic Influenza is losing its grip. We had 879 sick employes yesterday as against 2,145 on the worst day, October 12th. 71 is the death toll of this terrible scourge among our co-workers during the past month.

According to the records of the Health Department, Epidemic Influenza has already caused the death of 11,949 persons in Philadelphia alone. This appears terrifying in comparison with the 11,000 men so far reported as being killed in Pershing's great army.

Doctors Pepper and Krusen agree that spitting spread the contagion here, and YOU stopped the spitting.

You have sent thousands of your best men to join the army in Europe. The patriotic men and women of this City are properly engaged in helping win this war for Democracy, but it was left to you to exert yourselves in arresting the spread of this terrible scourge of Epidemic Influenza.

You may well be proud of this accomplishment.

Doctor Krusen, for the City Administration, joins us in a hearty appreciation of your wonderful co-operative effort.

E. T. STOTESBURY,
Chairman.

T. E. MITTEN,
President.

LETTER OF APPRECIATION SENT TO EMPLOYEES BY
MANAGEMENT ON NOV. 1

On Wednesday, Oct. 30, the third of the interior bulkhead poster signs was displayed in all the cars. The location of this bulkhead sign, together with the frame holding the smaller sign reading "Open All Ventilators," described in the previous article, is shown in the interior view of the car.

The fourth and last of the poster series, which went into the cars on Thursday, Oct. 31, is shown in the final poster.

As previously described, President T. E. Mitten at the beginning of the influenza epidemic, had placed at the disposal of the street cleaning department the company's entire fleet of sprinkling cars and carts, with the help of which the normal street sprinkling was more than doubled during the epidemic period. This was done with the view of stopping the spread of the contagion through the medium of street dust. The

sprinklers were also utilized to carry large banners as part of the preventive propaganda.

As a further safeguard to the health of its own employees, the company had previously distributed, free of cost, to each of the 11,000 employees a nasal applicator and a tube of nasal ointment known as V. E. M. which was found to be a cooling antiseptic for clearing the nasal passages. An accompanying view shows one of the demonstrating squads, consisting of a physician, a nurse and an assistant nurse, explaining to the motormen and conductors at one of the carhouses, the proper use of the nasal applicator.

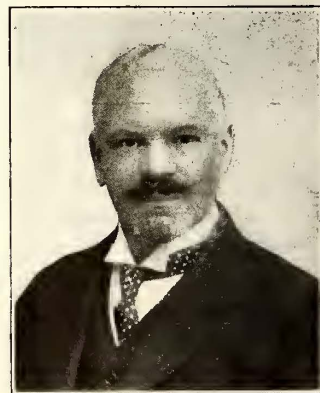
The final move in the anti-spitting campaign, after the epidemic had practically subsided, was made on Nov. 1, in the form of a personal letter of appreciation, also reproduced, which was mailed to the homes of all the employees and signed by Chairman E. T. Stotesbury and President T. E. Mitten.

Municipal Tramways Association Discusses Power Supply

A BRIEF meeting of the Municipal Tramways Association, Inc., of Great Britain was held on Sept. 26 and 27 at Leicester. There was but one formal paper, on power supply. T. B. Goodyer, general manager Croydon Corporation Tramways, was elected president of the association.

The paper on power supply was read by Ernest Hatton, engineer and general manager Newcastle Corporation Tramways. He discussed particularly the government reports on coal conservation and electric power supply which have been widely studied in the United States. The principal point made was that while a general scheme of power generation and utilization, including railway electrification, will undoubtedly conduce to economy no very radical or sudden reductions in energy generation costs are to be expected.

Mr. Hatton said that any successful scheme of general power supply must be able to "carry on its back" the annual charges of plants superseded. With the introduction of electric traction originally the ability of the new system to carry the then existing expenditure on horse traction was a vital factor. The same principles must apply in the unification of the power supply. If the controlling authorities are satisfied that the electrification of the railway systems of the country is desirable then this policy will lend itself to the most active and advantageous method of setting up a general power supply all over the country. This follows because the railways touch all centers of population and industry within reasonable distances and as a rule provide the shortest routes and best opportunity for laying main trunk line cables. Such a system of power supply will be advantageous to street and interurban traction services.



T. B. GOODYER
President-Elect Municipal
Tramways Association

More Opinions on Public Ownership

Telegraphic Canvass by Electric Railway Journal Brings Out Valuable Comment on Subject from Several Angles

IN LAST week's issue of this paper there was printed the first instalment of replies to an inquiry from the editors designed to secure an expression of views on the subject broached in a resolution presented by James D. Mortimer at the New York conference of the American Electric Railway Association. The text of the resolution was printed in the issue for Nov. 2, page 795. Following are more replies received since the Nov. 9 issue went to press.

Why Confuse the Issue by Branching Out on New Lines?

I do not believe that the Association should go on record for municipal operation in any blanket form. The industry must have relief, which means that we must charge enough for our services to cover operating expenses, taxes, interest and a fair return on money honestly and actually invested. A wholesale indorsement of municipal operation will not meet the situation.

While we are fiddling with this our deficits will increase, as will receiverships also. After months of fighting we have broken away from the nickel. Public service commissions realize that they must act to the limit of their powers, and the public now is awakening to the fact that something must be done to preserve adequate service. To branch out on a new policy will only confuse the issue and slow up the present movement. Would it not be better to hammer home the fact that the business must bear its legitimate charges and leave the character of the operation to be determined by local conditions in each case?

There should be an organization of the owners of securities similar to the National Association of Railway Security Owners, heretofore not represented. Competent counsel should be permanently employed and every effort should be brought to bear to secure federal action and direction. A national advertising campaign should be planned to inform the public and to hold up the hands of state regulatory bodies. Service at cost, regardless of the form of operation, is our salvation. If any municipality desires that its public officials operate a property it should be allowed to take the property over provided that adequate guarantees and protection are given to stock and bond owners. But these cases are local; why not pound away on the service-at-cost plan and not confuse the issue?

PHILIP J. KEALY,

President Kansas City (Mo.) Railways.

Five Reasons for Caution in Advocating Municipal Ownership

I do not concur in the views expressed in the resolution for the following reasons: First, a blanket policy may lead to a blanket measure of value, the poorest properties thus being the gage for better properties. The relations between communities served and electric

railways are individual and local in nature, and should be dealt with accordingly. Second, where the public does not realize the justice and the need in its own interest of increasing fares, and reducing the public obligations of the electric railways to enable them to meet new conditions, then it is not apt to deal broadly when importuned to acquire railways. Third, many communities have been responsive to the need for increased fares. The campaign along that line has been in part successful and should be continued vigorously. It should not be weakened with public ownership propaganda. Fourth, local conditions, such as extensions of lines beyond municipal limits, the serving of more than one municipality, or the legal obligations of municipalities will in many cases make very difficult or impossible the sale of the electric railways to the public under any conditions satisfactory to the public or to the owners. Fifth, the very broad question of public ownership and operation of business on a large scale is deeply involved, and it demands, from the public viewpoint, very serious consideration.

I believe that the establishment of closer relationships, as suggested by Mr. Gadsden, involving in many cases the taking of steps which are intermediate to, but do not involve, public ownership and operation but do involve a direct public responsibility for and interest in the adequate maintenance of electric railway service and return on capital invested, would be a better course to follow where electric railways are in trouble, than that expressed in the resolution.

PAUL SHOUP,

President Pacific Electric Railway, Los Angeles, Cal.

Only Two Alternatives if Railways Are to Survive

The electric railway industry is in desperate straits. I know of no electric railway in the country that is now receiving from its patrons the cost of serving them. This is due to the insufficiency of fares and fare systems under which the railways are compelled to operate, and owners of street railways cannot continue indefinitely to provide for deficits. There are but two ways in which electric railways can continue to serve the public. One is recognition by the public of the fact that the cost of service must be provided, and that honestly-invested capital is entitled to fair treatment and a fair return. This means the adjustment of rates and rate systems to meet these conditions. The other solution is municipal ownership, under which service will be continued and the cost of service paid either by the patrons or by the taxpayers. If the cost of service is to be paid by the patrons, that cost would certainly not be less under municipal than under private management subject to public regulation. Before declaring oneself unequivocally in favor of municipal ownership of the electric railways one must first conclude that the public will not deal honestly and fairly with private ownership under which all of the advantages of

municipal ownership and operation may be secured and none of its disadvantages imposed. I am not yet ready to declare that I have lost faith in the willingness of the public to deal fairly with this industry; I still hope the public will accord fair treatment.

FRANKLIN T. GRIFFITH,

President Portland Railway, Light & Power Company,
Portland, Ore.

Deprecates Agitation to Facilitate Sale to Public

In cities like San Francisco, where the municipality has already inaugurated a competitive system, it is a condition and not a theory that confronts us. It is elementary that a street car system to be profitable must be a monopoly, and inasmuch as the city cannot be expected to sell out to the private corporation the latter must favor a sale to the city if a reasonable price can be obtained. In any event, I am thoroughly opposed to the agitation by private corporations for municipal ownership if intended to facilitate sale, because it will defeat its own purpose in that it will look to the public simply as an effort to unload something that has proved unprofitable. Let us at least await the time when an aroused public opinion will concede to the public utilities compensatory rates and permit of a showing that will assure something better than rubbish prices.

JESSE W. LILIENTHAL,

President United Railroads of San Francisco.

Would Federal Ownership and Operation Be Best?

In my opinion municipal ownership will be the most practical demonstration of Bolshevism that can be inflicted upon the nation at this time. Possibly state ownership is a lesser evil but, since electric railways are not local but are national ways of transportation, why not try federal ownership and thereby make possible the financing and carrying of the enormous investments necessary? It might possibly be better to wait until the several governmental agencies demonstrate ability wisely to regulate before asking them to assume burdens of ownership, management and operation, and in the meantime inform the people and ask them to insure that these investments are permanent and shall not be destroyed at the will or caprice of contending political factions. It seems to me that at this time the government should be relieved of every burden that private enterprise can carry and to that end co-ordination of purpose and co-operation are essential.

F. W. BROOKS,

President Detroit (Mich.) United Railway.

Combined Benefits of Private and Public Control Are Obtainable

To speak broadly, municipal ownership has not been successful. It cannot be separated from politics, which is bad for any business. The 5-cent fare has been a false fetich throughout the United States. Many roads that have operated on a 5-cent fare have lost money every day since they commenced operations, and are only just finding it out. There are many companies which, were they to charge full depreciation on cars, tracks, power houses, etc., would find that they have not earned more than bare operating expenses, and yet they have been declaring dividends annually. Unfortunately, so-called "high finance" in some companies has caused the public to condemn all street railways.

I see no reason why the public should not be satisfied to pay rates of fare higher than 5 cents, beyond the inconvenience and the annoyance caused through "breaking" the 10-cent piece and taking coppers in change. Much of the opposition to higher rates of fare would vanish if we had an intermediate coin between the 5- and the 10-cent pieces that would fit most car fares in the country. Under municipal ownership the public would pay all the bills. Why not remit all taxes on street railways, relieving them from maintaining paving, but putting them under an indeterminate franchise. Their operation, the fares and the dividends could be under railway commission control and yet the benefits of private control would be attained. The public would pay less and get more efficient service than under municipal ownership. Offering to sell out under present conditions is equivalent to a man on his deathbed trying to take out life insurance.

W. CLAYTON,

Vice-President San Diego (Cal.) Electric Railway.

Various Complications Are Involved in Public Ownership Proposition

I believe that municipal ownership would be more extravagant and inefficient under present conditions than ever before and would be unfortunate for the public interest. From the standpoint of the electric railway seeking relief from war conditions the proposition is one which must be decided by each electric railway for itself after considering its own problems. Conditions differ greatly and are affected by interurban lines, as well as by combined sources of power with other electrical industries and by consolidation with other utilities.

CLEMENT C. SMITH,

President Wisconsin Public Service Company and Wisconsin Railway, Light & Power Company.

Municipal Ownership Agitation Largely Political

I believe that a general application of the municipal ownership theory to electric railways would be prejudicial to the best interests of the country. Through the exercise of paternalism in connection with such properties individual initiative and enterprise, which thrive under private operation, would be restricted or even destroyed. But the public must pay the cost of operation. Electric railway operators are not desirous of sitting around a corpse. If the public refuses to allow operation except at a loss, the municipalities or the state must step in and furnish the service. The present exigency, however, does not demand a change so radical and so theoretically undesirable. The municipal ownership issue is largely a political one, and utilities do not help their case by fighting it. If operators were to say that municipalities might purchase the properties, although this would not be advisable, city officials would not have such an opportunity to play politics. The public looks with suspicion upon any operator who insists upon maintenance of control over a losing proposition, but it will aid the one who shows himself to have only one interest at heart—the giving of proper service, at cost, regardless of who the operator is. In other words, municipal ownership is not a general remedy for electric railways ills, and the public will understand this and act accordingly if the matter is properly handled by the companies.

REPRESENTATIVE OPERATOR.

Commissioners Meet in Washington

Special War Committee Reports at Convention of National Association of Railway and Utilities Commissioners

THE National Association of Railway and Utilities Commissioners held its annual convention on Tuesday, Wednesday and Thursday of this week in the rooms of the Interstate Commerce Commission in Washington, D. C. The program consisted mainly of reports of standing committees, which will be covered in detail in a later issue. Winthrop M. Daniels, chairman of the Interstate Commerce Commission, made the address of welcome, following which was the annual address of Charles E. Elmquist of Minnesota, acting president of the association.

The most important matter before the convention was the report of the special war committee, presented by Joseph B. Eastman of Massachusetts. In this it was asserted that the state commissions have worked in harmony with the spirit and needs of the times. They have allowed and facilitated reductions of service needed for the conservation of labor and fuel by refraining from requirements reasonable under ordinary conditions but wasteful of capital and energy in time of war, and by permitting without undue delay or controversy increases fairly demanded by the rapid advances of wages and prices and necessary to relieve utilities of more than their fair share of the burden of war conditions. In the committee's opinion, while federal control of railroads may perhaps be tolerable in war times, it is neither expedient nor wise in time of peace. It is desirable in the public interest that the state commissions should possess under federal control substantially the same authority over service and rates and the same general powers of supervision and investigation which they have exercised under private ownership.

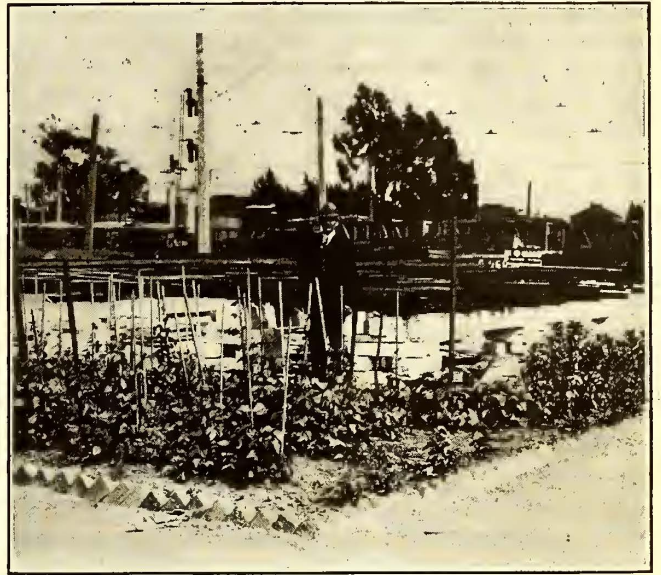
C. A. Prouty, director of public service and accounting of the United States Railroad Administration, addressed the convention on Wednesday afternoon. He declared that Director-General McAdoo was anxious for the co-operation of the state commissions and desired to co-operate with them. He advised the state commission, before making orders affecting railroads under

Charles M. Candler of Georgia; second vice-president, Joseph B. Eastman of Massachusetts; secretary, James Blaine Walker of New York; assistant secretary, L. S. Boyd of Washington, D. C.

