Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Volume 53 New York, Saturday, June 21, 1919 *Number* 25

The Last Call for Dinner

IT WAS a momentous investigation that began in New York on Thursday morning when the new Federal Electric Railways Commission held its first hearing. Practically every other course to secure justice for the electric railway companies of the country was tried before the President appointed this special commission. But although the essential nature of the properties to community development has been generally recognized and the injustice of compelling the companies to give this service at less than cost because of war conditions has been universally admitted, relief measures have been refused in many cities. Where the railway companies appealed for bread in the form of higher fares and reduced taxation, they have received a stone, and in consequence some fifty street railways are in the hands of receivers.

Now the last call for dinner has sounded. The federal authorities, with their wider view of the situation, have appointed a commission to investigate the entire subject, and this commission is now sitting. The fact that the President of the United States has thus acted ought to call forth the best efforts of every man in the electric railway industry. The constructive factors of the United States, particularly with relation to the electric railway industry of the country, ought to come forth in support of the President. The men in the industry ought to suggest remedies for all the things that they think are wrong. They know better than anyone else what is happening to the electric railways, and it is their duty now to help in recommending a solution. The burden of representing the electric railway interests in this investigation will naturally fall largely on the American Electric Railway Association and its committee of one hundred, and they should receive hearty support.

There have been so many important questions relating to the technical and engineering phases of the electric railway industry during the past thirty years that fundamental questions in connection with the earning power of these properties have been largely ignored. The consequence is that many railways which have been completely reconstructed several times during the past decades are operating under charters granted during horse-car days. The existing hearings should result in a condition which will be fair and liberal both to the investor and labor, and now is the time to get these fundamental conditions changed. By this we mean that in the future it ought to be impossible for a well managed public utility in a growing and prosperous city to be in a position where it cannot recompense both its investors and its employees adequately. Both men and owners should be paid on a parity with the conditions in other industries, with due regard, in the first case, to the skill exercised, and in the second case, to the hazards run.

The Constant-Speed Motor in Heavy Electric Traction

THE commutatorless induction motor has been considered, since its inception, a desirable source of motive power for heavy electrification, but the necessity for using two contact conductors opposed an effective barrier to its progress until within a few years. To be sure this type of motor was used abroad on the Valtellina line of the Italian State Railways, in the Simplon tunnel and elsewhere, but for years the Cascade tunnel electrification of the Great Northern Railway in Washington was the only example of a polyphase-motor-equipped road in this country. Some operating data and a brief review of the equipping of this tunnel zone by the Great Northern's electrical engineer are given elsewhere in this issue. Attention is directed especially to the striking evidence of the power of the motors furnished by an instance in which the drivers of one of the locomotives cut deep into the rails. Mr. Marshall's article is of particular interest because little has been heard of this electrification since all four of the locomotives comprising it were overturned by an avalanche of snow in 1910.

About four years ago the Norfolk & Western Railway began operation of its electric zone in the West Virginia mountains with a novel modification of the type of locomotive used in Washington, but in which only one overhead conductor was employed. Power received in single-phase form at the locomotive is transformed in an induction-type phase converter to three-phase form for use in the driving motors. The result has been a combination of the virtues of the single- phase and polyphase systems. The next step, now in process of being taken, was characterized by the Pennsylvania Railroad's exhibit at the Atlantic City convention of the past few days. This road has inaugurated a study of the qualities of the phase-converter locomotive for use on its Altoona division. As the Pennsylvania is a heavy stockholder in the N. & W. this step is logical and commendatory of the results secured further south. The

division for which this type of locomotive is proposed is one containing heavy grades through the Allegheny Mountains. The general features of the experimental locomotive exhibited are similar to those of the N. & W. machine, but a synchronous rather than an induction type of converter is used with a view to improving the power factor.

Some of the advantages of the constant-speed locomotive were given in last week's issue in an article by A. H. Babcock, consulting engineer Southern Pacific Railroad. Those inherent qualities which appeal to us most forcefully are the simplicity and ruggedness of the polyphase motor, its adaptability to power regeneration and the ease with which a high power factor at the motor can be secured.

Some Non-Spectacular But Useful Electric Zones on Steam Roads

THE reference in the preceding editorial to the Great Northern electrification suggests a word of appreciation for several short sections of large railroad systems on which electric operation has been doing its special work on a small scale for years. So smoothly and unostentatiously do these function that they are largely forgotten. For example, take the pioneer Baltimore & Ohio tunnel zone in Baltimore, Md., now rounding out its quarter century. This blazed the way for the application of direct current in many other quarters. Then there is that largely-forgotten single-phase spur of the Erie at Rochester, N. Y., where plans were tried out that later were expanded on the New Haven and other roads, most lately on the Chestnut Hill branch of the Pennsylvania at Philadelphia. Of the same type and also quite early were the Sarnia tunnel section of the Grand Trunk and the Hoosac tunnel section of the Boston & Maine. And the direct current zone of the Michigan Central under the Detroit River must not be overlooked, either.

The above are but a few of the instances where electric operation has so long been a matter of course that attention is no longer paid to it. These installations, however, have furnished and are furnishing the data which will become invaluable as the merits of electric operation are better and better appreciatd. We by no means claim that the problems in this field are all solved or that the positions of the men in charge of the operation of present electrified zones and divisions are sinecures. We aver, however, that the electric locomotive is no longer an experiment, and that its present rate of metamorphosis is no more rapid than a live art warrants.

The One-Man Car Is Its Own Skip Stop

DURING our period of big-car development we have strayed a long way from the true purpose of a street railway, to wit, to keep the people from walking. In the day of the bobtail horse car that purpose was in at least one sense carried out better than now because it was possible to stop the car just where the customers wanted it without any annoyance to fellow-passengers. As cars became bigger, the passenger was asked to walk to a corner in boarding a car and from a corner in leaving it. More recently, it has been found that the stops must be still further apart if economical operation, good speed and pleasant riding for all passengers are to be efficiently attained. Thus we reached the point where a man who rode say one mile might have to walk a goodly fraction thereof along the route because he was not taken on and let off at exactly the places most convenient for himself. Now to start a person's pedals going is dangerous business for the street railway, and it is still more dangerous if no car is in sight when he reaches a stop sign. Unless he is going a distance unprofitably long for the railway, he is likely to keep moving and spend his money for something else.

Here is just the point where the modern one-man car combines the personal service feature of the bobtail vehicle and the higher running speed of its electrical successor. The one-man car does not have to stop precisely at one's doorstep, but it can come closer than the big car toward this ideal because inherently it has a smaller number of stops per mile. For instance, to keep the number of stops of a fifty-passenger car down to six, we must permit it to stop only at six specified stopping places within a mile. But this arbitrary arrangement is not necessary with a thirty-five-passenger one-man car, for, other conditions being equal, it will not have to stop more than six times per mile in any event to make stops at the crossing most satisfactory to each passenger. Thus, as we said as early as June 22, 1918, the smaller car actually embodies the skip-stop principle so far as the features of passenger convenience and free running speed are concerned.

We do not ignore the fact that the total number of stops for all cars will be greater in the case of one-man car operation. However, the cost of the extra stops with 15,000-lb. cars is a less fearsome proposition than with 30,000 to 40,000-lb. cars. It seems odd that cars should have grown so heavy that it was almost cheaper to skip a single passenger than to stop for him! The return to the small, one-man car with its optional-stop, frequent-service possibilities is a return to a saner viewpoint of the true function of a street railway. Hence, the "Don't let em' walk" principle of the one-man car is not a negation of the general skip-stop idea.

The Daylight-Saving Law in Danger

THERE is a determined effort on the part of a considerable number of our countrymen to have Congress "call off" the summer practice of turning the clock hands forward *pro tempore* each spring. This effort is to be regretted as it is apparently due to a desire to put individual preference above the common good. The electric railway industry can look at this matter in an unprejudiced way, being affected very little as far as the transportation end of the business is concerned. Those who do lighting as a side line undoubtedly lose some patronage, but the extra daylight hour at the end of the day probably brings in some additional transportation revenue from those who use the cars then to get out into the country or to the parks for recreation. But, to speak broadly, it is in the general interest of conservation to utilize to the full the hours of daylight, as Benjamin Franklin sagely observed when he was ambassador at the French court. If our readers agree with this they will take no offense at the suggestion that they utilize their company publications and other publicity mediums in supporting the daylight-saving movement, explaining clearly at the same time, to quote Franklin again, that they have "no axe to grind."

Comments on the Detroit Wage Settlement

AGAIN a contract has been discarded and an award of the War Labor Board set at naught. Developments in Detroit during the past week have shown that an agreement on the part of union labor, to abide by such an award is sacred only while it is in favor of the employee. Had the management of the company rejected the decree because it was unsatisfactory or too burdensome—as such a decree usually is—there would have been no end to criticism on the part of the public. The many companies which were affected by these awards accepted the additional expense although it meant another step toward bankruptcy, knowing that even the proclamation of peace is not likely to lead to a reduction in this item of expense.

The setting up of a 60-cent maximum wage in Detroit holds a threatening aspect for properties in other large cities. This rate may have been justified by the high cost of living in that city and the company probably had to pay it because of the scarcity of labor and the appeals for help from competitive industries. However, inasmuch as the War Labor Board saw fit to put other cities in the same class with Detroit in fixing a wage standard this conclusion is not likely to be overlooked by organized labor when wages are up for readjustment elsewhere. In our issue of Jan. 18 we pointed out the injustice which was likely to result from this attempt to fix a standard wage, and we believe that recent developments have helped to accentuate our criticism.

Cost of living may be unusually high in one city and lower in another community. The railway company in the former place may be exceptionally prosperous (if such an expression can be used even in a comparative sense) while in the other city it may be facing a receivership. On the War Labor Board's theory the same wage scale would be fair for both companies. We cannot see any justification for this, and we contend that each company should have an opportunity to prove the cost of living and the situation as to labor supply in its own community.

It was probably more than a coincidence that the platform employees of the Cleveland company should have presented their demands for a 60-cent maximum wage on the same day that the Detroit settlement was made. These men, like those in Detroit, were bound by the federal board's ruling until the end of the war, but they insisted that the wages established last August were no longer adequate. The company has replied that it cannot grant the increase unless the franchise is amended to remove the fare limit which was recently fixed. Here again we find a situation which might set an unfair precedent for other cities of the 48-cent wage class, because the Cleveland company may be able to get a higher rate of fare while others on whom similar demands are made may be less successful.

One fortunate development may come from these wage disputes. In Detroit the people were impressed as never before with the company's need for additional revenue and a slight increase in fares was granted, although it had been refused several times before. The public seem to need such crises to impress them with the merits of the utilities' petitions for relief. Perhaps they will see a justification also in the request of the Cleveland company both for a higher fare and an increased dividend for stockholders. President Stanley argues that the purchasing power of a dollar has depreciated to such an extent that a 6 per cent return is no longer adequate and that the widows and orphans who depend on such dividends for a living are entitled to the same consideration as the men who operate the cars. The day may be at hand when the investor as well as the employee is to get a living wage. In that case, there may be a silver lining to these clouds.

House Paint or Attractive Finish for Cars?

MOST of us recall the gaudy coloring and elaborate gold leafing and striping of the old-time horse car. As the railway lines were consolidated and electrified, simplicity and uniformity became the rule almost to the point of obliterating the car number and the company's monogram or symbol. In more recent times, the statement has been made that a car is simply a house on wheels and deserves no more attractive finish.

We do not intend to advocate the restoration of the filigree school of car painting nor the long-drawn-out painting schedules that were characteristic of the time. What we do question is whether it is wise to attempt to save a few dollars on paint, varnish or enamel, if thereby a company loses the ride-pulling value of attractive rolling stock.

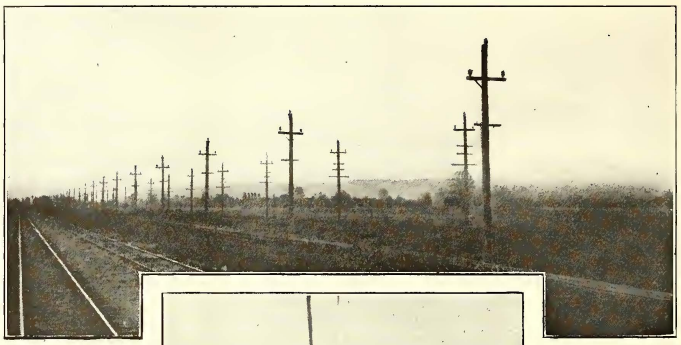
House paint or its equivalent may be good enough for a subway car which always runs underground, but it isn't the most attractive finish for a public conveyance which does most of its work in the light of day. Even the negligent house owner will paint his dwelling spick and span if he wants to sell it and thinks thereby he can make it look much more attractive. What, then, about the car which is selling itself always? Should a company be bound down to use dull, drabby colors because they happen to wear better or should it adopt a combination that will make "a hit, a most palpable hit" with the riding prospects? Orange and blue, for example, may not be the most durable colors, but wasn't it shrewd business for the Charlottesville & Albemarle Electric Railway to adopt as its own car colors those of the University of Virginia? We shall not attempt to figure how many more rides, if any, were due to this color scheme, but we know that it met with acclaim from the townspeople, the faculty and the university. Good-will is a precious asset to be acquired in divers ways.

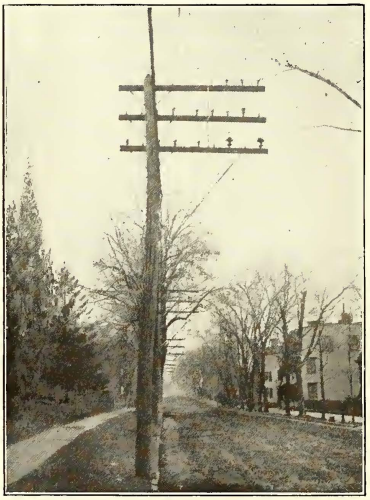
It was the bold and irrepressible Peter Witt who suggested one day: "Why not paint electric cars cream white?" This may be unprecedented in America but it isn't in Europe. If memory serves aright, cream is the shade (or rather the *light*) used by the Cologne-Bonn interurban railway and a number of city railways on the Continent. Whether advertising value was in the minds of their operators we know not, but that the cars looked more inviting than shades too akin to dust goes without saying. White cars like white gloves simply must be kept up to the mark. We should expect the modern enamels of any shade to withstand better the frequent but inexpensive use of mop, cloth and squeegee than the old-fashioned paints and varnishes. It is not up to the master painter to recommend such drastic changes as these, for his must be the path of economy for its own sake. The policy of selecting car colors on the basis of their advertising value is one that belongs wholly to the "Selling Rides Department"—when we get that department!

Insuring Durability of the Pole-Top Fittings

The Author Takes Up Details of Attaching Crossarms to the Pole, Bracing Them in Place and Providing Insurance Against Breakdown Under Every-day and Emergency Strains

BY CHARLES R. HARTE
Construction Engineer The Connecticut Company, New Haven, Conn.





TOP VIEW, TRANSMISSION LINE WITH SINGLE BRACE. BOTTOM VIEW, OUTRIGGED ARMS

CONSIDERED broadly, a pole or tower line consists primarily of the supports, which may carry transmssion or distribution devices or both, the terms "transmission" and "distribution" being used respectively when the current is of different voltage from that at which it is to be eventually employed, and when it is of the same voltage. In the case of very important lines the supports for transmission circuits are quite special, as are those for very important distribution circuits and contact systems, but in very many cases—probably in the large majority—the same type of support is used for both, and this applies not only to the pole, but to the crossarm which carries the conductors.

As with so much of the overhead, the old telegraph practice has been continued with little modification of material or methods, the changes being those necessitated by the heavier loads, and to-day our crossarms are "gained" in the pole, held to it by a through bolt, and kept from tipping by braces attached to arm and pole, practically as in the case of signal and communication lines.

WHY CROSSARMS SOMETIMES FAIL

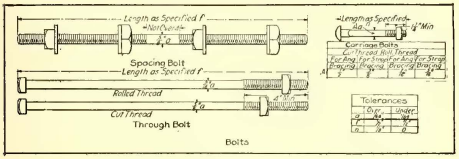
In regular service a crossarm is a beam supported at its middle and carrying the vertical load of the weight of the wire supported (one-half of each of the ajacent spans) plus the maximum ice load on that wire. In case of wind, the stress is the resultant of this vertical load and of the horizontal push of the wind against the ice-covered wire. In case of very heavy sleet the arms may be forced off the pole, but broken arms are generally due to the failure of adjacent spans or supports, thus allowing a heavy unbalanced pull to come against the arm in the direction of its least strength, breaking it at the through bolt, or splitting it as the result of the leverage of the pins.

It is to-day almost universal practice to hold the arm by a through bolt through its middle, and through the pole. In cedar, the bolt hole is often bored of the same diameter as the bolt if the latter has cut threads, or of the diameter of the threads if these are rolled. Cut threads are cut out of the bolt, and unless the latter has upset ends, which is very unusual for overhead work, the effective diameter of the bolt is less than the actual shank diameter; rolled threads, on the contrary, are rolled up from the shank, so that the effective diameter and the actual shank diameter are the same, but as the diameter over the threads is greater, holes for rolled bolts have to be a little larger than for the bolt of the same size with cut threads.

In chestnut the hole is usually bored a trifle larger, and it is invariably larger in the crossarm itself. While there is little likelihood that the arm will actually be split, a tight fit generally results in breaking out bad splinters on the face, for the bolt should be driven through the pole first. Perhaps it would be better to

say that it is generally so driven, for some overhead men claim that if good material is used the bolt will also require replacement by the time an arm has to be replaced.

Then the "advantage" of not having to pull the bolt through the pole to remove the arm quite disappears.



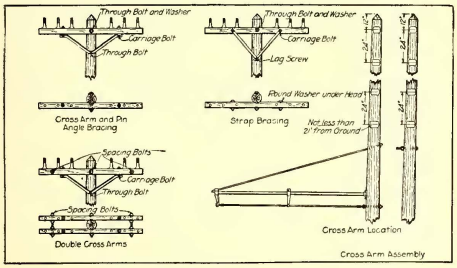
BOLTS FOR OVERHEAD LINES*

*This and the following line drawings are reproduced from the Engineering Manual of the American Electric Railway Engineering Association.

The arm is given a good bearing on the pole by a "gain," formed by making at right angles to the pole two parallel saw cuts each $\frac{3}{4}$ in. deep at the center, and a distance apart just equal to the depth of the crossarm. The wood between these cuts should be taken out with a broad chisel, and the resulting surface hollowed very slightly, so that when the arm is bolted on, it first bears at the edges of the gain, thus preventing rocking. If this is properly done, and the width of the gain is such as to give a tight fit, there need be little fear of any trouble under reasonable loading, but it is suprising how few linemen can really make a good gain.

This has led to the development of several types of patent gain. One of the simplest is a piece of sheet steel, curved to fit the pole, with lugs to hold the arm in place, a central hole permitting the through bolt to pass. Where the pole diameter at the arm is known and constant, and where the gain can be bent to this curvature this device is said to be very satisfactory, but the irregularity of the general run of natural poles makes necessary at least as much work as would insure good fitting wood gains, while a poor fit on the pole makes the patent gain as poor as a bad fit in wood.

For any but the heaviest of arms a $\frac{5}{8}$-in. through bolt is sufficient, although a $\frac{3}{4}$-in. bolt is frequently and a $\frac{7}{8}$-in. bolt occasionally used. The threads may be



CROSS-ARM LOCATION AND ASSEMBLY

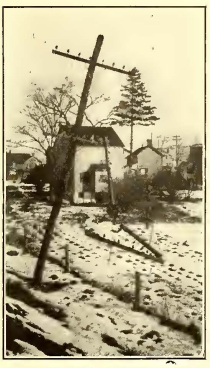
cut or rolled. The latter is better because the full section of the bolt is available, as the threads are raised on it, and the threads are more even and stronger than cut threads because the rolling gives a tough, smooth surface.

In either case the threads should be 4 in. in length to allow for variations in the pole diameter at the arm. For any given line the probable diameter can be estimated as soon as the pole-top design is determined, and the allowance of a small percentage of bolts longer and shorter by 2-in. steps will take care of unusually large or small poles.

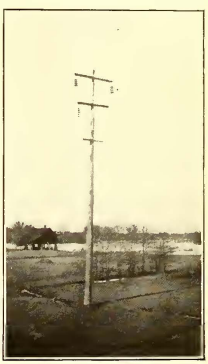
It is almost universal practice to use square washers $2\frac{1}{4}$ x $2\frac{1}{4}$ x $\frac{3}{16}$ in. for either $\frac{3}{4}$-in. or $\frac{5}{8}$-in. bolts. This gives a net bearing surface of a trifle more than $4\frac{1}{2}$ sq. in. The standard round washer for $\frac{3}{4}$-in. bolts has a bearing area a trifle more than $2\frac{1}{2}$ sq.in. The difference in cost is not such as to warrant taking chances that the round washer is sufficient, although there seems to be little real evidence one way or the other.

Preventing Rotation of the Crossarm

For the lighter arms and for many heavy arms also, the strap brace is the chief source of resistance against any tendency of the crossarm to turn about the through bolt. The brace is lag-screwed or bolted to the pole, and carriage-bolted to the arm at such points as to make an angle of approximately 45 deg. The usual practice, of course, is to use two braces, fastened to the



ARMS PULLED OFF POLE BY SLEET LOAD

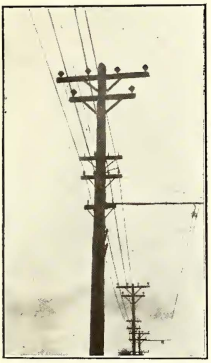


SUSPENSION ARMS WITH BRACES ON TOP

pole by a single bolt or lag, and held to the crossarm by carriage bolts, the braces being below the arm. For moderate voltage transmission with two crossarms and for use with suspension insulators, however, the braces for the top arm are sometimes fastened to the pole above the arm, to give better clearance for the lower "phases." This location also tends to discourage "sneak" currents from following the metal and burning the pole and arm at the points of contact. It should be said, however, that the development of the modern insulator has reduced these burnings to a minimum, and a more general recognition of the fact that jumping the potential of a line built for 2300 volts to 6600 or 11,000 without changing insulators, is at least likely to cause annoyance. On the other hand, it is not so long since burning of the pole and arm at the points of contact was a very real danger, and there are still in operation lines with but a single brace and lines with wooden braces, designed to prevent such troubles. Indeed, on a line from Logan to Ogden and Salt Lake City, Utah, and possibly elsewhere, the crossarm was mortised through the pole and held in place by a wooden tree nail, cutting out not only braces but all metal as

well, the insulator pins and their fastening being also of wood.

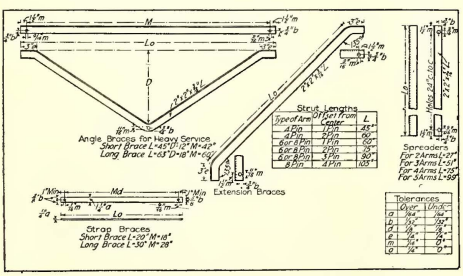
The standard strap brace is $\frac{1}{4}$ in. thick, $1\frac{1}{2}$ in. wide and 30 in. long. It has a hole of $\frac{9}{16}$ in. diameter with its center 1 in. from one end, for the pole bolt or lag, and a similar hole of $\frac{7}{16}$-in. diameter with its center 1 in. from the other end for the arm bolt. The material should withstand bending at the larger hole around a pin of diameter equal to twice the thickness of the brace until the ends are parallel, without fracture on the outside of the bend. For two-pin arms a brace 20 in. long is usually used, while for long arms, braces 32 in. long or even longer are sometimes employed. For heavy service, however, the present tendency is to use a single piece of angle iron of a broad V-form with the horizontal leg uppermost. The two ends are bent down so that when in place they are horizontal and the arm rests upon them, where it is held by carriage bolts which pass vertically through the arm. While various sizes of angle are used for braces, the usual section is 2 in. x 2 in. by $\frac{3}{16}$ in. The standard sizes of braces are 63 in. and 45 in., measured along the crossarm, with "drops" at the bend of the V of 18 in. and 12 in. respectively. The pole bolt hole is $\frac{11}{16}$ in. in diameter and the two carriage bolt holes are $\frac{9}{16}$ in. in diameter.



33,000-VOLT TRANSMISSION LINE WITH WOODEN BRACES FOR ARMS

Note poor fit of top of right brace against pole.

As in the case of the crossarm bolt, the hole for the pole bolt for either type of brace is bored from the face or arm side of the pole to the back, but the bolt itself is driven from back to face, with a round washer under the head. To insure proper line-up in assembling, the braces are first bolted to the arm; the latter is next bolted to the pole and properly squared with it; the braces are then put in position and the exact position for the pole bolt marked. At the brace end of the bolt no washer is required as the brace itself serves that purpose.



CROSS-ARM BRACES AND SPREADERS

Strap braces are held to the arm by $\frac{5}{8}$-in. carriage bolts, driven from the back of the arm outward, a round washer being put under the head, but none under the nut which fits against the brace. Angle braces are held by $\frac{1}{2}$-in. carriage bolts driven down through the arm, with a round washer under the head; the nut, as in the case of the strap brace, requires no washer since it is against the angle.

A word might here be said about wood braces. These were employed somewhat when leaky insulators were more common, but the cost of properly fitting them in place left little to their credit, while the tendency of the wood to split if, as in many instances, they were bolted or nailed in place made them an element of weakness. To-day they are rarely seen.

THE CROSSARM TENDS TO ROTATE HORIZONTALLY ALSO

Still another form of brace, somewhat different from those described, is used to prevent a crossarm from twisting horizontally on the pole. For a comparatively light strain a strip of angle iron of about the same length as the arm, and fastened to it at the ends, is carried behind the pole where it is anchored by the through bolt of the arm. If, however, there is a really heavy twisting pull the best plan is to install an I-bolt in the arm as near the pull as possible, putting a generous square washer under the nut and running an anchoring guy in the line of the pull, or as nearly in that line as possible, to some good anchorage. Most crossarms are installed singly and have equal lengths each side of the pole, but often "double arms" are used at points of extra strain, while cramped quarters sometimes necessitate "alley," "extension," or "outrigged" construction, which may also have to be of double-armed design.

ANGLE-IRON BRACE

The two insulators at top of arm are carried on a short arm giving spacing for 11,000 volts; main arms are bored for 33,000-volt spacing, the future potential of the line.

Double arms are practically what the name implies, two arms at the same elevation but on opposite sides of the pole. Where they are placed at an angle the line of the two should split the angle unless a much heavier pull is to be anticipated from one direction than from the other, in which case the arms should square with this direction.

SOME HINTS ON INSTALLING DOUBLE CROSSARMS

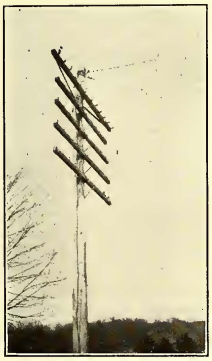
The proper installation of double arms is not quite as simple as it looks, but there are a few "kinks" which help very materially. The two arms are held to the pole by the same bolt, which should be in the center of each "gain," but it is anything but easy to bore accurately through the pole. If the second "gain" is centered on the hole after it has been bored the two arms are quite unlikely to match. By cutting the "gains" properly opposite, however, and boring a little more than half way from each, the holes as a rule can be connected and the bolt driven through even if there is a small bend, and the brace bolt can be similarly installed.