Garden Idea for Track Yards

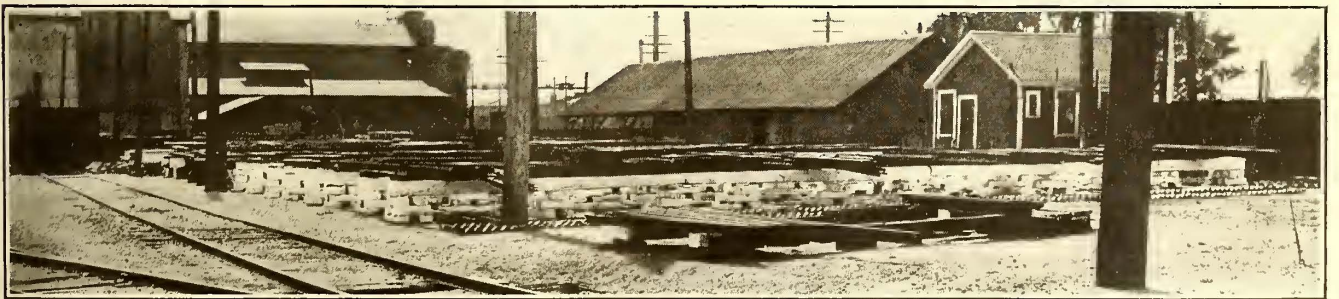
It Not Only Makes Them Attractive in Appearance but the Storage Is More Efficient

CHARLES CHRISTOPHER, storekeeper of the San Francisco-Oakland Terminal Railways, has found that the subtle influence of a garden-farm does more to inculcate care and cleanliness in a track storage yard than any amount of pleading or commanding.



FLOWERS ARE GROWN IN THE TRACK YARD

At one time the special work and other track materials stored at the yard lay in masses of weeds and were often hard to find. To-day, the weeds have been practically banished by the use of quarry dust, while the assignment to the men of odd areas for personal cultivation has done wonders in promoting care and neatness. The men, mainly Italians, raise the plants them-



THE RAILS AND PIECES OF SPECIAL WORK ARE MOUNTED ON WOODEN SKIDS

government control, to submit to the Director-General the proposed order. Speaking for himself, Judge Prouty said that if this were done he had no doubt the Director-General would approve the course suggested by the state commissions unless there was some grave reason to disapprove it.

The following officers were elected: President, Charles E. Elmquist of Minnesota; first vice-president,

and they are thoroughly conscientious in removing sticks, stones and scrap that do not belong to the yards. The very fact that the special work pieces are mounted on neatly whitewashed wooden skids has had a helpful influence, for when the men see that the company has some regard for this material they are more careful than if it were dropped higgledy-piggledy.

The photographs show conditions as they are to-day.

Urges Electrifying of California Road

Representative of Oil Division of Fuel Administration Points to Oil and Capital Economy—Purchase of Power

Electrification of the mountain division of California railroads has been recommended to Director-General of Railroads McAdoo by D. F. Folsom, director of the Pacific Coast section of the Oil Division of the Fuel Administration, as a means of conserving fuel oil and reducing the operating expenses of the sections of the railroads involved by \$4,923,300 a year. The recommendation, based on the report of W. F. Dietrich, engineer of the Oil Division of the Fuel Administration, shows that the electrification of 510 miles of railroad would mean an annual saving of 3,062,000 barrels of fuel oil, the total cost of which is \$6,147,000, and that the cost of power to operate the trains over these sections at 0.75 cent per kilowatt-hour would be \$2,000,000, indicating a reduction in the bill for motive power of \$4,147,000 annually. The first cost of the electrification is placed at \$23,012,000, on which there is estimated an annual profit of 9.4 per cent, after allowing for depreciation, amortization, taxes and interest.

The railroad divisions affected by the recommendation are the Sacramento division of the South Pacific, 157 miles from Roseville, Cal., to Sparks, Neb.; the Shasta division of the Southern Pacific, 215 miles from Gerber, Cal., to Ashland, Ore.; and the San Joaquin combination division of the Southern Pacific and Santa Fé railroads, 138 miles from Bakersfield to Saugus.

With oil valued at an average figure of \$2.02 a barrel and electricity at 0.75 cent per kilowatt-hour (a total of \$2,000,000), the annual saving in the cost of power is \$4,147,000 in favor of electrification. The purchase of hydroelectric power is contemplated throughout the report, but it is pointed out that even if the electricity were generated by oil there would be a saving of about half the consumption now used as locomotive fuel.

The following table gives the power required and the fuel oil saved by the proposed electrification:

Division	Kw.-Hr. per Year	Maximum Kw. Demand	Barrels of Oil Saved
Sacramento	104,200,000	47,600	978,000
Shasta	73,200,000	33,400	907,000
San Joaquin	89,000,000	40,000	1,177,000

A summary of the first costs after deduction of salvage, the percentage of profit on the net investment and the annual saving obtained in each of the three districts considered in the report is given as follows:

Division	First Cost	Annual Saving	Per Cent. Saving*
Sacramento	\$8,100,000	\$1,592,600	7.6
Shasta	8,038,000	1,903,800	11.7
San Joaquin	6,784,000	1,426,900	8.7
Total	\$23,012,000	\$4,923,300	9.4

* After deducting 12 per cent for depreciation, amortization, taxes and interest.

The total first cost is as follows:

Substations, at \$45 per kw	\$8,100,000
Track bonding, at \$1,000 per mile of main track and \$800 per mile of sidings	851,000
Transmission line, at \$8,000 per mile	3,760,000
Contact system, at \$8,000 per mile of main track and \$6,000 per mile of sidings	6,620,000
Block signal changes	1,166,000
Inspection shops and sheds	45,000
Electric locomotives, at \$600 per ton on drivers	8,910,000
	\$29,452,000
Credit for steam locomotive equipment released	6,440,000
Total net cost	\$23,012,000

The estimate for locomotives includes twenty 150-ton passenger, sixty-three 100-ton freight and ten 100-ton switching locomotives.

The power requirements for the proposed electrification are estimated as follows: 730,000 kw.-hr. per day, 267,400,000 kw.-hr. per year, 121,600 kw. maximum demand and 30,400 kw. average demand.

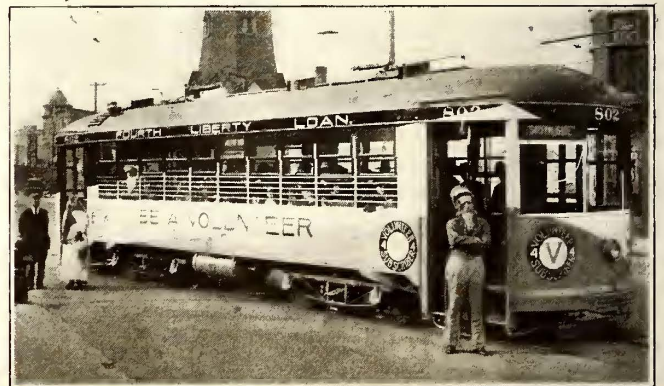
A part of the report follows:

Railroads consume more coal and fuel oil than any other single industry. Over 20 per cent of the annual production of coal and fuel oil in the United States is consumed by the railroads, and half this amount is wasted by the inherent inefficiencies of steam locomotives. Western railroads consumed 31.2 per cent of California's 1917 production of fuel oil.

The great saving in locomotive fuel by the generation of power in central power plants is made possible by reason of the fact that the steam locomotive carries its power plant on its back and consumes a large portion of its energy in carrying its own fuel. Roughly, about 12 per cent of the energy of the locomotive fuel supplied to the steam locomotive is used in hauling its own fuel in tenders and in coal cars or oil tank cars to the distributing points along the line. Other large wastes of fuel are occasioned by the starting of fires, keeping hot and standing at sidings. In mountain districts there is the added waste of keeping up steam on the long downhill grades and more inefficient utilization of fuel on the uphill grades, especially in starting.

Special Liberty Loan Car

A VERY effective Liberty Loan car was put in service for the Liberty Loan week at South Bend, Ind., on the Chicago, South Bend & Northern Indiana Railway Company's line. It was not simply decorated by bunting but especially painted for the occasion. The car selected was one of the new 800-type of cars which happened to be in the paint shop at the time. Broad stripes of red, white and blue running diagonally across the car from vestibule corner post to vestibule corner post and from roof eave to lower step gave the car a



THIS CAR WAS PAINTED RED, WHITE AND BLUE

very striking and patriotic appearance. Then the lettering shown in the illustration was placed on the sides, and on both ends.

The plan was carried out by L. E. Hollar, superintendent of transportation, who was also chairman of the advertising for the railroads in St. Joseph County for the Fourth Liberty Loan drive. The car was put in service on Sept. 28 and F. Stevens, dressed as Uncle Sam, was motorman, and Miss Hazel Hollar was Miss Liberty and acted as conductor and collected fares. Later others acted in these capacities and the car has operated on all of the lines of the company, in fact, it was kept in service for some time after the loan closed and was known as the "Red, White and Blue Car."

AMERICAN ASSOCIATION NEWS

Electric Railway War Board Bulletin

IN THE report of the war board, presented at the New York conference, a list of the bulletins issued by the board was included. For purpose of reference the list is reprinted below:

- Bulletin No. 1. Coal Conservation.
- Bulletin No. 2. Public Improvements.
- Bulletin No. 3. Trainmen's Pledges; Coal Report.
- Bulletin No. 4. Organization of Traffic Bureau.
- Bulletin No. 5. Traffic Information Wanted.
- Bulletin No. 6. Expenditures for Public Improvements; Coal for Electric Railways; Co-operation of State Commissions; Information as to Conservation Activities; the War Board Pledge; Newspaper Clippings.
- Bulletin No. 7. Report on Coal Savings in Washington.
- Bulletin No. 8. The Controller of the Currency Urges Authorities and Public to Assist in Maintenance of Public Utility Credit.
- Bulletin No. 9. Bill to Provide for Taking Over Certain Electric Railways (Shipping Board Act).
- Bulletin No. 10. War Finance Corporation Measure.
- Bulletin No. 11. Correspondence Between the President and the Secretary of the Treasury.
- Bulletin No. 12. Organization and Fuel Supply.
- Bulletin No. 13. Government Control Act (Steam Lines).
- Bulletin No. 14. Unnecessary Improvements.
- Bulletin No. 15. Transportation—Shipbuilding Plants, with Questionnaire.
- Bulletin No. 16. Return Loads Bureaus, with Pamphlet.
- Bulletin No. 17. Electric Railways "War Utilities."
- Bulletin No. 18. Power to Take Over Electric Lines (Shipping Board Act as Passed).
- Bulletin No. 19. Rules Governing Procedure for Taking Up Industrial Disputes with the National War Labor Board.
- Bulletin No. 20. Local Transportation in Housing Act.
- Bulletin No. 21. War Finance Corporation Urges Public Utility Commissions and Municipal Authorities to Allow Companies to Increase Fares.
- Bulletin No. 22. United States Chamber of Commerce Acts.
- Bulletin No. 23. Federal Control of Utility Rates.
- Bulletin No. 24. Transportation of United States Mail by Electric Railways.
- Bulletin No. 25. National War Labor Board Ruling Regarding Policy of Board.
- Bulletin No. 26. Announcement Decisions National War Labor Board in Twenty-two Electric Railway Cases.
- Bulletin No. 27. Letter to the President from the National Association of Railway and Public Utilities Commissioners Relating to Increased Rates.
- Bulletin No. 28. Letter from Capital Issues Committee to State Public Utility Commissioners on Non-essential Improvements.
- Bulletin No. 29. Skip Stops—U. S. Fuel Administration.
- Bulletin No. 30. Operation of the Draft.
- Bulletin No. 31. Priorities Classification.
- Bulletin No. 32. Non-War Construction—War Industries Board.
- Bulletin No. 33. National War Labor Board Decision in Birmingham Case, Declining Jurisdiction.
- Bulletin No. 34. Non-Essential Improvements—Capital Issues Committee—War Industries Board.
- Bulletin No. 35. Conservation of Non-Ferrous Condenser Tubes—War Industries Board.
- Bulletin No. 36. Comparative Income Account of 388 Electric Railways.
- Bulletin No. 37. Tie Requirements.
- Bulletin No. 38. National War Labor Board Decisions in Ten Additional Electric Railway Cases.

Stirring Meeting at Manila

FIVE HUNDRED employees of "Meralco," including 186 members of the company section, attended the meeting of this section held on Sept. 3. The guest of honor was Carl W. Hamilton, president Visayan Refining Company, who gave a patriotic address which aroused real enthusiasm. He paid a glowing tribute to the part which America has played in world events, such as the opening up of China and Japan, leading naturally to the circumstances of the war just closed. He showed that America purposes to do for the Philippines what she has done for other rising and struggling peoples. Prophesying that America will come out of the war the richest nation on earth, the one with the greatest navy and the largest merchant marine, he said that there is no reason why the \$1,000,000,000 spent by America in tropical products yearly should not be

spent in the Philippines. He urged the development of the Philippines on a high plane, stating: "The Filipinos have religion; they have manners and many other splendid characteristics in common with the great Western nation. If for no other reason we must not sit back and allow other nations, whose religion is constituted of the so-called 'non-Christian' type, to develop this great country to the detriment of Christianity and the highest ideals which the world has ever seen." He urged for those present the development of the highest type of spiritual life.

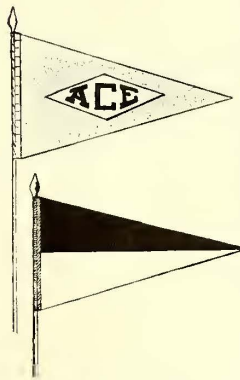
Following Mr. Hamilton, C. N. Duffy, who has just resigned the vice-presidency of the company, told briefly the story of Mr. Hamilton's life. From the standpoint of the Philippines he said: "We must learn to appreciate our advantages. We must wake up to the situation. As Mr. Hamilton has well said, 'the Philippines, the people in the Philippines, a Christian people and an educated people, and practically a people as an independent nation, should be leading the Orient.'"

Following the speeches the audience was entertained by a "pulsator sketch" followed by a violin solo, a poem and songs from President Bury, sword fencing and two four-round boxing contests.

Fuel Economy in New York Bus Service

Rivalry of 400 Bus Drivers for Title of "Ace"
Brings Average Mileage per Week from
6 Up to 6.82 Miles per Gallon

THE fuel economy "ace" has arrived; he is a product of the Fifth Avenue Coach Company of New York. The ace is the driver who runs his bus with the lowest fuel economy per mile for a given week. One ace is chosen from each garage where the buses are taken care of and the winning drivers are permitted to carry the ace flag on their buses until a rival driver takes the honor away from them. In addition to the ace flag the company uses an honor flag which is given to the driver with the second best record each week. The ace flag is a green triangular pennant in the center of which is a gold colored diamond carrying the word "Ace" in green letters. The honor flag is a triangular pennant half blue and half gold. When the ace system was started last July the buses averaged



FUEL ECONOMY ACE
AND HONOR
FLAGS

6 miles per gallon of fuel. In less than two weeks after the system was inaugurated the fuel average was increased to 6.75 miles per gallon. Many drivers are now far above this figure. One driver now has a reputation of 9.8 miles per gallon of gasoline.

The buses are all of double-deck type, using four-cylinder engines with 4-in. x 6-in. cylinders. Each bus loaded weights 16,000 lb., and the average service consists of ten stops per mile. Nearly all of the driving is on hard asphalt pavement. Under this economy system each bus has actually saved on an average about 4 gal of gasoline per week.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Seattle Votes for M. O.

Immediate Steps to Be Taken to Buy
Puget Sound Lines for Sum
of \$15,000,000

The city of Seattle on Nov. 5 voted nearly 3½ to 1 in favor of buying the street car lines of the Puget Sound Traction, Light & Power Company for \$15,000,000. A preliminary note in regard to this was published last week.

The City Council and Mayor Hanson will take immediate steps to close the deal for the purchase. While no definite date has been set, it is believed the negotiations will be completed by Jan. 1. The Department of Public Utilities has gathered much of the data required by the corporation counsel. The city and the company have agreed upon a division of the real estate and the placing of some of the property in escrow or the provision of title insurance to protect the city.

The purchase of the property of the Seattle & Rainier Valley Railway lines is part of the general scheme for a street railway system owned by the city. The company has offered the property to the city for \$1,600,000.

One question to be settled relates to the contract by which the Puget Sound Traction, Light & Power Company will sell the city electric power to operate the street railway system until the Skagit power plant is completed. The company has agreed to a tentative contract to sell the city power for 1 cent a kilowatt, but city officials have raised the question of what may happen if the Public Service Commission should later decide that this was not enough to give the company a fair return on the investment.

The local union has voted to withdraw the request filed with the National War Labor Board for a hearing on the Seattle wages. The business agent of the union, in discussing the election returns, said: "The union is more than pleased with the result of the election. Its members worked faithfully to bring out votes for the purchase. The wages the city now pays carmen on the municipal lines are nearly as high as we had asked of the traction company."

The Mayor and the City Council of Seattle have been notified that the loan of \$300,000, which the Emergency Fleet Corporation had agreed to make to the city for extensions to the municipal railway system and for purchase of new cars, will not be made. The Council had proceeded with the purchase of six single-truck and twenty-five double-truck cars, costing \$217,000. The cars had been delivered

in Seattle and were being placed in service. The City Council, upon receiving advice that the government would not finance the loan, immediately made plans to care for the proposition. A requisition was issued for \$169,025 to pay for the twenty-five cars delivered, and \$217,000 will be transferred from the general fund to the street railway fund. The transfer will make the general fund short by \$277,000.

Louisville Wages Adjusted

Increase Granted by Company Is Accepted—More Wages if Fare Is Increased

Under an agreement signed by representatives of the Louisville (Ky.) Railway and its unionized employees, in accordance with an understanding reached on Oct. 24 before the War Labor Board, the 7-cent increase previously granted by the company is accepted. The company, however, has agreed to add 7 cents more an hour to the pay should the city permit it to advance the city fare to 6 cents. The union has reserved the option to appeal to the War Labor Board after Jan. 1 for another increase, whether the fare advance is permitted or refused.

Under the contract urban motormen and conductors receive 34 to 38 cents an hour, and those on suburban cars receive 35 to 39 cents. In addition, they are to get time and a half after regular runs have been finished on the ten-hour day basis, ten minutes' pay for work they are required to do each morning preparing to take their cars from the carhouses, and fifteen minutes' pay for making out reports of accidents.

The original demand of the union was that the wage scale for experienced motormen and conductors should be increased to 45 cents an hour, and that of new men to 41 cents. The present standard of 38 and 34 cents respectively was fixed on Sept. 1 by the company after the matter was taken before the War Labor Board on Aug. 15. Before then the rate was 31 cents and 27 cents.

Under the settlement now agreed upon the men receive back pay from Aug. 15 to Sept. 1. The agreement provides for a continuation of the increase of 22.5 per cent allowed on Sept. 1 to shopmen, power-house men and trackmen.

The new contract holds good until Jan. 1. The union agrees that it will not go before the War Labor Board to ask for any increases in pay before that date. The contract provides for the arbitration of future differences.

B. R. T. Wreck Investigation

Motorman Said to Be Incompetent—
City Will Not Pay Damages Out
of Its Share of Earnings

The investigation into the causes of the recent accident on the Brooklyn (N. Y.) Rapid Transit Company's Brighton Beach line has been postponed during the past week on account of the effect of the war news. At one short hearing the testimony tended to show that the motorman who had charge of the wrecked train had not received the usual instruction given motormen before they are permitted to operate trains in regular passenger service. At a later hearing steps were taken to ascertain the exact division of authority between officials of the Brooklyn Rapid Transit Company and officials of its various operating subsidiaries.

The Public Service Commission has informed the directors of the New York Consolidated Railroad, the subsidiary which operates the elevated lines of the Brooklyn Rapid Transit Company, that it purposes to enter an objection on behalf of the city against any attempt of the company to include wreck damages in the financial accounting to which the city is a party under the provisions of contract No. 4 of the dual system of rapid transit. The commission, in a letter to the company, also objects to the inclusion in the joint accounting of any legal or other expenses, and especially such expenses as may be incurred in criminal proceedings against officers or employees of the company. If any such expenses were so included, it is said, they would thereby increase the city's deficit.

The commission also raises the question, to which it has directed its counsel to give attention, whether the methods of maintenance and operation employed by the company and particularly the facts of the particular accident in question do not constitute a forfeiture or default of the whole contract for operation by the Brooklyn company. This contract provides that the dual system lines must be operated "carefully and skillfully according to the highest standards of railway operation, with due regard to the safety of passengers and employees thereof and all other persons."

The Board of Aldermen has adopted a resolution calling upon its committee on public welfare to prepare ordinances to make for safer traveling facilities and to prevent the employment of green motormen by any electric railway in New York City.

Public Control for Buffalo

Agreement Reached Between City and Company to Drop Litigation and Adopt Massachusetts Plan

An agreement was reached on Nov. 13 between the International Railway, Buffalo, N. Y., and the municipal authorities whereby all pending litigation will be dropped and the so-called Massachusetts plan of electric railway operation and control will be put into effect in this city. Edward G. Connette, president of the company, offers to co-operate with the City Council to determine a fair valuation of the company's properties within the city of Buffalo.

In a statement, President Connette said:

"Upon receiving assurances of a fixed return and of proper provisions for maintenance and upkeep of the property, we will agree to any form of management the Mayor wants. Nothing can be more liberal than that. Furthermore we will then agree to place the city properties in such position that ultimately the city can buy them out of surplus earnings or whenever it has the power to do so. This meets the wishes for municipal ownership. I can guarantee the resignation of the present management in its entirety whenever the city or anyone else is in a position to manage and protect the property, giving us a fixed return on a fair valuation. If the city acts promptly, we will discontinue all litigation. This may be regarded as a complete surrender, and I hope it will bring to an end the bitter feeling against us."

Petitions for a referendum on the 6-cent fare resolution enacted by the City Council are being circulated and will be filed within the next few days. The filing of these petitions automatically suspends the operation of the 6-cent fare resolution until Feb. 20, 1919, the earliest date for another referendum on the action of the City Council. The new agreement between the city and the traction company would put an end to this litigation and would be a solution to the street car problem.

CITY COUNCIL FAVORS PLAN

The agreement between the city and the company will necessitate action on the part of the State Legislature, but President Connette assured the Council that the International Railway would join the city in its efforts to secure the enactment of the necessary legislation. All of the members of the City Council favor the proposed plan.

J. C. Brackenridge, formerly of the Brooklyn Rapid Transit Company, who was retained by the municipal authorities last winter to make a survey of traction conditions, stated in his report that all the physical properties could be replaced new for \$26,210,080, and that after allowance for depreciation the property was not worth more than \$20,170,851. Of this amount the properties in the city are said to represent

\$13,261,622. The bonded indebtedness amounts to \$75,585,000.

By basing a rate of fare upon a fair valuation of the International properties within the city of Buffalo, municipal authorities believe that the company could be guaranteed an 8 per cent return with a 4-cent fare or not more than a 5-cent fare. Last year the gross operating revenues amounted to \$8,171,886, of which \$6,616,964 was derived from passenger fares in Buffalo.

In addition to defaulting on the bond interest due on Nov. 1, as announced in the ELECTRIC RAILWAY JOURNAL last week, the company has defaulted in the payment of city taxes amounting to \$409,199.20. The bond interest amounted to \$427,975. In a public statement President Connette said:

"We are using this money, which rightfully belongs to the city of Buffalo and the bondholders, to give good street car service. We will have to pay this money sooner or later. There is no escaping it. We are trusting to the sense of fairness, of justice, of the people of Buffalo to enable us to pay back this money we diverted to give good service now."

Reconstruction Bills In

Business Men Should Insist Upon Public Hearings Before Measures Are Acted Upon in Committee

A great fight is about to be staged in Congress, according to the view of well-informed Washingtonians, based upon what character of reconstruction commission or agency shall be intrusted with the work of guiding American industry during the period after the war.

TWO BILLS PRESENTED

Two important bills have been introduced in Congress dealing with this subject. One is a bill by Senator John W. Weeks of Massachusetts, which would provide for a congressional committee on reconstruction, to consist of six senators and six representatives, to be chosen half and half by democratic and republican conferences.

On the other hand, the bill by Senator Lee S. Overman of North Carolina would establish a federal commission on reconstruction, to be composed of five commissioners appointed by the President. The plan of Senator Overman is known in Washington as the administration plan and is said to have the sanction of President Wilson.

Both measures specify the character of the investigations to be made; covering problems affecting labor; capital and credit; public utilities; the results from the demobilization of industrial and military war resources; foreign trade; shipbuilding; housing; existing legislation, and other vital matters.

It is pointed out in Washington that under Senator Weeks' proposal it

would be difficult, if not impossible, in many cases to have questions decided upon a basis other than their political merits. Senator Overman's proposal, however, contemplates the appointment of business men, who might be expected to treat problems from a business point of view.

Additional bills looking to reconstruction are being introduced almost daily, and the indications are that Congress intends to have much to say about the policies to be followed.

Kickers Against Staggered Hours

The Public Service Commission for the First District of New York held a conference on Nov. 12 with representatives of business houses, industries, civic organizations and electric railway operators to determine whether it would not be possible to continue, with perhaps some modifications, the staggered-hour regulations imposed by Health Commissioner Copeland during the recent epidemic of influenza. These provided for an adjustment of business hours in various industries and lines of effort so as to reduce the congestion on the electric railway lines, including elevated and subway roads, in the morning and evening rush hours. The transportation conditions during the change were materially improved both in the morning and at night.

The conference on the subject brought out views both favorable and unfavorable. Union representatives from the clothing industries expressed general satisfaction with the results of the staggered-hour trial and desired the practice to be continued. The stereotype and printing unions, however, were adverse to any change from their old working hours. The department stores asserted that the shift of hours in their case had interfered with buying habits and was unsatisfactory to the clerks. The hearing is to be continued on Nov. 19.

Des Moines Arbitrators Raise Wages

The three arbitrators chosen to pass upon the demand of the employees of the Des Moines (Iowa) City Railway for a wage advance have granted 41 cents an hour for the first three months, 44 cents for the next three months and 47 cents thereafter.

Almost simultaneously the company filed an appeal to the State board of conciliation to secure a fare increase. The board has consented to pass upon the justice of the company's plea. The company asks for a 7-cent fare, based on the increase of \$200,000 to the payroll which, it estimates, will be added by the new rates of wages.

Previous references to the efforts of the men to get the wage question before the War Labor Board, and to the refusal of this board to act when the agreement between the company and its men provided for arbitration, were made in the ELECTRIC RAILWAY JOURNAL of Nov. 2 and Nov. 9.

Federal Labor Readjustment War Labor Board Asks Abolition After Settlement of Pending Cases—358 Cases Already Decided

With the coming of peace it is intimated in government circles that a new wage readjustment policy may be laid down by the government to cover the reconstruction period. In this connection it is noteworthy that abolition of the War Labor Board as soon as cases now in process of disposition are completed was recommended on Nov. 12 to Secretary Wilson by William H. Taft and Frank P. Walsh, joint chairmen.

The joint chairmen, in their letter, said the President had created the board to promote maximum production during the war, and that the end of hostilities had removed the reason for its existence. Cases now in progress should be disposed of, the chairmen said, because a large number of the awards will be retroactive.

Since its inception last April the National War Labor Board has made awards and otherwise disposed of 358 industrial disputes between employers and employees in war industries and industries directly essential to war production. About 100 cases are now in process and 300 unheard cases are pending.

Fifty cases have been dropped or suspended, mainly for failure of the complainants to prosecute. In seventeen cases the board did not take jurisdiction. Thirty-three cases were settled without the intervention of the board after one of the parties to the dispute had sought action by the War Labor Board. Four cases were withdrawn, and 177 were referred for settlement to other departments of the government, under rules of the board. In all, 673 cases were filed with the board between April and Nov. 1.

To Enforce B. R. T. Car Order

Justice Benedict of the Supreme Court signed an order on Nov. 12 on the application of the Public Service Commission requiring the Brooklyn Heights Railroad, a subsidiary of the Brooklyn Rapid Transit Company, to show cause on Nov. 18 why a mandamus should not issue compelling the company to put in operation 135 steel cars of the center-door type.

The application was made by William L. Ransom, counsel for the commission, who said that in 1917 the commission issued an order requiring the Brooklyn Rapid Transit Company, as the holding company, to put in operation 250 of these cars, 135 of which were to be operated on the Brooklyn Heights Railroad. The latter company operates about six different surface lines in Brooklyn. Since the commission issued the order the company, it was charged, had failed to comply with it.

The commission on Nov. 9 denied an application by the companies for a further hearing in the case, basing its

action on an opinion of Commissioner Travis H. Whitney. Mr. Whitney accused the company of resistance to legal mandates, defiance of public obligations and disregard of the comfort and safety of passengers. Similar remarks were made by Mr. Ransom in his application to Justice Benedict.

T. S. Williams, president Brooklyn Rapid Transit Company, has asked that the accusations be expunged from the record, because they are contrary to the facts and constitute a libel upon the companies and their officers. Mr. Williams says:

"There is not the slightest evidence in any of the records or elsewhere that the companies entering into the compromise agreement of Feb. 15 have failed in any respect to live up to its terms, so far as lay within their disposition and power."

New Orleans Shopmen Disappointed

Due to the award of the War Labor Board, which gives 38 cents an hour to pitmen, helpers, dopers and car washers, nearly 100 men have left the employ of the New Orleans Railway & Light Company, New Orleans, La. The men protest that under the wage scale the promotion system is destroyed, and that the man who starts to work as a car washer and knows nothing about railway work, will receive as much pay as the pitmen, who have achieved their places through years of toil. This has seriously handicapped the company and may affect the operation of power-house plants and carhouses.

State Board Seeks P. R. T. Data

The Pennsylvania Public Service Commission, through C. J. Joyce, chief of the bureau of accounts and statistics, has asked the Philadelphia Rapid Transit Company for detailed information bearing upon the company's position with respect to the pending lease between the city and the company for the operation of the city-built high-speed lines.

The commission asks the company to reply to the following question: "Will the company stipulate, and under the law is it your opinion that the company can stipulate, that if the contract be approved, it will not be used at any time to defend an action for the revision of rates?"

The commission also desires a practical illustration of the effect of the deductions from gross revenue provided for under the terms of the proposed contract as applied to the fiscal year ended June 30, 1918. It also asks for a statement of recent operating results and a complete analysis of the surplus of the company, showing the sources from which it is derived.

Another point of information requested is mileage and traffic statistics for the period of operation of transit facilities in Philadelphia by the Philadelphia Rapid Transit Company.

News Notes

Savannah Service Resumed.—The car service in Savannah, Ga., which was interrupted by strike on Nov. 1, was resumed after three days. None of the demands of the strikers was met, it is reported, and the places of strikers who did not return were filled by other employees and by new men.

Westchester Wages Raised Five Cents.—All conductors and motormen of the Westchester Street Railroad, White Plains, N. Y., on Nov. 1 received an increase of 5 cents in their rates of from 34 to 40 cents an hour. The closing date of the company's agreement with the men was advanced from June 1, 1919, to June 1, 1920.

Portland Studying M. O.—A resolution prepared by Commissioner Kellaher, providing for an investigation of existing franchises, conditions and laws with a view to the city of Portland, Ore., acquiring ownership of the electric railway system, has been passed by the City Council. Commissioners Kellaher, Bigelow and Barbur have been appointed as a committee to conduct the investigation.

Cleveland Union to Discuss City Ownership.—The local branch of the Amalgamated Association at Cleveland, Ohio, will within a short time consider a resolution pledging the support of the organization to municipal ownership of the railway. William Reo, secretary of the union, said that the first step toward municipal ownership would be the introduction of a measure in the City Council to that end. Any step taken there would call for a referendum, but if the Council does not act, then the union will aid in the initiation of an ordinance providing for city ownership.

Berkeley Asks Valuation.—On Oct. 29 the City Council of Berkeley, Cal., adopted a resolution calling on the State Railroad Commission to fix a physical valuation of the San Francisco-Oakland Terminal Railways. The valuation will be used as the basis in any negotiations between the city and the railway in the matter of operation or purchase. This action of the Council was taken because an indeterminate franchise is before it for final action. It was felt that a fixed valuation should be decided upon, thus obviating any wrangling later if the city should desire to buy the property instead of having it operated under a joint board of control.

Oklahoma Associations Combine.—The Oklahoma Gas, Electric & Street Railway Association and the Oklahoma Public Utilities Bureau have been merged into the Oklahoma Utilities As-

sociation. The officers of the new associations are: President, J. F. Owens, general manager of the Oklahoma Gas & Electric Company, Oklahoma City, Okla.; first vice-president, C. S. Thompson, manager of the Shawnee Gas & Electric Company, Shawnee, Okla.; second vice-president, J. W. Shartel, manager of the Oklahoma Railways, Oklahoma City, Okla.; treasurer, William Mee, president of the Security National Bank, Oklahoma City, Okla.; secretary, H. A. Lane, State National Bank Building, Oklahoma City, Okla.; assistant secretary, Prof. F. G. Tappan, University of Oklahoma, Norman, Okla. Feb. 13, 14 and 15 were selected as the dates for the first annual meeting of the new organization. The session will be held in Oklahoma City.

Program for Meetings

Investment Bankers' Association

On account of the prevalence of Spanish influenza in St. Louis, Mo., it has become necessary to postpone until some future date the convention of the Investment Bankers' Association set to be held in that city on Nov. 18.

American Institute of Electrical Engineers

The 344th meeting of the American Institute of Electrical Engineers will be held in Toronto, Ont., on Nov. 22 and 23, at the Engineers' Club. The technical papers to be presented are as follows:

"Electrical Power Development in Ontario," by Arthur H. Hull.