By using a spacing bolt of the proper length instead of a through bolt (of course omitting the two inside nuts) either arm or brace can be removed without disturbing the other.

It is well to have a piece of soft steel, 3 in. or 4 in. long, with a hole about 2 in. deep tapped to fit the spacing bolt, which temporarily can be screwed on one end as a driving head. In the absence of this, two nuts can be used, the first being screwed on a short distance, and then the second one run on so that the end of the bolt lacks about ¼ in. of coming through.

The first nut is then screwed up against the second to lock it. If the bolt goes through reasonably easily a single nut on the end will serve, but the double nut is safer and the special head best of all.

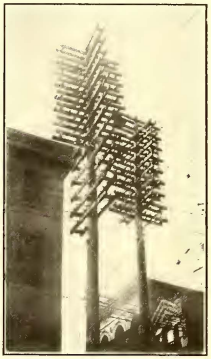
Double arms should be tied into a rigid structure. This can be done by putting spacing blocks near the ends, of a length equal to the distance between arms at the pole, and bolting through both arms and the block. Variations in the poles and "gains," however, make necessary quite a little fitting for good work. A better plan is to use a regular spacing bolt, which is simply a rod of proper length threaded for all but about 4 in. at the center and having two nuts and washers on each end, one for each side of the arm. The bolt goes about one-eighth of the arm length in from the ends. The inner nuts are brought snugly against the arms and the outer nuts are then screwed against them on the outside, washers of course going between each nut and the arm face. Extension arms are usually "every-day" arms fastened to the pole at a point other than the middle. If the difference in length of arms is small they may be braced as usual, but if there is much overhang it is customary to put a regular strap brace on the short end, and a special, long, angle-iron brace which makes an angle of 45 deg. with the arm, on the other. For very long overhang or very heavy unbalanced loading this bracing is double, one on each side of pole and of arm. Where there are two or more arms, a vertical angle-iron "spreader" or "spacer" starts at the bolt which holds the diagonal brace at the arm and runs vertically, fastening to each arm above. This is also doubled for heavy work, and sometimes there are two such sets of spreaders, in which case one set is placed near the ends of the arms and the other a distance from the pole equal to about one-third the length of the long side of the arm.



TELEPHONE LINE WITH DEAD END TOP ARM AND SPECIAL BRACE

So much for the installation of crossarms, and the hardware in connection therewith. It might be well to mention that the latter has been pretty well standardized by the American Telephone and Telegraph Company, the Western Union Telegraph Company, the National Electric Light Association and the American Electric Railway Association in the order of their action. The fact that the last-named association has also standardized on this material seems to be known to comparatively few.

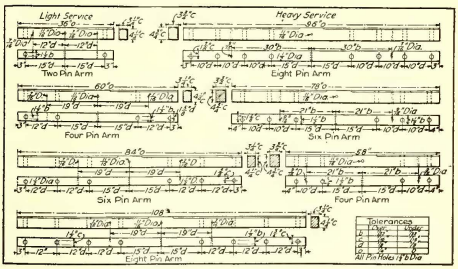
The arms themselves are less satisfactorily agreed upon. The A. T. & T., W. U. and A. E. R. A. agree upon the 3½-in. x 4½-in. section for light service arms, and the 3¾-in. x 4¾-in. for much of the heavy service. In 1917 about 75 per cent of the crossarms used were of these two sizes. The N. E. L. A., however, has 3½-in. x 4½-in. for its standard section, which has to be dressed from a 4-in. x 5-in. stick. The 3½-in. x 4½-in. arm can be cut from a 7-in. x 9-in. stick, making four, while the 3¾-in. x 4¾-in. arm is cut from the 4-in. x 5-in. stick, the same stick used for the N. E. L. A. smaller section. For very heavy transmission lines special sections are used, but here time and money can be saved by choosing sections which can be dressed readily from commercial sizes. There will be lost about ¼ in. each way at best, giving 3¾-in. x 5¾-in., 4¾-in. x 5¾-in., 3¾-in. x 7¾-in. and 5¾-in. x 7¾-in., for example, as finished sizes from 4-in. x 6-in., 5-in. x 6-in., 4-in. x 8-in. and 6-in. x 8-in. stock.



DOUBLE BUCK-ARMED POLE

Note spacing block at end of arm.

Pin spacing is more readily varied than is the section, and as a matter of fact there is quite a little variation among the several associations. Both the N. E. L. A. and the A. E. R. A. put the pole pins 15 in. from the middle of the arm, giving 30 in. of climbing space. The N. E. L. A. uses 14½-in. spacing for other pins on the four-pin and six-pin arms, and 12-in. spacing on the eight-pin arm. The A. E. R. A. uses 12-in. spacing for other than pole pins on light service arms, and 10-in. spacing on heavy service arms. The A. T. & T. use 16-in. spacing for pole pins except in joint use, where this distance is doubled to 32 in., and 12-in.



WOOD CROSS-ARM

spacing elsewhere, while the W. U. uses 16-in. spacing for pole pins and 12⅜ in. elsewhere on the ten-pin arm, 19 in. and 15½ in. on the eight-pin arm, 19 in. and 17¼ in. on the six-pin arm, and 20 in. and 22 in. on the four-pin arm. Each association had good reasons for its choice, but the number is a little unfortunate.

In the matter of physical properties and finish the "big four" are substantially in agreement although the wording differs somewhat. The A. E. R. A. specification is as follows:

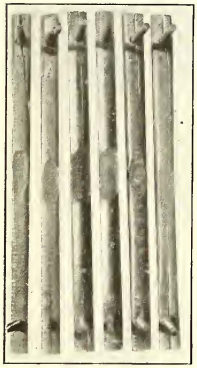
SPECIFICATIONS FOR WOOD CROSSARMS

Material Requirements. Crossarms may be of cypress, Douglas fir, Norway pine or yellow pine, but must be thoroughly seasoned, sound, and free from wane or defects which would reduce strength; the grain must be close and not out of parallel with any edge of arm more than 1 in. in 3 ft. of length.

Pitch Pockets Pitch pockets not exceeding 2 in. in depth, up to 12 in. in length or ¼ in. in width, not entering pin or bolt holes on the top or sides of the arm, will be permitted provided the area does not exceed ½ sq.in. if within 1 ft. of the center bolt hole, nor exceed 1 sq.in. if outside the 1 ft. limit. Pitch seams or streaks which do not open the grain are not considered "pockets."

Shakes and Checks. Ring shakes, end checks, or other checks entering pin or bolt holes will not be permitted; a few fine checks not entering pin or bolt holes, nor exceeding 6 in. in length nor ⅛ in. in depth, will be allowed.

Knots No knots will be allowed within 24 in. of the center of any arm, nor entering any pin or bolt hole. Sound knots not exceeding ¾ in. diameter, and not entering any



FAILURE OF PINS AND RIMS UNDER CONDITIONS OF SERVICE

pin or bolt hole will be allowed between limits 24 in. and 36 in. from the center of any arm; outside limit 36 in. from the center of any arm, sound knots not entering a pin or bolt hole may increase in size to not exceed 1 in. diameter at the end of the arm.

Sap Wood. Cypress arms must be free from sap wood or pitch heart; Douglas fir, Norway pine, and yellow pine arms may contain, on top or one side only, clear sap wood of maximum cross-section not exceeding 15 per cent of the total cross-section of the arm.

Warp. Crossarms must be out of wind; must not be bent edgeways in any direction, nor sideways in more than one direction; and a straight edge applied to a concave side must not show offset exceeding ⅛ in. per foot of length of the arm.

Finish. Arms must be delivered unpainted with every face planed, square to adjacent faces and bored as specified. Holes must be accurately located, square with face, clean cut, not badly splintered where the bit passed out, and within 1/32 in. of the correct diameter.

Boring. (*a*) All crossarms must have holes 1½ in. diameter on the center line of the top, one on either side of and with the center 15 in. from the arm center, others 12 in. apart center to center on light service arms, and 10 in. on heavy service arms. (*b*) All crossarms must have one center hole 1½ in. diameter in the center of the side. (*c*) All crossarms to be strap braced shall have two holes each 7/16 in. diameter on the center line of the side, one on either side of the center hole; 12 in. distant for two pin arms and 19 in. distant for all others. (*d*) All crossarms to be angle braced shall have two holes, each ⅝ in. diameter on the center line of the bottom, and spaced one either side of the middle, 21 in. distant for four-pin and six-pin arms, and 30 in. distant for eight-pin arms.

Classes and Section. Crossarms are of two classes: Light service arms, 3¼ in. wide by 4¼ in. deep; and heavy service arms, 3¾ in. wide by 4¾ in. deep.

Lengths. Crossarms lengths must be as shown in the table at the top of the next column.

Wood crossarms are often painted, but if this is done before the sap is thoroughly dried out it is much worse

Size of Arm	Light Service	Heavy Service
Two-pin	36 in.	
Four-pin	60 in.	58 in.
Six-pin	84 in.	78 in.
Eight-pin	108 in.	96 in.

NOTE: Accompanying illustrations show overhead line material as described in the preceding specifications.

than no treatment at all. It not only seems to accelerate decay but it also conceals the decay, usually until a bad failure tells the story. For this reason not a few overhead men install arms with no treatment whatever, but there is an increasing tendency toward the use of creosoted or kyanized arms, although the linemen dislike the occasional tendency of creosote to "sweat out" in hot weather. There is, too, a not entirely unwarranted fear that treatment tends to weaken wood, particularly in the case of treatments employing a fairly high temperature. That in such cases there has been an initial loss of strength and particularly a marked increase in brittleness is beyond question, but recent investigations show that there is at least a partial recovery after a short interval.

There have been various figures given for the strengths of crossarms, but most of them are the results of the United States Department of Agriculture tests (Forestry Service Circular 204). While they show the ultimate strength of arms rigidly held to the pole, and given equal loads at each pin, they are anything but correct for the service capacity of similar arms. The "pole" used in these tests had a piece of gas pipe as a liner for the through bolt hole, thus materially increasing the bearing area of the bolt, and a special heavy bracket supported the arm end of the through bolt. Both of these items gave a resistance to the combination of arm and pole far in excess of that which is had in usual practice. On the other hand, the braces were attached to the arm 14 in. instead of 19 in. from the through bolt, and if the drawing (Fig. 2 of the circular) is correct, they were fastened to the back instead of the face of the arm, both of which facts would reduce the capacity over that of usual practice.

In actual service failure usually occurs by the arm pulling off the pole, by the arm breaking from a side pull or by the arm splitting as the result of the pin leverage. This raises the question whether the present arm design is the most economical, particularly in the shorter lengths. There would seem little reason for providing great strength in a vertical direction if the strength against a side pull does not bear the corresponding relation to the stress likely to come in that direction, or if the arm support cannot safely carry as much as the arm. There is needed a series of service condition tests for, after all, it is the strength of the parts in combination with which we are particularly concerned.

Structural steel has been used to some little extent for crossarms, with various results. Two forms used for transmission lines have proved very satisfactory; the Byllesby "wishbone" type, and the Pierce "bo-arrow" form, each of which is substantially a Y, fabricated from angle iron and turned on its side. A number of angle, channel and built-up straight forms are also used for both distribution and transmission, but in this country there seems to be quite a little difference of opinion as to their desirability. Unquestionably the wood situation makes desirable the development of a good substitute, but the latter is not yet here.

Car Performance from the Engineer's Office to the Track

Degree of Accuracy to Which Performance of Railway Equipment Can Be Predetermined Is Shown by Comparison of Test Results with Calculations Made Before Test Motors Were Designed

By C. W. SQUIER
Electrical Engineer

IN THE SERIES of articles which I have contributed to the ELECTRIC RAILWAY JOURNAL during the past year on the considerations which govern the choice of railway motors, I have described the methods commonly used for calculating the performance of motors previous to their design and operation. The degree of accuracy with which railway motor performance under actual operating conditions can be predetermined is surprising. In order to illustrate the close agreement which exists between theory and practice I shall in this article give figures for motor performance that were calculated before the motors were designed and compare these with results later actually obtained in service with the equipment.

In requesting the various motor manufacturers to submit bids and recommend motors, definite data were given regarding the service requirements. These included profile and alignment of a certain line that showed average characteristics, and a statement of the service features desired, such as schedule speed, duration of stop, duration of layover, average line voltage, train resistance values and car weight. In submitting their suggestions each of two manufacturers proposed to furnish two series, 600-volt, tapped-field motors of 140-hp. capacity at 600 volts for each car. Each submitted speed-time and power curves for operation over the line for which the profile and alignment were furnished. The schedule speed and energy consumption were calculated from these curves and were as follows:

For motor No. 1 the energy consumption was 60.8 watt-hours per ton-mile, with a schedule speed of 14.9 m.p.h. and 38.8 per cent coasting. Motor No. 2 required 78.8 watt-hours per ton-mile with a schedule speed of 15 m.p.h. and 26.7 per cent coasting. By comparison of these figures it will be noted that motor No. 1 showed considerable advantage in the amount of energy required compared with motor No. 2. Motor No. 1 was geared with a ratio of 2.46, while motor No. 2 was geared with one of 2.65. Considerable study was given to this condition and many curves indicating speeds and the power consumed by the cars operating with the different motors were calculated by using the characteristic curves of the respective motors. Motor No. 1 was apparently better adapted for the service under all conditions.

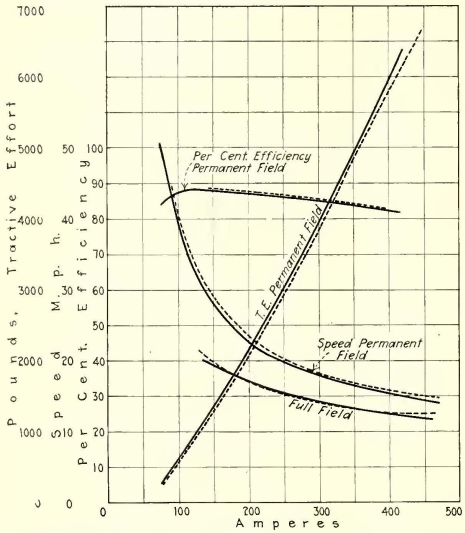
After discussion of the results with the engineers of the several manufacturers, those responsible for the design of motor No. 2 agreed that they would render their motor as efficient and economical for the service as was motor No. 1. This they did by reducing the speed of the armature and by increasing the gear ratio. Many studies were again made by the various engineers with this redesigned motor to make sure that the motor was of proper design and gear ratio and the best for all service requirements as laid down and determined by previous operating data. It must be realized that these motors were being especially designed for the particular service requirements, and to meet these certain definite characteristics were required. In the theoretical calculations the motor which was the most economical in power consumption for the service was the one with a low armature speed and with as high a gear ratio as the service permitted, and the fields of the motors were arranged to be tapped when the motors were connected directly across the line in order to get a sufficient maximum speed to make the high schedules on the various runs as specified. This combination of low armature speed, very high gear ratio and tapped-field combination made rapid acceleration possible with a reasonable starting current and involved the minimum losses in the resistors.

COMPARISON OF THEORETICAL CHARACTERISTICS WITH THOSE ACTUALLY OBTAINED

An accompanying illustration shows the characteristic curves for the motor which was finally adopted. The full lines show the characteristics as calculated from design and the dotted curves are the characteristics which were actually obtained when the motors were tested at the works of the manufacturer. By comparing these two a better idea can be obtained of the closeness with which theory can be made to agree with practice. The speed of the motor as constructed was slightly higher when operating with permanent or tapped field with the same current than the speed as calculated from design. When operating with full field the speeds above 175 amp. and below 325 amp. were slightly lower than that calculated, but for current values below 175 amp. and above 325 amp. they were slightly higher. The efficiency of the motor as constructed was slightly higher than the calculated effi-

ciency for all current values above 145 amp. and for speeds below 30 m.p.h. The assumed gear losses which were used for the theoretical calculations were 9.5 per cent at 75 amp., 7.5 per cent at 90 amp., 5.5 per cent at 120 amp., 5 per cent at 150 amp. and 5 per cent at 180 amp.

After the motors were received by the railway company and the cars were completely equipped ready



COMPARISON OF CALCULATED CHARACTERISTIC CURVES WITH THOSE OBTAINED FROM TEST

for operation, elaborate arrangements were made to check the performance of the motors to permit accurate comparison with the preliminary calculations. A section of track was set aside for use as a test track and runs were laid out so as to duplicate as nearly as possible the service originally specified to form the the basis for the motor design. Tests were made to determine all of the variables which had entered into the original calculations, and final tests were made to ascertain the power consumed in service, the temperature rise of the motors and other parts of the equipment and other desirable data which were used in calculating the motor capacities.

A two-car train was used for this test, each car being loaded with bags of sand so that the total weight per car was brought exactly to that specified for determining the equipment capacity. This train was operated over the several series of runs continuously at proper speeds with the amount of coasting, duration of stop, etc., regulated to the specification requirements and to produce the schedule speeds which had been originally given. The energy per ton-mile, exclusive of that used for compressors, heat and light, or in other words that used for actually propelling the train, was 62.97 watt-hours. The schedule speed corresponding to this power consumption was 16.1 m.p.h. and the coasting made was 43.4 per cent. By comparing these with the original figures which were determined by calculation, a fair idea can be gained of the closeness with which the equipment fulfilled expectations. There was an excess of 2.17 watt-hours per ton-mile shown by the test, but this could be readily accounted for by the schedule speed, which was 1.2 m.p.h. higher than that for which the original calculations were made. The percentage of coasting obtained in the test operation was 4.6 higher than that originally estimated.

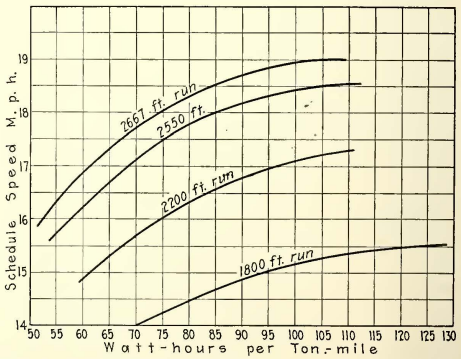
By comparing the characteristic curves previously mentioned these variations will be seen to be about what would be expected. As the speeds were slightly higher for the motor as finally constructed with the same current, it would be expected that a higher schedule speed could be made with a great percentage of coasting.

In order to determine the effect of the variation of schedule speed upon the power consumption, a series of graphs was plotted using theoretical figures and runs of several lengths made at different schedule speeds. A set of these graphs for runs of 1800 ft., 2200 ft., 2550 ft. and 2667 ft. is shown in an accompanying illustration.

OPERATING DATA WERE OBTAINED TO CHECK EACH PART OF THE SPEED-TIME GRAPH

For comparison of what may be termed a typical speed-time graph obtained under operating conditions with the theoretical speed-time graph originally plotted, many runs were made and accurate readings were taken. In the theoretical speed-time graph, originally plotted, an acceleration of 1¼ m.p.h.p.s. was assumed. Theoretically this required a tractive effort of 3800 lb. per motor, which was produced with a current of 248 amp. per motor, operating with full field, and 302 amp. per motor on tapped field. These figures are all obtained from the theoretical characteristic curves of the motor plotted before this was designed.

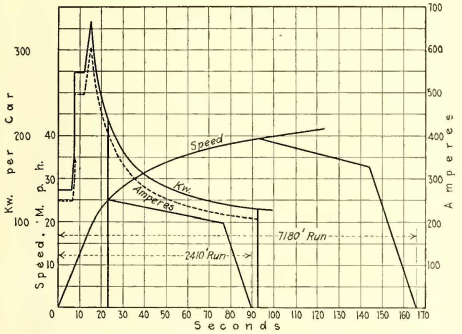
Calculations showed that the peak to which the current would swing when passing from full to tapped field with an accelerating current of 248 amp. when operating with full field was excessively high as the maximum current swing was estimated to be about 490

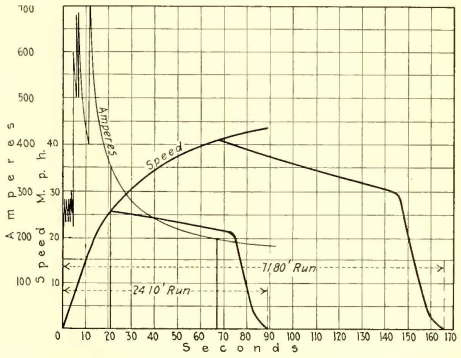


POWER CONSUMED AT DIFFERENT SCHEDULE SPEEDS AND WITH VARIOUS LENGTH RUNS

amp. To reduce the magnitude of this current swing, the control equipment was so arranged that the transition from full field to tapped field could not take place until the motor current had dropped to 200 amp. Results of tests made on a tangent level track with a fully loaded car showed that the average ac-

celerating current was approximately 260 amp., and this produced a rate of acceleration of 1½ m.p.h.p.s., ¾ m.p.h.p.s. higher than that originally considered. The calculated and test performance are shown in two other illustrations giving speed-time and current graphs for runs of 7180 ft. and 2410 ft., obtained both from theoretical calculations and from actual tests. By referring to the graphs obtained from actual service operation, the figures just referred to be will be seen to have been obtained. With the short run made at schedule speed of 15 m.p.h. with a twenty-second stop, the maximum speed obtained is seen to be 26 m.p.h. as against 25 m.p.h. originally estimated. With the long run of 7180 ft., the speed at the point of cut-off is 40.75 m.p.h. as against 39.2 m.p.h originally estimated. The shape of the speed-time graph with power on after the straight line accelerating period has been passed shows the test speed to be somewhat higher than the calculated speed, due to a higher train resistance having been assumed than was actually encountered; this was





SPEED-TIME, POWER AND CURRENT GRAPHS—AT LEFT, THEORETICAL GRAPHS AS CALCULATED; AT RIGHT, GRAPHS OBTAINED FROM TESTS

further demonstrated by the coasting tests described later.

The net results of this difference in train resistance was to make the calculated time for the coasting period twenty-seven seconds shorter for the express run than was actually obtained on test. The coasting periods for the short local runs were practically the same on test as calculated. This is because the short runs required power for only a short time, so that the speeds at the point of cut-off were nearly the same.

To facilitate the calculations it was assumed that the voltage was increased uniformly during acceleration instead of by steps as in actual operation. This accounts for the difference in the character of the current and power consumption curves in the two cases. No appreciable error, however, was introduced by this assumption.

The average line voltage was assumed at 550, and that found on tests was 547, a very close agreement. The actual energy consumption for the short runs was 63 watt-hours per ton-mile, as against the 58 watt-hours calculated. This difference is readily accounted for by the increased rate of acceleration found in actual service.

To check the coasting portion of the speed-time graph, a large number of coasting tests were made by allowing the train to roll at various speeds over a section of tangent level track while readings of speed, time and distance were taken. In addition many tests were made by allowing the train to roll on grades of various degrees of steepness. A comparison of the figures actually obtained for train resistance showed that those originally used for the theoretical calculations were approximately 10 per cent high. These actual results, however, checked closely with some previous test figures developed by J. V. Davies from tests made on the Hudson & Manhattan Railroad, and which were used as a basis for the theoretical train-resistance values. To insure a conservative margin these test figures were increased somewhat for the theoretical calculations.

Average Braking Rate Checked Closely

A composite braking graph was also developed from a large number of tests. The average slope of the central part of this graph indicated a braking rate of about 2 m.p.h.p.s. However, there was some time lost between the movement of the brake handle and the actual application of the brakes. In order to make a smooth, service stop the braking rate was decreased and graduated off at the stop so that the average for the entire braking period was about 1½ m.p.h.p.s., the value originally assumed.

It should not be inferred from the above that the calculation of the operation of trains or cars can be reduced to an exact science, or that the time for any run and the resulting load upon the equipment can always be predetermined within the limits indicated. These test results were obtained under conditions duplicating as nearly as possible those assumed for the initial calculations. There were no delays such as occur in actual service due to variations in the duration of station stops or additional stops and slowdowns such as are necessary for signals. Throughout the test the schedule speed was kept almost exactly at that assumed in the initial calculations. A special man made a record of the time and gave his information to a motorman's "coach" provided with a stop watch. The coach instructed the motorman as to the length of time that the power should be kept on to maintain the schedule speed at the assumed value. Thus this operation was performed under ideal conditions and under the assumed conditions as nearly as it was possible to operate the train.

To indicate what variation might be expected from

TEST RESULTS WITH TRAIN IN PASSENGER SERVICE

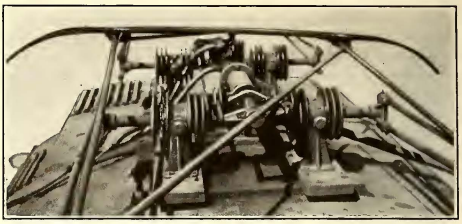
Average Length Run, Feet	Average Number Passengers per Car	Schedule Speed, Miles per Hour	Per Cent. Coasting Obtained	Watt-Hours per Ton-Mile
2,352	21	15.8	26.3	87.5
2,352	22	15.2	26.0	97.8
2,909	31	15.7	24.8	82.6
2,909	14	16.6	20.0	80.6
2,909	38	15.6	25.6	83.9
2,909	23	15.4	19.9	80.2
2,909	28	15.7	25.8	82.7
2,909	31	16.3	25.5	74.1
*2,770	26	15.8	24.2	82.4
†2,410	200	16.1	44.1	63.0

* Average for above eight runs.
† Results of test with train operated in service duplicating theoretical assumptions.

this operation when passengers were being carried and the train operated in regular service another series of tests were made. These, of course, included the incidental delays due to various causes such as high winds, signal stops, variation in the duration of stops, and special stops and slowdowns. The results of eight runs made in passenger service are given in an accompanying table and for convenience in comparing these figures with those obtained from tests under ideal conditions these test figures are given below the averages. The average length of run in passenger service was a little more than 300 ft. longer than that in the test service. The schedule speeds were almost the same, being 15.8 m.p.h. in actual passenger service against 16.1 m.p.h. for the test service. There was a large decrease in the per cent of coasting obtained under actual service conditions, this being reduced from 44.1 per cent to 24.2 per cent. The power consumption, of course, increased correspondingly, the increase being from 63 to 82 watt-hours per ton-mile, that is practically 30 per cent.

A comparison of the results shows the great advantage which may be obtained by regulating the amount of coasting. As there was a variation in the schedule speed obtained, the watt-hours per ton-mile do not follow the percentage of coasting in all cases. These tests were also made with different motormen operating the train so that there was a difference in the operation due to the personal element as well as to traffic conditions. After all is said about the close agreement of theoretical calculations with results actually obtained in operation, the final element in producing efficient operation is the human element. The same accuracy and analytical common sense essential in methods of work and calculations are likewise essential in the operator.

This comparison emphasizes the fact that proper allowance must be provided in the preliminary calculations for equipment so as to make up time in case of delays. The examples given, however, show that when the conditions of operation are specified, the actual performance of the electrical equipment for a given service can be predetermined with considerable accuracy, and in most cases this can be done without making very elaborate calculations.

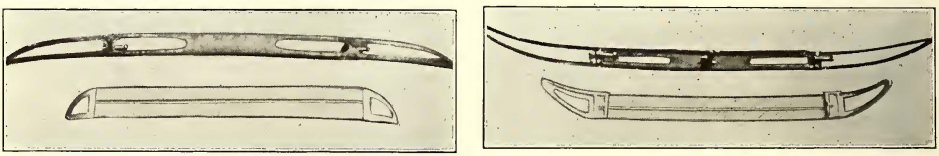


NEW TYPE OF PANTOGRAPH SHOE IN POSITION SHOWING CONNECTION DETAILS

Longer Life With Lower Cost for Pantograph Shoes

High-Speed Line in Colorado Gets 30,000 Miles From Its Trolley Shoes at Cost of 60 Cents Per Shoe

THE Denver & Interurban Railroad, Denver, Col., operates 45 miles of 11,000-volt, alternating-current, single-phase catenary system between Denver and Boulder, Col., with a short branch to Eldorado Springs, a popular summer resort located in a canyon of the Rockies. Boulder, a city of 15,000 population, harbors the State University with about 1500 students and the finest armory in the State where several hundred soldiers were trained during the war. The interurban line, which operates on a private right-of-way except within the city limits of Denver and Boulder, carries by far the greater part of the local traffic between these two cities and maintains an hourly schedule during the day and evening. The 60-ton motor cars in regular service average 5000 miles a month and travel of very high speeds, often hauling trailers.



AT LEFT, WEARING SURFACE OF OLD AND NEW TYPES OF PANTOGRAPH SHOES; AT RIGHT, UNDER SIDE OF OLD AND NEW TYPES OF PANTOGRAPH SHOES

This service is very hard on the pantograph trolley shoes. The type which has been in use for some years consisted of a center section made of $\frac{1}{16}$-in. galvanized iron 6 in. wide and with aluminum ends as shown in the lower parts of two of the accompanying illustrations. The total reach of this shoe was 60 in., which proved to be too short, for due to the swing of the car the pantograph occasionally got caught in the catenary and was ripped off. To replace the renewable center when worn out the whole shoe had to be removed, as it was fastened to the base by a center rod. These shoes cost $1.05 each, and had a life of 10,000 miles.

A new type of shoe which is now in use is shown in the upper part of the illustrations just referred to. This shoe includes a center section 4 in. wide and 40 in. long, made of $\frac{1}{8}$-in. sheet steel. The ends are made of small steel angles, and the total reach is 90 in. The center may be quickly renewed without disturbing the ends. These shoes cost 60 cents each and last for 30,000 miles in this class of service.

Mechanical Section of A. R. A. Meets at Atlantic City

First Convention of Former M. C. B. and A. M. M. Associations Since 1916 — Exhibit, as Usual, an Important Auxiliary to Technical Sessions

AFTER omitting the two meetings covered by the war period, Section III, the mechanical section, of the American Railroad Association, which replaces the former Master Car Builders' and American Railway Master Mechanics' Association, met at Atlantic City beginning June 18. The meeting will continue to and including June 25. The exhibit of railway supplies is, as formerly, an important feature of the meeting.

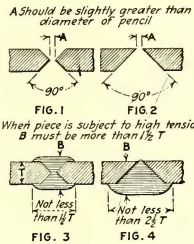
GAS AND ELECTRIC WELDING AS APPLIED TO TRUCK PARTS

Among the committee reports of most direct interest to electric railway men presented during the first part of the convention, that on welding truck side frames, bolsters and arch bars takes first place. The committee recommends that in welding, either by the use of gas or electricity, care and judgment on the part of the operator are of prime importance. The operator's ability as to the desired proficiency should be certified by the mechanical officers in charge or by an instructor qualified by experience in general railroad welding with the method involved. The committee adds that as the metal added is liable to be porous and relatively brittle, and as the heat at the surfaces welded affects other sections near the weld tending to reduce strength and toughness, certain general rules should be followed substantially as below.

Welding cracks or fractures will not be permitted on axles, arch bars, car wheels or tires, truck equalizers, spring or bolster hangers, brake staffs, brake wheels, coupler bodies, knuckles, knuckle pins, locks, lifters and throwers, as well as parts made of alloy steel or heat-treated carbon steel. Building up worn surfaces will be permissible on parts subject to compression only; on *spring or bolster hangers** and in *holes in levers,* provided that the material remaining in the part is equal to at least 80 per cent of the original section; on *center plates, truck sides, bolsters and column castings,* provided the material remaining in the part is equal to 60 per cent of the original section; and on journal boxes, coupler bodies, knuckles, locks, lifters and throwers, flat spots on rolled steel wheels and tires if the thickness of thread is 1 in. or more above the limit of wear groove.

Welding cracks or fractures will be permitted on parts subject to compression only and general car parts not subject to high-tension strain except as otherwise prohibited, on car and roof sheets, draft castings, car sills, posts, braces, carlines, side plates and end plates, and on the following where welding is permitted only when the area of the crack is less than 40 per cent of the total area through the section at the point of fracture, but it is not permissible to weld any crack located within 6 in. of an old weld: *Cast-steel truck sides, pressed and structural steel truck sides, bolsters and transoms, cast-steel bolsters, brake beams and cast-steel coupler yokes.*

The edges of pieces for welding must be prepared as shown in Figs. 1 and 2. If both sides of the fractured member can be worked upon, the fracture should be prepared as shown in Fig. 1. Where only one side of the fractured member is accessible, the plan shown in Fig. 2 should be followed. The entire crack should be burned or chipped out sufficiently far back that there will be no portion of the crack in the metal. Failure to do this permits the crack to work its way across the metal to the farther side, due to the constant vibration, even after the weld has been made. A hole may be drilled at the end of the crack or check, and the chipping or burning should be directed toward the hole. The surfaces where the new material is to be applied must be clean and bright and reasonably smooth and, therefore, if the surfaces are prepared by the burning process the surfaces must be finished by chipping before welding.



SECURING GOOD RESULTS IN WELDING

The portion of the part adjacent to the fracture should be heated before the welding is begun. In welding the operator should begin to weld at the point farthest away from the outside edge and work the weld towards the edge. All efforts must be made to prevent oxidation and to accomplish this the work should be placed at an angle that will allow the blowing out of all slag or impurities in the fuse metal, and the torch should be given a rotary movement to assist in their removal.

The new material must be deposited to the form shown in Figs. 3 and 4, in order properly to reinforce the weld, and "B" should be somewhat greater than "T." For cast-steel truck sides, pressed and structural-steel truck sides, bolsters and transoms, cast-steel bolsters, brake beams, cast-steel coupler yokes, car sills, posts, braces, stakes, carlines, side plates and end plates, "B" must be at least one and a half times "T."

In building up worn surfaces on spring or bolster hangers, or welding holes, cracks or fractures in the parts listed in the preceding sentence, with the exception of truck transoms welded in place, the parts must be carefully annealed by uniformly heating to about 1400 or 1500 deg. Fahr., and slowly cooling.

*Parts of which the names are *printed in italics* may not be welded unless removed from the car or truck; but truck transoms may be welded in place by removing the truck from under the car body.

Worn surfaces, permitted to be built up to the original section by depositing of new metal thereon, must first be made clean, bright and fairly smooth, and after the metal is deposited they must be dressed to the required dimensions and gaged where necessary. When truck side frames and bolsters are welded the weld must be made smooth and a suitable record of the welding must be legibly stamped upon the weld.

In another report the committee on car wheels treated largely of items of steam railroad interest. However, it should be noted that the committee reported the decision of the executive committee that the association shall obtain standard rings of 33 and 36-in. diameters which can be used for reference. These rings are to be certified by the United States Bureau of Standards and will be used, in cases of dispute, to check wheel tapes.

Some Suggestions Germaine to all Standardization Work

The character of the report of the committee on brake-shoe and brake-beam equipment was also largely of steam railroad interest. The committee made some general observations, however, which are suggestive to any other committees which have work to do in the line of standardization. One point is that when standards are "unapproved" by the authorities, the reasons for the failure to approve the recommendations should be stated so that the committee can benefit in further work.

The committee says further: "We have heard from time to time in the past of the representatives of some roads 'trying to force matters,' others being on the defensive, either on account of pending 'damage' to them, or of simply a 'disinclination to change anything,' and then, too, of the selfish influence of manufacturers' interests. It is the belief of the present committee, that each of its members should enter upon your committee work independent of the operation of any such impeding factors, as contributing to the fullest, through it their individual engineering judgment, skill, experience, etc., to the solution of the country's brake-beam and brake-shoe problems. No one should work upon the committee as representing the road from which he may happen to come, but as one called to co-operate with other committee members in the solution of the general questions involving all lines, to which as a committee member, his talents and efforts should be freely and impartially addressed. Conditions peculiar to his own line should only weigh with him, as with his fellow-members, in proportion to their significance when compared with other conditions represented in the country."

The brake-shoe and brake-beam committee is considering the advisability of presenting next year a report on the "state of the art" both as regards brake beams and brake-shoes. In the present report a number of charts have been presented, especially for the benefit of the younger members of the association who may be interested in the history of the standard and recommended practice sheets, showing the changes which have been made in these sheets during recent years.

On motion of the committee on nominations the following were elected to serve for two and one years respectively: Chairman, W. J. Tollerton, general mechanical superintendent, Chicago, Rock Island & Pacific Railroad; vice-president, James Coleman, superintendent car department, Grand Trunk Railway. Seven members of the general committee were also elected to serve for two years and seven for one year.

Exhibits Bigger and Better Than Ever

In number and variety of material displayed the exhibits surpassed those of any previous similar railroad convention. They totaled 301, and covered about 93,500 sq.ft. of floor space. The previous record was made in 1913 when there were 277 exhibits in a floor area of 87,360 sq.ft.

The general impression conveyed was that a large number of parts which formerly had been specified and designed by the operating companies were now being taken up vigorously by the manufacturers and produced as specialties. Steel in all its various forms has been used extensively and increasingly.

The exhibits of machine and shop tools were especially elaborate. The improvements in this class of machinery have resulted from an endeavor to cut down the time and labor necessary to machine various parts. Provision for more rapid and efficient setting up of the work and for insuring greater reliability are the most conspicuous.

The scarcity of labor during the war has evidently stimulated the development of automatic machines. The continued use of these machines should lead to far reaching economies in electric railway shops which manufacture or finish their own repair and maintenance parts. One operator can run from two to four machines which turn out the work as rapidly as a turret lathe and much more quickly than a center lathe.

The development which has been made in automatic chucking devices is surprising. A form of magnetic chuck shown provides a rapid method of preparing parts for face grinding. Electric railway mechanical departments will certainly soon show the benefits to be derived as a result of the rapid progress made in shop tools.

Other exhibits of particular interest to railway shop men were those displaying hoists, travelers, jacks and other lifting devices. Special features displayed in connection with these were designs to facilitate the handling of light parts efficiently and rapidly and at the same time to provide sufficient capacity for lifting heavy parts. There were many exhibits of pneumatic and electric shop tools. These portable machines are adapted for electric car repairs which can be made over the shop pits without dismantling the various heavy parts. The exhibits included both pneumatic and electric drills, reaming machines, cutting guns, grinders, riveters, hammers, saws, chippers, bolt drivers and rammers. The use of special heat-treated steel in the construction of these tools marked an advance of interest.

The several displays and demonstrations of electric truck tractors showed their particular adaptability for use in electric railway shops and particularly those in which new equipment is being installed on cars. The low-platform types with provision for elevating, lowering and dumping, are especially designed for use in shops where the space is limited and where sharp turns are necessary. The removal and reinstallation of compressors or other heavy electrical equipment installed underneath car bodies can be handled quickly and efficiently with one man and these tractors provide efficient means for replacing the work and labor used with

hand trucks, wheelbarrows and other means of transportation in shops. Provision is made for hauling trailers as desired.

The rapid progress that welding has made during the last few years is indicated by the large amount of equipment of this character displayed. This included all classes of gas, electric and thermit welding apparatus. In the electric exhibits both alternating-current and direct-current motors were used to drive generators or were driven from gas engine or line shaft. Systems requiring no auxiliary equipment were also shown, some for use on circuits of voltage as low as 125.

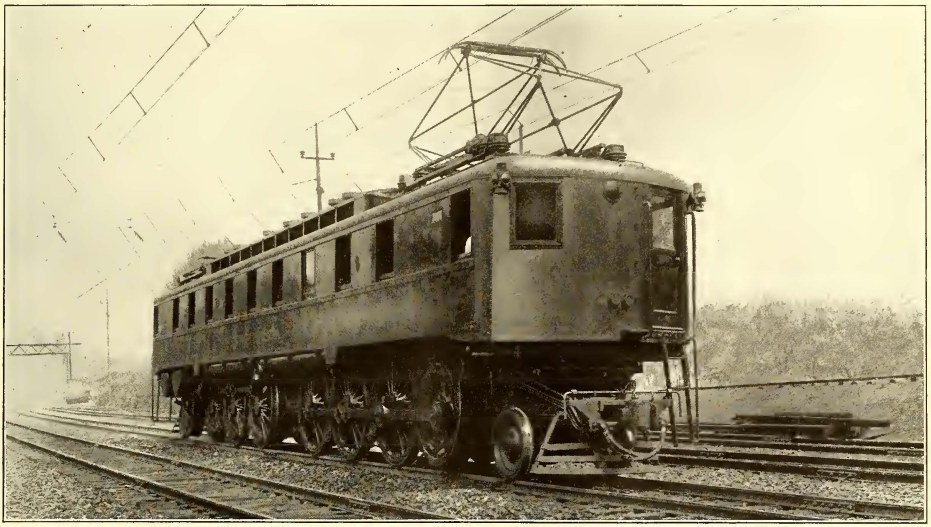
In one welding display a large number of articles of artistic design and workmanship made with constant-energy sets showed the possibility of using welding apparatus for delicate operations and specimens of large welds exemplified the rugged work that can be accomplished with this system.

Master mechanics and superintendents of equipment exclusively for heater coils. Great advances have been made in providing binding posts and special connectors for attaching the wiring. In former days heaters were furnished with copper insulated leads soldered to the coils. This necessitated making a splice to connect them, and the solder often softened from the heat. By attaching the ends of the coils direct to terminals furnishing additional provision for connecting the outside wiring, troubles of this nature are avoided. Lightness of construction is obtained by using sheet-steel and other sheet-metal punchings instead of castings.

A 600-volt portable cab heater with plug socket was a special feature. This should be of great benefit for cars with motormen's caps or in cases where train operation is employed.

For shops and stations wall and floor type heaters are arranged for mounting in batteries so that any number of units may be employed.

Improvements in thermostats included moulded insu-



250-TON, 4800-HP. SINGLE-PHASE, THREE-PHASE PENNSYLVANIA LOCOMOTIVE, SHOWN AT ATLANTIC CITY

of electric railways found plenty to occupy their attention in the exhibits of car parts and car fixtures, specialties and appliances. These included new types of seats and seat parts, car trimmings, hardware, curtains, safety treads, as well as drawn steel and pressed-steel shapes and stampings. An anti-rattling and window-sash brake device of new design is arranged to retard the downward movement of the sash and offer no resistance to the sash being raised. Two springs of different strength are used. In raising the sash a shoe compresses the weaker spring and the window can be easily raised. In lowering, the shoe automatically slides to a position to compress the heavy spring. This increases the pressure and prevents the sash from falling.

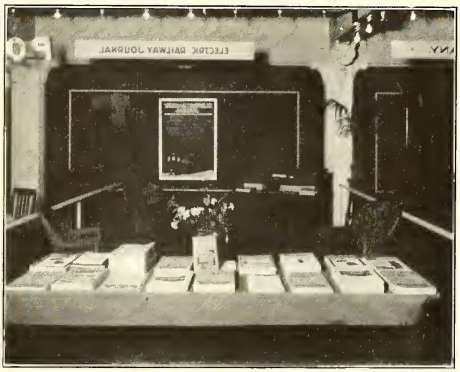
The display of car heating equipment included electric heaters, switches, thermostats, etc. Improvements in electric heater construction provided for ventilated cores with a case construction to give better and more efficient radiation of heat. Special alloy wire is used

lating bases for mounting and provision for removing the contact portion complete. Ample space with binding posts for wiring is a feature. Covers are fastened with through screws so they can not be removed unless the complete thermostat is loosened. The regulating switches for thermostatic control are provided with blow-out for the main contacts. Relays have exposed contacts for ready inspection made of german silver or "monel" metal. Where equipments are installed underneath cars waterproof boxes are provided. These are arranged for mounting at either top or back, have binding posts for attaching all wires and are provided with knockouts so that the wiring may be brought inside the box in conduit.

Other exhibits of especial interest to rolling-stock engineers were those of trucks, wheels, brakes, brake-shoes slack adjusters and foundation-brake rigging. In the various trucks and truck parts shown special attention had been given to the design of springs, journal

boxes, bolsters and method of suspension. A special construction for guiding the bolster consisted in providing slots in the ends of the bolster, both forward and behind the columns. Carrier bars pass through these and rest on the trunnions of the spring caps, thereby forming the support for the bolster and locking the side frames securely into position. As the carrier bars pass through the bolster at a point on a level with the journal bearings they deliver all side thrust to the frames, without any tendency to tilt the side frames, and thereby eliminate the necessity for a spring plank.

Included in the Pennsylvania Railroad exhibit on Tennessee Avenue near the railroad station is the 250-ton Pennsylvania electric freight locomotive. This represents the present maximum capacity for a single-cab unit. The principal object in the design was to concentrate the greatest power possible within the limita-



ELECTRIC RAILWAY JOURNAL BOOTH AT THE A. R. A. CONVENTION

tions imposed by existing track structures, clearances and modern electrical development. This locomotive has 4800 hp. capacity, with 140,000 lb. starting tractive effort. The free running speed is 20.6 m.p.h. Power is received from a 11,000-volt single-phase contact wire and fed through a transformer and phase converter to three-phase induction motors geared to a jackshaft. Some of the principal dimensions are: Total weight of locomotive, 250 tons; weight on drivers, 210 tons; number of driving axles, 6; capacity of locomotive—one-hour rating, 4800 hp.; starting tractive effort, 140,000 lb.; tractive effort at hourly rating of motors, 87,200 lb.; speed, 20.6 m.p.h.; total wheelbase, 63 ft. 11 in.; rigid wheelbase, 13 ft. 4 in.; overall length, 76 ft. 6¼ in.; height from rail to locked position of pantograph, 15 ft. 6 in.; height from rail to top of cab, 14 ft. 8 in.; width over cab body, 10 ft.; overall width, 10 ft. 1 in.; driving wheelbase, 38 ft. 8 in.; diameter of driving wheels, 72 in.; diameter of pony wheels, 36 in.; weight on each pony truck, 20 tons; voltage of locomotive, 11,000 a.c. Two of these engines in regular service will handle a 6300-ton train up a 1 per cent grade of 24 miles at a constant speed of 20.6 m.p.h.

This locomotive was built at the Altoona shops of the Pennsylvania Railroad and the design was evolved under the direction of J. T. Wallis, general superintendent of motive power, Pennsylvania Railroad, together with B. G. Lamme, chief engineer, Westinghouse Company.

The track exhibits were of particular interest this year. In addition to the exhibits of railroad equipment there were a number of heavy railroad mounts for the Army and Navy Ordnance which demand the natural interest attaching to equipment of this character at the present time and also are interesting due to the problems of extraordinary stresses which had to be solved in designing this equipment. They show in a general way the gigantic war activities which were engaged in by the manufacturers. The railway mounts include two 14-in. army rifles as well as several smaller sizes and a 12-in. mortar. The mounts for the 7-in. and 8-in. army rifles were of the well-car type carried on standard M.C.B. 50 and 70-ton trucks respectively.

These exhibits were shown through the courtesy of the Ordnance Department of the United States Navy and were in charge of naval officers and enlisted men together with representatives of the manufacturers.

Among other exhibits of special interest to electric railway men were those of storage batteries, electric headlights, paints, insulating material, air hose fittings, ventilators, journal box packing, roller bearings, draft gear, couplers, steel castings, bolts and nuts.

Iowa Railway Men Meet

THE Iowa utilities were in convention as this issue of the JOURNAL goes to press. The Iowa Electric Railway Association meeting at Colfax, Iowa, officially opened its railway sessions on Thursday morning of this week, but on Wednesday afternoon a joint session was held with the Iowa section of the National Electric Light Association during which a paper on the Iowa State Board of Conciliation was read by Dean Raymond of the State University.

The session on Thursday morning was called to order by Vice-President F. J. Hanlon, general manager Mason City & Clear Lake Railroad, in the absence of President C. E. Fahrney, general manager Ottumwa Railway & Light Company. Following the disposal of routine business, R. J. Smith, superintendent way and structures Tri-City Railway Company, Davenport, opened the discussion on the best paving to be used in connection with track, with reference to advantages of cement, creosote blocks, brick and asphalt. Mr. Smith gave as his opinion that brick laid in grout and with joints filled with grout gives the best paving where traffic is not extremely heavy. A general discussion followed substantiating this opinion.

The afternoon session opened with papers on the safety car by T. C. Roderick, assistant general manager Tri-City Railway Company. This was followed by extensive discussion showing great interest in the subject, all the comments being favorable to the car and the discussion centered on details. The second paper was on the automatic control of substations and was read by C. W. Place, engineer of the General Electric Company. The presentation of this paper was followed by a general discussion on reclaiming of track and special work by welding and grinding, led by R. J. Smith.

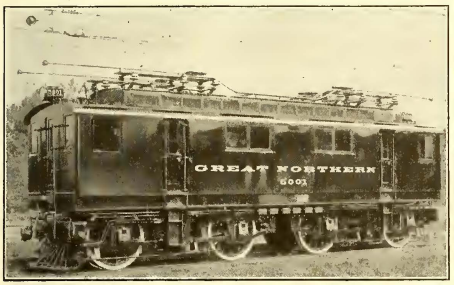
At the executive session J. P. Ingle, manager Keokuk Electric Company, was elected president of the association for the coming year and member of board of directors for five years. Abstracts of the papers presented at the Iowa meeting most closely allied to the electric railway industry will appear in a later issue of this journal.

1918 Data for the Pioneer Constant-Speed Electrification*

In Cascade Tunnel, Electrified Ten Years Ago, Great Northern Railway Uses Constant-Speed Four Motor Units on 1.7 Per Cent Grade

BY E. MARSHALL
Electrical Engineer, Great Northern Railroad, St. Paul, Minn.

IN 1909 the Great Northern Railroad began the operation of four electric locomotives through the Cascade tunnel, in the State of Washington, to do away with smoke conditions of steam operation. This tunnel is about 14,000 ft. long with a uniform grade of 1.7 per cent eastbound. In the yard of the west end of the tunnel there is a grade of 2.2 per cent on which trains must be started. A train is brought to this grade by three Mallet locomotives and is taken, together



CASCADE TUNNEL LOCOMOTIVE OF GREAT NORTHERN RAILWAY

with the three idle locomotives, up the grade and through the tunnel in two cuts by three electric locomotives.

The electric locomotives are four in number, in single units, each with four motors. Each motor is a three-phase 25-cycle, slip-ring induction motor, running at a synchronous speed of 375 r.p.m. Its capacity is 250 hp. at a three-hour rating or 375 hp. at a one-hour rating. Each motor is geared to its axle by a pinion on each end of the motor shaft, making a double drive. The gear ratio is 4.26 and the driving wheels are 60 in. in diameter. This then gives a locomotive speed

TABLE I—LOCOMOTIVE DATA, CASCADE TUNNEL ELECTRIFIED

Total weight, lb.	230,000
Weight on drivers, lb.	230,000
Number of driving axles	4
Number of other axles	0
Diameter of wheels, inches	60
Gear ratio	4.26
Number of motors	4
Output of motor for one hour (nominal), horsepower	400
Output of motor for one hour (test), horsepower	505
Rise in temperature, dehrees Fahr	75
Output of motor for three hours (nominal), horsepower	250
Output of motor for three hours (test), horsepower	397
Rise in temperature, degrees Fahr	75
Forced ventilation, cu.ft. per minute	1,500
Number of poles on motors	8
Frequency, cycles per second	25
Synchronous speed of motors, r.p.m.	375
Voltage between terminals	500
Synchronous speed of locomotive, m.p.h.	15.7
Number of transformers	2
High potential voltage of transformers	6,000
Rating of transformers (three hours), kva.	400
Forced ventilation, cubic feet per minute	1,500
Number of steps in control	13
Continuous rating locomotive, pound tractive effort	25,00
Accelerating rating locomotive, pound tractive effort	38,000
Momentary rating locomotive, pound tractive effort	56,000
Maximum rating locomotive, pound tractive effort	72,000
Length over all of locomotive	44 ft. 2 in.
Total wheelbase	31 ft. 9 in.
Rigid wheelbase	11 ft. 0 in.

TABLE II—OPERATING DATA CASCADE TUNNEL ELECTRIFICATION

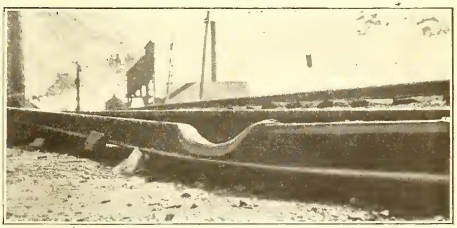
Freight mileage	24,528
Return (idle) mileage	24,528
Passenger mileage	13,020
Passenger (idle) mileage	13,020
Special mileage	12
Special (idle) mileage	12
Total	75,120
Tons 1 mile, cars and contents	8,461,770
Passenger train cars, 1 mile	48,096
Average gross tons per engine-mile	345
Average haul is double the above or	690
Cost of repairs, total	$5,653.91
Miles per pint of oil, valve	313
Miles per pint of oil, engine and car	19
Cost per mile for repairs, in cents per mile run	7.53
Cost per mile for wages, in cents per mile run	27.39
Cost per mile for lubricants, in cents per mile run	0.2
Cost per mile for supplies, in cents per mile run	0.33
Cost per mile for total, in cents per mile run	35.45

when the motors are running at exact synchronism of 15.79 m.p.h.

This was the first constant-speed locomotive installation in this country, and constant-speed operation was selected because up to the time of its adoption this was the only method whereby regeneration could be secured without getting into what then seemed to be prohibitive complications. Regeneration appeared to be of great value for mountain grades. Of course, for this particular installation regeneration has proved to be of no value, on account of the short distance involved, and because we do not handle trains with the electric locomotives westbound. It was, however, part of a general scheme to electrify the entire mountain grade, taking in a distance of about 60 miles.

Power is delivered to the locomotives by a three-phase overhead-contact system, using two wires for two phases, and the track return for the third phase. The voltage is 6600 between the overhead wires and between each wire and the rail. The power plant is located 30 miles from the tunnel and generates power at 6600 volts, 25 cycles, three-phase. This is stepped up to 33,000 volts, and transmitted to a substation at Cascade tunnel where it is stepped down again to 6600 volts.

One of the features of constant-speed operation is that there must be ample power behind the locomotive



AN EVIDENCE OF THE POWERFUL TORQUE OF THE GREAT NORTHERN LOCOMOTIVE

to handle the load, as no increase in torque can be obtained by any means whatever. Also if the load is too great for the amount of power available, the requirements cannot be reduced as can be done with the series, or variable-speed motor. This makes it necessary to keep the train load down well within the power capacity of the system. An accompanying photograph indicates

*Previous articles on the Great Northern electrification will be found in the following issues of the ELECTRIC RAILWAY JOURNAL: Oct. 31, 1908, page 1276, details of locomotive; March 27, 1909, page 545, referred to in a general discussion; Nov. 20, 1909, page 1052, extended abstract of A. I. E. E. paper by Dr. Cary T. Hutchinson, read at New York meeting of Nov. 12; March 19, 1910, page 494, account of overturning of locomotives and other damage by avalanche at Wellington, Wash., March 1.

what happened by reason of the constant speed characteristics of these locomotives. We operate with two locomotives in the rear of the train and one ahead. On one trip a fuse blew on one of the rear locomtives and this double unit stopped. It being dark in the tunnel the forward engineer knew nothing of this occurrence and his locomotive started to slip. As it could not exceed the speed of 15 m.p.h., he supposed he was moving through the tunnel. In due time he considered that he ought to be through, but discovered that this locomotive was standing still and had ground the rail two-thirds of the way through. The two accompanying tables on the preceding page give locomotive and operating data for this electrification. Table I contains the principal dimensions of the locomotive as well as its weight, output, rating, etc. Table II includes some very interesting figures on mileage made and data on the operating cost of these locomotives for the year 1918.