"Electrical Equipment of the Canadian Northern Tunnel in Montreal," by W. G. Gordon.

"110,000-Volt Transmission Line Over the St. Lawrence River," by S. Svenningson.

United States Chamber of Commerce

The convention of the war service committees to be held at Atlantic City on Dec. 4, 5 and 6, under the auspices of the Chamber of Commerce of the United States, will be for the primary purpose of planning reconstruction. The original plans, as previously announced in these pages, called for a war emergency and reconstruction conference, but because the war is ended everything will be centered on reconstruction.

War service committees will come together in thirty-five related groups. The plan is to form a great national advisory council with a representative from each of these groups. This council, in turn, will name a small executive committee which will speak for industries as representing all war service committees.

Some of the men who have been asked to speak at Atlantic City are James A. Farrell, John D. Rockefeller, Jr., Secretary McAdoo, Secretary Baker, Charles M. Schwab and President Wilson.

Financial and Corporate

Piedmont Is Doing Well

**Increase in Operating Cost Is More Than Met by Higher Receipts—
Net Revenue Up 16 Per Cent**

The 1917 report of the Piedmont & Northern Railway, Charlotte, N. C., shows a gain of \$299,515 or 24.5 per cent in gross revenues. This gain was brought about by the following increases: Passengers, \$157,716 or 39.5 per cent; freight, \$121,512 or 16.1 per cent; express, \$3,963 or 21.8 per cent, and other transportation, \$16,322 or 22.7 per cent.

The operating expenses increased but not to so great an extent, the rise being \$203,061 or 30.9 per cent. The largest increases were in maintenance of way and structures and in general expenses, these being \$64,378 or 84.3 per cent and \$67,089 or 34.7 per cent respectively. Maintenance of equipment rose \$19,227 or 32.8 per cent; power, \$15,190 or 11.8 per cent; transportation, \$37,114 or 21.7 per cent, and traffic, \$60 or 0.2 per cent.

The net operating revenue gained \$96,453 or 16.9 per cent. Taxes jumped, but income additions and deductions did not show material changes, and the result for the year was a gain in net income from \$182,224 to \$257,837.

In 1917 the company expended \$108,719 for road and equipment. The equipment value is now \$794,854, against which there is a depreciation reserve of \$83,451. Miscellaneous operating

statistics are given in the accompanying table.

Two army training camps—Camp Sevier, 5 miles north of Greenville, S. C., and Camp Wadsworth, 5 miles south of Spartanburg—were located on the company's lines in 1917. At Camp Sevier, tracks and station buildings were constructed at a cost of \$12,665, and at Camp Wadsworth at a cost of \$54,644 to take care of government business. The company also purchased eight passenger coaches and constructed four electric locomotives. The President's proclamation of Dec. 28, 1917, included this property under government control.

Oakland-Antioch Gaining

The operating revenues of the Oakland, Antioch & Eastern Railway, Oakland, Cal., for the twelve months ended Dec. 31, 1917, amounted to \$745,834, a gain of \$125,618 or 20.25 per cent over those of 1916. The details of the 1917 revenues follow: Passengers, \$555,432; freight, \$146,893; express and milk, \$25,403, and other sources, \$18,107.

The operating expenses in 1917 totaled \$506,677, as compared to \$437,255 in 1916, but the 1917 amount included \$15,494 for depreciation of equipment, which was not charged against operating expenses in 1916. The operating ratio decreased from 70.5 per cent in 1916 to 67.9 per cent in 1917. A total of \$19,887 in excess of the 1916 amount

COMPARATIVE INCOME STATEMENT OF PIEDMONT & NORTHERN RAILWAY FOR CALENDAR YEARS 1916 AND 1917

	1917		1916	
	Amount	Per Cent	Amount	Per Cent
Passenger revenue	\$562,566	36.9	\$401,293	32.8
Freight revenue	872,330	57.3	750,988	61.3
Miscellaneous revenue	88,777	5.8	71,878	5.9
Total operating revenue	\$1,523,673	100.0	\$1,224,159	100.0
Way and structures	\$140,722	9.2	\$76,344	6.2
Equipment	77,886	5.1	58,658	4.8
Power	144,237	9.5	129,047	10.5
Transportation	207,837	13.6	170,722	13.9
Traffic	28,871	1.9	28,811	2.4
General	260,225	17.1	193,135	15.8
Total operating expenses	\$859,778	56.4	\$656,717	53.6
Net operating revenue	\$663,895	43.6	\$567,442	46.4
Taxes	74,604	4.9	48,847	3.9
Operating income	\$589,291	38.7	\$518,595	42.5
Non-operating income	8,360	0.5	9,653	0.8
Gross income	\$597,651	39.2	\$528,248	43.3
Deductions from income	339,814	22.3	346,023	28.3
Net income	\$257,837	16.9	\$182,224	15.0

COMPARATIVE OPERATING STATISTICS OF PIEDMONT & NORTHERN RAILWAY

Calendar Years	Gross Revenue	Operating Expenses and Taxes	Operating Income	Operating Ratio (Taxes Included)	Gross Revenue per Mile of Road	Operating Expenses and Taxes per Mile of Road	Operating Income per Mile of Road
1912	\$160,344	\$106,748	\$53,596	66.6	\$3,737	\$2,488	\$1,249
1913	659,551	402,167	257,383	60.9	6,906	4,211	2,695
1914	949,914	625,570	324,344	65.8	7,850	5,170	2,680
1915	1,010,547	612,262	398,286	60.6	8,103	4,909	3,193
1916	1,224,158	705,564	518,594	57.6	9,608	5,538	4,070
1917	1,523,673	934,382	589,290	61.3	11,913	7,305	4,607

was expended for maintenance of road and equipment in 1917.

The operating income at \$206,757 represented an increase of \$54,103, or 35.44 per cent over that for 1916. The final result for the year was a deficit of \$149,989, as compared to a deficit of \$210,231 for 1916.

The passenger revenues rose from \$471,121 in 1916 to \$555,431 in 1917, owing to a steady development along the entire line. The number of passengers carried was 788,555, as compared to 722,138 in 1916. The freight revenues increased from \$108,701 in 1916 to \$146,893 in 1917, the tonnage rising from 153,027 to 186,328. These figures bear out the prediction made in the company's 1916 report, to the effect that the territory served was apparently beginning to awaken.

Duluth Net Up Six Per Cent

Higher Operating Expenses, However Absorbed All But \$17,800 of the Revenue Increase

The gross operating revenues of the Duluth-Superior Traction Company, Duluth, Minn., for the calendar year 1917 showed an increase of \$219,958 or

C. C. & C. R. Trust Earnings

Lower Income from Dividends in 1917 Caused \$59,000 Decline in Gross Income of Trust

The comparative income statement of the Chicago City & Connecting Railways Collateral Trust for the calendar years 1916 and 1917 follows:

	1917	1916
Dividends	\$1,916,831	\$1,979,750
Interest	101,682	91,256
Other income	22,338	29,662
Gross income	\$2,040,851	\$2,100,668
Interest on bonds	\$1,078,315	\$1,087,208
Bond redemption	105,000	105,000
Interest on bills payable	34,791	24,908
General expense	21,375	20,978
Taxes	25,178	26,052
Total disbursements	\$1,264,661	\$1,264,146
Net income	\$ 776,189	\$ 836,522
Dividends on participation shares	750,000	812,500
Surplus income	\$ 26,189	\$ 24,022

The outstanding point in the 1917 financial results of the Chicago City & Connecting Railways Collateral Trust was the decline of \$59,817 in gross income, mostly due to lower income from dividends. As a result the net income shrank 7.2 per cent, and the dividends on the participation shares had to be

“Operating expenses for the year 1918 by reason of war conditions have largely increased. On Feb. 1, 1918, a voluntary increase of 1 cent an hour was given all employees, making the wages of motormen and conductors 31 cents an hour. June 3, an additional 6½ cents an hour was granted to motormen and conductors and a 20 per cent increase to all other employees; the question of a further increase was submitted to the War Labor Board. This board made an award fixing a minimum of 40 cents an hour, retroactive to June 3, 1918. Cost of materials used in operation and maintenance have increased from 50 per cent to 300 per cent.

“Effective on Aug. 19, 1918, the fare charged by the company was increased from 5 to 6 cents per passenger but transfer privileges were enlarged to a considerable extent.

“The revenues from operation for 1918 up to and including July 31 fell short \$148,474 of paying operating expenses, taxes and interest on indebtedness of the company for the same period. Up to Sept. 30, after one month and thirteen days of the increased fare, the revenues from operation fell short \$203,639 of paying operating expenses, taxes and interest for the first nine months of 1918.”

COMPARATIVE INCOME STATEMENT OF DULUTH-SUPERIOR TRACTION COMPANY FOR CALENDAR YEARS 1916 AND 1917

	1917		1916	
	Amount	Per Cent	Amount	Per Cent
Operating revenues	\$1,621,952	100.00	\$1,407,511	100.00
Operating expenses:				
Way and structures	\$163,027	10.05	\$166,197	11.81
Equipment	119,106	7.34	91,571	6.50
Power	191,625	11.82	171,473	12.18
Conducting transportation	431,219	26.59	348,939	24.79
Traffic	1,747	0.11	813	0.06
General and miscellaneous	158,375	9.76	137,720	9.79
Transportation for investment—credit	2,828	0.18	2,140	0.15
Total	\$1,062,271	65.49	\$914,573	64.98
Net operating revenue	\$559,681	34.51	\$492,938	35.02
Taxes assignable to railway operations	119,708	7.38	69,512	4.94
Operating income	\$439,973	27.13	\$423,425	30.08
Non-operating income	22,435	1.38	16,917	1.20
Gross income	\$462,408	28.51	\$440,342	31.28
Deductions from income	176,611	10.89	172,341	12.24
Net Income	\$285,797	17.62	\$268,001	19.04

15.44 per cent over those of 1916. The net income, however, gained only \$17,796 or 6.64 per cent on account of the higher costs of operation.

The operating expenses during the last six months of 1917 showed a large increase owing to the increase in wages, accrued taxes and material costs. In the opinion of the company, the higher expenses will undoubtedly continue during the war.

Expenditures for additions to property during 1917 aggregated \$353,437. Of this total \$279,815 was for way and structures, \$71,013 for equipment and \$2,609 for power. The depreciation reserve on Dec. 31, 1917, totaled \$701,637.

The revenue passengers carried in 1917 numbered 32,196,521 as compared to 28,081,851 in 1916. The company earned 6.45 per cent on its common stock in 1917 as compared to 5.94 per cent for the year preceding, and 2 per cent was paid thereon in 1917 whereas no payment was made in 1916.

cut from \$812,500 to \$750,000. The surplus income for the year then showed a slight increase.

Albany Results Disappointing

A statement of results of operation by the United Traction Company, Albany, N. Y., was made to the public recently by printed advertisement over the signature of H. B. Weatherwax, vice-president. The company said:

“The management of the United Traction Company feels in duty bound from time to time to report to the public and keep it informed as to the company's financial condition, especially as affected by the recent increase of fares from 5 to 6 cents.

“The revenues from operation for the year 1917 fell short \$244,270 of paying the operating expenses, taxes and interest on the indebtedness of the company.

A., E. & C. Feels Expenses

Owing to the change in the fiscal year under the direction of the Interstate Commerce Commission, the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., did not issue a report for the year ended June 30, 1917. Its latest report, however, covers the eighteen months that came to an end on Dec. 31, 1917.

As shown by the accompanying income statements for the last half of 1916 and the entire period of 1917, the burden of higher operating costs has been felt by the company. Although the operating expenses and taxes for 1917 more than doubled those of the last half of 1916, this was not true of gross earnings, and the net income for the year was less than for the six months.

The ratio of operating expenses and taxes to gross earnings was 66.86 per cent for the second half of 1916 and 72.51 per cent for 1917. The charge to reserve for depreciation of equipment in 1917 was \$31,844, and for amortization of debt discount and expense, \$42,184.

INCOME STATEMENT OF AURORA, ELGIN & CHICAGO RAILROAD FOR LATEST FISCAL PERIODS

	Last Six Months of 1916	Calendar Year, 1917
Gross earnings	\$1,109,326	\$2,159,349
Operating expenses and taxes	741,515	1,563,900
Net earnings	\$367,811	\$595,448
Other income	202	193
Gross income	\$368,013	\$595,642
Deductions	253,425	502,546
Net Income	\$114,588	\$93,096

How to Use Ownership Certificates

The First National Bank, Cleveland, Ohio, is distributing without charge a twenty-four page pamphlet telling bankers and investors how ownership certificates should be used under the income-tax law in connection with the collection of dividends and interest payments. The chief purpose in preparing the booklet was to reduce the number of transit items which arise on account of the ownership certificates being incorrectly or incompletely executed.

The compilation was made by Charles H. Hubbell, federal tax consultant of the bank. He was formerly auditor of receipts for the Illinois Traction Company, Champaign, Ill.

Besides information on ownership certificates, the pamphlet contains data in regard to the various Liberty Bond acts and stamp taxes applicable to drafts and notes, stock certificates, powers of attorney, proxies and bonds.

Interborough Notes Sold

All of the \$33,400,000 of three-year 7 per cent convertible notes of the Interborough Rapid Transit Company, New York, N. Y., which were offered for subscription at 98½ a few weeks ago, have been sold. A notice has been sent to syndicate participants by J. P. Morgan & Company, as head of the syndicate, announcing that all members of the syndicate are relieved from all liability in connection with the underwriting.

Following the Liberty Loan campaign it was announced that a little less than one-half of the Interborough notes had been sold up to that time. During the last few days there has been a pronounced revival of activity in the bond and short-term note markets, and this no doubt has been re-

sponsible for the quick sale of the remainder of the issue. The War Finance Corporation participated in the underwriting to the extent of \$12,000,000.

Financial News Notes

Christopher Street Bonds Extended.

—The issue of \$210,000 of first mortgage 4 per cent bonds of the Christopher & Tenth Street Railroad, New York, N. Y., has been extended for five years until Oct. 1, 1923.

Successor Company Organized.—The Cincinnati, Milford & Blanchester Traction Company, Cincinnati, Ohio, was incorporated under the laws of Ohio on Oct. 24 with an authorized capital of \$400,000 as the successor by reorganization to the Cincinnati, Milford & Loveland Traction Company.

Company Loses Tax Case.—Judge McPherson of Adams County has upheld the right of the Borough of Mechanicsburg to charge an annual rental of \$1,200 to the Valley Railways. This matter has been in the courts for years. By the decision the town can now collect back claims of about \$10,000.

Oklahoma Railway Issues Notes.—The Mississippi Valley Trust Company, St. Louis, Mo., is offering at 100 and interest to net 8 per cent, \$375,000 of bond-secured 8 per cent gold notes of the Oklahoma Railway, Oklahoma City, Okla., dated Sept. 1, 1918, and due on March 1, 1921. The collateral securing the notes consists of \$500,000 of first and refunding mortgage 5 per cent gold bonds of the company due on Jan.

1, 1941, or in the ratio of 133 per cent par value of bonds to notes.

Receiver Wants to Cut Loss.—J. Moss Ives, receiver Danbury & Bethel Street Railway, Danbury, Conn., has petitioned the Superior Court for permission to discontinue the branch between Bridgeport and Long Hill. This line for 5½ miles runs over tracks of the Danbury & Bethel Street Railway and for 2½ miles over tracks of the Connecticut Company. The line has been operated at a loss, largely on account of jitneys on the same route.

New Portland Mortgage Filed.—A mortgage has been filed by the Portland Railway, Light & Power Company, Portland, Ore., transferring to the Guaranty Trust Company, New York, in trust, all real estate and properties of the company in Multnomah County and Clarke County, and in parts of Oregon and Washington. The mortgage is executed to secure the payment of the \$4,000,000 of the company's general mortgage 6 per cent gold bonds, authorized by the directors on Aug. 21.

Public Service Revenues Up Fifteen Per Cent.—The Public Service Railway, Newark, N. J., announces that its receipts have increased 15 per cent under the increase in fare from 5 to 7 cents and the imposition of a 1-cent charge for transfers. John O'Toole, secretary to President McCarter, says: "Notwithstanding the falling off in the traffic due to the influenza epidemic, the receipts since the 7-cent fare became effective on Oct. 15 have been in excess of those for the corresponding period of last year. The situation is not normal because a period of readjustment follows every change in any line, but we do know that the company's business has materially increased. The experience of the past few days and the indications for the future show that the estimates were about correct."

Electric Railway Monthly Earnings

ATLANTIC SHORE RAILWAY, SANFORD, ME.					
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '18	\$13,689	\$12,451	\$1,238	\$612	\$626
1m., Sept., '17	18,378	12,044	6,334	431	5,903
BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.					
1m., Sept., '18	\$83,952	*\$49,452	\$34,500	\$19,983	\$14,517
1m., Sept., '17	80,836	*42,701	38,135	19,000	19,135
12m., Sept., '18	924,778	*559,287	365,491	237,202	128,289
12m., Sept., '17	871,269	*496,695	374,574	224,813	149,761
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.					
1m., Sept., '18	\$173,242	*\$130,164	\$43,078	\$31,959	\$11,119
1m., Sept., '17	72,342	*129,262	†56,920	29,539	†86,459
12m., Sept., '18	1,677,838	*1,399,442	278,396	374,184	†95,788
12m., Sept., '17	1,347,092	*1,023,185	323,907	357,053	†33,146
COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO					
1m., Sept., '18	\$331,983	*\$272,316	\$59,667	\$59,093	\$574
1m., Sept., '17	349,881	*244,555	105,326	42,209	63,117
12m., Sept., '18	4,222,247	*3,112,973	1,109,274	649,705	459,569
12m., Sept., '17	3,884,890	*2,664,680	1,220,210	543,204	677,006
COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.					
1m., Sept., '18	\$1,920,908	*\$1,307,461	\$613,447	\$514,123	\$99,324
1m., Sept., '17	1,695,725	*1,058,018	637,707	442,529	195,178
12m., Sept., '18	21,498,459	*14,486,921	7,011,538	5,849,712	1,161,826
12m., Sept., '17	18,843,595	*11,290,067	7,553,528	5,178,205	2,375,323

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

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.					
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Aug., '18	\$224,382	*\$157,609	\$66,773	\$38,602	†\$48,185
1m., Aug., '17	210,459	*123,538	86,921	29,149	57,772
12m., Aug., '18	3,153,395	*1,823,366	1,330,029	341,675	†1,093,769
12m., Aug., '17	2,178,387	*1,271,677	906,710	349,938	556,772
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.					
1m., Aug., '18	\$26,279	*\$19,923	\$6,356	\$8,350	†\$1,994
1m., Aug., '17	23,298	*18,663	4,635	7,546	†2,911
12m., Aug., '18	310,221	*231,244	78,976	96,238	†17,262
12m., Aug., '17	305,834	*227,882	77,952	87,888	†9,936
PENSACOLA (FLA.) ELECTRIC COMPANY					
1m., Aug., '18	\$48,779	*\$32,904	\$15,875	\$8,401	\$7,474
1m., Aug., '17	34,399	*19,932	14,467	7,833	6,634
12m., Aug., '18	443,339	*286,007	157,332	96,363	60,969
12m., Aug., '17	319,397	*185,338	134,059	93,221	40,838
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY					
1m., Sept., '18	\$2,728,887	\$1,672,385	\$1,056,502	\$818,881	\$237,621
1m., Sept., '17	2,419,584	1,389,338	1,030,246	811,165	219,081
3m., Sept., '18	8,180,341	5,196,173	2,984,168	2,451,526	532,642
3m., Sept., '17	7,293,659	4,223,780	3,069,879	2,434,936	634,943
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.					
1m., Aug., '18	\$1,021,191	*\$644,712	\$376,479	\$263,708	\$112,771
1m., Aug., '17	774,847	*490,870	283,977	196,691	87,285
12m., Aug., '18	11,173,578	*6,936,225	4,237,353	2,693,734	1,543,619
12m., Aug., '17	8,837,724	*5,388,166	3,449,558	2,275,183	1,174,375

Traffic and Transportation

Youngstown Plans Presented

All the Lines There Would Be Routed Through the Public Square and Past a Waiting Station

Plans formulated by Peter Witt for Youngstown, Ohio, call for the erection of a large waiting and comfort station and the rerouting of all the lines of the Mahoning & Shenango Railway & Light Company entering the Public Square. The comfort and waiting station will be approximately 100 ft. long and will be erected in the center of the street. It will be constructed of brick and be modern in every respect. The comfort station will be underneath the waiting station, which will provide ample room for both.

According to the plan as reported by Mr. Witt, all city lines will terminate at the Public Square. This, he explains, is necessary in order to provide adequate service for all the lines.

Work on changing the tracks and building the station will not be started before next spring, Mr. Witt stated, which will provide the railway adequate time to secure the necessary material to make the changes.

Plans have been worked out for the erection of a temporary shelter on both sides of the square this winter, Mr. Witt states. The shelter will be constructed of sheet metal and will provide adequate shelter until the permanent station is erected in the spring.

Starting on Nov. 3 the new plan, announced by Mr. Witt several weeks ago, terminating all city lines at the square, was to go into effect.

Passengers coming into the city will be expected to pay their fares when they board the car, while those leaving the city will pay when they get off. Mr. Witt explains that this will be one of the first steps toward improving service. On the lines where traffic is not exceedingly heavy, the motorman will have entire charge of the car and passengers will be requested to pay their fares as they board the car. Mr. Witt states this will relieve a number of conductors who will be available for motormen and enable the company to place some of the idle cars in service.

Another Georgia Petition Entered

The Georgia Railway & Power Company, Atlanta, Ga., has appealed to the City Council for financial relief in the shape of a 6-cent fare. The company states that it is confronted with the possibility of a wage increase, which cannot be met from present revenues, and that it has suffered loss of revenue and increase in expenses on account of an unprecedented drought and the influ-

enza epidemic. It asks, therefore, that the city consent to an increase in the fare until normal conditions are restored.

Several months ago, when the company petitioned the Georgia Railroad Commission for an increased rate, the commission refused to grant a higher fare because the regulatory law expressly prevented it from exercising supervision over already existing franchises. The commission, however, recommended that the City Council grant a 6-cent fare, which the Council refused to do. Mandamus proceedings were then brought to compel the commission to take jurisdiction, and this case is now pending before the higher courts on appeal.

Another Adverse Columbus Ruling

United States District Judge Howard C. Hollister rendered a decision on Oct. 29 adverse to the claims of the Eastern bondholders of the Columbus Railway, Power & Light Company, Columbus, Ohio. He ruled that the company could not escape the provisions of the ordinance under which it has been operating and stated that all the points made by Judge D. C. Westenhaver in a recent decision on similar claims were well taken.

With the exception of the question of complainants' capacity to sue, he said Judge Westenhaver's opinion was applicable to this case. According to Judge Hollister the authorities quoted by the complainants' attorneys to sustain the claim that the franchise might be set aside because of the peculiar conditions existing at present had no bearing on this case. Among other things, he said:

"A novel feature of prime importance lies in the claim of the complainants that the doctrine of implied conditions in the law of contracts is applicable to the facts stated in the bill. If this were the case, a contractor, who by reason of labor trouble or advanced cost of materials was forced into bankruptcy, could urge these reasons for being released from his contract and held without damages for its non-performance."

The bondholders sought to set aside the franchise on the ground that the company could not operate at the present rate of fare because of the greatly increased cost of labor and materials.

The United States Supreme Court on Nov. 4 granted a motion for certiorari advancing for argument early in December the case of the Columbus company arising from the denial by Judge Westenhaver of an injunction against the enforcement of confiscatory fare restrictions.

Influenza Epidemic Obscures Fare Results

Public opposition to the 8-cent fare together with the influenza epidemic in Scranton and Wilkes-Barre, Pa., has caused a decrease in fare receipts of the railways operating in these places which amounts to from 25 per cent to 30 per cent over the receipts for September.

In March of this year both the Scranton Railway and the Wilkes-Barre Railway increased their fare from 5 cents to 6 cents. There was no noticeable falling off in the number of people traveling at this time, but in June a great many men were drafted or went into war industries at other points so that there was a falling off in traffic due to the decrease in population.

On Sept. 15 in Scranton and Oct. 1 in Wilkes-Barre the fare was increased from 6 cents to 8 cents. This increase came just as the influenza epidemic was beginning to be felt. On Oct. 11 all schools, churches, theaters, moving-picture shows, saloons and soda fountains were closed and orders were issued to close all stores at 5 p.m. including Saturdays. This, of course, caused a large decrease in passenger traffic, and the desire of many people to keep in the open as much as possible caused many people to walk to and from their work. A great many will, probably, continue to walk after the epidemic has subsided, but at this time it is impossible to determine how much of the present decrease is due to the increase in fare.

Fitchburg & Leominster Fare Increase Advocated

An advance in fares from a 5-cent to a 7-cent basis was advocated by the Fitchburg & Leominster Street Railway at a recent hearing before the Massachusetts Public Service Commission. The company also proposed to sell eight tickets for 50 cents with pupils' tickets at half this rate. Existing pupils', 5-cent fare and workmen's tickets (between Shirley and Ayer and in Lunenburg) are to be abolished.

In its appeal to the board on behalf of the proposed rates the company pointed out that the increasing cost of operation and additional necessary charges will require an additional revenue of \$77,146 a year in order to maintain the present 6 per cent dividend rate. Additional wages, \$53,006, are based on a 30 per cent increase over the payroll of the fiscal year 1918. Increases of 10 to 20 per cent over the wage rates in effect during most of the year to June 30, 1918, are now being paid. The company pointed out the advance in material prices since the year before the war broke out and it was shown that there was a balance of only \$2,340 at the end of 1917 after the payment of 6 per cent dividends for that year. The road operates 41.5 miles of track and its gross earnings for the year 1917 amounted to the sum of \$402,179.

Low State Rate Confiscatory

Illinois Authorities Forbidden by Court to Interfere With Increase— Commission Grants 3 Cents a Mile

A decision in the case of the Alton, Granite & St. Louis Traction Company, complainant, vs. Edward J. Brundage, attorney general of the State of Illinois, Hubert E. Schaumleffel, State's attorney of St. Clair County, Illinois, Joseph P. Streuber, State's attorney of Madison County, Illinois, and Thomas E. Dempcy, Frank H. Funk, Walter A. Shaw, Fred E. Sterling and P. J. Lucey, commissioners of the Public Utilities Commission of the State of Illinois, defendants, has just been rendered in the Circuit Court, State of Illinois, St. Clair County. The case was brought as a bill in chancery for an injunction restraining the defendants from interfering with the company if it charged a higher rate of fare than that permitted by the laws of the State, and the decision of the master in chancery in favor of the complainants was approved by the court.

Briefly the decision holds that the capital stock of the company is \$3,189,000, that its indebtedness on which it has to pay interest is \$2,534,000, that its non-interest bearing debt is approximately \$200,000 and that the physical valuation of its properties is \$3,115,000. The court further finds that although the company is economically managed its income at the present rate of fare is inadequate to pay its operating expenses and fixed charges, that with certain increases permitted by the Utilities Commission the income will not be sufficient to pay these expenses "plus a fair and reasonable return on the investment," that the company has been unable to meet certain interest payments and that foreclosure proceedings would cause irreparable injury to the complainant and its stockholders. The decision continues as follows:

PRESENT RATE MEANS CONFISCATION OF PROPERTY

"The court further finds that the equities of this cause are with the complainant; that to compel the complainant to operate its road and to limit its interurban charges to the maximum rates prescribed by the laws of this State will amount to a confiscation of its property and deprive complainant of its property without due process of law in violation of the Fourteenth Amendment to the Constitution of the United States and also in violation of Sec. 2, Art. 2 of the Constitution of the State of Illinois; and that to subject the complainant to prosecution and the penalties imposed by the laws of this State for making charges in excess of the maximum rates prescribed by the laws of this State would deprive complainant of its property without due process of law in violation of the Fourteenth Amendment to the Constitution of the United States, and in violation of Sec. 2, Art. 2, of the Constitution of

the State of Illinois; and the court further finds that the complainant is entitled to relief."

The court therefore issued an order restraining the defendants named from prosecuting the company for charging a higher fare than that now allowed under the law and ordered the company to make application to the commission for permission to charge such fares as "will yield sufficient revenue to pay its operating expenses and a fair and reasonable return in addition thereto on the capital invested by complainant in its said railway system, such rate of fares to be fixed and determined by the said Public Utilities Commission."

The court then said that if the complainant should attempt to put in force a higher rate than 3 cents a mile without receiving the permission of the Public Utilities Commission, the injunction would become inoperative.

COMMISSION GRANTS INCREASE

Following the decision of the court the commission granted the right to the company to charge a fare of 3 cents a mile, beginning Nov. 10. The train or cash fare is 5 cents higher than the ticket fare when the amount of the latter is 30 cents or less, and 10 cents higher when the ticket fare is in excess of 31 cents.

Lake Erie Line Wants More

George Bullock, receiver for the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., has petitioned the City Council of Buffalo, N. Y., for annulment and abrogation of franchise provisions, transfer and other regulations between the city and the company which would interfere with increasing the fare on the company's lines between the heart of the city to Erie, Pa., to 3 cents a mile, or to authorize the receiver to charge such rates as may be fixed from time to time by the Public Service Commission for the Second District. It is the aim of the company to charge 5 cents a mile within the city of Buffalo on its interurban lines.

Lyman M. Bass, of counsel for the company, said that the Buffalo & Lake Erie Company has no connection with the International Railway operating within the city of Buffalo. Under a lease the company operates over the International tracks in Buffalo and is bound by franchise agreements not to charge more than a 5-cent fare within the city. The new fare which the company seeks to charge would be approximately 13 cents from the Buffalo & Lake Erie terminal in Buffalo to the city line. Mr. Bass said:

"We are not afraid of losing our franchise. Unless relief is granted we shall insist upon being released from its obligations."

The company's counsel says that the village boards of Westfield, Portland,

Ripley and Brockton have agreed to abrogate certain fare restrictions in franchises for a period of fifteen years from July 1, 1918. It was pointed out that the road had a deficit of \$86,000 last year. A deficit of \$200,000 is predicted for this year.

Chicago Road Gets 7-Cent Fare

The Public Utilities Commission of Illinois on Oct. 29 granted to the Chicago & West Towns Railway the right to charge a fare of 7 cents on portions of its lines upon which the fare has previously been 5 cents. The commission held that (1) in fixing a reasonable fare the entire system should be considered as a unit; (2) efforts should be made to encourage short-haul traffic and (3) the company is entitled to an increase sufficient to enable it to pay advanced costs in wages and materials that have been forced upon it by causes beyond its control.

The following rates were therefore provided: Cash fare of 7 cents or five tickets for 30 cents; 5-cent fare within the limits of any of the twelve municipalities in which the company operates; commutation ticket charges to be increased approximately 40 per cent. and on certain lines charges of 10 cents, 13 cents and 15 cents to be made. Fares for children will be 4 cents, 5 cents and 7 cents where the adult charge is 7 cents, 10 cents and 13 cents respectively. All commutation tickets that were previously issued must be accepted for passage until Dec. 1. After Nov. 30, such tickets will be redeemed by the company.

The company is required to submit monthly financial reports. Unless otherwise ordered by the commission, the new rates are not to be effective after Dec. 31, 1919. They may be discontinued at any time prior to this date.

Charlotte Wants to Know

The Corporation Commission of North Carolina certifies to the Mecklenburg court the record in the Southern Public Utilities case in which the commission allowed an increase in fares to 7 cents, so Charlotte can appeal to the Superior Court from the order of the commission. The commission holds there may be, under the Ansonville depot case passed on by the Supreme Court, no appeal from the order of the commission fixing fares but that Charlotte can go into the courts to try the contract of 1886 between the city and railway fixing the fares at 5 cents as beyond the power of the commission to change. The commission says:

"We do not believe Charlotte is or can be made such a party to this proceeding as would entitle it to prosecute an appeal from the commission's order under the rules laid down by the Superior Court in the case cited or that the question of fixing the rate of fare to be charged by the Southern Public Utilities Company is a proper question to submit to a jury, but there is raised in the record a question of the franchise

contract as to fares entered into Sept. 20, 1886, by the Charlotte Street Railway, the predecessor of the Southern Public Utilities Company, with Charlotte. It is held in many states that franchise contracts of this character do not preclude state authority from fixing rates higher or lower as conditions justify, but Charlotte is entitled to try out the issue in our own courts. Whether it is entitled to do so by way of an appeal in this proceeding is a question submitted to the courts by the certification of this record."

Transportation News Notes

Women Operators in Oklahoma.—The Sand Springs Railway, Tulsa, Okla., has several women in its employ as conductorettes.

Ten-Cent Fare Wanted.—The Valdosta (Ga.) Street Railway has petitioned the Georgia Railroad Commission for authority to increase its fare from 5 to 10 cents.