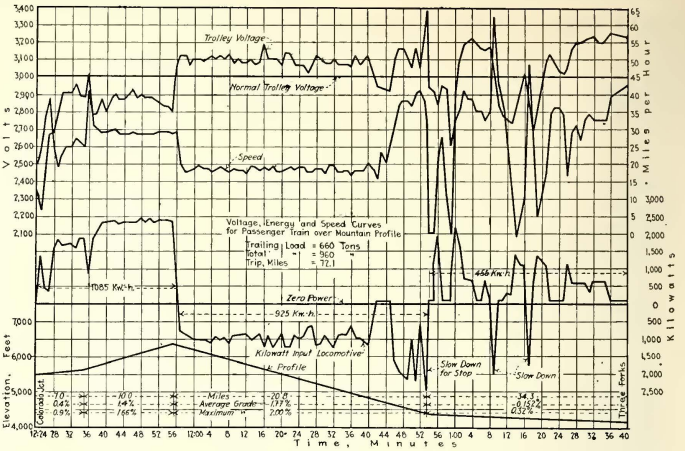


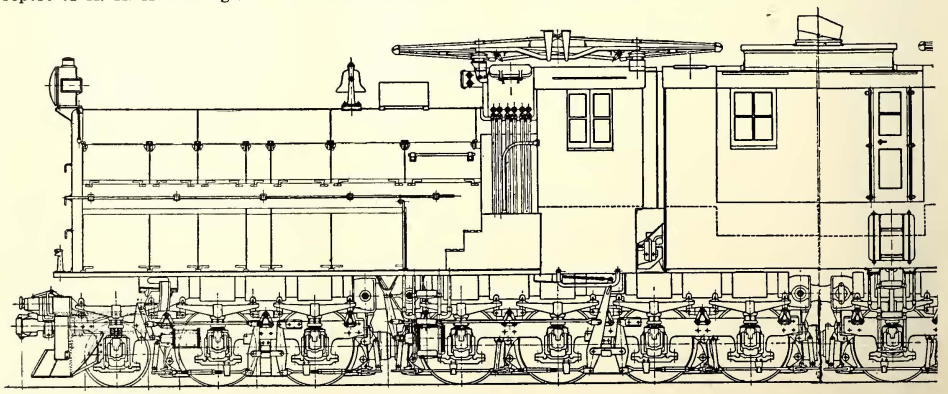
CHART SHOWING OPERATING CONDITIONS FOR 960-TON PASSENGER TRAIN OPERATING FROM COLORADO JUNCTION (BUTTE) TO THREE FORKS, MONT.

Power Regeneration on the St. Paul

IN ITS June issue the *General Electric Review* reprints the paper read by W. B. Potter and S. T. Dodd before the Western Railway Club at Chicago on April 21 (published in this paper for April 26). The *Review* shows some interesting illustrations, not available at the time the ELECTRIC RAILWAY JOURNAL article was published, from which the accompanying two have been selected.

One of these illustrations shows some details of the new type of locomotive which the General Electric Company is building for the Chicago, Milwaukee & St. Paul Railway. The drawing indicates several differences in detail from that reproduced in connection with the report of A. H. Armstrong's New York Railroad Club paper published in the issue of this paper for March 23, 1918, page 561. For example, the pantograph is now shown mounted on the cab instead of the hood. More details of the knuckles connecting the central section of the cab with the other section are visible also.

The second illustration gives data regarding regeneration on the section of the electrified section between Three Forks and Butte. In this connection the authors say: "The amount of power returned to the trolley by regeneration varies with the amount of the grade and the type of train. On specific tests it has been shown that a train on a 2 per cent grade has regenerated 42 per cent of the power required to pull the same train up the grade. On a 1.66 per cent grade 23 per cent has been regenerated. The records for a particular month over the entire Rocky Mountain Division of the C. M. & St. P. for both freight and passenger trains show that the regeneration was equivalent to 11.3 per cent of the total power used."



PARTIAL ELEVATION OF 265-TON PASSENGER LOCOMOTIVE UNDER CONSTRUCTION FOR C., M. & ST. P. RAILWAY—CASCADE ELECTRIFICATION

Advantages of Service-at-Cost*

Plan Is Desirable Through Equitable Adjustment of Fares and Service—It Removes Antagonism and Fosters Co-operation

By Harlow C. Clark
American Electric Railway Association.

THE laws of New York State as they now exist have taken away from the cities the right of regulation and control and the spectacle is presented of the largest state in the Union adrift on a sea of uncertainty and absolute inefficiency insofar as the control and regulation of one of the semi-public enterprises most important to the welfare, health and comfort and convenience of its citizens is concerned. The situation is one that is intolerable alike to the communities and to the investors. It is one that must be speedily corrected if the onward march of the Empire State is not to be halted.

In seeking the way out, it is necessary first of all to have a clear conception of the service and the duty that an electric railway performs. Street, interurban and suburban railway transportation is first of all a community function. As I conceive it, the only reason why it should not be performed by the community itself, acting through its corporate organization, is that it can be better and more efficiently and more economically performed by private enterprise.

I am not going to enter upon a discussion of the advantages and disadvantages of municipal ownership. It may be that in the halcyon days that are always before us, our form of government will so improve and develop that it will be capable of performing every service for its citizens better than similar service could be performed by private enterprise. There is nothing, however, in the history of our national, state or city government to indicate that so far in its history it has ever been as efficient and as economical as private enterprise, or most important of all—that it has ever brought to the conduct of such enterprises the initiative that has placed America in the forefront of the nations in everything that pertains to the physical welfare of its people.

Moreover, as far as the State of New York is concerned, the discussion of public ownership as affecting electric railways is, I think, academic. There is said to be no city in the State which is in a position, under the bonding limitations of the State Constitution, to purchase its electric railway system.

Important Elements of Cost

If we are not to have government operation of our electric railway systems, what then? It seems to me that we should seek to secure the advantages of private enterprise and initiative to get for the communities the best possible service, at the lowest possible cost.

There are several things that the public requires of corporations which it calls upon to perform public service for it. First of all it requires their money, not only that amount which covers the initial cost, but a continuous flow of money to develop, improve and extend the enterprise. It also requires their skill, their knowledge, their experience and their efficiency. These it must pay for, and the rate that must be paid decreases as the assurance of a proper return increases.

In addition to this assured return, which is capital's wage, there must be, if the public is to receive the best that is in the men who carry on their public service, some additional incentive for the exercise to the fullest of those qualities which give private management its value. I am not yet enough of an optimist to believe that the necessity of reward, to induce initiative and care and hard work and deep thinking in the management of business, is no longer with us.

These two elements of cost—the return to capital and the reward for initiative—are the only two which result from private operation and ownership, and the first does so only as the return demanded upon private investment differs from the return demanded upon public investment. Every other cost, with the single exception of taxes, is unaffected by the kind of ownership and operation under which an electric railway is conducted. These other elements are operating expenses, taxes, depreciation and maintenance. There is no virtue in public ownership or operation which can eliminate any of these costs except taxes.

It is evident that the money to pay these costs can come from but two sources—either from the car rider, who receives the service, or from the taxpayer. The policy of state subsidization of public utilities is even now being advocated, and more than that is actually in practice in Massachusetts. I doubt, however, whether this paternalistic policy will generally appeal to the American people.

Hence, if we are to have the "best possible service at the lowest possible cost," it is necessary that the fares shall vary as the cost of furnishing the service varies. It is perfectly evident that a fixed fare will, over any considerable length of time, be either too much or too little. What we must have is a fare that will readily and easily respond to the changes in the cost of the service demanded. This flexible relation between cost and price is what prevails in every other industry. The tax levies of cities change from time to time as the expense of administration changes. If, then, we are to adopt for the business of furnishing public service the same natural economic laws that apply to all other enterprise, we must have a flexible fare.

The next most important step is to determine the kind, character and extent of the service to be furnished. That I consider to be a direct function of the public itself, for it is a matter that depends upon the price. It should be the privilege of the public to specify the service required, and it should be the duty of the company to furnish it, as long as it is possible to furnish it for the fare received.

We must remember, however, that it is to the interest of both the public and company that fares be as low as is consistent with good service. One of the great advantages of the plan I am outlining is that it tends to bring about a spirit of co-operation between the company and the public that results in low fares. There is but one alternative to high fares under existing conditions, *i.e.*, extreme economy in operation, and this economy cannot be secured without the support and assistance of the public.

The advent of the automobile has made a great change in the conditions under which electric railways are being operated. It is very evident that a large part of the field formerly occupied by the electric railway has been invaded by this new form of transportation, which is furnishing a kind of competition that cannot be got-

*Abstract of address before New York State Conference of Mayors at Schenectady, N. Y., June 11, 1919.

ten rid of. It seems to me that what is immediately needed is a survey of the situation in each city, in order to ascertain how the service performed by the electric railways can be so readjusted as to eliminate all that is no longer necessary. It is certainly true that most electric railway systems are now furnishing service that is both unwarranted and unnecessary, and that they are being compelled by regulatory commissions and by public opinion to pursue many practices and methods which could and would be done away with if the public realized how important an effect they had upon the cost of operation and consequently upon the fare.

There are in addition many operating economies that could profitably be introduced, if the public was convinced that it was in the interest of low rates and good service. Among these are the one-man car, turnbacks, increased speed, and the enforcement of traffic regulations which would better protect the schedules.

SUMMARY OF SERVICE-AT-COST PLAN

The service-at-cost plan proposes the following:

1. That private individuals and corporations shall act as the agents of the public in providing electric railway service.
2. That such agents shall receive for their services (a) such a rate of interest upon their investment in the property used and useful in serving the public as will attract capital into the business, and (b) an additional compensation as a reward for initiative, to be measured by the economy and efficiency manifested in the management.
3. That the degree to which the electric railway system shall be called upon to bear public taxes and imposts be determined in the light of fairness and justice as between the tax-payer and the car rider against whom such imposts are directly levied.
4. That the cost of operating the property shall be borne by the persons receiving the service, through a system of fares so adjusted as to respond to the variations in costs.
5. That the public, under such a system of fares as will provide the cost of whatever service is required, shall prescribe the service to be furnished.
6. That because under the plan proposed the rate of fare will largely depend upon the economy and efficiency with which the property is operated, the co-operation of the public in the elimination of unnecessary service and in the introduction of all proper operation economies be enlisted.

I greatly doubt that any intelligent, honest and well-informed body of men seeking a solution of the problem of the traction interests will very far depart from these principles. Their soundness is, as I see it, unaffected by any considerations of state or local control, or of varying systems of fares and fare collection. They can be applied through public service commissions or municipal directors, and they function as well if fares be measured by the distance the passengers are transported as if flat rates are in effect.

If they are to be applied to existing situations in communities already served by electric railway systems created under the old theory of the relations between municipalities and transportation utilities, a valuation of the property of the companies is a necessity. I see no unsurmountable obstacle in such valuation. I do not believe that any inflexible formula has yet been arrived at by courts and commissions by which the value of any particular property can be determined in justice to everyone concerned. The history of each company must be taken into consideration. I do believe that it is possible for reasonable men, even though their interests may seem to be opposed, to get together and arrive at an honest conclusion. In six cities in which service-at-cost agreements are now in effect valuations have been reached, and each valuation made has made the next one easier.

I conceive the merits of service-at-cost to be these:

That it establishes a method by which the price of electric railway service may be brought into correct relation with its cost.

That it is applicable to all methods of operation and control, whether by public or private corporations or under state or local regulation.

That it permits the public to specify the kind and the extent of service to be furnished.

That it is applicable to any system of charging, either by distance, by zones or by a flat rate.

That it induces co-operation between the public and the management in securing economical and efficient management.

That it removes the antagonism between the public and the corporations furnishing them transportation service.

That it establishes the transportation utilities as agents of the public, performing for the public a public service and receiving therefor a reasonable, a sufficient and an assured return.

I have no fear for the future of the electric railway industry. It is gradually adjusting itself to the higher price level, which we all know is upon us to remain. Undoubtedly fares will be higher than before, but the ability of the citizen to pay them has increased. Considered in terms of the average income, the fares will never, in my opinion, take from the patron so large a portion of his income as did the 5-cent fare when it was first established.

Solving the Traction Problem

The Problem from the Public Point of View Demands a Solution in the Form of Public Ownership Based on a Conservative Valuation

DELOS F. WILCOX, at the New York State conference of mayors at Schenectady on June 11, urged municipal ownership as the real solution of the present electric railway situation, and he favored action by the next Legislature in New York. He declared, however, that valuation is the crucial point, for municipal ownership cannot afford to start off under the handicap of an excessive purchase price. As regards financing, Dr. Wilcox referred to the method followed in Seattle by which the municipal railway bonds were made a first lien upon the gross earnings of the railway. He thought that this might offer a way of handling the financial problem in New York.

ELEMENTS OF THE COST OF SERVICE

In opening his remarks Dr. Wilcox analyzed the cost of service under (a) operating expenses, (b) accruing depreciation, (c) taxes and (d) return on investment. Under the first head he said that the public has a right to demand efficient management, which should include the taking advantage of progress in the art to reduce the operating costs now chargeable to unnecessary trackage, uneconomical routing, over-heavy cars, over-consumption of power and waste of platform labor. As for depreciation, he said that this had been too much neglected by over-optimistic managers, and that a correct policy should now be followed. This will have a tendency to increase the recognized cost of service and emphasize the demand for larger revenues.

Large taxes on electric railways were assessed because of the exaggerated ideas of the excess profits of electric railways, and budget makers for city and state have come to depend on them. In many cases the taxes have borne no direct relation to the profitableness of the industry and therefore are very little affected by a

decrease in revenues or by an increase in operating expenses. A proper means of reducing the outgo in the case of hard-pressed electric railways, in the speaker's opinion, would be the reduction or the complete elimination of the special taxes and charges which have been levied against them in the days of their assumed or real prosperity. But this method of granting relief should not be adopted unless the companies demonstrate their good faith and efficiency by making use of all reasonable methods for the reduction of operating expenses.

The cost of capital, said Dr. Wilcox, has increased largely because the margin of safety, that is, the percentage of a company's income remaining after the payment of fixed charges, has decreased. But this decrease in the margin of safety, in the speaker's opinion, has been due largely to over-capitalization and the consequent inability of companies to sell common stock. Apologists for electric railways protest that the sins of the predecessor managements are now outlawed, but the trouble is that obligations rashly assumed will not cease to torment a man or a company until they are either repudiated or paid.

In regard to the general condition of electric railway finance, Dr. Wilcox said in part:

Electric railway finance must be put upon a sound conservative basis. I say this knowing full well that in most cases the remedy proposed cannot be voluntarily accepted by the electric railway managers, directors and lawyers, who are in nominal control of the properties and the policies. These men frequently represent a narrow marginal interest that is threatened with extinction whenever earnings fall or expenses rise. Nevertheless, this marginal interest includes practically the entire group of active men whom we see and negotiate with as the operators and nominal owners of the electric railways. To them it is a matter of life or death to maintain their narrow footing and retain their jobs and their power.

When the prices of materials increase so that it is almost impossible for an electric railway to earn a moderate return on a conservative investment at any rates that may be charged, these men seize upon this condition to assert that it has doubled the value of their property. They recognize perfectly that the fundamental fact of importance to them from the point of view of their private interest is the valuation. If they can get a high enough value recognized, then public service commissions will be impotent to control rates or to compel radical improvements in service. If they can get a value fixed that makes electric railway operations appear unprofitable, then they can forestall municipal ownership by putting it under an initial handicap that could not be overcome for many years, if ever.

The foundation of the structure of electric railway investments in this country is rotten, and this is one of the fundamental reasons why the business has been unable to weather the storm of war times. I do not say that this is the only reason, but I do say that no plan which calls upon the public to pour more revenues and still more into the coffers of the electric railways will result in putting them on their feet financially without wrecking them as public utilities, unless this rotten financial foundation is removed and the whole structure rebuilt on a sound basis.

I gravely doubt the possibility of getting the electric railway business upon a sound basis with its own consent. It feels itself desperately sick and would like to be cured, but apparently it prefers death to castor oil. I do not anticipate that the committees of the American Electric Railway Association and the United States Chamber of Commerce, or even the new federal advisory commission, will get very far in helping the bankrupt companies, unless they prescribe a disagreeable remedy.

Dr. Wilcox then took up the question of who is to pay the cost of service, mentioning the following points that require consideration: Is it to be the largest number of persons who can be persuaded by low fares and good service to avail themselves of electric railway facilities? Or is it to be the residual number of street car patrons who cannot be driven away by high fares and inconvenient service? Or is it to be the people who can be arrested and compelled to ride in street cars even though, at the price charged, they would prefer to walk, take a jitney or buy a Ford? Or shall a levy be made on the land owners for a share of the cost, and people be taxed because they could ride but do not?

In connection with the various aspects of this matter of paying for service, Dr. Wilcox said in part:

American zoning experiments do not look to a decrease in the fares below the old 5-cent unit, even to the short rider, and so far as these zoning plans have been put into effect and so far as the results of proposed zoning plans have been forecast by the companies, they have been attended or will be attended by a decrease in traffic resulting from the increase in fares. The electric railway companies in this country have been flirting with permanent ruin by the pursuit of a rate policy that tends to diminish their usefulness as a public utility by driving away traffic, particularly that portion of it which is from the financial point of view most profitable to the carriers.

It seems clear that there is little chance of reaching an agreement with the electric railways by which they will accept as the cost of service a figure that we can afford to pay. At least matters have come to such a pass that in many cases we cannot afford to saddle upon the car riders the full cost of service as measured by the demands of private ownership and operation. But with public operation for the benefit of the private owners, after the Massachusetts plan, or with subsidies out of taxation to make up for deficiencies in revenue where rates are kept down to the level which the general welfare of the community demands, we get into a realm of uncertainty and danger that ought to be avoided if possible. To make a service-at-cost plan effective under private management requires a persistent application of public intelligence and public will that is just as difficult as efficiency in direct public operation. It can hardly be doubted that the Cleveland plan has worked more satisfactorily than any other plan of private operation which has been tried in connection with any important electric railway system in this country, but Cleveland has its troubles, and the agitation for municipal ownership seems to be just as keen there as it is in other American cities. The case for public ownership and operation rests squarely upon the premise that the function of local transportation is public business.

Despite the legal and financial difficulties involved, Dr. Wilcox believed that until the cities adopted a definite program for definite action toward the municipalization of utilities, very little progress toward a solution of the electric railway problem would be made. He did not hesitate to blame the cities, and more particularly the mayors and other officials, for the negligence which has been displayed by them with respect to the electric railway problem. It is their narrowness of vision, their lack of initiative, their unwillingness to tackle big public jobs or to assume big responsibilities, that have kept cities in a condition of unreadiness and impotence. Yet the traction problem is the cities' problem.

In conclusion, Dr. Wilcox urged the passage of municipal ownership legislation that can and will be used. To his mind, one of the most important things in this connection is that the law shall leave a city free to initiate and carry through a municipal ownership policy without having to come to an agreement with the existing company as to how or when the policy is to be put into effect, or as to the price to be paid for the company's plant. There is needed an adequate public utility condemnation law so drawn as to protect the cities from having to pay an exorbitant price for property already devoted to the public service, merely because it is being taken from its private owner to be continued in the same service under more responsible management. In short, he declared, the crux of the traction problem is the valuation.

Safety Car and Public Ownership Discussed

Properly Devised Service-at-Cost Franchise Might Serve for Present, Says Dr. Wilcox—Local Chambers of Commerce Being Canvassed

THE public utilities committee of the Chamber of Commerce of the United States held its third hearing in Washington, D. C., on June 13 in regard to the electric railway situation. The main speakers were Henry G. Bradlee, Stone & Webster management corporation, and Delos F. Wilcox, consulting franchise expert, New York, N. Y., their subjects being respectively the one-man safety car and the general problem of the electric railway industry.

Mr. Bradlee, after describing the origin and the development of the safety car, directed attention to the three savings in wages, power and maintenance costs and to the increases in revenue from the greater service and riding that go with the use of this car. Mr. Bradlee stated that in general Stone & Webster find motor buses more expensive than the light-weight safety cars for heavy traffic; but sometimes because of the smaller investment required it is better to try buses during the test period in opening up new territory. As for the conversion of old cars, he declared that this would result substantially in only labor saving, with no benefit to the public through increased service.

Mr. Bradlee said that Stone & Webster companies have shown decreases in the number and the cost of accidents since the adoption of safety cars. In regard to employees, he averred that no man has been dropped because of one-man operation, for the increased service given with the safety cars and the very heavy labor turnover in the electric railway industry have enabled the companies to take care of all the old employees, new men not being taken on quite so fast for a short time.

In Dr. Wilcox's opinion, the present electric railway situation is due partly to financial policies voluntarily pursued by the companies, partly to restrictions imposed by the public and partly to economic changes. In connection with the first item he criticized the tendency of companies to neglect depreciation provisions and to be forever pushing for a bigger capitalization or a bigger capital value. In most cases, he admitted, electric railways are not receiving a fair return upon a conservative valuation of the property in public use. Even with such a fair return, however, the fixed charges in many cases could not be paid and sufficient margin for stock be left to attract new capital for development.

Under the heading of public restrictions Dr. Wilcox placed the fixed fare and tax burdens. He favored a flexible fare except in cases where the public policy of the community requires a certain fare for the sake of city development, it being understood that the full cost of service must be paid in some way. Likewise he favored reduced or eliminated taxes where they do not constitute a proper part of the cost of service. In so far as the paving tax is legitimately created by car operation, it should be charged against the railway, but in so far as it is simply a relic of past days and not related to present operation, it should be abolished. The replacement of paving after track repairs is a proper charge against the railway.

In the face of existing conditions, Mr. Wilcox thought that the only way out would be through public ownership. The tendency is toward a greater recognition of electric railway operation as a public business and a greater public control thereover, and the world does not move backward. There is a great movement in favor of service-at-cost resettlements, but such arrangements have the disadvantage of being indirect. Dr. Wilcox admitted, however, that public opinion is divided on the question of the advisability of municipal ownership and also that much time would be required to straighten out existing legislation so as to make such ownership possible.

In response to a query from P. H. Gadsden, as to whether efforts should not be made to scrap existing franchises and secure universal acceptance of new service-at-cost franchises based on fair valuations with the right of municipal purchase when the cities should secure the power, Dr. Wilcox agreed that such a general plan would help to steady the situation. Moreover, it would be a good permanent policy as regards preparation for an ultimate decision either way on the question of municipal ownership. Dr. Wilcox made the reservation, however, that the service-at-cost franchises must have satisfactory safeguards in relation to the purchase price of the property, an amortization process if the city so desired, and control over fares and extensions. He deplored the fact that no general authority exists for finding fair values and making both sides accept them, for the extravagant claims made when valuations are handled by direct negotiation militate against speedy settlements.

The members of the public utilities committee present were Lewis E. Pierson, New York, N. Y., chairman; P. H. Gadsden, Philadelphia, Pa.; E. K. Hall, New York, N. Y.; F. B. DeBerard, New York, N. Y.; A. W. Harris, Chicago, Ill.; Henry G. Bradlee, Boston, Mass.; H. L. McCune, Kansas City, Mo., and C. L. Harrison, Cincinnati, Ohio. Royal Meeker, commissioner of the bureau of labor statistics, who with Mr. Gadsden is a member of the recently created Federal Electric Railways Commission, also attended. Mr. Gadsden explained the proposed work of the federal body, and the public utilities committee expressed itself in favor of full co-operation.

LETTER SENT TO LOCAL CHAMBER

In order to add to the data already secured at hearings, the public utilities committee on June 11 sent to local chambers of commerce throughout the United States a letter asking for information concerning the local transportation situation in the larger cities. The letter was in part as follows:

> The committee on public utilities of the Chamber of Commerce of the United States has been so deeply impressed by the extent and gravity of the financial condition of street railways everywhere that it plans to make a report as soon as possible upon this national problem.
>
> Everyone agrees that the actual solution of each separate situation must be made by the official representatives of the community concerned, but certain general principles are common to all cases and the problem is of vital importance in its relation to the home owner, the manufacturer, the merchant, and business and social welfare generally. The problem is essentially a business problem, and it will not be well solved unless the representative business men of every city give it careful study and consideration and tender their best judgment and advice.
>
> In order to assure the compilation of a comprehensive report with practical and helpful recommendations, the national chamber's committee asks for the immediate co-operation of a committee of your organization and hopes that, if a proper committee is not already constituted, such a special committee may be appointed at once.

Side Lights on the Fare Zone—Why Fare Stages Should Vary in Length

It Is Better Business to Serve the Majority Than to Attempt to Give Exactly the Same Distance for a Given Fare

BY WALTER JACKSON

"WELL, here's another request from the Clamsboro Commercial club to extend Zone 18 another 800 ft. That means the northbound riders could reach the Clamsboro stores without paying an additional fare. No wonder the Club members are united on this. What do you think we ought to do?"

"Why give it to 'em and thank the club for the tip. In trying to sell more of their merchandise, they are trying to show you how to sell more of yours."

"I can't see it that way at all. Seems to me we're expected to give another 800 ft. when we can hardly break even now. According to our latest survey, it costs just 4.76108 cents to carry a passenger through that zone. Give him another 800 ft. and we're busted good and plenty."

"Now, old man, let's forget those laboratory decimals for a minute and get down to hard pan. How much money are you getting from passengers who are sporty enough to pay another nickel for the sake of riding that 800 ft.?"

"Not enough to choke the fare box or callouse the palms of the conductor. Fact is 'most everybody gets off and walks; and we don't get any thanks for giving them the exercise, either."

"So you're not getting the money after all?"

"Lord, no. But we've got to be consistent and have everybody pay exactly the same rate. It's beyond me why the public doesn't see that we are simply trying to be fair."

"Sure, you're trying to be fair. The only trouble is that you're standing so straight that you're falling over backward. By the way, if your northbound passengers to Clamsboro are left 800 ft. short of the stores, then your southbound passengers must be able to override by the same distance."

"They can, but they don't. It's only a theoretical advantage. No reason, you know, why they should, because most of them are out to shop in Clamsboro and the rest are going through to other zones."

"I see. So if you shortened the zone of southbound riders by this 800 ft., nobody would start talking about discrimination, huh?"

"Nobody I can think of."

"And, on the other hand, it's pretty certain that none of your northbound riders are going to kick if you give them an additional 800 ft."

"You bet they wouldn't, as that's just what they have been after for years. But, as I said before, we can't afford it."

"What d'you mean, can't afford it? You just said that practically nobody paid that additional fare. Chances are that if you do extend that zone you'll make a lot more than at present."

"Give more and get more? How come, how come?"

"Why, because you will be taking the passengers exactly to the place they want to get to without creating the feeling that the railway is trying to do them. They won't care a peanut shell if you give them 1.843 miles for a nickel in one place and 2.41144 miles in another provided you land 'em in the jazz part of town instead of half way down the cemetery. If you must shorten the zone, cut back far enough to make walking out of the question. When I say you'll make more money by giving that extra 800 ft., I mean that people will ride oftener because your service will no longer be associated with any annoyances or hardships. These business men are right. They know that if the customer carries away pleasant associations he, or more often she, comes again. Who knows how many times the nickels that you need went into telephone orders. And even if this extension doesn't bring you an extra penny directly, it will save you many a dollar in better public relations."

"You're right. There's merit in the idea of shortening or lengthening the stages from the point of view of the mass of our passengers. As you know, I was raised in the old 5-cent suburban school which let the stages come wherever the milestones happened to be. I guess we can put this common-sense way across with the public as long as the Public Service Commission can be induced to see that what looks like discrimination is really the squarest thing after all. If we please the bulk of our riders, we needn't worry about what the regulators and the courts may say about this departure from old practices."

Supervision of Public Improvements

Should Be Under Special Department, Not Army, Says Recent Protest

M. O. LEIGHTON, chairman national service committee of Engineering Council, acting as chairman of the Engineers, Architects and Constructors' Conference on National Public Works, has just addressed a strong protest to the chairman of the committee on commerce, United States Senate, on a bill to create an "auxiliary engineer corps" in the United States Army for duty on the works of public improvement. This bill was introduced June 5, 1919, by Senator Ransdell of Louisiana "by request."

Such a program, according to Mr. Leighton, is opposed by a great majority of the engineers, architects and constructors of the United States who are advocating instead the consolidation of the engineering and construction work of the government into a department of public works. The United States stands practically alone among the great and small nations of the world in that it has no such department, and a bill will be introduced in Congress in the near future for the creation of a department of public works. Mr. Leighton says in his letter to the chairman of the Senate Committee on Commerce that such a plan is far superior to that described in the bill mentioned which "is merely a part of a very ambitious plan to place the army in the saddle over all engineering operations of the government."

The last section of the electric railway system encircling the city of Tokyo, Japan, was put in operation on March 1. A passenger may get on at any point of the circle, and alight at any other point on the route. A part of the circle passes through the busy part of the city as an elevated railway. The system belongs to the Imperial Government Railways, and constitutes an important adjunct to the main railway system.

Committee of One-Hundred

List of Those Appointed to Assist in Presenting the Electric Railway Case Before the Federal Electric Railways Commission

PRESIDENT PARDEE of the American Electric Railway Association announced on June 19 that the committee of 100 was nearly complete. The membership on that day is given in the list below. There remain only nine appointments to be made.

MILTON E. AILES, Vice-President Riggs National Bank, Washington

H. M. ATKINSON, Director Georgia Railway & Power Company, Atlanta

FRANK BACKUS, Vice-President American Steel & Wire Company, Worcester

JULIAN M. BAMBERGER, President Bamberger Electric Railroad Company, Salt Lake City

S. R. BERTRON, Director United Gas & Electric Engineering Corporation, New York

HENRY A. BLAIR, Chairman Board of Directors, Chicago Surface Lines, Chicago

CHARLES BOETTCHER, Chairman Board of Directors, Denver Tramway Company, Denver

NICHOLAS F. BRADY, President New York Edison Company, New York

FRANK W. BROOKS, President Detroit United Railway, Detroit

BRITTON I. BUDD, President Metropolitan West Side Elevated Railway, Chicago

H. M. BYLLESBY, President H. M. Byllesby Company, Chicago

CLARENCE M. CLARK, President E. W. Clark Management Corporation, Philadelphia

EMERY W. CLARK, President First Old National Bank, Detroit

E. G. CONNETTE, President International Railway, Buffalo

NORMAN McD. CRAWFORD, Vice-President Columbus Railway, Power & Light Company, Columbus, Ohio

THOMAS A. CROSS, President United Railways & Electric Company, Baltimore

GERHARD M. DAHL, Vice-President Chase National Bank, New York

ARTHUR V. DAVIS, President Aluminum Company of America, Pittsburgh

MOREAU DELANO Brown Brothers, New York

A. C. DINKEY, President Midvale Steel Company, Philadelphia

HENRY L. DOHERTY, President Henry L. Doherty & Company, New York

WALLACE B. DONHAM, Vice-President Old Colony Trust Company, Boston

R. J. DUNHAM, Vice-President Armour & Company, Chicago

VAN HORN ELY, President American Railway, Philadelphia

WALTER F. FIELD, Vice-President Philipps Insulated Wire Company, Providence

HENRY FLOWERS, President Fidelity National Bank & Trust Company Kansas City

ALLEN B. FORBES President Harris, Forbes & Company, New York

FRANK R. FORD Ford, Bacon & Davis, New York

FREDERICK GOFF, President Cleveland Trust Company, Cleveland

FRANKLIN T. GRIFFITH, President Portland Railway, Light & Power Company Portland, Oregon

B. H. GRISWALD, Jr. Alexander Brown & Sons, Baltimore

W. F. HAM, President Washington Railway & Electric Company, Washington

GEORGE E. HAMILTON, President Capital Traction Company, Washington

OLE HANSON, Mayor City of Seattle, Washington

C. H. HARVEY, President Knoxville Railway & Light Company, Knoxville

Chairman

GUY E. TRIPP
Westinghouse Electric & Manufacturing Company, New York

Vice-Chairmen

JOHN H. PARDEE
President American Electric Railway Association, New York

H. L. STUART
Halsey, Stuart & Company, Chicago

JAMES H. McGRAW
President, McGraw-Hill Company, New York

J. D. MORTIMER
President North American Company, New York

PHILIP J. KEALY
President, Kansas City Railway, Kansas City

THOMAS N. McCARTER
President Public Service Railway, Newark, N. J.

A. W. BRADY
President Union Traction Company of Indiana, Anderson

O. B. WILLCOX
Vice-President Bonbright & Company, New York

SAMUEL M. CURWEN
President J. G. Brill Company, Philadelphia

ANTON G. HODENPYL Hodenpyl, Hardy & Company, New York

SAMUEL INSULL, Chairman Board of Directors, Metropolitan West Side Elevated Railway, Chicago

A. B. LEACH, President A. B. Leach & Company, New York

ARTHUR W. LOASBY, President First Trust & Deposit Company, Syracuse

HOMER LORING, Chairman Public Trustees, Eastern Massachusetts Street Railway System, Boston

HORACE LOWRY, President Twin City Rapid Transit Company, Minneapolis

A. M. LYNN, President West Penn Railways, Pittsburgh

RICHARD McCULLOCH, President United Railways of St. Louis, St. Louis

WILLIAM B. McKINLEY, President Illinois Traction System, Peoria

SAMUELS McROBERTS, Executive Manager National City Bank, New York City

S. Z. MITCHELL, President Electric Bond & Share Company, New York

THOMAS E. MITTEN, President Philadelphia Rapid Transit Company, Philadelphia

RANDALL MORGAN, Vice-President United Gas & Improvement Company, Philadelphia

J. K. NEWMAN, Chairman of Executive Committee, American Cities Company, New Orleans

J. R. NUTT, President Citizens Savings & Trust Company, Cleveland

E. H. OUTERBRIDGE, President Pantasote Company, New York

J. S. PEVEAR, President Birmingham-Tide Water Railway, Birmingham

E. W. RICE Jr., President General Electric Company, New York

EDWIN W. ROBERTSON, President Columbia Railway, Gas & Electric Company, Columbia

E. N. SANDERSON Sanderson & Porter, New York

W. KESLEY SCHOEPF, President Cincinnati Traction Company, Cincinnati

J. N. SHANNAHAN, President Newport News & Hampton Railway, Gas & Electric Company, Hampton

THEODORE P. SHONTS, President Interborough Rapid Transit Company, New York

PAUL SHOUP, President Pacific Electric Railway, Los Angeles

FRANCIS H. SISSON, Vice-President Guaranty Trust Company, New York

CLEMENT C. SMITH, President Wisconsin Securities Company, Milwaukee

JOHN J. STANLEY, President Cleveland Railway, Cleveland

CHARLES A. STONE Stone & Webster, Boston

J. J. STORROW Lee, Higginson & Company, Boston

LUCIUS S. STORRS, President The Connecticut Company, New Haven

EDWARD T. STOTESBURY J. P. Morgan & Company, Philadelphia

J. F. STRICKLAND, President Dallas Railway, Dallas

KNOX TAYLOR, President Taylor-Wharton Iron & Steel Company, High Bridge, N. J.

A. W. THOMPSON, Federal Manager Baltimore & Ohio Railroad, Baltimore

W. B. TUTTLE, First Vice-President San Antonio Public Service Company, San Antonio

T. H. TUTWILER, President Memphis Street Railway, Memphis

WILLIAM VON PHUL, Vice-President United Railroads of San Francisco

G. W. WATTLES, Vice-President Omaha & Council Bluffs Street Railway, Omaha

H. H. WESTINGHOUSE, Chairman Board, Westinghouse Traction Brake Company, New York

THOMAS N. WHEELWRIGHT, President Virginia Railway & Power Company, Richmond

JAMES G. WHITE, President J. G. White & Company, New York

HARRISON WILLIAMS 60 Broadway, New York

TIMOTHY S. WILLIAMS, President Brooklyn Rapid Transit Subsidiary Companies, Brooklyn

GEORGE T. WILSON, Vice-President Equitable Life Assurance Company, New York

J. H. WILSON, President Mobile Light & Railroad Company, Mobile

O. D. YOUNG, Vice-President General Electric Company, New York

Federal Investigation Opens in New York

Ex-President Taft, as First Witness, Says that Public Antagonism Must Be Removed to Get Industry Out of Discouraging Situation

THE Federal Electric Railways Commission, recently appointed by President Wilson to investigate the general electric railway situation, began its public hearings with a session on June 19 in New York City. The chief witnesses were ex-President William H. Taft and John H. Pardee, president American Electric Railway Association.

Mr. Taft began with a recital of the work of the National War Labor Board, of which he is joint-chairman, in its efforts to insure maximum production during war time. He has concluded, from his experience, that the restricted financial condition of electric railways in the past kept wages down below what they should have been. The board early decided that in determining wages it would be inequitable to consider, as a basis, the companies' ability to pay, but it recommended that the companies be allowed increased revenues. The board frequently met with response on the part of state authorities, but upon local councils and referendum voters the recommendation had no more effect than if it had been written in water.

The War Labor Board at first recommended the appointment of a federal commission with control over rates, it being Mr. Taft's view that it was within the constitutional power of Congress to give the President authority to grant rate relief to needy electric railways in war time. The recommendation was not accepted, and now the near-peace situation does not justify legislation to this end. In reply to queries as to what the present commission can do, however, Mr. Taft declared that its duty is to get the facts from all interests concerned and to make findings thereon. Such findings, in his opinion, will have a strong moral effect throughout the country. He particularly thought that the commission should receive evidence as to the exact situation in individual localities but that no decision or suggestion as to the settlement of local questions should be made unless the dispute was voluntarily submitted by both parties and the commission deemed it wise to act.

The Industry Needs Help

The general situation in the electric railway industry, Mr. Taft said, is most discouraging. As factors in the situation he mentioned the expansion of the systems, the growth of automobile competition, high war costs and, in some cases, public belief in past corruption and over-capitalization. In his opinion, however, the advantages which some railways secured through sinister means in the early days have been more than offset by the injustices later inflicted by the public in a desire for revenge.

The fixed 5-cent fare has been another handicap. Some of the public evidently believe that this fare is guaranteed to them by the Constitution and look upon an increase as the grant of an outrageous profit to the investors. As a matter of fact, Mr. Taft stated, a fixed fare in the long run is not just for either side, and the public should consider that the purchasing power of the nickel has greatly declined in recent years. The difficulty with increasing fares, however, is that higher fares cause reduction of traffic. A railway rate increase, which may be paid eight or ten times a day by a family, is much more irritating than other utility increases payable monthly.

Costs Are Not Going Down

The electric railway industry, Mr. Taft said, was established on the basis of a cheap fare and cheap labor and materials. It was never contemplated that the 5-cent fare would be sufficient to bear the burdens of present-day operation. It is true that the War Labor Board did not deem it wise to fix a general minimum wage, and that the basic wages from 36 to 42 cents in various cases, according to living costs, were only temporary adjustments for six months or during the period of the war. Nevertheless, Mr. Taft asserted, the awards made have established a more or less permanent higher standard of wages, and there is not a bit of doubt that the operating expenses of electric railways will remain on a high level. If he were a member of the federal commission, trying to formulate a suggestion for a permanent solution, he would advocate the commission's addressing itself to the public upon the basis of present prices being the normal ones for the future.

Suggestions for Improvement

In the course of his replies to various queries, Mr. Taft touched upon several points relating to improvement of the situation. In order to overcome public prejudice on the ground of financial history, it will be necessary to ascertain the real investment in the properties. Upon this an adequate return must be allowed if the credit of the industry is to be restored. As in many cases in recent years, commission approval should be required for the issuance of new securities. Electric railways should not be required to pay taxes under any other rule that that applying to other forms of invested capital. Furthermore, the companies should be so reorganized as to have power to give up unprofitable lines that should never have been built.

As for fares, Mr. Taft felt that any fare above 7 cents was sure to cause a loss of business. The zoning system, in his opinion, should be tried more than it has been, for the flat-fare system, adopted mainly for convenience, has not produced the results expected. In the zoning system there should be a charge to encourage the short-haul rider, and the minimum might be below 5 cents.

If increased fares leave a deficit which must be met through taxation, the public will naturally take over control of the management. Mr. Taft's belief in the reduced economy of public operation, however, made him hope for the continuation of private operation. The service-at-cost plan is theoretically just, but its practical workings in the various cities should be studied. While

the incentive to efficiency and economy may not be so strong under service-at-cost as under private operation. there is still enough motive, in the absence of an absolute guarantee of return, to make the management more economical than under public operation. In Mr. Taft's opinion, service-at-cost franchises would allay rather than strengthen the demand for public ownership. It would not be practicable to have all franchises converted at once to the service-at-cost plan, but the success of such franchises in one state would be likely to lead eventually to uniformity throughout the country.

Lastly, Mr. Taft suggested that in trying to devise a permanent solution of the electric railway problem the federal commission should not seek to fix exact terms but should outline equitable principles and leave the working out of details to public bodies. As to whether such bodies, for the exercise of control over rates and service, should consist of state commissions or city councils, he believed that the more practicable plan would be to give complete control to the state bodies. In view of the strong desire of people for local regulation, however, and the fact that a certain amount of initial supervision by the cities might help to reconcile them to state control without sacrificing too much speed and efficiency, it might be wise to allow the cities thus to participate. State commissions are better qualified to make all final decisions, and matters of rates and service should not be left to the cities without appeal to the commissions.

Railways Offer Aid

Mr. Pardee stated that at a recent meeting of the executive committee of the American Electric Railway Association a committee of one hundred of the leading owners, operators, bankers and others was appointed to prepare a presentation of the situation as it is viewed by the electric railway interests. A meeting has been called for June 26 in New York, and sub-committees are working out a definite plan which it is hoped will be adopted then. A week later, Mr. Pardee thought, the committee could make its first report, the idea being to present different phases of the situation one at a time. In reply to a query as to whether or not the committee would desire a three or four-day session for the presentation of all its data, Mr. Pardee said that some parts of its work would require more time than others but that such a general session might be possible at a later date.

Commission Asks for Larger Appropriation

Gaylord C. Cummin, consulting engineer, New York, at one time city manager of Grand Rapids, Mich., and also of Jackson, Mich., was the only witness on Thursday afternoon. He divided electric railways into two groups, those which had an earning capacity sufficient to pay their way and those which did not. For the latter group, where they were a public necessity, he saw no future except with a subsidy. Most roads belong to the former group. He considered no form of franchise universally satisfactory, the best being service-at-cost. With such, however, there should be a sliding scale of return, the rate increasing when the fare decreased, so as to give an incentive to the company to economical operation and to the public to co-operate with the company. He thought that municipal operation should be considered only as a last resort as the public was a poor employer.

In referring to the extent of automobile competition he mentioned the gasless Sundays of last Autumn, when the traffic on several electric railways with which he was acquainted increased from 30 to 40 per cent. He considered electric railways should be relieved of burdens, like that of paving, which were not connected with railway operation. He believed the companies ready to adopt improvements conducive to economical operation, such as the one-man car under conditions for which it was suited, but pointed out that lack of credit often prevented action along these lines. He urged the re-establishment of credit as a primary step.

At the conclusion of Mr. Cummin's testimony Chairman Elmquist announced that the meeting was adjourned.

After the organization meeting, held in Washington, June 18, Chairman Elmquist gave out the following statement: "In order to handle the electric railway situation adequately and comprehensively the commission decided it would be necessary that more money be provided to carry out the program. We have therefore asked for an appropriation of $100,000 which will come before the Senate appropriations committee within the next few days. We have received a number of inquiries from various cities throughout the country presenting specific problems arising from the electric railway situation in those localities. We want to emphasize that the function of the commission is merely to investigate and recommend as regards the general situation, and it is not its purpose to advise on any specific situation that confronts a given community. The commission has not the facilities to do this and moreover it is necessary that both sides of the question be presented before a just and reliable recommendation can be made."

Recovering Track Material in St. Louis

THE track yards of the United Railways of St. Louis are located adjoining the repair shops and general office of the company on Park Avenue where they occupy a tract of two city blocks. The property has a direct steam railroad connection so that heavy materials are easily received. In the yards at present the company is meeting with much success in making available for reuse a great deal of old track material, particularly screw spikes, joint plates, joint bolts and Nichols' joints. The means employed is the sand blast.

The screw spikes, when removed from old track, have usually parts of the old ties adhering to them, but a short treatment with the sand blast cleans them perfectly and after being dipped in oil they are ready to use again. Fish plates require no treatment other than the sand blast.

Nichols' joints are taken out of the track by cutting the rail on each side of the joint near the end of the plate. The plates are then taken into the yard and the rivets knocked out with a pneumatic hammer with a long stroke, called a pneumatic "gun." The spelter is easily knocked loose from the plates and is then ready for remelting.

The company tried various ways of operating the sand blast, particularly with bolts and screw spikes which are so small that they could not easily be set up against a board. Finally the best way was found to be to put the bolts and screws in the hoppers of some old dismantled wheelbarrows so that they roll around as the sand blast plays on them.

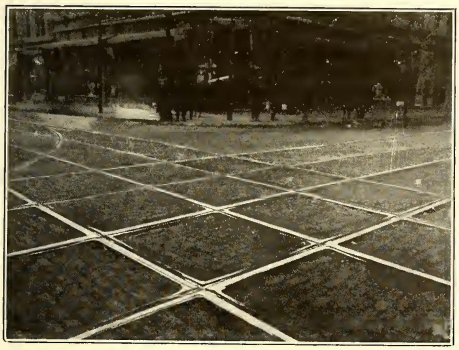
Manganese Special Work Repaired by Welding

The Method Used by the Montreal Tramways for Reclaiming and Repairing Cast Manganese Special Work Is Described and Some Figures for Savings Are Given

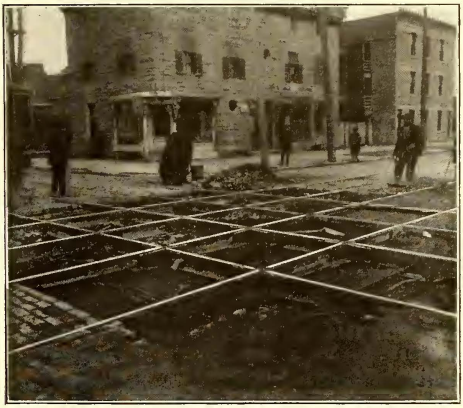
BY JULIAN M. SCOTT
Superintendent of Tools and Machinery Montreal Tramways

IN THE April 19, 1919, issue of the ELECTRIC RAILWAY JOURNAL an article appeared which dealt, in a general way, with the application of electric arc welding to track work, and included its use for manganese special work repairs. From this portion of the article, I would conclude that the author's experience with this class of work had been rather unfortunate and entirely contrary to results obtained by the Montreal tramways, where, with a few exceptions, all classes of worn and broken manganese special work are repaired with satisfactory results and with a large saving in labor and material.

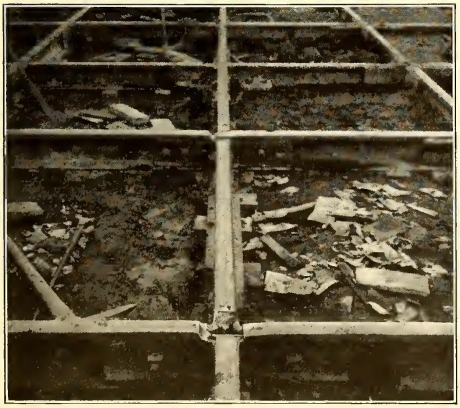
An accompanying illustration shows a 90-deg. double-track cast-manganese crossing. This is one of our most important intersections and bears heavy traffic on both streets. In the fall of 1916 the diamonds of this crossing were practically worn out; all the floors were broken through and most of the corners missing. Our usual method of rebuilding floors and corners was applied and with a small amount of filling done periodically, this crossing will be kept in service until, at least, 1921. The serviceable condition of these diamonds is proved by the fact that our engineers consider them worth new foundation and paving this spring. For five

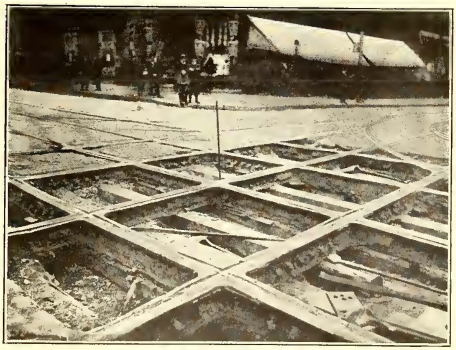


NINETY DEGREE DOUBLE TRACK CAST MANGANESE CROSSING

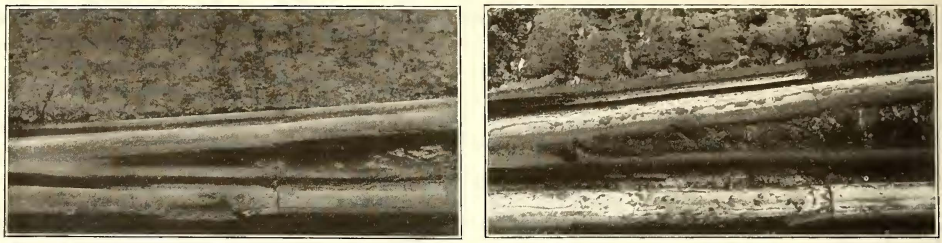


NINETY DEGREE CAST MANGANESE CROSSING AFTER FLOOR AND TOP WERE RENEWED





RECLAIMING RAIL DIAMONDS—AT LEFT, BEFORE REPAIR; AT RIGHT, READY FOR PAVING IN



RECONSTRUCTING THE HEEL OF A DAMAGED MATE—AT LEFT, MATE WITH PIECE SHELLED OUT; AT RIGHT, REPAIRED MATE

years these repairs will have deferred an expenditure of $6,000 and made a net saving of $5,550 on interest and depreciation charges, at a cost of less than $200. A second illustration shows the condition of one of the corners of this crossing after having the entire floor and top renewed.

Another valuable and highly successful class of repair is that of replacing pieces broken from the tread and other portions of switches, mates, crosses, etc. In this same class might be included the building in of badly cupped ends on these same pieces. The heel of a perfectly good 115-lb. mate from which a large piece shelled out is shown on this page. Ordinarily this mate would have to be immediately scrapped, but in this case it was returned to full working life, as indicated in the next illustration.

The points of frogs and mates when worn short and off center are readily replaced. Switches and mates on which the bulk of the traffic takes the curve, become worn low on one side, causing derailments, etc. This trouble can be mitigated for a time by grinding, but before long the only cure is replacement. We remedy this trouble by building the tread up to the original height and shape.

To illustrate the saving, the following figures are an approximation of the value of such work to this road during 1918. All figures are based on the assumption that the life of each piece of special work is prolonged one year, thus deferring expenditures and earning the depreciation and interest charges. No allowance is made for pieces saved from the scrap pile and returned to remaining working life.

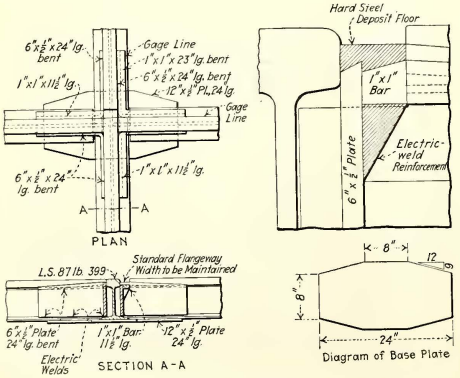
526 pieces of special work treated representing a value of	$159,000.00
Interest for one year on the deferred investment at 6 per cent	$9,540.00
Depreciation at 12½ per cent per year	$19,875.00
	$29,415.00
Total cost of the work—all charges included	$1,200.00
Saving effected	$28,215.00

This is a very substantial saving and proves beyond question the value of repairing special work.

Special work of the hard-center type is treated in exactly the same manner and with equally satisfactory results. Our method and materials are of the simplest. When building in large breaks or holes, the first material used is bare ¼-in. round common mild steel electrodes. The wearing top is built on with bare ¼-in. round electrodes of low-grade tool steel having a carbon content of 0.85 to 0.95, which has proved to be good material at a reasonable price. The current is kept at the lowest point which will give proper fusion, and is about 140 amp. at 30 to 40 volts across the arc. No welding operations are ever carried on at 250 volts, and the standard resistance welders deliver about 70 volts, which will give 35 to 40 volts across the arc.

We are at present reclaiming and adding floors to some 87-lb. built-up high T-rail diamonds by a method which has proved satisfactory. The rail is fairly good, but the rail ends and connections are bad.

The last two illustrations show portions of the diamond before and after repair, and the sketch details the method. The total cost of this intersection reclaimed, amounts to $500.



METHOD OF WELDING AND REINFORCING DIAMONDS

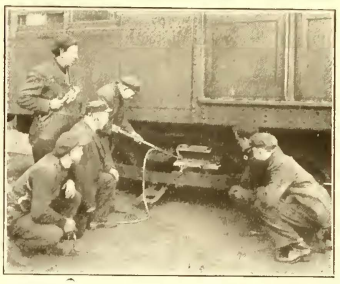
Keeping Down Air Resistance of Trains

In view of the progress made in aeronautics during recent years a writer in the *Engineer*, London, considers timely the renewal of interest in reducing the resistance met by trains in their passage through the air. He calls attention to the law that the power required to force a flat transverse surface through the air is, in horse-power per square foot, approximately 6 millionths of the cube of the velocity in miles per hour. Every square foot of transverse surface, then, requires about ½ hp. at 43 m.p.h., 1 hp. at 55 m.p.h., 2 hp. at 70 m.p.h., and 3 hp. at 80 m.p.h.

The article referred to quotes from the report of the Electric Railway Test Commission, based on work done at the Louisiana Purchase Exposition and elsewhere, relative to the importance of so shaping high-speed cars as to reduce the resistance to an economic minimum.

The leading editorial in the *Saturday Evening Post* for June 14 is on the electric railway financial situation. The title is "Settle This."

Some Mysterious Car Ailments



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

CONTRIBUTIONS ARE INVITED FROM THE FIELD

Another Suggestion for Securing Proper Connection for Fields of Interpole Motors

A SHORT ARTICLE in this department published in the April 19 issue of the ELECTRIC RAILWAY JOURNAL described trouble due to a wrong connection of the interpole fields of a motor. In the case described the interpole field was reversed and flat spots on the commutator developed very rapidly.