Grand Rapids Six-Cent Fare Passed.—A 6-cent fare for Grand Rapids, Mich., has been approved by the City Commission without a dissenting vote. The passage of the required ordinance is being taken up, and the increase in fare is scheduled to become effective on Dec. 4.

Jitney Competition Restored.—The City Commission of Sacramento has repealed the ordinance requiring every jitney to secure a permit before engaging as a common carrier. The commission had threatened to take this step unless the company withdrew its application to the California Railroad Commission for a 6-cent fare.

Bay State Ten-Cent Fare Suspended.—The Massachusetts Public Service Commission on Nov. 8 issued an order suspending until Dec. 10 the 10-cent fare schedule of the Bay State Street Railway, Boston, Mass., unless otherwise ordered by the commission in the meantime. Extended hearings were scheduled for the next two weeks.

New Rhode Island Rates Still in Effect.—The Rhode Island Supreme Court has handed down a rescript to the effect that the new rates recently put into effect by the Rhode Island Company under authorization by the Public Utilities Commission are to continue in force until the appeals filed by various cities have been decided upon their merits by the court.

Union Traction Gets Relief from I. C. C.—Permission to increase rates not more than 25 per cent or in excess of existing rates on competing steam carriers has been granted to the Union Traction Company of Indiana by the Interstate Commerce Commission. The increase applies between points on the

company's lines and connections in Illinois, Indiana, Kentucky, Michigan and Ohio.

Tuscaloosa Line Gets Six-Cent Fare.—The Alabama Public Service Commission has authorized the Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala., to charge a 6-cent fare within Tuscaloosa and on the loop line and a 10-cent fare on the Holt extension. The new rates were placed in effect on Oct. 27. The increase had previously been approved by the public of Tuscaloosa at a mass meeting and by the City Commission.

Winona Freight Traffic Growing.—The Winona Interurban Railway, Warsaw, Ind., is handling large quantities of freight in carload lots averaging 200 loads a month. An interchange business has been effected with the Wabash, Big Four and Pennsylvania steam lines. Many government materials, logs, etc., are being hauled. Direct connection with Chicago via boat is made during the Lake travel season for both freight and passenger traffic at Michigan City, Ind., and Benton Harbor, Mich.

New Gary Rates Asked.—Application has been made by the Gary (Ind.) Street Railway for a raise of fare from 5 to 6 cents. The company also desires an increase from 10 to 20 cents on the line from Gary to Hammond, or a little more than 1 cent a mile. It is now possible to go from the Loop, Chicago, to Gary, Ind., a distance of more than 30 miles, for 25 cents. Under the new rate it would cost 35 cents. This new rate would also be in effect between Gary and Indiana Harbor.

Will Not Refer Rates to Commission.—The committee of the whole of the Board of Aldermen of Yonkers, N. Y., to which was referred the petition of the Yonkers Railroad for an increase in fares, has decided that a reference of the question of a proper rate to the Public Service Commission would be of doubtful legality and the aldermen will not delegate any of their powers. On Nov. 14 the aldermen refused to approve two 5-cent zones for Yonkers and one 5-cent zone outside.

Memphis Asks for a Seven-Cent Fare.—The petition of the Memphis (Tenn.) Street Railway for a straight 7-cent fare will be considered by the Mayor and City Commissioners at a special meeting. It is stated that Mayor Monteverde is in favor of submitting the question to a referendum vote, even should the petition which was filed some time ago be favorably considered by the commission. Before the recent award of the War Labor Board, a 6-cent fare petition had been filed by the company, but the award makes necessary the 7-cent rate.

Influenza Affects Jersey Line.—At a fare hearing before the Board of Public Utility Commissioners of New Jersey on Nov. 4 Gaylord Thompson, vice-president and general manager of the New Jersey & Pennsylvania Traction Company, Trenton, N. J., stated that

the influenza epidemic between Trenton and Princeton had caused a large decrease in revenues. He also said that the increase in fares allowed last spring had been more than wiped out by the wage increase given by the War Labor Board. The prices of coal and materials are about the same as when the new fare was permitted.

Berkshire Increase to Be Tried.—Representatives of cities and towns have reached an agreement with the Berkshire (Mass.) Street Railway whereby the proposed fare schedule will be tried for thirty days and the company will maintain its present service. In the meantime, the representatives of both sides will endeavor to reach a compromise for a permanent arrangement. The agreement received the sanction of the Public Service Commission on Nov. 8. The new fare plan, which was filed to become effective on Nov. 12, provided for the reduction of the 5-cent fare areas in the cities, the rearrangement of the 5-cent suburban zones and the abandonment of 44 miles of non-paying lines, as noted in the ELECTRIC RAILWAY JOURNAL of Oct. 19.

San Antonio Wants Fare Rehearing.—Application for a rehearing on its rejected plea for a 6-cent fare has been filed with the City Clerk of San Antonio, Tex., by the San Antonio Public Service Company. A reference to the rejection of the company's first application was made in the ELECTRIC RAILWAY JOURNAL of Oct. 19. As to the assertion that the City Commission has no right to disregard the 5-cent clause in the franchise, it is pointed out that in the Altgelt case, brought to test the validity of the children's half-fare statute, the company contended that the 5-cent provision was a valid contract. This plea was overruled by the District Court, the Court of Civil Appeals, the Supreme Court of Texas and the United States Supreme Court, upon the ground that a city cannot contract away the exercise of the state police power of rate-making.

I. T. S. Quick to Respond with Service.—The Illinois Traction System is now operating a daily freight train between Springfield and Carlinville, Ill., to provide transportation especially for groceries and produce which are in much demand in Carlinville and vicinity. During the past year the Standard Oil Company has done some important mine development in and around Carlinville and four large mines have been opened. These shafts promise steady work and good wages for several thousand miners. As a result, the city of Carlinville, as well as adjacent towns, has experienced a boom which is conservative and stable, and the Illinois Traction System is sharing in the greatly increased business of that locality. Excellent freight service is given by this company from St. Louis, Springfield, Peoria, Decatur and Bloomington to Carlinville, and the officials of the company report greatly increased freight business in and out of Carlinville.

Legal Notes

CALIFORNIA—Degree of Care Required When Car Is Run on Wrong Track.

Though it is unusual to operate a west-bound street car on a south track, the railroad need use only reasonable and ordinary care under the circumstances, and not special and particular care. (*Busch vs. Los Angeles Railway Corporation*, 174 Pacific Rep., 665.)

NEW JERSEY—Municipal Restrictions Must Be Reasonable.

The power of a municipality to impose lawful restrictions upon granting consent to the location of tracks of a street railway is subject to the condition that they must be reasonable, not only at the time but at all times. (*Atlantic Coast Electric Railway vs. Board of Public Utility Commissioners et al.*, 104 Atlantic Rep., 218.)

NEW YORK.—Company Not Responsible for Person Injured Between Cars.

A street railroad, to reduce accidents to passengers in boarding or alighting, had been using for more than a year lower but wider cars than formerly. No order of the Public Service Commission had been made, but the engineer of the commission had supervised in part the construction of this type of car. On a section of track, where the tracks were closer together than elsewhere in the city, the clearance between the new cars was reduced to 9½ in. A pedestrian was caught between two cars and was crushed to death. Held, that the use of such cars on such tracks was not a public nuisance, the cars being of the latest and best standard type, and the right to relocate the tracks to provide wider clearance being at least doubtful. (*Levine vs. New York Railways*, 169 New York Sup., 1032.)

NEW YORK—Injuries from High Voltage under Employers' Liability Act.

Notice of a railroad company to employees to avoid high-voltage wires and stating that they assumed the risk thereof, though signed and read by an employee, did not change the rules of law governing assumption of risk, since it was not a contract, but even if it was, there was no consideration because it was signed after the original employment, and in any event it would be contrary to public policy in so far as it relieved the company from liability for its own negligence.

Risk of negligence of a fellow servant in turning on current in high-voltage wire without warning, producing an unsafe place to work, may be assumed under the federal employers' liability act, unless the place was rendered unsafe by the negligence of the master. (*Fried vs. New York, New Haven & Hartford Railroad*, 170 New York Sup., 697.)

OREGON.—Specific Performance Not Necessary in Right-of-Way Agreement.

Where plaintiffs granted right-of-way in consideration of railway's agreement to build a dike which the railway failed to build as specified in the contract, plaintiffs were not entitled to specific performance, since they could have had another build the dike and could recover as damages the cost thereof. (*Cartwright et ux. vs. Oregon Electric Railway*, 171 Pacific Rep., 1055.)

PENNSYLVANIA.—Public Service Commissions Have Power to Increase Rates.

Where contracts fixing a rate "unlimited" in time have been entered into by public service companies, the State has the right through the Public Service Commission, notwithstanding the contracts, to inquire into and adjust the rate to a reasonable basis. (*St. Clair Borough vs. Tamaqua & Pottsville Electric Railway*, 103 Atlantic Rep., 287.)

PENNSYLVANIA.—Accident on Line Operated Under Lease.

Where plaintiffs took passage on defendant's interurban car for continuous passage to a point near by in another state, knowing no other carrier than defendant, defendant company was liable for collision damages, although the fare was collected in six installments of a nickel each, and the collision occurred in the fifth fare zone, over the state line, on tracks belonging to another company on which defendant operated under an operating agreement and although defendant had no charter to operate outside the State, for defendant's liability is determinable by its express or implied contract of carriage with plaintiffs, not by its charter powers or length of its line. (*Simpson et ux. vs. Southern Pennsylvania Traction Company*, 103 Atlantic Rep., 884.)

PENNSYLVANIA.—Injury to One Passenger from Iron Pipe Carried by Another.

Street cars being for the use of people with or without their luggage, negligence cannot be inferred because a workman is permitted to carry tools, etc., and while there might be some piece of machinery or instrument so dangerous that to suffer a passenger to take it with him on a street car would be evidence of the company's negligence, that could not be affirmed of an iron pipe carried by an alighting passenger. Hence, where a passenger while entering a car was struck by an iron pipe which a workman who was leaving the car was carrying, the carrier was not liable. (*Wood vs. Philadelphia Rapid Transit Company*, 104 Atlantic Rep., 69.)

RHODE ISLAND.—Injury at Corner for Car Overhang.

A pedestrian about to cross the car tracks, being warned back by the motorman and stepping back a short distance, should have known that the car in rounding the corner would project beyond the rails. Hence she could not recover for injuries due to the fact that she failed to step back far enough

to clear the car. (*Mignault vs. Rhode Island Company*, 103 Atlantic Rep. 716.)

TEXAS—Injury to Employee Through Carelessness of Military Guard.

Where soldiers, not under the control of a railway company, were placed on guard around its power plant in the interest of the general public by the United States military authorities during a warlike situation, and not at its request, the company was not liable to a servant, shot through the negligence of a soldier. (*Sweetman vs. Laredo Electric & Railway Company*, 204 Southwestern Rep., 701.)

UTAH—No Injury to Household When Fares Are Raised.

That a street railway franchise called for commutation tickets, and in reliance thereon many persons built homes in the suburbs of the city along the street railway, does not estop the company from raising the rates by permission of the Public Utilities Commission. The constitutional provisions (Art. 1, Sec. 11) that "every person for an injury done to him * * * shall have remedy by due course of law," apply to judicial questions, and, unless a railroad rate as fixed by the Public Utilities Commission is either clearly oppressive or confiscatory, no judicial question is presented. (*Salt Lake City vs. Utah Light & Traction Company*, 173 Pacific Rep., 556.)

VIRGINIA—Prosecution of Holder of Railroad Brass Not Malicious.

Where a junk dealer was in possession of railroad brass, probable cause existed for his indictment under Code 1904, Sec. 3715, making the possession of such property, bought or received from any other person than the manufacturer thereof, or his authorized agent, or of a regularly licensed dealer therein, prima facie evidence of a fraudulent intent, and he should not recover in an action for malicious prosecution, although he was frank, concealed no fact within his personal knowledge and did not personally receive such goods. (*Virginia Railway & Power Company, vs. Klaff*, 96 South-eastern Rep., 244.)

WASHINGTON—Injunction Will Hold Against Illegal Operation of Jitneys.

Damage to a street railway by deprivation of fares by the illegal operation of jitney buses was "special damage," within the meaning of the rule permitting injunctive relief to one who unlawfully interferes with the property rights of another, though there was no actual injury to the physical property of the railway. (*Puget Sound Traction, Light & Power Company, vs. Grassmeyer et al.*, 173 Pacific Rep., 504.)

WEST VIRGINIA.—Physical Examination by Company's Physician—Special Injury Because of Enfeebled Condition.

It is doubtful whether the court has the power to require the plaintiff in an accident suit to submit to an examination by a physician of the defendant,

but the plaintiff was certainly within his rights when after submitting to one such examination he declined to submit to another except at the trial.

One suffering an injury from the negligence of another is entitled to recover all of the damages resulting from such negligence, even though, because of his enfeebled condition, the injury to him is much more severe than would have been sustained by one in good health. (*Perkins vs. Monongahela Valley Railway Company*, 95 South-eastern Rep., 797.)

New Publications

Goggles, Freight Elevators and Safe Clothing for Men and Women in Industry

Respectively Nos. 14, 15 and 16 in the series on "Safe Practices," issued by the National Safety Council, Chicago, Ill., 10 cents each.

Petroleum, an Economic Study of a Limited Resource

By C. G. Gilbert and Joseph E. Pogue, of the Division of Mineral Technology, United States National Museum. Bulletin 102, part 6, of the Smithsonian Institution, United States National Museum, Washington, D. C.

This is a part of a series entitled "Mineral Industries of the United States" and is a general study of the subject which should be of interest to electric railway men who depend upon petroleum in part or entirely for their power supply.

Efficiency in the Use of Oil Fuel

A handbook for boiler plant and locomotive engineers. By J. M. Wadsworth. Bureau of Mines, Washington, D. C. One copy free from Bureau of Mines, extra copies 15 cents each from Superintendent of Documents, Government Printing Office, Washington, D. C.

This is a very convenient handbook for users of oil fuel, containing tables of data, information regarding oil-burning apparatus and directions for operating fuel-oil plants economically. The book is of size suitable for slipping into the pocket.

Tests to Determine the Rigidity of Riveted Joints of Steel Structures

By W. M. Wilson and H. F. Moore, University of Illinois. Bulletin 104 of the Engineering Experiment Station, University of Illinois, Urbana, Ill. Copies can be obtained free from the station.

This bulletin gives the results of tests made to determine whether serious error is produced in the computation for stresses in steel frames by the assumption that the joints are perfectly rigid. The test pieces used were connections which are types common in engineering structures and which resist loads and moments by methods fundamentally different.

Personal Mention

New British President

T. R. Goodyer, Manager of Croydon Corporation Tramways, Elected as Chief Executive

The closer relations which are bound to exist between Great Britain and America after the war make a biography of the newly-elected president of the British Municipal Tramways Association of interest, especially as he is known to many American readers through visits to this country and by his writings on technical topics.

The new president, Thomas Boyce Goodyer, is tramways manager of the Croydon Corporation Tramways and has had a long experience with both municipal and private undertakings. For a number of years he was secretary of the Edinburgh Street Tramways. After an experience in a transportation way with several of the smaller tramways he was appointed in April, 1898, general traffic superintendent of the British Electric Traction Company, Ltd., owner of many of the smaller tramways systems in Great Britain. It was shortly after this that he visited the United States and Canada to study the development of the industry here. In 1901 Mr. Goodyer was appointed general manager at Croydon, for the British Electric Traction Company, the lessee of the Croydon Corporation Tramways, but when this property became municipalized in 1906, he remained with the property and has since occupied his present position.

Mr. Goodyer has been an active member of the executive council of the Municipal Tramways Association for some years. He has also been a member of the Tramways & Light Railways Association. He contributed an article on British tramway practice to the Sept. 28 issue of this paper.

I. T. S. President Returns from France

William B. McKinley, president of the Illinois Traction System, Champaign, Ill., and Congressman from the Nineteenth Illinois District, has returned from a visit of six weeks to the western battlefield in Europe. Mr. McKinley inspected 600 miles of the front during his trip and was the guest of the English and French governments. He traveled for the most part in an automobile and made a thorough investigation of the general British and French military positions.

Mr. McKinley paid especial attention to the business management of the military forces, noting the problems of transportation, electric lighting, feeding, clothing and arming the allied troops. He was much impressed with the double-track railways constructed in France and equipped with

American locomotives, as well as by the electric lighting plants which have been set up in various parts of the allied fronts. The general splendid business efficiency manifested by the American, British and French armies was a theme of special consideration by Mr. McKinley.

Mr. McKinley was accompanied on the trip by Newton M. Harris, vice-president of the First National Bank, Champaign, Ill.