On a large Eastern property similar trouble was experienced not only from the interpole fields being reversed but also from the main field coils of tapped-field motors becoming reversed. These field coils were so constructed that they could be put in the motor either side up with equal facility. Where new fields were installed at the shops several cases occurred where these were installed wrongly and it became necessary to devise some means so that the shopman could tell readily when the fields were properly installed. A method which has proved entirely satisfactory was to stamp the terminals with numerals instead of with the letters "O" and "I" which were previously employed. These numerals were selected so as to tell not only which end of the coil was the commutator end but also which was the top and bottom side of the coil.

A Train That Wrecked Itself

IN ORDER to begin passenger operation on a certain high-speed electric line it was necessary to resort to some temporary construction at one of its terminals. The electric interlocking and signal plant could not be completed in time, and a temporary hand-throw switch was installed to regulate the movement of trains when entering and leaving the one-pocket terminal.

An employee, whose duty it was to govern all train operations into and out of this pocket, was stationed at this hand-throw switch on the tracks. During the course of his work he found it rather difficult to throw this switch without a better leverage. He accordingly slipped a short length of 2-in. pipe over the switch handle each time that he operated the switch. This method worked satisfactorily until one time the handle stuck so that he could not remove the pipe. The switch was thrown and the motorman had received the signal to proceed out of the pocket. The forward truck of the first car passed over the switch point in the proper direction, but on account of the curvature of the tracks and the length of the car there was sufficient overhang at the center of the first car so that the low body construction at the center doors struck the 2-in. pipe handle. This forced the switch to the opposite position just before the rear truck of the first car reached the switch point. The front truck thus started to operate on one track while the rear truck was on another track. There were several upright columns at this point with which the car collided. The force of impact was so great that it literally cut the car in half. Considering the present high cost of this type of car, which is about $25,000, the accident was a very costly one.

A Puzzling Case of Battery Control Trouble

A LARGE Eastern railway property operating cars equipped with multiple-unit, battery-type control, used single-car operation during the off-peak period and train operation during rush hours. At one of the inspection and overhauling shops trains were made up by adding a car taken from the yard to the one already in service. On one occasion the coupling was made, but as soon as the low-voltage control jumper was inserted the control equipment of both cars would not operate. An electrician was hastily summoned, and he found all battery fuses blown. He applied new fuses to one of the cars, but on attempting to install new fuses in the other car all fuses were immediately blown again. Thinking that there might be a short-circuit in the latter car, he removed the control jumper from between the cars and inserted new fuses so that the control equipment of both cars operated satisfactorily. This seemed to indicate that there was a short-circuit in the jumper itself. A new jumper was obtained and inserted, whereupon all the battery fuses were again blown. The passengers were then transferred to another train and the two cars were brought into the shop for a careful inspection and test. The control equipment on each car was tried out separately and both operated properly, but as soon as the cars were connected with a jumper the battery fuses would be blown. Connections were rung out and the usual tests for wrong connections were applied, but everything appeared satisfactory. The batteries were removed from both cars, and one of them was found to have been reversed; that is, the positive end had been placed where the negative end should have been and *vice versa*. With a single car this did not affect its operation as there was the necessary difference of potential between the positive and negative battery wires, but as soon as this car was coupled electrically to another car with batteries properly installed there

was a short-circuit through the fuses and both batteries of the two cars. This, of course, resulted in the blowing of the fuses, through the connection of the negative of one battery to the positive of the other.

As a precaution to prevent a recurrence of this trouble the battery boxes were arranged with small wooden cleats so that it would be impossible to insert them improperly.

Paint and Varnish Prove Effective Insulators

A TRAIN operating in elevated service on a large Eastern railway system was ready to leave the yard but the motorman found that the train would not start. He examined all fuses to make certain that none had blown, and other parts of the equipment that might be the cause of the trouble, but nothing unusual was found. He then signaled for an electrician to help him out of the difficulty. The motorman operated hismaster controller at the front end of the train in the usual manner while the electrician noted the operation of the various switches of the multiple-unit equipment. It was found that the control operated properly but that the line switch did not come in. This being the first switch in circuit, there was no power to operate the train.

With this type of equipment, cut-out and reset switches were located in the motorman's cab. The cut-out switch was for the purpose of opening the line switch control circuits so that the control apparatus could be operated without the line switch coming in. The reset switch was to reset the line switch or circiut breaker in case it blew from overload. In this particular case the cause of the trouble was found to be a small amount of varnish on the switch blade of the cut-out switch. This car had been in the shop for its annual painting and varnishing, and in varnishing the woodwork of the interior of the cab a small amount of varnish had been placed on the switch blade. The trouble was quickly remedied by scraping this off and the train proceeded into service. Special instructions were given the painters to be careful not paint the contact surfaces of any switches or electrical equipment.

Too Much Lubrication Is as Bad as None at All

THE train dispatcher had just been remarking how smoothly everything was running when the telephone rang and an excited voice asked to have an electrician sent at once to the incline on the main line. The electrician hurried to the scene of the trouble where he found a two-car train stalled which was equipped for double-end multiple-unit control operation. Other cars were now being held up by the disabled train so that it was necessary to have quick action. By attempting to operate the equipment from the different master controllers of the train the electrician found that both cars would work correctly if operated from the No. 2 controller of the dead car. With the motorman in the front cab to apply the air brakes and give the signals for operation the electrician operated the train to the terminal from the cab at the middle of the two cars. The train was then ordered to the shop where a careful inspection was made. It was found that when the control was operated in the usual manner from the front cab that the control notched up correctly on the good car but would not notch up on the other. As both cars operated correctly from the No. 2 controller of the dead car, it was evident that trouble existed somewhere on the reverse control wire of the dead car. This trouble was finally located as a ground on the interlock finger of the main reverser. Current had passed to ground for a distance of 2 in. along the surface of the drum from this control finger to the grounded main circuit reverse finger. It was found that oil and vaseline which had been applied for lubricating the contacts had run down over the insulating surface and had gathered small particles of copper and brakeshoe dust which had ultimately caused the ground. This trouble was easily eliminated by thoroughly wiping the insulating surface of the drum. To prevent the recurrence of this trouble instructions were given to the repairmen to exercise more care in lubricating contact surfaces and to use less oil and vaseline.

The Chicken-Egg Problem Has Its Parallel in Railway Transportation

TWO railway men were discussing the subject of delays and overcrowding recently. The first maintained that whenever a car becomes overcrowded this condition results from being delayed. The second argued that it is the overcrowding that causes the delay and that the cars are delayed more and more because they are jammed full on the back platform so that passengers cannot readily get aboard.

This is the chicken-egg problem all over again. Eggs come from chickens, chickens come from eggs. Delays mean overcrowding, overcrowding means delays. Where did it start?

It may have been due to a person not standing at the right place when the car stopped, or to the passenger who made the car stop a second time to let him or her board or alight. It may be due to the passenger who hadn't the right fare or ticket ready and caused a delay on the platform, or maybe the passenger did not unfold his transfer before handing it to the conductor. Most likely it began with the first man who insisted on staying on the rear platform of the car. When one man remains there, others do the same. Two passengers who stand near the rear of a car beget more rear-end stickers, and so the game goes on. Passengers apparently do not understand that by moving forward in the car as far as possible, even when the car is not crowded, that the service will be greatly improved.

Peter Witt, in an address before the New England Street Railway Club recently, made these interesting comments upon why people stand in cars:

"I used to think the people wanted to sit, but when I saw a motor of inferior kind drawing a trailer of a superior kind, with the people standing in the motor and vacant seats in the trailer, I became convinced that people do not want seats. They want to get home, and they want to go by the first car that comes along, on the theory that it will get them home sooner. Of course they don't know, as you know, that the more they crowd the first car, the later they will get home."

This latter seems to give the overcrowding-means-delay argument the best of it.

F. N. Koziell, chief engineer Railway Storage Battery Company, calls attention to the statement of the weight of the Yucatan cars described on page 968 of the issue of this paper for May 17. The weight complete is 28.3 tons, not 37.5 tons as stated.

Insuring Standard End Play for Armatures

The B. R. T. Provides Calipers for Each Overhauling Shop to Insure Rapid and Uniform Installation of All Armatures

WHEN installing a new armature and new armature bearings in a motor shell one of the problems which the overhauler has to solve is the proper location of the bearing faces. Sufficient clearance should be allowed between the armature and bearing faces to insure free movement of the armature, for if this is too tight hot bearings will result. On the other hand care must be taken to see that the end play is not too great, otherwise the armature head may be ripped off by striking the brush-holders or the back ends of the armature coils may be damaged by striking the frame.

The mechanical department of the Brooklyn Rapid Transit Company has designed a special form of shop caliper to facilitate this installation and to make sure that all armatures are installed with a standard end clearance of $\frac{1}{16}$ in. The accompanying illustrations show the details and the method of use. The standard practice of this company is to require that all new armature bearings be fitted to the individual shafts on which they are to be placed and that their faces be finished to standard dimensions. The babbitting and rough finishing of all armature bearings is done at a single shop. Bearings are rough-bored to a diameter such that it will still be necessary to turn off $\frac{1}{16}$ in. of babbitt in order to fit the smallest size shaft allowed for the particular type of motor. Shafts are calipered at the overhauling shops and in the electrical repair department for uneven wear on bearing seat. Where necessary the shafts are trued up in a lathe. Shafts of armatures for surface cars which are worn $\frac{1}{8}$ in. and of elevated cars which are worn $\frac{1}{16}$ in. below standard are scrapped. In order to provide for uniform clearance bearings are calipered with a combination inside and outside caliper. The outside end is set to fit over the shaft on which a special clearance gage strip 0.012 in. thick has been placed. The bore of the bearings is then made to fit the inside end of the caliper.

The method used in fitting armature bearings into motor frames by means of the special shop calipers, illustrated herewith, consists first of setting the caliper to give the distance between the outside faces of the armature collars. This gives a reading *A* on one scale of the caliper. The caliper is next set to give the measurement between the inside faces of the motor shell housings *B*. By referring to tables for the different types of motors' samples of which are given herewith, the distance that the bearings project inside the frame and indicated by *C* and *D* is read directly. The bearings to be used are then placed in position and the amount that it is necessary to turn off the faces to give the desired dimensions is obtained.

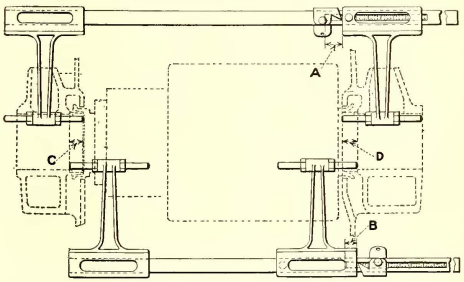
To illustrate this let us consider the installation of a new armature and bearings in a Westinghouse-101 mo-

WESTINGHOUSE No. 101 MOTOR

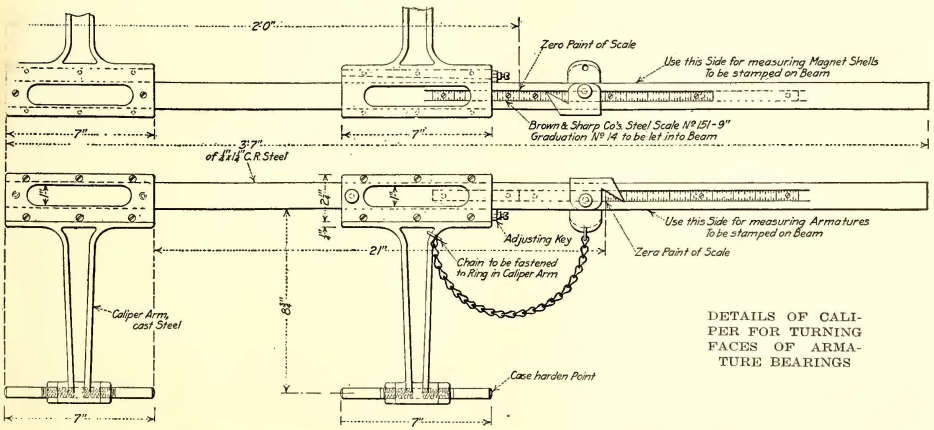
Reading at *B*	Reading at *A*									
	C	D	C	D	C	D	C	D	C	D
13/16	9/16	1/2	25/32	27/32	11/16	29/32	23/32	25/32	11/16	13/16
7/8	5/8	9/16	13/16	7/8	23/32	15/16	3/4	13/16	23/32	7/8
15/16	11/16	5/8	27/32	29/32	3/4	31/32	25/32	27/32	3/4	15/16
1	3/4	11/16	7/8	15/16	25/32	1	13/16	7/8	25/32	1
1 1/16	13/16	3/4	29/32	31/32	13/16	1 1/32	27/32	29/32	13/16	1 1/16
1 1/8	7/8	13/16	15/16	1	27/32	1 1/16	7/8	15/16	27/32	1 1/8
1 3/16	15/16	7/8	31/32	1 1/32	7/8	1 1/8	29/32	31/32	7/8	1 3/16
1 1/4	1	15/16	1	1 1/16	29/32	1 3/16	15/16	1	29/32	1 1/4
1 5/16	1 1/16	1	1 1/32	1 1/8	15/16	1 1/4	31/32	1 1/32	15/16	1 5/16

GENERAL ELECTRIC No. 234-A MOTOR

Reading at *B*	Reading At *A*									
	C	5 1/2 D	C	5 5/8 D	C	5 3/4 D	C	5 7/8 D	C	5 15/16 D
3 1/8	3/16	3/16	47/64	47/64	23/32	23/32	45/64	45/64	11/16	11/16
3 3/16	13/64	13/64	3/4	3/4	47/64	47/64	23/32	23/32	45/64	45/64
3 1/4	7/32	7/32	25/32	25/32	3/4	3/4	47/64	47/64	23/32	23/32
3 5/16	15/64	15/64	13/16	13/16	25/32	25/32	3/4	3/4	47/64	47/64
3 3/8	1/4	1/4	27/32	27/32	13/16	13/16	25/32	25/32	3/4	3/4
3 7/16	17/64	17/64	7/8	7/8	27/32	27/32	13/16	13/16	25/32	25/32
3 1/2	9/32	9/32	29/32	29/32	7/8	7/8	27/32	27/32	13/16	13/16
3 9/16	19/64	19/64	15/16	15/16	29/32	29/32	7/8	7/8	27/32	27/32
3 5/8	5/16	5/16	31/32	31/32	15/16	15/16	29/32	29/32	7/8	7/8



METHOD OF USING CALIPER GAGES



DETAILS OF CALIPER FOR TURNING FACES OF ARMATURE BEARINGS

tor. If the reading A is $\frac{5}{8}$ in. and B 1 in. we find by referring to the table for this motor that the distance C by which the bearing should project inside at the commutator end is $1\frac{9}{16}$ in. and the distance D by which the bearing should project inside the motor at the pinion end is $1\frac{3}{4}$ in. Bearings fitted to these dimensions will provide $\frac{1}{16}$ in. end play for the armature.

The use of these calipers and tables provides a very accurate and rapid method for fitting the bearings and makes certain that all are installed uniformly and with the correct clearance.

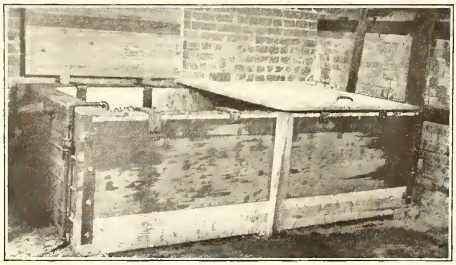
Keeping Quenching Oil Cool for Tempering Steel Springs

Union Traction Company of Indiana Builds Water and Air-Cooled Tank at Its Anderson Shops for Use in Tempering Springs

AT THE Anderson shops of the Union Traction Company of Indiana, trouble was experienced in tempering car springs because the oil in which the hot springs were immersed direct from the furnace could not be kept cool. A new cooling tank has recently been constructed and the results indicate that there will be no further trouble in this respect.

The tank frame is constructed from 1½-in. timber and measures approximately 7 ft. long, 4 ft. wide and 27 in. high, with the ends of the side timbers protruding and tied with rods as shown in an accompanying illustration. The inside of the tank is lined with No. 24 galvanized iron, leaving a wall space of 4 in. on all four sides. A second lining of galvanized iron is put in at the bottom and all joints soldered. Cold water is piped into this wall space entering through a 1½-in. pipe near the top at one end and leaving at the opposite end through three 1-in. pipes leading into a 1½-in. outlet.

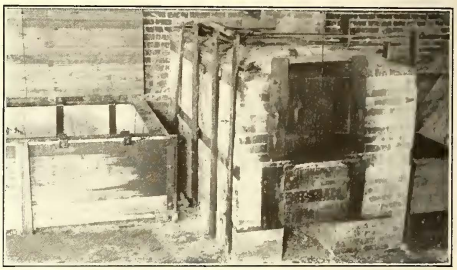
Several pipes are laid across the bottom of the oil tank. These are perforated in the side with small holes and are connected to an air line piped over one side of the top of the tank. Four straps of 2½-in. x ½-in. iron



NEW QUENCHING OIL TANK FOR TEMPERING STEEL SPRINGS

bent into U-shape act as braces to the sides of the tank. These extend to within an inch or two of the bottom and on them is laid a strip of wire mesh which gives a new bottom to the tank on which the springs are laid. The tank is fitted with covers and is filled with a quantity of oil.

Car springs lose their temper with age and hard service. When they have lost much of their spring and have flattened considerably they are taken into the shop and again bent into the proper shape. They are then placed in the furnace shown in an accompanying illustration. The heat from the firebox below passes up through a hollow wall on one side and enters the oven through 4-in. x 5-in. ports about every 4 in. along one side, passes over the springs and is drawn through



FURNACE FOR HEATING SPRINGS AND QUENCHING OIL TANK

similar openings in the opposite side out into the chimney.

After the proper temperature has been reached the springs are drawn from the furnace and quenched in the tank of oil. A flow of cold water circulating around the four sides and bottom of the tank and streams of air from the pipes in the bottom of the oil keep the oil cool and aërated, so that the springs are properly quenched without unduly heating the oil.

It is planned soon to install an air-operated bulldozer in this room with proper dies for bending the springs into the desired shape before tempering. This work is now done by hand.

Hollow Boring of Axles to Reduce Weight

THE Twin City Rapid Transit Company, Minneapolis, Minn., has for the past seven years been hollow-boring all of its 4¼ x 8-in. car axles in order to reduce the total weight of the car. A special lathe machine was designed and built by the American Machine Company for this purpose. A hole 2 in. in diameter is bored through the center of the axle, reducing the weight of the axle approximately 60 lb. at a cost of 60 cents per axle. This figure is based on the cost of labor approximately three years ago, as no axles have been bored recently.

Since 1912 approximately 2500 axles have been hollow-bored with no detrimental effects. It is believed that the metal in the center of the axle contributes very little to the strength and this would seem to be borne out by the fact that of the 2500 axles on this property no breakages or other accidents have occurred. These axles are not heat-treated, but are bought in the rough by the company, and are forged and finished in the company's shops. It is claimed that hollow boring of heat-treated axles actually increases the strength of the axles.

Electric Railway & Tramway Journal, London, notes that women conductors are disappearing from tramways in almost all parts of Great Britain, in many cases rapidly, making way for the men who have been fighting for their country.

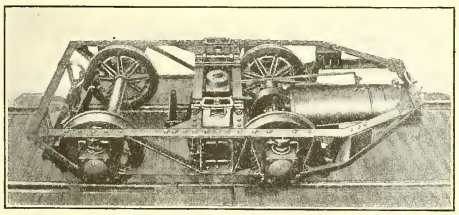
Life of Creosoted Piles

Still Sound After Twenty-eight Years' Service in Southern Pacific Wharf

INTERESTING facts as to the effect of salt water on wooden piles were developed this year when a wharf of the Southern Pacific Railroad on San Francisco Bay was removed to make room for port improvements. The wharf was the oldest creosoted pile structure which thus far had been dismantled on the Pacific coast and contained about 14,000 creosoted piles which had been in service for periods ranging from eighteen to twenty-nine years. Of these piles, interest centers particularly in 600 which were of Douglas fir, well seasoned before being treated with creosote by the Bethel process in the fall of 1889, and were driven in 1890. Records show that under a pressure of 200 lb. per square inch and a temperature of 260 deg. Fahr., the piles absorbed 14.17 lb. of creosote per cubic foot.

Of these 600 piles, thirty-three were selected at random for test purposes when the wharf was dismantled. Out of this number twenty-two (67 per cent.) were entirely sound; two (9 per cent) had been slightly attacked by borers; six (18 per cent) had been severely attacked and two (six per cent) were so damaged as to be unfit for further use. These percentages were typical of the entire lot, it is reported, and about 70 per cent of the 600 are to be redriven just as they are. In fact, this percentage of poles suitable for redriving, it is reported, applies approximately to the entire 14,000 piles. Those not as suitable showed damage only between mud line and high-water mark, and other portions of these piles were in good condition.

The results of this study are believed to confirm the theory that a creosoted pile is absolutely immune from attack of marine borers such as exist in Pacific Coast waters, so long as the shell or portion of the pile impregnated with creosote remains intact. If the borer can gain access to the inner and untreated core through some defect in the wood, he will work upward and downward in the untreated wood, but in no case have traces of borers been found in the creosoted section.



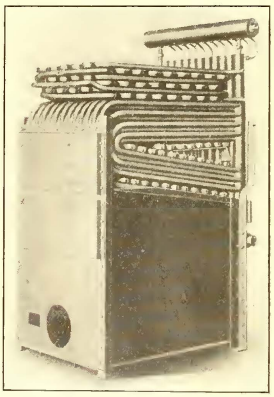
FRONT TRUCK AND METHOD OF INSTALLING ENGINE OF UNIT RAILWAY CAR

NEW TYPE OF STEAM-DRIVEN RAILWAY CAR USING GASOLINE OR KEROSENE AS FUEL

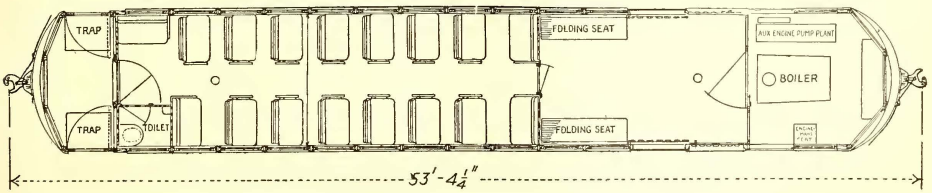
Steam-Driven Passenger and Baggage Car for Railway Operation

THE Unit Railway Car Company, Boston, Mass., is placing on the market a steam-driven car to which the name "Unit Railway Car" has been applied. It is propelled by a twin cylinder engine developed by F. O. Stanley, inventor of the Stanley steam automobile. The engine is mounted on and forms a part of the forward truck as shown in an accompanying illustration. Power is transmitted direct to the axle by a spur gear, the engine and driving gear running in an oil bath in an oil-tight case.

Either kerosene or refined crude oil may be used for fuel. The fuel is fed to the combustion chamber under constant pressure controlled by an automatic valve. The water is also fed automatically to the boiler, which is located in the forward part of the car. Control of the steam as it passes from the boiler to the engine gives direct control of the car, and this is effected by a throttle valve placed in the steam line where it leaves the boiler. The throttle valve is operated by control levers in a similar manner to that used in the control of the modern locomotive. The trucks used are of the archbar type and are equipped with Timkin roller bearings. The engine and front truck



BOILER AND SUPERHEATER FOR STEAM-DRIVEN RAILWAY CAR



SIMPLIFIED PLAN OF LAYOUT OF STEAM-DRIVEN RAILWAY CAR

constitute a unit, the bolter being placed quite near the driving axle in order to secure proper weight on the driving wheels.

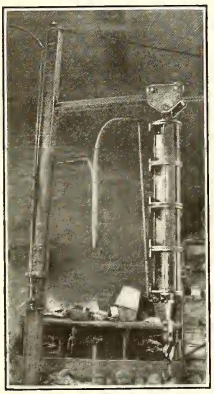
The manufacturer shows one of these new types of car at the Atlantic City convention of the American Railroad Association, in session as this issue of the ELECTRIC RAILWAY JOURNAL goes to press.

Air Hoist Built from Old Brake Cylinders

Union Traction Company of Indiana Designs a Hoist from Scrap Material for Use in the Brass Foundry

TO FACILITATE the handling of 60-lb. and 80-lb. crucibles to and from the furnaces in the brass foundry of the Union Traction Company, Anderson, Ind., an air hoist has been erected. This has been built almost entirely from scrap material, so that the cost of the hoist has been confined practically to the labor of construction and erection.

The hoist itself is made from four old 7-in. straight air-brake cylinders discarded from antiquated equipment. The cylinders are separated from each other by a pasteboard gasket and are held together by six ⅜-in. rods, extending the full length of the four cylinders and passing through holes drilled in the flanges. As an additional factor of safety, the cylinders are spot welded together with the oxy-acetylene torch. The plunger is a 1½-in. steel rod with a large hook on the lower end and is operated in the same manner as the brake-cylinder plunger. The hoist is suspended by a ring from a four-wheel truck which operates on a horizontal track 10 ft. long. This track is composed of two angle irons, set back to back and separated by lugs. The track is fastened 9 ft. from the floor by a large angle to the bottom of a 6-in. I-beam which serves as a vertical support extending from the floor to the ceiling and so pivoted at each end as to revolve freely. The free end of the track is suspended by a rod from the top of the vertical support.



AIR HOIST BUILT FROM OLD SCRAP 7-IN. BRAKE CYLINDERS

Air at the shop pressure of 90 lb. is piped to the vicinity of the hoist and this line is connected by a rubber hose to a pipe on the vertical support. An ordinary three-way air valve is inserted in the line about 4 ft. from the floor, and the piping then extends up the support again and is connected with the hoist by means of a long rubber hose to permit the use of the hoist within a radius of 10 ft. in any direction from the vertical support.

The chief use of the hoist, as already mentioned, is to lift into and out of the furnaces, by means of a special grip device, the crucibles of brass which weigh approximately 160 lb. The hoist is capable, however, of easily handling 2000 pounds.

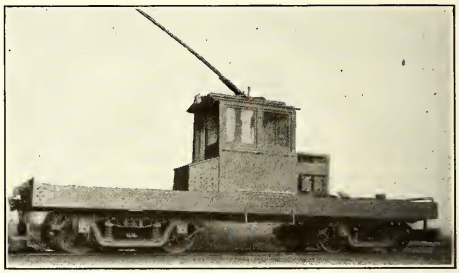
Economically Constructed Locomotive for Handling Coal

Much of the Material Which Was Used in the Construction of a 60,000-Lb. Locomotive Was Salvaged

THE Union Traction Company of Indiana has recently completed a locomotive for use exclusively in handling coal at the power house. The over-all dimensions are: length 30 ft., width 8 ft., height from top of rail to clearance line 12 ft. 6 in. A great deal of the material used in the construction of the body was salvaged.

The end sills, side sills and cross sills consist of one 15 in., 40-lb. channel each, the end sills and side sills having flanges set in. There are four longitudinal sills each being a 4-in. x 10-in. stringer, and the draft beams are 10-in. I-beams. The cross sills are spaced 6 ft. apart and the wheelbase is 18 ft. The flooring of the car is 1¾ in. yellow pine. The 15-in. channels used for sills were salvaged from an old bridge on the company's right-of-way, and the draft beams were salvaged from one of the shops.

The cab of the locomotive is of wood construction, 4 ft. x 6 ft., the material being salvaged and rebuilt from an old work car. The K-14 control equipment used also came from the same car. The trucks were made by the St. Louis Car Company. The locomotive is equipped with four GE-57 motors, M-15-C automatic air brakes, Tower couplers and electric markers. A 23-watt headlight is operated in a five-light series with two markers and two lights within the cab. The total weight of the locomotive is approximately 60,000 lb.



LOCOMOTIVE BUILT BY UNION TRACTION TO HANDLE COAL FOR POWER PLANT

It has been found under operating conditions that the locomotive is a trifle light for handling several cars of coal on a grade. Weight will be temporarily added by placing materials on the platform, and eventually the 15 in. of floor space between sills will probably be filled with concrete. Other locomotives in use by the company have the sloping end hoods, but this equipment was built without the hoods so that, if necessity required, it could be used as a general utility car in transporting materials or men as well as to pull a train.

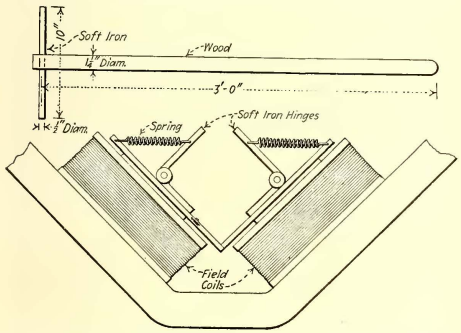
In the article on third-rail bonding appearing in last week's issue of this paper one of the cuts shown in the center of page 1155 was inverted and the captions for the twin terminal bond and soldered type of ribbon bond were interchanged.

Testing Newly Installed Field Coils for Polarity

Simply Constructed Shop Devices Insure Proper Installation and Connection of Railway Motor Field Coils

WITH some types of motors it is a very easy matter to reverse the field coils or to install improper coils. With such motors the only safe plan after new fields have been installed is to test their polarity. Testing with a compass is not a satisfactory method, as the magnetism from the motor field is liable to reverse the polarity of the compass needle so that a false indication will be given.

One method for testing the polarity of newly installed field coils which has been in use at the East New York surface shop of the Broklyn Rapid Transit System for several years has proved entirely satisfactory. The testing apparatus used consists of two pieces of round soft iron, about ½ in. in diameter and 10 in. long, which are inserted transversely in the end of two wooden rods about 3 ft. long, and 1¼ in. in diameter. The iron rods make a driving fit in the poles which serve as handles. By means of a water rheostat a current of from 7 to 10 amp. is passed through the field windings. Two of



SHOP TESTING APPARATUS FOR DETERMINING POLARITY OF RAILWAY MOTOR FIELDS. AT TOP, IRON ROD WITH HANDLE. AT BOTTOM HINGED PIECES HELD IN POSITION BY SPRINGS

the testing devices are used while making the test, one end of each iron rod being placed in the center of each field magnet. Befor the circuit is closed through the field winding the outside ends of these testing rods are held apart about 2 in. When the current is passed through the windings they will be drawn together where the two pole faces have opposite polarity and repelled if the faces have the same polarity. The wooden handles on these testing devices are used as a safety precaution. In an earlier form of the apparatus, the workman held the iron pieces directly and experience showed that there was danger of the two pieces being drawn too forcibly together if an excessive current was passed through the motor field. Under this condition if the workman had the iron pieces in his hands he would be liable to injury and a short-circuit at the field terminals might result, while with the wooden handles he has a longer leverage and can hold the pieces steadier.

Another device similar to the preceding in its method of operation is shown in another illustration. This consists of a wooden framework upon which two-hinged iron pieces are mounted. The wooden framework is so constructed that the hinge pieces will come in the center of the pole faces of a motor. In their normal position the hinged ends are held about 2 in. apart by two springs. In place of a water rheostat for cutting down the current to the desired value for energizing the field coils, a resistor has been constructed of approximately 60 ohms resistance. The end of this has a flexible lead which is attached to a hook pole. A 20-amp. fuse is mounted on the pole in series with the connection as a matter of precaution. The hook of the pole is placed over a trolley wire and the regular railway shop voltage will cause from 8 to 10 amp. to pass through this resistor and through the field windings. The advantage of this last method over the preceding is that one man can make the test on a pair of field coils by placing the testing apparatus in position first and then closing the circuit, while with the preceding method it is necessary to have two men, one to hold the testing pieces in position and the other to close the circuit.

AMERICAN ASSOCIATION NEWS

Mail Hearing in Boston

A HEARING was given to the New England electric railways at Boston, Mass., on June 13 and 14 by Attorney-Examiner George N. Brown of the Interstate Commerce Commission upon rates to be paid by the United States government for the transportation of mail on trolley lines in that district. Joseph Stewart, assistant to the Attorney General, appeared as at earlier hearings as counsel for the Post Office Department and S. S. Ashbaugh appeared for the electric railways, representing the American Electric Railway Association. The New England case was prepared with great thoroughness under the leadership of a committee of the New England Street Railway Club headed by R. B. Stearns, chairman, the other members being C. K. Reed, Howard Fritch and D. P. Abercrombie, Jr.

As was the case in the Washington hearing of June 9, the evidence showed that the companies are receiving but 25 to 33 per cent of what should be paid for the services rendered. It was brought out that twenty-seven leading companies receive a total of but $49,359 annually for their mail service. The schedule of witnesses included members of the above committee and the following: Clark V. Wood, president Springfield (Mass.) Street Railway; Roscoe Anderson, Rhode Island Company; Elton S. Wilde, Union Street Railway, New Bedford, Mass.; R. E. Hood, Massachusetts Northeastern Street Railway; M. G. Stratton, Shore Line Electric Railway, Norwich, Conn., and V. S. Curtiss, Connecticut Company, New Haven.

The exhibits filed in the case included a map of all the electric roads in New England, lists of companies, mileage of companies, statistical summary of replies to the committee's questionnaire, detailed data as to mail service, costs and revenue on each system replying, maps of individual roads showing mail routes. Witnesses were examined as to their special burdens in handling through, side and terminal service since 1916, when the present law went into effect governing electric railway mail pay, and witnesses for companies under public con-

trol emphasized the intent of the legislation under which they operate to provide for meeting all costs of all classes of service in the revenue received from operation. It was provided in the procedure that each company might have its own ideas as to the proper method of rate-making, but all were agreed that the present compensation is absurdly inadequate. It was pointed out that unless the rates are very materially increased, a general withdrawal from the carriage of mails by electric roads in New England must follow.

An example of the burdensome nature of mail transportation under present conditions was presented by R. B. Stearns, first vice-president, Eastern Massachusetts Street Railway, Boston. On this system, which includes 915 miles of track, there are twenty-eight mail routes. In 1918, 42,247 trips were made between terminals, the average weight of pouches being 18 lb. The pouches ranged in weight from 8 to 100 lb., the heavier cases arising from the transportation of shoe heels by parcel post.

The length of the routes varies from 0.75 to 19.2 miles, the weighted average length of route being 4.37 miles. The annual pouch ton-miles is 8383, and the company receives but $5,874 for its mail-handling service. The carriage of parcel post sacks is the chief cause of congestion. The interference with traffic and annoyance to passengers are so serious that the company would have discontinued the carriage of mails last spring had it not been for the hearings now being realized. The side service is especially troublesome and should be eliminated entirely, and should be handled by specially delegated government employees. The compensation for parcel post packages should be on the basis of space and weight required, and no company, Mr. Stearns said, should be obliged to carry milk, chickens and produce on its passenger cars. Much relief would be obtained if the Post Office would limit passenger car mail to first-class matter in three or four pouches, arranging for the carriage of other mail on the freight cars of the company. The relation of the mail revenue to the total passenger earnings, which are about $13,000,000 per year, is too small to justify the present service. The company is furnishing a $40,000 service for less than $6,000.

Many instances of apparent discrimination, inequalities in compensation, and inadequacy of revenue resulting from present arrangements were brought out by the witnesses. It was shown that in numerous cases where railways have given up the carriage of mails, the contractors succeeding have been paid by the government three to four times as much as the companies were able to obtain.

Zone Systems of Fare Collection Discussed

A MEETING of the American Association committee on zone systems was held in New York City on June 13. Of the committee, W. H. Sawyer, Columbus, Ohio, Chairman; Thomas Conway, Jr., Philadelphia, Pa.; J. H. Hanna, Washington, D. C.; L. H. Palmer, Baltimore, Md.; R. P. Stevens, Youngstown, Ohio; L. S. Storrs, New Haven, Conn., and C. L. S. Tingley, Philadelphia, Pa., were present. E. B. Burritt, secretary of the association, and Walter Jackson, of the ELECTRIC RAILWAY JOURNAL were also in attendance.

The committee confined itself largely to a general discussion of the scope of the work, and Dr. Conway suggested as an outline for the committee's report that it contain sections on bibliography, terminology, field of application for zone systems, varieties of zone systems, methods of fixing rates and methods of collecting fares. Doctor Conway and Prof. A. S. Richey were appointed to draft a report along the lines suggested. R. M. Feustel, president Fort Wayne & Northern Indiana Traction Company, and Mr. Jackson will be asked to assist the sub-committee. July 7 was selected as a tentative date for the meeting of the sub-committee and July 11 as that for the next meeting of the full committee.

The committee on collection and registration of fares, of the Transportation & Traffic Association, was requested through the secretary to confer with the committee on zone systems before submitting that portion of its report dealing with the collection and registration of fares on zone systems.

Providence Section Activities

THE Rhode Island Company section held meetings on April 7 and May 6 with attendances of more than 100 at each. At the April meeting A. L. Campbell was elected president, W. C. Slade and A. E. Paddock vice-presidents, H. B. Shaftoe and S. J. Allard secretaries, E. E. Worrall treasurer, and C. E. Redfern, J. A. Lockhart, W. D. Wright and A. V. Gardiner directors. At this meeting W. D. Wright, superintendent of equipment, described in non-technical language the development of the equipment features of an electric railway car. Theodore F. Green, co-receiver of the company, explained what is being done to straighten out the company's financial affairs. At the May meeting Corp. H. E. Eklund related his war experiences. At both of these meetings the entertainment features were made much of by the members in attendance.

LETTER TO THE EDITORS

Rule Should Be In Code

NATIONAL FIRE PROTECTION ASSOCIATION
ELECTRICAL COMMITTEE

BOSTON, MASS., June 13, 1919.

To the Editors:

In the 1915 edition of the National Electrical Code the second paragraph of Rule 23, section "a" read as follows:

> Where the switch required by No. 24 "a" is inside the building, the cutout required by this section must be placed so as to protect it, unless the switch is of the knife-blade type and is enclosed in an approved box or cabinet, under which conditions the switch may be placed between the source of the supply and the cutout.

Through an error this section was omitted when the 1918 edition was printed.

The electrical committee of the National Fire Protection Association has voted that this matter be given the widest publicity, that all interested parties may be advised that this section was omitted. The electrical committee would recommend that inspection departments approve an installation in accordance with this paragraph.

RALPH SWEETLAND,
Secretary Electrical Committee.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Detroit Men Accept

Compromise on Wage of Sixty-five Cents Maximum—Fare Increase Part of Settlement

The employees of the Detroit (Mich.) United Railway resumed work Thursday night, June 12, after voting to accept the compromise wage offer of the company. The increase of wages, which is retroactive to May 16, provides for a scale of 50 cents an hour for the first three months, 55 cents for the next nine months and 65 cents an hour after one year's employment. This increase, according to W. D. Mahon, president of the Amalgamated Association, makes the Detroit men the highest paid employees of their kind in the United States and Canada.

COMPANY PRESENTS SETTLEMENT PLAN

Immediately following the issuance of the court order by Circuit Judge Marschner by which the controversy as to proper fare rate was placed in the hands of an arbitration board, officials of the railway presented a plan to the men whereby they would all be granted a straight increase of 10 cents an hour. This proposal was flatly rejected and finally a program calling for increases of 7, 9 and 12 cents an hour was decided upon. This plan involves about the same amount of money as the first.

As a result of the strike settlement 3-cent tickets on the Pingree lines, the Cross Town, Sherman, Harper and Fourteenth lines will be abolished and workingmen's eight for a quarter tickets will also be done away with on June 21. While the court order fixed the fare on all lines at 5 cents, President Brooks of the company instructed the employees to accept outstanding workingmen's tickets and tickets of the so-called 3-cent lines for full fare the same as previously until midnight, June 21.

INCREASES FOR OTHERS LIKELY

In line with the increases granted the 3000 platform men, who operate the cars, it is expected that employees of the company serving in other departments will be granted increases also. The combined wage increases have been estimated as adding more than $1,000,000 to the annual operating expenses of the company.

The company has announced it intends to charge only one 5-cent fare to North Detroit in the future, instead of two, as has been collected previously. The city was also notified that the company would comply with the Council resolution and proceed with the Twelfth Street and St. Jean Avenue extensions.

The special election on the $10,000,000 bond issue to provide funds for beginning a municipal railway system will be called early in August instead of July 22, as formerly planned. The fact that the Council must specify in the resolution and ordinances fixing the election, that money will be raised for extensions and purchase of the day-to-day agreement lines, makes the postponement necessary.

COUNCIL HAS APPROVED NEW FARES

The Council approved the 5-cent fare agreement reached with the railway by Mayor Couzens and Corporation Counsel Wilcox. A resolution calling for the appointment by the Council of the city's arbitrators to the board was passed. The board will determine after three months whether the company needs to charge 1 cent for transfers. It is expected that the board of arbitrators will be named in the very near future.

Strike at Lowell, Mass.

The lines of the Lowell (Mass.) division of the Eastern Massachusetts Street Railway were shut down by a strike which began on June 16, the cause being the introduction of a hand fare register. The strike took place in violation of the agreement of the employees' union to arbitrate all matters in dispute, and the chief bone of contention was the attempted use of these registers by conductors on open cars.

Thomas Lees, manager of the Lowell division, issued a statement early in the day, pointing out that the employees had disregarded their agreement and expressing the company's regret at the inconvenience caused the public by the walkout. Later in the day the public trustees of the company issued the following statement over the signature of Homer Loring, chairman of the board:

> This is not only a strike by the Lowell employees in violation of the existing arbitration agreement, but it is an attempt on the part of these employees to control the matter of collecting fares. The fare register, against which the strike is directed, insures two things—first, that the passenger pays his fare, and, second, that the company gets it after it is paid. Its use on many large lines has been personally investigated by the trustees, who are firmly of the opinion that such use is beneficial alike to patrons, employees and owners.
>
> The Legislature has placed on the trustees certain very definite responsibilities as to administrative and operative duties, and if we are to allow the men to dictate the method of collecting fares we are shirking a major responsibility at the outset.
>
> We regret the inconvenience to the people of Lowell, and the loss of revenue both to the company and the men, but the issue must be squarely met—our conductors in Lowell cannot be allowed to decide what system of fare collection the company shall adopt.

Comment Worth Pondering

Minneapolis "Journal" Talks from Shoulder on Local Traction Situation

The Minneapolis *Journal* says service is paramount in any settlement of traction affairs there. In some quarters the effort has been made to befuddle the issue as contrasted between that city and St. Paul, in both of which the Twin City Rapid Transit Company operates, but the *Journal* refuses to be beguiled. In a recent public debate it was contended that it is unwise to adopt a cost-of-service franchise in Minneapolis on a basis of 7 per cent return on a valuation of $24,000,000, because that would mean a 6-cent or 7-cent fare in Minneapolis, while St. Paul, with a franchise guaranteeing a 5-cent fare and eighteen years to run, would have an intolerable advantage. In replying to this argument the *Journal* pubished the following comment:

> One trouble with this argument is that it assumes the rate of fare to be the paramount consideration. But if Minneapolis had a 6-cent service, with plenty of cars running, with extensions built where necessary, while St. Paul struggled with a 5-cent service that meant cars crowded and infrequent and no extensions, how long does Mr. Keyes suppose St. Paul would stand for retention of her present franchise?
>
> In other words, service is more important than rate of fare—more important to the individual car-rider, and more important to a growing city which cannot permit its development to be stunted by lack of transportation facilities.
>
> Since it is probably not practicable for the two cities to act together in arriving at a settlement, and since the State cannot step in, it follows that one of the cities must take the lead and make a settlement. The other will follow very quickly. If Minneapolis is to postpone settlement just because St. Paul has a 5-cent franchise running till 1937, must she put up with the present pinched service for the next eighteen years?
>
> The 5-cent fare is throttling the development of both cities, because it is producing financial anemia in the company. There is great need for the transfusion of new capital into its veins in order to restore its health so that it can function properly. But no investor is going to submit himself to such an operation, unless it appears that the patient is to be properly nourished.
>
> This community would not need to concern itself greatly over the health or illness, the life or death, of the Twin City Rapid Transit Company were it not for the service that corporation performs, or ought to perform for the community.
>
> Let us not permit the desire to "get the best" of the company in a bargain blind us to our own interests as a community. The chief thing that we need to consider in any new franchise is whether it will result in good service at the lowest cost compatible with sound financing. Service is the first consideration; as low a rate of fare as possible is the second.
>
> We believe the discussion is proceeding on right lines as to valuation and return. These are at the base of the question, and another checking, as is proposed, may clear it.
>
> The company must have enough to pay charges and standardize service. We believe 6 cents at the start is about established as a necessary fare.

Winnipeg Completely Tied Up

Upheaval in Canadian City Regarded as an Effort to Establish the Rule of the Soviet

For more than a month, Winnipeg, Man., a city of 200,000 people, has been in the throes of a general strike affecting 35,000 workers, aimed at depriving the city of its public utilities and necessities of life and acclaimed to be an attempt on the part of the radical leaders in control of the local Trades & Labor Council to establish the rule of the Soviet. The Ministers of the Crown have described the strike as a revolutionary attempt to overturn governmental authority and to supplant sane, progressive trade unionism with the idea of one big union. This is akin to the I. W. W. and Bolshevist movement in other countries. That the strike has extended over so long a period is due to the wholehearted manner in which the citizens have banded together in an effort to defeat the movement.

A dispute between metal trades employers and employees was seized upon by the Trades & Labor Council as the *casus belli*. The metal trades employers, while being prepared to negotiate schedules, with committees of their own employees or international representatives of the latter, refused to recognize the Metal Trades Council—a combination of unions including several with which the metal trades employers had no dealings and nothing to discuss. The Metal Trades Council, which is composed of very radical Socialists, insists on being recognized as the official negotiating body for all metal trades workers. The employers, however, refused to recognize any extraneous body.

WILL NOT ARBITRATE A PRINCIPLE

In spite of the fact that the employers of labor were prepared to negotiate with unions or committees of their own employees the Metal Trades Council received the support of the Trades & Labor Council on the plea that "the employers refused to recognize the principle of collective bargaining," and in order to force the employers to accept the definition of collective bargaining as drawn up by the Metal Trades Council, a general sympathetic strike of all unions, including firemen and policemen, associated with the Trades & Labor Council, was called. The strike leaders, holding that they could not arbitrate a principle, which in this case was collective bargaining, refused to arbitrate. They struck on May 15.

Incensed at the attempt to deprive the city of fire and police protection, urban transportation, water, light, milk and bread, etc., the citizens have banded together into a "committee of one thousand" and have issued the edict that before a settlement of the metal trades dispute is made the question of the sympathetic strike must be settled once and for all.

Volunteer forces were organized to man the police and fire brigades, the light and water plants, and the milk plants and bakeries. Having thus successfully nullified the attempt of the strike committee to reduce the city to starvation, the citizens have expressed determination that the sympathetic strike weapon, as it applies to various utilities, shall not be resorted to every time there is a dispute between a private employer and his employees. Permanent staffs for the fire, police, and other utility departments have to sign a "loyalty" oath before being taken on, in which they declare they will not become members of any union affiliated with an outside body, and that they will not participate in sympathetic strikes.

EFFECT ON WINNIPEG ELECTRIC RAILWAY

So much for the general situation. It seemed to be essential to an intelligent understanding of the effect of the strike on the Winnipeg Electric Railway, which operates light, power, gas, and transportation utilities, that the movement be reviewed very briefly in its wider phases. Fortunately the railway was able to keep its light and power and gas plants in full service, but transportation has been completely tied up since May 15. The 1700 motormen, conductors, and shop employees struck in sympathy with the metal trades employees and not through any dispute with the company.

At the time the strike on the Winnipeg Electric Railway was called a board of conciliation was engaged in arbitrating the demands of the motormen and conductors for 70 cents an hour (maximum) and an eight-hour day. Several sessions of this board had been held, but A. Scoble, business agent of the railway union, had told the board that unless the demands of the men were met they would go out on strike. The union refused to name a representative to the board, and refused to put in "its case." Three days before the sympathetic strike was called the railway men were asked, by their union officials, to vote on the question: "Are you in favor of a strike to enforce your demands." Reference was made to conciliation, and the result of the vote was 97 per cent in favor of a strike. No vote was taken on the sympathetic strike issue, but the men responded to the call of the Trades & Labor Council and went out on strike on the morning of May 15. Meantime the board of conciliation investigating the men's demands has suspended sessions until the strike is over.

No action was taken with regard to resuming railway service until June 9 when the City Council of Winnipeg passed a resolution requesting the company to operate cars immediately. Several conferences were held between officials of the company and the city with regard to the provision of police protection. In response to the demand of the City Council, A. W. McLimont, vice-president and general manager of the Winnipeg Electric Railway, published an advertisement in all local papers asking the men to report for work at their respective carhouses at 8 a.m. on June 12. This advertisement closed with the following appeal:

> I wish to convey to you men my personal feeling that you are not now aiding the cause for which the general strike was called by continuing to deprive the people of Winnipeg of transportation. On the contrary, you are injuring your personal standing in the community and getting the authorities and the public alike down upon the employees of the Winnipeg Electric Railway. Remaining on strike now only results in seriously injuring the company which employs you and depriving it of revenue it must have to conduct its business and provide the wherewithal to pay your wages in order that you in turn may support your families and yourselves.

On June 11 members of the railway union held a meeting to consider this new development, and after discussion they decided unanimously to remain out on strike in sympathy with the other workers. Strong pickets were placed at the respective carhouses the following morning, and only two employees reported for duty. Resumption of service, of course, was impossible.

In a letter to Mr. McLimont, the president of the railway union, said:

> We appreciate the spirit in which your letter is couched and we hope that in the very near future we will be able to resume our former positions, and continue our past amicable relationship, and we would request that you use your good offices with the many other influential interests that are working with the object in view of restoring to our fair city of Winnipeg that spirit of good fellowship and brotherly love that should permeate every man and woman that has the welfare of the community at heart.
>
> Try with us to establish again the spirit "Do to others as we would have them do to us."

At a meeting of the City Council on June 14 the question was discussed of permitting jitneys to ply the streets just so long as the railway service was tied up. After discussion the city solicitor asked for time to study the question before making a statement as to what rights the city had to permit jitneys to run under the circumstances.

Fourteen cars were in operation on June 19 until sundown. They plied the principal thoroughfares and were greeted with cheers. No untoward incidents occurred. The company issued an ultimatum on June 18 to employees to return to work on June 19 which stated:

> The employees who do not report and are not available when required to enable the company to resume service will be replaced by permanent new employees and will lose their seniority. New employees taken into service will not be dismissed to make places for any old employees who may subsequently decide to return to duty.

Several regular employees responded. These men and supervisors and inspectors manned the fourteen cars in service. A mass meeting of the electric railway employees was set for June 19 to decide on future action. Eleven leaders of the general strike were arrested on June 18 charged with seditious conspiracy.

Something to Think About

George B. Cortelyou Advises Publicity, But Lays Stress on Adequate Service as Essential First

George B. Cortelyou, president of the Consolidated Gas Company, New York, and the American Gas Association, in an address before the joint meeting of the Natural Gas Association of America and the American Petroleum Institute, summed up the utility situation as follows:

We hear much of the needs of the utilities. Presupposing that they are honestly and efficiently conducted, what is their greatest need to-day? Simply that they should have what we mean when we ask for a "square deal."

APOLOGETIC PUBLICITY CONDEMNED

A public utility is a part of the community—an essential part—its personnel are citizens, taxpayers, business men, as surely as any others who bear those honorable names. Why should there be the discrimination that in many places exists in the public mind? Partly because of past mistakes, of the misdeeds of a few, of the exigencies of politics, of a variety of causes, but in my judgment quite largely because we have underestimated the inherent sense of fairness of the American people when they are informed, when they are in possession of the facts.

We have not given them the facts. Much of our publicity has been of a halting, apologetic kind, as though we were on the defensive. I say to you, gentlemen, that the facts are with us—the nature of our business, the cost of conducting it, the burdensome restrictions put upon it, the lack of flexibility in its regulation, the part it plays in the life of every community. We must make every company in very truth a public utility and then see that the public is made to realize that it is. With this established, we have made progress toward adequate rates, enhanced credit and an ample and responsive market for our securities.

How many American communities know even the general features of our business? Properly told it would be a most interesting story; in these days when so much stress is laid upon practical information, it would be eminently practical.

And cost of production! Highly interesting, too; also, serious and well-nigh ruinous for some companies, but extremely instructive in itself and when compared with that of other products. Restrictions are probably necessary in some degree in all business, but does business thrive in proportion to the stringent character of these restrictions? Rather, does it not expand and realize the hopes of both producer and consumer alike in proportion to their tendency toward reasonableness?

And that brings us to the absence of flexibility in public regulation. I undertake to say that much of the regulation of this character makes it impossible for the companies to render their best service. That is what each community wants from its utilities, the best service, and if it can be sure that the exactions put upon them are counter to its own best interests, we have prepared the way for sympathetic response to our just claims.

The public is better informed of the part played by the utilities in the war than of their daily routine of business—and it was a splendid and essential part—but it seems to me that, aside from all other aspects, that most patriotic and creditable record is useful as a foundation for the diffusion of a more permanent understanding of their vital relations to all industrial activity.

HONEST MANAGEMENT AND HONEST SERVICE CONFOUND THE CROAKERS

With a prompt and widespread resumption of business one of the most urgent demands of the country, and with governmental war restrictions lifted, why is not this a good time to acquaint the public with the part the utility can play in the business life of the community, if encouraged to its best efforts, and to look squarely in the face this deterrent influence of unnecessarily burdensome regulation?

Many of us who believe thoroughly in the regulation of utilities, when it is administered fairly and impartially, feel that not a little of it is dispensed upon theories far removed from that wholesome conception.

We must hasten the day when we shall, as great industries, take and maintain our place in American business life by the side of merchant and manufacturer and banker, and as surely and with as general acceptance. But back of all publicity must be adequate equipment, trained personnel, contented labor and a management alive to its responsibilities; for when the response comes to our announcements we must be ready to meet it in full measure.

In our business nothing confounds hostile attacks so quickly as good service; nothing silences hasty criticism so thoroughly as honest and efficient management.

Strike in Vancouver

Demonstration There Another Manifestation of General Unrest Throughout Canada

Platform and shop men of the British Columbia Electric Railway's Vancouver and North Vancouver city systems ceased work on June 5 in a sympathetic strike, outbreaks of which have spread with revolutionary aspects throughout Western Canada.

The union took a ballot on June 1 and registered three to one against the sympathetic strike. The Trades & Labor Council of Vancouver held a mass meeting of all unions on June 2 and in spite of a majority of the unions of the city being against the strike, this council called upon the unions of the city to walk out on a general strike, the street railway men's and electrical workers' included.