E. E. Corken has been appointed secretary of the Springfield (Ill.) Consolidated Railway to succeed E. L. Maxwell.

W. S. Dixon has been appointed master mechanic of the Connecticut Company at Waterbury to succeed E. F. Mott.

James Funderburg has been appointed superintendent of the Springfield (Ohio) Railway to succeed E. B. Gunn.

J. S. Wathey has been appointed purchasing agent of the Butte (Mont.) Electric Railway to succeed William Hosking.

S. A. Sturgeon has been appointed treasurer of the Stark Electric Railroad, Alliance, Ohio, to succeed John M. Blatt.

W. M. Varner has been appointed purchasing agent of the Western Ohio Railway, Lima, Ohio, to succeed H. L. Boysell.

J. E. Irwin has been appointed master mechanic of the Sand Springs Railway, Tulsa, Okla., to succeed T. A. Seacord.

E. Littlefield has been appointed chief engineer of the Cairo Railway & Light System, Cairo, Ill., to succeed W. C. Siebold.

J. H. Bradbury has been elected vice-president of the Denver & Interurban Railroad, Denver, Col., to succeed T. S. McMurray.

Thomas F. Morris has been appointed auditor of the Springfield (Ill.) Consolidated Railway, to succeed George Streckfuss.

N. M. Hudson has been appointed auditor of the Macon Railway & Light Company, Macon, Ga., to succeed J. J. Thames, Jr.

J. P. Pulliam has been elected vice-president of the Evanston (Ill.) Railway, with headquarters at Milwaukee, Wis.

E. P. Clawson has been appointed auditor of the Peoria Railway & Terminal Company, Peoria, Ill., to succeed J. McMahon.

M. J. Murphy has been elected president of the Georgia Light, Power & Railways Company, Macon, Ga., to succeed G. T. Toby.

D. W. Allaman, secretary of the Tulsa (Okla.) Street Railway, has also been elected treasurer of the company, to succeed A. H. Reeder.

Charles Miller has been appointed chief engineer of power station of the Connecticut Company at Hartford to succeed John Fisher.

H. W. Bathiany has been appointed purchasing agent of the Pacific Power & Light Company, Astoria, Ore., to succeed W. N. Voegtly.

A. D. Foster has been appointed auditor of the Portsmouth, Dover & York Street Railway, Portsmouth, N. H., to succeed W. A. Levitt.

C. A. Slaney has been appointed secretary and auditor of the St. Cloud (Minn.) Public Service Company, to succeed A. D. McKenzie.

W. J. Gail has been appointed superintendent of the Buffalo & Lake Erie Traction Company at Buffalo, N. Y., to succeed R. H. Douglass.

A. N. Richardson has been appointed operating superintendent of the Illinois Northern Utilities Company, Dixon, Ill., to succeed P. T. Sealey.

Wayne Warfield has been appointed superintendent of lighting of the Savannah (Ga.) Electric Company to succeed J. L. Alexander.

Charles I. Taylor has been appointed vice-president of the Black River Traction Company, Watertown, N. Y., to succeed Frank Lebkuecher.

D. E. Moran has been appointed chief engineer of power station of the Peoria Railway & Terminal Company, Peoria, Ill., to succeed A. M. Scott.

T. C. Roderick has been appointed assistant general manager of the Tri-City Railway of Iowa, Davenport, Iowa, to succeed Clark Anderson.

J. N. Hinds has been appointed master mechanic of the Dayton, Springfield & Xenia Southern Railway, Dayton, Ohio, to succeed Ira Scofield.

Lieut. Walter A. Neely, former superintendent of the New Jersey & Pennsylvania Traction Company, Trenton, N. J., has been wounded in France. He was injured about the hip and arm by a shell.

W. G. Fitzpatrick has been appointed general claim attorney of the Detroit (Mich.) United Railway and subsidiary companies to succeed F. E. Rankin and George A. Chapman, the latter being appointed assistant general claim attorney.

Walter B. Gibson, assistant treasurer of the Galveston (Tex.) Traction Company, has resigned to accept a position with the Eastern Texas Electric Company, Beaumont, Tex., as railway superintendent. Both of these properties are operated by Stone & Webster.

Robert O. Himel, assistant treasurer of the Eastern Texas Electric Company, Beaumont, Tex., has been appointed assistant treasurer of the Galveston (Tex.) Electric Company to succeed Walter B. Gibson, who has been

appointed to the position of railway superintendent of the Eastern Texas Electric Company.

George A. Chapman, formerly one of the two general claim attorneys of the Detroit (Mich.) United Railway, has been appointed assistant general claim attorney of the company and its subsidiary lines, W. G. Fitzpatrick becoming general claim attorney vice F. E. Rankin.

P. R. McComas has been named general manager of the Illinois Central Electric Railway, with headquarters at Canton, Ill. Mr. McComas has had a number of years' experience in both steam and electric railway work. He was formerly assistant general manager of the Peoria & Pekin Union Railroad, Peoria, Ill.

W. E. Wood, superintendent of the El Paso (Tex.) Electric Company, has been appointed local manager of the Galveston (Tex.) Electric Company. Mr. Wood has been connected with Stone & Webster properties since his graduation from the Georgia School of Technology in 1907. He occupied various positions with the Jacksonville (Fla.) Traction Company, including that of superintendent. He was transferred from that company to the position of general superintendent of the Houston (Tex.) Traction Company, later being appointed to the position of superintendent of the El Paso Electric Company.

W. B. Atwood has resigned as safety engineer of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, to become associated with Mr. Culbertson of the Culbertson Construction Company in general construction work. His leave taking is sincerely regretted by the Mahoning & Shenango system, with which he has been connected since April, 1918. Mr. Atwood was general superintendent of the Wheeling (W. Va.) Traction Company for two and a half years, prior to which he acted as vice-president of the Geneva, Seneca Falls & Auburn Railway, Seneca Falls, N. Y., for five years. His successor will not be appointed for the present.

H. L. Treeman has been promoted by the J. G. White Management Corporation, New York, N. Y., from industrial engineer of that organization to the position of manager of the electric department of the Eastern Pennsylvania Railways and the Pennsylvania Light, Heat & Power Company, Pottsville, Pa. Both of these utilities are operated by the management corporation. Mr. Treeman was graduated from Oklahoma Agricultural and Mechanical College in 1909, with the degree of bachelor of science, having specialized in mechanical and electrical engineering. He was associated with the Edison Electric Illuminating Company, Brooklyn, N. Y., as power engineer for a number of years. In 1915 he left the service of that company to accept the position of industrial engineer with the J. G. White Management Corporation, as above mentioned.

Obituary

Paul H. Cordes, first lieutenant of Company C, Thirtieth Engineers, was killed in action on Sept. 12 on the western front. Lieutenant Cordes was thirty-one years old. He had been in the employ of the Worthington Pump & Machinery Corporation twelve years, for the last five years holding the position of sales engineer in the Chicago office.

Ira H. Metzger was killed in the catastrophe on the Brooklyn (N. Y.) Rapid Transit System on the evening of Nov. 1. Mr. Metzger was a thoroughly trained technical man and an advertising writer of unusual ability. For the last two years he has been in charge of the copy department of Rickard & Sloan, Inc., New York. Prior to that he was associated with the Service Department of *Industrial Management* and the *ELECTRIC RAILWAY JOURNAL*. Mr. Metzger was twenty-nine years old. His many friends in trade press and advertising circles will learn of his untimely death with deep sorrow.

T. L. Robinson, of the Winnipeg (Man.) Electric Railway, died on Oct. 24. Mr. Robinson went to Winnipeg as an employee of the company last winter. He was engineer in charge of the rehabilitation of rolling stock, and the reconstruction of the cars now in service was carried out under his direction. Before going to Winnipeg, Mr. Robinson had, for a number of years, held the position of designing engineer for the McGuire-Cummings Manufacturing Company, Chicago, and was loaned by that company to the directors of the Panama Exposition at San Francisco to design electric cars capable of dealing with the enormous crowds of visitors to the exposition. His death was due to complications following an attack of Spanish influenza.

Morton F. Plant, retired, financier and yachtsman, died of pneumonia on Nov. 4 at his home in New York. Mr. Plant was born in New Haven, Conn., on Aug. 18, 1852. He was educated in the Russell Military School in New Haven, and began his business career in 1868 in the service of the Southern Express Company at Memphis, Tenn. The Plant system of railroads bore the marks of his business genius, and he served as vice-president of the system until 1902, when the system became part of the Atlantic Coast Line, in which company he was a director. He was vice-president and director of the Chicago, Indianapolis & Louisville Railway, trustee of the Connecticut Trust & Safe Deposit Company, director of the National Bank of Commerce of New Haven, chairman of the board of directors of the Southern Express Company and a director of the Shore Line Electric Railway, Norwich, Conn.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Safety Features Essential for the One-Man Car

Decision of Massachusetts Commission Expected to Exert Favorable Influence on Rolling Stock Market

A recent decision of the Massachusetts Public Service Commission is of considerable interest to the trade from the rolling stock standpoint. The Connecticut Valley Street Railway desired permission to operate its existing equipment on two branch lines with one man per car, closing the rear door except on certain trips where the traffic would warrant the use of an extra man as a conductor. In view of the present high cost of operation, the advanced price of new equipment and the state of its finances, the company felt that it ought not to go to the expense of furnishing new cars under existing conditions. The commission, however, dismissed the petition on the ground that the proposed operation of old cars unfitted with the customary safety features for one-man service would be insufficiently inside the danger line to justify the board's consent. The usual safety features in the commission's mind include the automatic control of door locks and opening, removal of power, setting of brakes and sanding rails. The commission feels that the operation of one-man cars is to be encouraged and stands ready to approve the use of new one-man cars of modern design or of old cars properly reconstructed for such use. An interesting "slant" in the decision is a statement to the effect that it is possible that in some cases all the special devices associated with automatic control might not be necessary, but the commission leaves it to the company to submit which, if any, of these features should be omitted in the interest of cutting down the first cost of providing such service. The commission intimated that apparently reasonably prompt deliveries can be expected, either of new equipment or of apparatus necessary for reconstruction.

An indorsement of this kind from a board of the standing of the Massachusetts commission of the necessity for employing safety features in the one-man car is looked upon in traction circles as a clear intimation that makeshift methods of the temporary character proposed in this case cannot take the place of an investment in the real safety car, whether that car be bought new or rebuilt to meet the new conditions. The company is not to be criticised unfavorably for seeking to solve its problem at the lowest possible cost

and in the honest belief that by the method proposed safe and satisfactory operation could be had. It appears, however, that there is a minimum expenditure which must be made in order to insure that degree of operating safety which has given the one-man car its current name of the "safety car." That point is the purchase and application of enough material to equip such a car with the fundamentally essential safety features, and beyond this, an operating company may go as far as wisdom dictates. New England has been slow to adopt the safety car in comparison with some other sections of the country. With the increasing shortage of men due to the immediate demands of the war and the remarkably promising field many of the roads in that section offer for supplying an increased and faster service of attractive character in competition with other agencies of transportation and locomotion, it would seem that the time cannot long be postponed when the safety car shall come into its own even as it has in the West and South. A decision like the foregoing is bound to exert a favorable effect on the rolling stock market within the range of its influence, and should make it easier to raise funds for such equipment even on properties at present hard pressed for revenue.

Five-Year Increase in Traction Material

The extent to which material prices have advanced in the past five years is well illustrated by the prices of typical material as billed to the Fitchburg (Mass.) & Leominster Street Railway in 1913 and 1918 which follow:

	1913	1918
Axles	\$13.50	\$36.80
Armature coils...	18.10	35.00
Babbitt .....	.25 lb.	.42 1/2 lb.
Track bolts....	5.70 keg	15.00 keg
Machine bolts....	1.86	4.64
Track brooms....	3.75	6.75
Cap and cone....	.35 each	.85 each
Cement	2.05 bbl.	3.20 bbl.
Composition castings .....	.25 lb.	.38-40 lb.
Trolley cord .....	.37 1/2 lb.	.70 lb.
Coal	4.86 ton	8.34 ton
Commutator segments	22.10 set	37.83 set
White shellac....	1.65 gal.	4.00 gal.
Foliage green paint .....	.85 gal.	2.35 gal.
Switch rubber....	.50 lb.	.90 lb.
Duck .....	.35	.50
Field coils	13.90	30.00
Journal bearings .....	.25	.40
Lumber (spruce)	28.50	56.00
Spikes	3.80 keg	14.00 keg
Transfers (per thousand) .....	.16	.22 M
Friction tape .....	.22 1/2 lb.	.46 lb.
Ties .....	.55 each	.63 each
Wheels	16.75 each	32.50 each
Wheels, trolley....	.85	1.25
Trolley wire....	1.805 lb.	.29155 lb.
Ears .....	.219	.48

Reconstruction Program Under Way

Modification of Priorities—Return of Labor to Peace Basis the Work of the Week

Reconstruction is replacing war in business circles. Many problems are involved, and serious ones. It has frequently been said that industry will find it more difficult to return to a peace basis than it was to turn from a peace to a war basis.

For some time raw materials and their fabrication have been controlled by government agencies. To suddenly release this control might mean business chaos for many months. The War Industries Board, therefore, has revised its priorities list, modified the enforced curtailment of production in a number of lines by 50 per cent and served notice that it will continue to exercise supervision over industry until peace is signed. What form a government program will take after that is not known, but there are serious doubts in Washington that existing agencies will be named. Congress is apparently becoming impatient to take the lead and to formulate its own program.

Among the modifications of previous curtailment there is announced this week the lifting by the War Industries Board of the ban on certain kinds of construction. Construction projects that do not require permits or licenses from the non-war construction section are of interest to the supplier of traction materials in the section following:

"The construction, extension, improvement, maintenance or repair of any public utility, including water supply systems, sewer systems, light and power facilities, and street and interurban railways."

Street railways have been obliged in the past to secure permits in order to procure considerable of the equipment for construction and maintenance even when contracts had previously been placed for the material. No deliveries could be made until the permit was secured. The present ruling relieves the roads of the necessity for obtaining such permits.

Even though an armistice has been signed, government contracts must be continued on a large scale. B. M. Baruch, chairman of the War Industries Board, stated a few days ago. Certain contracts, however, surely must be cancelled and already this has happened to such an alarming degree that the Chamber of Commerce has brought it to the attention of President Wilson, suggesting some announcement of the

government's policy in this connection. Major General George W. Goethals, assistant chief of staff and director of purchase, storage and traffic, has signed a statement showing that provisions have been made for the cancellation and termination of contracts before completion. To settle questions under the contract, a board of contract adjustment has been created by order of the Secretary of War. The functions of this board are to hear and determine all claims, doubts or disputes which may arise under any contract made by the War Department. The board is clothed with all powers necessary and incident to the performance of its duties.

CONTRACT ADJUSTMENT BOARD

Through the operation of the Board of Contract Adjustment, contractors supplying the army will be able to submit any differences that may arise between them and the contracting officers of the various supply bureaus to this board which will act without any of the technicalities of court procedure, thus insuring a speedy and equitable adjustment. The services of lawyers will not be necessary, as the contractor or his representative may appear before the board and state his case freely and fully with the assurance that he will be given an impartial hearing and a prompt decision. The decisions of the board will be final and conclusive on all matters submitted to it for determination, but appeals may be made to the Secretary of War.

The release of labor from war industry and its re-employment in peaceful production is receiving the attention of

the War Labor Board. Some government work, such as shipbuilding, will continue to employ large quantities of labor. Community war labor boards have been instructed to find out what the local labor needs are so that war plants can be relieved of surplus labor intelligently and quickly. Labor to be so transferred is being asked to fill out a questionnaire showing the individual past experience and individual fitness.

In all of these plans for reconstruction, therefore, every effort is being made to put business and industry on a peace basis gradually, so that there may be as little disturbance to business as is possible.

Scrap Market Quiet

Conditions Such That Lower Prices Are Expected—Consumers Not Buying

All activity has gone from the scrap iron and steel market. Consumers are terminating contracts with dealers as fast as they can and dealers consequently have no mind to purchase. Prices for other scrap metals are declining but with such a dead market in iron and steel scrap, no prices other than those that have been prevailing, namely the government prices, are quoted. These are the maximum prices and considering conditions it would not be surprising if any business done in the next couple of weeks is at somewhat lower prices. Indications on Friday were that offerings were being made at slightly lower prices than were current last week.

Washington-Virginia Specifications

The Washington-Virginia Railway, Washington, D. C., as mentioned in a recent issue of the ELECTRIC RAILWAY JOURNAL, expected delivery on Nov. 1 of twenty motor and twenty trail cars from the J. G. Brill Company. Specifications for the motor cars appeared in last week's issue. The specifications of the trail cars follow:

Number of cars ordered.....	20 trailer
Name of road.....	Washington-Virginia Railway
Date order was placed.....	June 21
Date of delivery.....	Nov. 1
Builder of car body.....	J. G. Brill
Type of car.....	Interurban passenger
Seating capacity.....	52
Weight, total.....	38,000 lb.
Length over all.....	48 ft. 0 in.
Truck wheelbase.....	6 ft. 0 in.
Width over all.....	8 ft. 2 1/2 in.
Height, rail to trolley base.....	12 ft. 1 1/2 in.
Body.....	Semi-steel
Interior trim.....	Cherry
Headlining.....	Agasote
Roof.....	Arch
Air brakes.....	Westinghouse A. M. M.
Axles.....	A.E.R.A. E-B
Bumpers.....	Brill
Car signal system.....	Electric Service Supplies
Car trimmings.....	Edwards
Couplers.....	Tomlinson
Curtain fixtures.....	Curtain Supply Co.
Curtain material.....	Pantasote
Door operating mechanism.....	National Pneumatic
Hand brakes.....	National Staffless
Heater equipment.....	Peter Smith electric
Journal bearings.....	M. C. B.
Journal boxes.....	M. C. B.
Paint, varnish or enamel.....	Brill
Registers.....	Ohmer
Sash fixtures.....	Edwards
Seats.....	Winner
Seating material.....	Rattan
Slack adjuster.....	Westinghouse
Step treaders.....	Feralun
Trucks.....	Brill, M. C. B. 2x
Ventilators.....	Railway Utility
Wheels (type and size).....	33 in. chilled iron

NEW YORK METAL MARKET PRICES

	Oct. 31	Nov. 14
Copper, ingots, cents per lb.....	26	26
Copp wire base, cents per lb.....	28.75	28.75
Lead, cents per lb.....	8.05	8.05
Nickel, cents per lb.....	40	40
Spelter, cents per lb.....	9.10	8.65
Tin, Chinese*, cents per lb.....	\$77.00 to \$77.50	74.50
Aluminum, 98 to 99 per cent., cents per lb.....	†33.10	†33.10

* No Straits offering. † Government price in 50-ton lots or more, f. o. b. plant.

OLD METAL PRICES—NEW YORK

	Oct. 31	Nov. 14
Heavy copper, cents per lb.....	23.00 to 23.50	22.50 to 23.00
Light copper, cents per lb.....	20.00 to 20.50	18.00 to 18.50
Red brass, cents per lb.....	23.00 to 24.00	22.00 to 23.00
Zinc, cents per lb.....	6.25 to 6.50	
Yellow brass, cents per lb.....	15.00 to 16.00	14.00 to 15.00
Lead, heavy, cents per lb.....	7.50 to 7.75	7.25 to 7.50
Steel car axles, Chicago, per net ton....	\$41.52	\$41.52
Old carwheels, Chicago, per gross ton....	\$29.00	\$29.00
Steel rails (scrap), Chicago, per gross ton.	\$34.00	\$34.00
Steel rails (relaying), Chicago, gross ton..	\$60.00	\$60.00
Machine shop turnings, Chicago, net ton.	\$16.00 to \$16.50	\$16.00 to \$16.50

ELECTRIC RAILWAY MATERIAL PRICES

	Oct. 31	Nov. 14
Rubber-covered wire fose, New York, cents per lb.....	34	34
Weatherproof wire (100 lb. lots), cents per lb., New York.....	38.75 to 40.00	38.75 to 40.00
Weatherproof wire (100 lb. lots), cents per lb., Chicago.....	38.75 to 39.76	38.75 to 39.76
T rails (A. S. C. E. standard), per gross ton.....	\$70.00 to \$80.00	\$70.00 to \$80.00
T rails (A. S. C. E. standard), 100 to 500 ton lots, per gross ton.....	\$67.50	\$67.50
T rails (A. S. C. E. standard), 500 ton lots, per gross ton.....	\$62.50	\$62.50
T rail, high (Shanghai), cents per lb....	4 1/2	4 1/2
Rails, girder (grooved), cents per lb....	4 1/2	4 1/2
Wire nails, Pittsburgh, cents per lb....	3 1/2	3 1/2
Railroad spikes, drive, Pittsburgh base, cents per lb.....	4 1/2	4 1/2
Railroad spikes, screw, Pittsburgh base, cents per lb.....	8	8
Tie plates (flat type), cents per lb.....	*3 1/2	*3 1/2
Tie plates (brace type), cents per lb.....	*3 1/2	*3 1/2
Tie rods, Pittsburgh base, cents per lb..	7	7
Fish plates, cents per lb.....	*3 1/2	*3 1/2
Angle plates, cents per lb.....	*3 1/2	*3 1/2
Angle bars, cents per lb.....	*3 1/2	*3 1/2
Rail bolts and nuts, Pittsburgh base, cents per lb.....	4.90	4.90
Steel bars, Pittsburgh, cents per lb.....	*2.90	*2.90
Sheet iron, black (24 gage), Pittsburgh, cents per lb.....	*5.00	*5.00
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.....	*6.25	*6.25
Galvanized barbed wire, Pittsburgh, cents per lb.....	4.35	*4.35

	Oct. 31	Nov. 14
Galvanized wire, ordinary, Pittsburgh, cents per lb.....	*3.95	*3.95
Car window glass (single strength), first three brackets, A quality, New York, discount †.....	77%	77%
Car window glass (single strength, first three brackets, B quality), New York, discount.....	77%	77%
Car window glass (double strength, all sizes AA quality), New York discount..	79%	79%
Waste, wool (according to grade), cents per lb.....	15 to 25	15 to 25
Waste cotton (100 lb. bale), cents per lb....	12 1/2 to 13	12 1/2 to 13
Asphalt, hot (150 tons minimum) per ton delivered.....	\$38.50	\$38.50
Asphalt, cold (150 tons minimum, pkgs. weighed in, F. O. B. plant, Maurer, N. J.) per ton.....	\$42.50	\$42.50
Asphalt filler, per ton.....	\$45.00	\$45.00
Cement (carload lots), New York, per bbl.....	\$3.20	\$3.20
Cement (carload lots), Chicago, per bbl....	\$3.34	\$3.34
Cement (carload lots), Seattle, per bbl....	\$3.68	\$3.68
Linseed oil (raw, 5 bbl. lots), New York, per gal.....	\$1.52	†\$1.63
Linseed oil (boiled, 5 bbl. lots), New York, per gal.....	†\$1.54	†\$1.65
White lead (100 lb. keg), New York, cents per lb.....	14	14
Turpentine (bbl. lots), New York, cents per gal.....	64	64

* Government price. † These prices are f. o. b. works, with boxing charges extra. ‡ Bid price, no quotation.

Franchises

Fayetteville, N. C.—Herbert L. Jones, Richmond, Va., has asked the City Council of Fayetteville for a franchise to construct an electric line in that city.

Track and Roadway

Alabama Power Company, Birmingham, Ala.—Plans are being made by the Alabama Power Company, which is controlled by the Alabama Traction, Light & Power Company, for improvements and additions to its system.

Washington, D. C.—A public hearing will be held on Nov. 19 before the Public Utilities Commission of the District of Columbia on the application of the Washington Railway & Electric Company for permission to construct a double track on Seventeenth Street, between H Street and Pennsylvania Avenue, to connect the lines of the company with the Capital Traction system. The cost will be about \$120,000. The Bureau of Housing, it is understood, will furnish the money for the construction, with the company depositing bonds as collateral. Its application requests authority for the issuance of bonds to the amount of \$150,000 for this purpose. If the improvement is authorized, construction work will be begun as soon as possible. The proposed link between the two railway systems is a part of the belt line proposed by Traffic Expert Beeler. Final action has not been taken on the belt-line plan as a whole.

Trenton and Mercer County Traction Corporation, Trenton, N. J.—Work will be begun shortly by the Trenton & Mercer County Traction Corporation repairing and laying new tracks in various parts of the city to fulfill the orders of the Board of Public Utilities Commissioners of New Jersey.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission for the First District has sent a letter to the Board of Estimate insisting that speedy action be taken on what is called the Ashland place agreement to amend the rapid transit contract between the city and the New York Municipal Railway Corporation so as to provide for a connection between the elevated railroad in Fulton Street and the Fourth Avenue subway. The elevated road has been reconstructed east of Nostrand Avenue but from that point west the line would be placed underground under the proposed agreement, and until the matter is decided heavy steel cars cannot be operated over the line, as the old structure is not sufficiently strong to bear their weight. Attention is called to the fact that the recent catastrophe on the Brighton Beach line was largely due to the use of wooden cars. If the Board of Estimate should refuse to approve the agreement the rest of the elevated line will be reconstructed according to the original plan and steel cars can then be used. The agreement was submitted to the Board of Estimate last December, but no action has been taken.

Brantford (Ont.) Municipal Railway.—At a recent meeting of the City Council of Brantford, notice was given of the introduction of a by-law to provide for raising \$100,000 by debentures to extend the tracks of the Brantford Municipal Railway in the Terrace Hill district, the by-law to be submitted for the ratepayers' approval at the municipal elections on Jan. 1. The estimated cost of the proposed extension is \$28,000 a mile, exclusive of equipment. The exact route has not been finally determined.

Petersburg-Hopewell & City Point Railway, Petersburg, Va.—It is reported that the Petersburg-Hopewell & City Point Railway contemplates the construction of an extension to Prince George Courthouse.

Power Houses, Shops and Buildings

Pacific Gas & Electric Company, Sacramento, Cal.—It is reported that the Pacific Gas & Electric Company has completed arrangements for the construction of a new substation at Knight's Landing, Yolo County, estimated to cost about \$250,000. The company plans to erect a new power line through Sycamore to a point near Colusa.

Georgia Railway & Power Company, Atlanta, Ga.—According to *Here We Are*, published by the Georgia Railway & Power Company, construction work has been speeded up on the various substations of the company. Work at the Boulevard substation will consist of the increase of the Lindale line transformer capacity to 6000 kva. This will be accomplished by the installation of two banks of three 1000-kva. transformers each, with a spare transformer for each bank. The transformers are to be connected 110,000 volts delta to 38,000 volts Y, and the two banks will be operated in multiple. Authority has been given for the purchase of spare transformers for the Lindale and Newnan substations.

Columbus (Ga.) Power Company.—A 7500-kw. steam turbine and two 600-hp. boilers are being installed by the Columbus Power Company, controlled by the Columbus Electric Company. A further extension of the boiler room and the installation of two more 600-hp. boilers is also under way.

Gary (Ind.) Street Railway.—The United States Housing Corporation has allowed the above concern \$170,000, which it will spend on necessary improvements. A 1000-kw. rotary unit substation is being added. The erection of 5 miles of feeder lines, an addition to the company's carhouse and enlarged storage yards are among the improvements.

Arkansas Valley Interurban Railway, Wichita, Kan.—Plans are being made by the Arkansas Valley Interurban Railway to construct a station and shops on Douglas and Waco Avenues, Wichita.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—The capacity of the power plant of the Lewiston, Augusta & Waterville Street Railway at Deer Rips has been increased from 11,000 volts to 22,000 volts. New transmission lines are being erected to Brunswick and Bath to supply additional power. New transformers and machines have been installed at the Bath station of the company and are ready for service.

Cumberland County Power & Light Company, Portland, Me.—Owing to the setting of the drawbridge between Portland and South Portland, the Cumberland County Light & Power Company has decided to relay its submarine cables between Portland and South Portland, increasing the length 760 ft.

Boston (Mass.) Elevated Railways.—The board on curtailment of non-war construction has authorized the Boston Elevated Railway to take up reconstruction work at the Clarendon Hill and East Boston carhouses, made necessary by fires on these premises. A lobby and stock room will be rebuilt at the former place, with pit extensions and increased track facilities in the yard. At East Boston thirty-two cars were housed prior to the fire and capacity for but ten cars has since been available, pits for eight cars being maintained out of doors. To enable winter inspection and housing to be carried on more advantageously an inexpensive covering will be provided, including a single tile wall, second-hand front and rear doors and I-beams salvaged from a condemned bridge. In granting the petition the board stated "that the uninterrupted operation and maintenance of street cars is as important to the community as the operation of trains is to the nation."

Columbus, Delaware & Marion Railway, Columbus, Ohio.—The electric light plant at Caledonia has been abandoned and a transmission line is being erected from the plant of the Columbus, Delaware & Marion Railway at Marion to supply current.

West Penn Power Company, Connessville, Pa.—It is reported that Sanderson & Porter, New York, have the contract for the construction of the \$5,000,000 power plant to be erected at Springdale by the West Penn Power Company, which is controlled by the West Penn Railways.

British Columbia Electric Railway, Ltd., Vancouver, B. C.—It is reported that the British Columbia Electric Railway will make considerable alterations and some new construction at its station on Carroll Street.

Consolidated Light, Heat & Power Company, Huntington, W. Va.—A 33,000-volt electrical transmission system will be erected from Ashland, Ky., to Ironton, Ohio, 5 miles, by the Consolidated Light, Heat & Power Company, which is controlled by the Ohio Valley Electric Railway. The company will also change the equipment of five of its substations in Ashland, Huntington and Ironton.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—It is reported that because of the increasing demand for power, plans are being made by the Milwaukee Electric Railway & Light Company for the construction of a new power plant.

Rolling Stock

Hydro Electric Power Commission of Ontario, Canada, has ordered a No. 2, double-end, double-track snow plow, equipped with flanges for right or left running, from the Canadian Car & Foundry Company for delivery early in December. The plow will have a clearance height of 15 ft. and is being built at the company's Amherst, N. S., works.

Winona Interurban Railway, Warsaw, Ind., is rebuilding its summer cars so that they can be used during winter months. One motor and two trail cars are being remodeled in this way. These cars are of the thirteen-bench style. They will be covered with pantasote on outside and will be equipped with automatic safety door operation. They will be remodeled so that they can be operated as one-man cars, electrically heated. The interurban cars are being equipped with electric heaters. There will be six heaters in each car auxiliary to water heaters. All cars are being equipped with Golden Glow headlights with dimming devices.

Gary (Ind) Street Railway will add ten new motor cars of the one-man type and which can be utilized as one-man or two-man cars. They will also add fourteen additional single-truck cars. These are being built by the American Car Company of St. Louis. Four trailers of the Coleman type will also be added. The ten combination one or two-man cars will be of the double-truck side middle entrance type. They will be equipped with all automatic safety devices so that they can be in complete control of the motorman when operated as one-man cars. These new cars will have four 25-hp. motors. This order is greater than that reported in these columns for Oct. 19.

Trade Notes

Bound Brook Oil-less Bearing Company announces the appointment of E. L. Evans as superintendent of plant No. 1. Mr. Evans was former chief inspector of this plant.

Railway Improvement Company, New York, announces that the Columbus, Delaware & Marion Electric Company, Marion, Ohio, has ordered fifteen Rico coasting recorders. The contract covers a complete installation for all the railroad company's interurban passenger cars.

F. Y. Stewart has been appointed manager of the tape department of the United States Rubber Company with headquarters at the company's main office in New York. Mr. Stewart was formerly manager of the Walpole Tire & Rubber Company from the time it was bought and finally absorbed by the United States Rubber Company about three years ago. The Walpole friction tape is now manufactured, sold and distributed by the various branches of the United Rubber Company in the principal cities of the

Western Electric Company, Inc., announces the election of Charles G. Du Bois as a vice-president of the company. Mr. Du Bois entered the employ of the company in 1891 at its New York office, and occupied successively the positions of chief clerk, secretary and supervisor of branch houses. In 1907 he became comptroller of the American Telephone & Telegraph Company and in this capacity inaugurated and supervised a comprehensive system of accounting for the Bell Telephone System. During the winter of 1917-1918 he was in Washington in the capacity of comptroller of the American Red Cross, which position he still retains. Mr. Du Bois is forty-eight years of age and was graduated from Dartmouth College in 1891.

Chicago Pneumatic Tool Company announces the appointment of A. M. Brown as district manager of sales, 1740 Market Street, Philadelphia, succeeding G. A. Bardeen, who remains in Philadelphia as sales representative for the company. For some time past Mr. Brown has been stationed in the New York offices of the company as assistant manager of the compressor sales division.

New Advertising Literature

Paragon Electric Company, Old Colony Building, Chicago, Ill.: Twenty-four-page booklet giving engineering information on grounding for telephone systems, telegraph systems, railway signal installations, lighting and power circuits and trolley circuits.