STRIKE DECLARED JUNE 9

The strike in Vancouver began at 11 a.m. on June 9. The street railway men decided to hold a mass meeting the following night. In the meantime, strikers are alleged to have intimidated the car men with threats of violence if they did not quit work. It is felt certain that this was the cause of the street railway men at their mass meeting voting two to one in favor of a strike. On that occasion, only two-thirds of the men who had previously voted against the strike voted the same way, the others presumably having gone over to the other side.

On June 7 transportation was being provided by means of jitneys and private automobiles. The City Council of Vancouver repealed the by-law prohibiting jitneys for the time being, much to the anger of the strikers.

INTERURBAN LINES NOT AFFECTED

Cars were still being operated on all interurban lines on June 7. Central Park and Burnaby Lake lines are operating to their connections with city lines, the men being attached to the New Westminster trades and labor council, which has registered against a sympathetic strike. The New Westminster city system was also operating on June 7. The Fraser Valley and Lulu Island interurban lines continued service, the trainmen there being attached to the Brotherhood of Railway Trainmen, which is not countenancing the sympathetic strike.

The electrical workers voted to strike, but up to June 7 only the line men had gone out. The substation operators were still at work

Cleveland Men Want More

Despite Recent Wage Settlement Men Still Restless—Company Wants Fare Limits Removed

The employees of the Cleveland (Ohio) Railway voted on June 11 to ask for an increase of 12 cents an hour in wages. They are now receiving 43 cents for the first three months' service, 46 cents for the next three months and 48 cents thereafter. The men contend that one of the conditions of the award made by the Federal War Labor Board is that the agreement under which they are now working may be reopened in order to increase the wages in proportion to the advance in the cost of living. The present agreement does not expire until May, 1920.

In an interview, John J. Stanley, president of the railway, announced that he would ask the Council to consider the advisability of making an additional operating appropriation of $1,500,000 annually to meet the increase in wages sought by the employees. About $1,000,000 of this would be taken in the increase the platform men have asked and he feels that, if this is granted, shop men and other employees should have a proportionate increase. When the demands of the men were presented to him, Mr. Stanley replied that he would consult the Council, inasmuch as it must furnish the money for any additional pay.

Mr. Stanley also suggested that the maximum rate of fare of 6 cents and 1 cent for transfer be stricken from the Tayler grant and that no maximum be specified on account of the uncertainty as to expenses. He further suggested that the return on the investment be advanced from 6 per cent to 7 per cent. Stockholders, he said, are receiving no increase on the money they have put into the company, although others concerned in the road have been thus favored.

Short Strike on Boston & Worcester

Union employees of the Boston & Worcester Street Railway, Boston, Mass., struck on June 13 for about ten hours owing to the failure of the War Labor Board to establish a finding issued in January last which awarded a maximum wage of 47 cents an hour to platform men. Following the announcement of the board's award last winter a disagreement arose as to its handling, particularly in relation to expenses involved in the proceedings. Upon learning of the strike, which completely tied up the road and threw a heavy traffic over to the parallel Boston & Albany Railroad, the War Labor Board confirmed its award and service was resumed. Besides the through service between Boston and Worcester, local service in Marlboro, Hudson and Framingham was interrupted. About 250 employees were involved. The award is retroactive to Nov. 1, 1918, but the total amount which it involves has not yet been determined.

Illinois Commission Enlarged

With the adjournment of the Legislature of Illinois only a few days away, members of the House took action on June 12 which sent to the discard all the bills which were intended to pave the way for improved transportation facilities in Chicago. With the next legislative session two years distant, this means that no permanent settlement of the traction problem can be made meanwhile even though the City Council may pass an ordinance which will need new statutes to make it effective. These bills appeared to have the support of all factions in Chicago, but they were presented at Springfield too late for thorough discussion.

On the same day that these bills were rejected, the Senate passed the House bill which increases the size of the State Utilities Commission to seven members. It is expected that three of the commissioners will devote their entire attention to Chicago matters, leaving three others to look after downstate matters.

Rapid Transit Loop Construction to Begin

At a meeting of the Board of Rapid Transit Commissioners in Cincinnati, Ohio, it was made known that construction work on the proposed rapid transit loop will begin on July 1, when a dam will be built at the canal spillway in Cumminsville to divert the water in the canal from its course.

Chief Engineer Krug reported to the commission that as soon as the dam is built the first contracts to be let should be that portion of the canal subway from Canal and Walnut Streets to Plum and Liberty Streets, as this portion must be built before any work on the parkway can be done. The cost of the loop is estimated to be $1,191,800. The initial issue of bonds for the canal section will be $1,200,000.

The following resolution was adopted:

To correct any misunderstanding that may be in the public mind the Board of Rapid Transit Commissioners states that the commission was appointed to build the rapid transit project as a whole. It can do nothing else. The first part to be built will be that section of the route now occupied by the canal. It is the intention of the commission to proceed with the building of the balance of the route just as soon as possible.

Toledo and Cincinnati Wage Awards

The War Labor Board has announced its decision in the Toledo controversy. Motormen and conductors in the employ of the Toledo Railway & Light Company are allowed a wage scale of 42 cents an hour for the first three months, 44 cents an hour for the next nine months and 46 cents thereafter.

All other employees are allowed a straight wage increase of 8 cents an hour. As both the Toledo Railways & Light Company and its employees agreed in advance to abide by the board's decision the new wage rates become effective immediately.

The board has also sustained a ruling of one of its sub-committees that the Cincinnati Traction Company must pay 700 of its miscellaneous employees increases which will put their wages on a scale ranging from 42½ cents to 57½ cents an hour. The company protested the ruling on the ground that this scale would give the miscellaneous employees a higher average than motormen and conductors. The board suggests that this inequality could be easily remedied by granting the motormen and conductors a corresponding increase.

Look Before You Leap

The Winnipeg (Man.) Electric Railway is carrying on a good steady work for safety. Here are a few epigrams taken from that company's bi-monthly *Public Service News.*

The cost of safety is only a thought.
Before the accident, think,
And then, without a doubt
There will not be an accident
For you to think about.

Far better for automobilists to wait a minute at a crossing than forever at a cemetery.

A bed at home is worth two in the hospital.

There was a man who fancied that by driving good and fast
He'd get his auto 'cross the track before the car came past;
He'd miss the fender by an inch and make the car crew sore—
There WAS a man who fancied this—he doesn't any more.

Wage Arbitration Under Way

Patrons of the Pittsburgh (Pa.) Railways are face to face with the probability of an 8-cent fare as a result of the War Labor Board hearing on the wages conducted in Pittsburgh on June 16 and 17 by Charlton Ogburn, transportation examiner of the board. Testimony offered at the hearing made it very plain to the public that if the men get the increase of 12 cents an hour they demand, the money to pay it must come directly out of the riders' pockets in the shape of a fare increase, and opinion of witnesses was that 8 cents must be the new figure in the high fare area. No opinion was expressed as to what charge would result in the present 5-cent area. Five cents is charged now in a district of a radius of approximately 2 miles from the downtown termini, and 7 cents for a ride any part of which passes outside that area.

Concluding arguments in the case will be heard before William H. Taft and Basil M. Manly, joint chairmen of the board, in Washington the latter part of the week ended June 28, it was announced at the conclusion of the Pittsburgh hearing. The decision of the board is expected within two weeks thereafter. This decision, however, will not be final, as any award made the men must be approved by the United States court of the Western Pennsylvania district, under which receivers are operating the Pittsburgh Railways. By the terms of the agreement which terminated the May strike of the men, refusal of the court to aprove an award in their favor will leave them free to strike again.

Co-ordinate All Transportation

Transportation throughout the United States is being hampered by a superfluity of governmental boards, all seemingly working for the same purpose, but independently and without co-ordination, in the opinion of Maj.-Gen. William M. Black who arrived at St. Louis on June 16 to let contracts for the construction of steel towboats. The St. Louis press quotes Major-General Black as follows:

I am quite convinced that business cannot receive the best results from the agency it depends on most—transportation—until steam, electric, water and all other forms of transportation are put under one departmental head.

All must be co-ordinated, so that transportation as a whole will do the greatest possible good for the country. In my judgment, this is impossible under present conditions, no matter what artificial aids are given one agency.

To-day a separate government organization has control of water transportation, another has control of the railroads, and all told, there are about half a dozen boards doing work that should be done under one head. This kind of management cannot result to the best advantage any more than in a municipal government.

Transportation is the most important element in the business life of America, yet the railroads, important as they are, are being hampered by legislation—because of the will of the people more than any other agency. The Standard Oil Company and the beef trust are little criticised to-day compared with the railroads.

Joyless Jersey Jitneys

They are planning to take the joy out of the Jersey jitneys. Atlantic City may be the world's playground, Jersey City and Camden, to those who do not live there, may seem to be the world's dumping grounds and Jersey commuters may continue to take money out of New York City and Philadelphia and horde it in New Jersey, but in Jersey a contract is a contract. Jersey City says so, and it intends to act to that end.

But to begin at the beginning again. Jersey City is up in arms against the jitney. Not only is it threatening dire things, but it is doing them. And the jitneurs, as they call them in Jersey, are quaking in their seats, as their rough-riding Fords pound down the pavement, with Jersey justice hot on their trail. At one fell swoop eighty-eight jitneurs, members of the clan that is said to have taken $4,000,000 away from the Public Service Railway, were jugged recently for charging a 10-cent fare on Bergen Avenue in Jersey City.

That city fixed a 5-cent fare for the jitneys. But some time ago the jitney men, avowing that they could not make the service pay at 5 cents, began to charge 10 cents. The arrests followed. Just as the culprits were about to be arraigned in court the jitneurs recalled that there was such a thing as a writ of certiorari. Armed with this they restrained the chief of police for the time being from requiring the jitney men to appear before the City Commissioners for the purpose of showing why their licenses should not be revoked for overcharging. And there the matter rests, or did rest, when this account was written.

News Notes

New Franchise at Paducah.—A new and more liberal franchise was auctioned off on June 6, at Paducah, Ky., and was purchased by the Paducah Traction Company.

Carhouse to Be Moved.—The Northwestern Ohio Railway & Power Company has announced that its carhouse will be moved from Genoa to Oak Harbor, Ohio.

Want $5 for an Eight-Hour Day.—The employees of the Worcester (Mass.) Consolidated Street Railway have voted unanimously to reject the company's proposal to retain the employees of the railway on a platform-time basis. The employees insist on their demand for an eight-hour day with a straight wage of $5.

Receiver's Compensation Fixed.—The United States District Court has allowed Wallace Donham $50,000 as final compensation for services as receiver for the Bay State Street Railway, Boston, Mass., from Dec. 12, 1917, to May 31, 1919, in addition to the salary which he received at the rate of $15,000 a year.

Supervisor on Inspection Tour.—Lynn B. Milam, supervisor of public utilities of Dallas, Tex., has gone to Salt Lake City, San Francisco, Los Angeles, Portland, Seattle, St. Paul, Minneapolis and Cleveland for the purpose of investigating the city railways in these cities with a view to improving service at Dallas.

Railway Office Robbed.—Bandits entered the office of the Cleveland, Southwestern & Columbus Railway at Seville early on June 9 and, after binding the night watchman and two other men who were in the station, blew open the safe with dynamite. They secured about $1,000 in cash and escaped in an automobile.

Bridge Service Unprofitable.—William O. Wood, president of the New York & Queens County Railway, Long Island City, N. Y., has informed Borough President Connolly that his company would be unable to continue to operate across the Queensborough Bridge after Dec. 16 next unless there was a modification of the contract between the company and the city.

Seattle to Operate Buses.—The City Council of Seattle, Wash., has authorized Thomas F. Murphine, superintendent of public utilities, in charge of the Seattle Municipal Railway to operate a bus service to and through Carleton Park, Magnolia Bluff, from the end of the city car line at Fifteenth Avenue, N. W., and West Wheeler Street. Property owners will provide the buses, and the city will undertake their operation provided they are satisfactory and can be operated on a basis that will pay their expense.

Improper Diversion of Funds.—Assistant Attorney General Packard of North Dakota on June 7 ruled that the extension to the Capitol Car Line, operated by the State from the inland station at Bismarck to the Capitol, for which the last Assembly appropriated $40,000 from the Capitol Building's funds, cannot be built with these public moneys. To use the Capitol Building fund for this purpose, the Assistant Attorney General holds, would be an improper diversion of funds. The opinion was furnished at the request of the board of control.

Company Makes Liberal Franchise Offers.—In order to reach a settlement with the Commissioners of Stark County in the controversy over the Canton-Massillon line, the Northern Ohio Traction & Light Company is said to have agreed to a 10-cent fare, to build double tracks between Canton and Massillon, to pay the county $75,000 toward the improvement of the north side of the roadway, to provide crossovers at frequent intervals and to pay for a curb on each side of the proposed double tracks.

Transit Director Urges Legislation.—To obtain funds to complete the Frankford elevated line in Philadelphia, Pa., Director Twining, of the department of city transit, urges passage of the Salus bill by the Legislature. This measure would permit the transfer of funds which could be used for completion of the Frankford line on June 13. Director Twining said the bill was in the hands of a sub-committee of the House, and that unless the measure should be reported immediately with a favorable recommendation, it would not be possible to pass it.

This Fellow No Piker.—An interesting case came up in Louisville during the finals of the spring races, when Butler Welsh, motorman, and John Bohon, conductor, on a Barrett Avenue car of the Louisville Railway were held up and robbed of their watches and cash shortly before ten o'clock at the loop. A few days later the watches, money and interest of $2 was sent to Samuel Riddle, superintendent of transportation of the railway, with a request that he turn it back to the car men. The sender stated in the letter that he went broke on the races and had to have cash to get going again. Apparently he picked a winner and got off of his uppers.

Conductorettes in Manila.—Filipino girls have recently taken jobs as "conductorettes" on the new autobus lines established at Manila to supplement the wartime shortage of street cars in that city. In spite of the initial shock conveyed to the conservative element of the island people at the appearance of native girls in positions hitherto filled exclusively by men, information reaching the United States department of labor indicates that the experiment has been pronounced a marked success, the directors of the company having expressed themselves as being highly gratified with the results, and the girls equally delighted.

No Home Rule in Illinois.—The proposed home rule legislation in Illinois was killed by both the Senate and the House. The Senate committee on public utilities laid the proposed bill on the table by a vote of thirteen to nine and reported out a bill by the committee increasing the membership of the commission to seven members. The House committee on public utilities reported out the home rule bill and the bills validating franchise ordinances with the recommendation that they do not pass. This recommendation was approved by the House by a vote of eighty-four to fifty-three. The above action insures that there will be no change in the public utilities laws affecting the jurisdiction of the Illinois Commission.

Toronto Men Want More.—In view of the wage increases demanded by employees of the Toronto (Ont.) Railway and the company's statement that it is financially unable to grant these increases, Mayor Church will confer with representatives of the Ontario government, the Ontario Railway Board and the railway in an effort to avoid a deadlock. The Mayor has stated that the city would not consent to any increase in the fares of the company, nor would the railway be taken over until 1921. He suggested that any dispute arising from the demands of the men should be settled by arbitration and conciliation. A committee representing the union will meet Manager Fleming of the railway to present their demands to him. These include an eight-hour day, pay at the rate of 55 cents an hour, and several minor changes.

Wage Arbitration Proposed.—The Des Moines (Ia.) City Railway has made application to the federal court for permission to arbitrate the proposed wage increases asked by the employees. Permission from the Federal Court is necessary on account of the fact that the company is being operated by receivers. The proposed schedule provides for a sliding scale of wages for trainmen as follows: first three months of service, 14 cents an hour increase over present scale; for men between three months and one year service 16 cents an hour increase; more than one year's service 18 cents an hour increase. For brake and pipe workers a straight increase of 30 cents is asked. For men in the paint shops an increase of 18 cents is asked and the carhouse and power house employees ask for 10 cents an hour. If the schedule is approved by the court it will go into effect on March 1, 1920. Judge Wade has set June 24 for the hearing on the request.

Financial and Corporate

Special Master in Rhode Island

R. E. Lyman Designated to Untangle Maze of Complications at Providence

Richard E. Lyman has been appointed master in chancery, and the receivers of the Rhode Island Company, Providence, R. I., have been given temporary directions for operation of the company by Presiding Justice Tanner in the Rhode Island Superior Court. Mr. Lyman was ordered to untangle the maze of complications into which the road's affairs have developed.

COURT INSTRUCTS RECEIVERS

The receivers, by virtue of the decree entered following a hearing, were authorized to pay the federal revenue taxes, to pay rentals of the Rhode Island Company to the United Traction & Electric Company, the amount to be determined by the master, and meanwhile to operate the lines, paying the traction company, the lessors of the property, at the rate of 3 cents per car-mile per month.

The master in chancery was ordered to determine and report to the court: The sum for rentals to be paid the United Traction & Electric Company from Jan. 30, the date of appointment of a temporary receiver, to April 21, when the court decreed leases terminated; the amount to be paid the receivers for operating expenses; the monthly compensation to be paid the lessor companies for rentals, beginning on April 21; the exact disposition of properties of the lessors and any losses resulting from neglect or breach of lease terms; and the exact ownership of all property, lines, equipment and rights-of-way, etc., composing the system.

The master was also empowered by the court, under the decree, to hire such engineers and accountants as might be necessary to aid in a proper determination of all the issues referred to him, and was directed to report to the court on each issue involved as soon as possible.

EAST SIDE TUNNEL A PROBLEM

Chief among the ownership problems to be settled is that relating to the East Side tunnel. The many other financial difficulties due to operation of the lines owned by several different companies and leased by the Rhode Island Company, and sale and exchange and improvements are likewise left to the master to untangle.

Eugene A. Kingman of Edwards & Angell represented the United Traction Company and Clifford Whipple, the receivers when the matter of the decree came before Presiding Justice Tanner, on petition filed by the lessor companies. There was no opposition to the terms of the decree, which had been discussed and agreed upon beforehand. The appointment of the master and thus the settlement of ownership questions became necessary when the leases of the Rhode Island Company were declared by the court on May 14 to have terminated by default of payment. The decree entered therefore was only the logical outcome of the decision previously made.

Not only are the receivers to retain control and operate the Rhode Island Company system under the decree, but they are given 3 cents per car-mile per month as the rate of compensation to be paid the lessors until such time as the master shall determine "a fair and reasonable" rate for such rentals. When the master has ascertained what the rate shall be it will be retroactive to April 21, according to the court's order.

The decree empowers the master to hear such evidence as may be presented by those concerned in the affairs of the company and to apply to the court for final authorization in employment of accountants and engineers or other needed assistants.

The decree also directs the master to make his report on the various questions as if each was embraced in a separate decree, the purpose of this being to expedite settlement of the sundry problems, and states lastly "all parties in interest are given leave to apply to the court as the occasion may arise."

Rhode Island Results Improve

The deficit for April of the Rhode Island Company, Providence, R. I., is placed at $61,169, according to a report filed with the Public Service Commission by Comptroller C. A. Babcock. This deficit, however, indicates an improvement in operating conditions inasmuch as it was less by $30,294 than the deficit for March.

An increase in passenger receipts of $93,086, or 21.38 per cent over the corresponding month of 1918. This result was obtained despite a drastic curtailment of service, the receivers of the company reducing the car-miles to the extent of 149,059.

The total net income for the first four months of the year was $378,908, an increase over the corresponding period of 1918 of $8,864.

The total deficit for the four months was $324,225, an increase of $4,326. To judge from past figures and the prospects for the future, a deficit of $1,000,000 before the expiration of the year is not unlikely.

Temporary Receiver

Subsidiary of the Rhode Island Company Placed in Hands of C. S. Sweetland

Upon petition of the Central Trust Company, New York, Cornelius S. Sweetland, Providence, R. I., has been appointed by Presiding Justice Tanner of the Superior Court, temporary receiver of the United Traction & Electric Company, a New Jersey corporation with its entire holdings in the State of Rhode Island. The Central Trust Company alleged default in the payment of taxes due in 1918, insolvency, etc.

REASONS FOR ACTION

It is contended in the petition that the United Traction & Electric Company issued on March 1, 1893, first collateral mortgage bonds to the amount of $8,000,000, payable on March 1, 1933, and bearing interest at the rate of 5 per cent, payable semi-annually on March 1 and Sept. 1 of each year. These bonds are secured by 19,341 shares of the stock of the Union Railroad, 1276 shares of the Pawtucket Street Railway and bonds of the Union Railroad and later, before June 24, 1902, all the outstanding capital stock of these companies and of the Providence Cable Tramway.

The assets of the United Traction & Electric Company not covered by the mortgage to the complainant trust company consist of 50,000 shares of the capital stock of the Rhode Island Suburban Railroad, of claims against the Rhode Island Company and the receivers thereof and of certain moneys deposited for the payment of interest due on bonds, it is stated.

If the interest due on March 1, 1919, is not paid on or before Sept. 1, 1919, the principal of the bonds may be declared immediately due and payable. Suits and attachments against the property of the United Traction & Electric Company might be started by creditors with the purpose of obtaining early judgment and securing priority for their claims, it is pointed out, unless the court enjoined such proceedings and appointed a receiver. The property might also be sold to pay the taxes due. For these and other reasons, that the creditors may secure equal protection, the petition for the receiver was filed.

RECEIVER APPOINTED

Presiding Justice Tanner entered a decree appointing Cornelius S. Sweetland temporary receiver and enjoining all parties from bringing suits against or levying attachments upon the United Traction & Electric Company. The temporary receiver was authorized to take possession of the property and assets of the resident corporation and was required to file within ten days a bond for $25,000. June 23 was the date set for a hearing on the appointment of a permanent receiver.

Merger Before Commission

Indianapolis Companies Seek Sanction of State to Carry Out Plan Approved by Stockholders

Following the approval by the majority stockholders of the merger of the properties of the Indianapolis Street Railway and the Indianapolis Traction & Terminal Company, as reported in the ELECTRIC RAILWAY JOURNAL for June 7, page 1118, a hearing was conducted by the Public Service Commission of Indiana on June 11 and 12 on the petition of the officers of both companies asking that the commission approve the merger agreement.

While the hearing was going on before the commission, a group of minority stockholders of the Indianapolis Street Railway filed a petition in the Marion Circuit Court asking for a permanent injunction against the merging of the two properties, and demanding a cancellation of the lease of the street railway by the terminal company. The officers and directors of both of these companies, as well as of the Terre Haute, Indianapolis & Eastern Traction Company, are named in the suit. The attorneys representing the minority stockholders are the same as sought to prevent the sanction of the merger agreement at the stockholders' meeting on June 2.

SAVINGS UNDER MERGER

During the hearing before the commission on June 11 Robert I. Todd, president of the Indianapolis Traction & Terminal Company, testified that under the 5-cent fare the increase in receipts from Jan. 1 to date has averaged about $2500 a day. Mr. Todd stated that at the present increase in traffic, the gross receipts for the Indianapolis city property, not including revenues from the interurban passenger and freight terminals, will be about $4,500,000 for the year 1919.

Mr. Todd informed the commission that with the operating expenses at 70 per cent, on the basis of the foregoing figures there would remain a balance of $1,350,000 from which would have to be deducted the interest on all bonds, payments into sinking funds, the $300,000 dividend paid as rental on the Indianapolis Street Railway property, interest on car trusts and floating indebtedness, which would amount to a total of about $1,290,000, leaving a net balance of approximately $60,000. If the proposed merger is approved, however, Mr. Todd pointed out that there would be a greater net revenue for the year 1919, as under the agreement the Indianapolis Street Railway stockholders would give up five months' dividends on their stock, which would reduce the annual payment to $175,000 this year.

Mr. Todd then explained that the proposed merger also contemplates omitting the payment of $120,000 annually into sinking funds for a period of two years. The reorganized company would, therefore, have about $300,000 out of this year's revenues to expend on repairs and betterments to the property. The improvements contemplated by the management in case the merger is approved would cost approximately $700,000 to $800,000. This would include the immediate purchase of twenty-five new cars.

CREDIT FOR GOOD MANAGEMENT

Commissioner Haynes thought that where a company could operate on a 5-cent fare, as had been the case in Indianapolis, and give reasonably good service to the public, it deserved more than ordinary comment and justified the assumption that its business affairs and management have been very efficiently handled.

Samuel Ashby, corporation counsel for the city of Indianapolis, entered an appearance for the city at the hearing. He stated that the companies had the legal right to merge and reorganize—that as to the contract agreement, he thought it absolutely fair, and as a street railway stockholder would be in favor of it. He explained, however, that he was opposed to the merger on the ground that the commission's approval of it would carry also the judgment that the property was worth the total issue of $24,000,000 of securities. He stated that if the commission decides to approve the merger, the city will insist that a stipulation be written into the order that the commission's approval would in no way validate the entire $24,000,000 securities of the consolidated company. Mr. Ashby had no suggestion to offer as to how it would be possible to reduce the securities of the company under the proposed merger agreement.

REDUCTION IN SECURITIES

In answer to a question of the commission, Mr. Latta, one of the attorneys for the terminal company, said that the reduction in securities provided in the merger agreement conformed with the order of the Public Service Commission made last December. He stated that the merger agreement was made under the 1899 law of the State of Indiana as amended in 1903, authorizing a merger on "such terms as may be by them (the constituent companies) mutually agreed upon." Chairman Lewis asked whether there was not a law limiting the preferred stock to one-half the capital. (Under the merger the preferred stock is $5,000,000 while the common stock has been reduced from $5,000,000 to $2,500,000.) Mr. Latta replied that the law referred to did not apply, as the petitioners were not proceeding under the general provisions of the public utility act of 1913 in regard to the issue of securities; that they were not asking for permission to issue any new stock, but simply to secure a merger of the present stock. The hearing on the suit for an injunction will probably be heard on June 25.

Mostly About Power Contracts

The testimony of former and present directors of the United Railways, St. Louis, Mo., principally concerning power contracts, took up the greater part of the proceedings during the week ended June 14 in the receivership suit of John W. Seaman, New York, against the railway before Special Master Lamm.

Late on June 10 John I. Beggs, director of the United Railways and of the North American Company, and former president of the United Railways, took the witness stand on the call of the defense. In reply to a question by counsel Mr. Beggs said his business was "rehabilitating broken down plants." Mr. Beggs had hardly completed giving an account of his career when the hearing was adjourned for the day.

Another development of the day was the introduction of a copy of a hitherto unmentioned power contract between the United Railways and the Union Electric Light & Power Company, St. Louis, whereby the latter agreed to furnish any portion of surplus power received from Keokuk that the United Railways desired at 4 mills per kilowatt-hour. The plaintiff's petition alleged that a contract made early in 1918 charged the United Railways at the rate of 9 cents per kilowatt-hour. The contract introduced on June 10 during the testimony of W. E. Bryan, superintendent of power plants for the United Railways, it was testified, was made in April, 1918.

Mount Vernon's Abandonment

The Knox County Court of Appeals was reversed by the Supreme Court of Ohio on May 13 in its holding that the firm of Berman & Reed had the right to remove the railway rails at Mount Vernon without restoring the streets to their original condition.

The railway at Mount Vernon never was profitable. Finally the tracks were sold to Berman & Reed. That firm started to wreck the property, but was prevented from tearing up the line by an injunction suit in which it was sought to compel the new owners to give bond to insure the city that the streets would be restored to their original condition, if torn up. This case went through all the lower courts, with decisions against the city.

In passing on the question the Supreme Court ruled that the streets are held in trust for the public and are to be kept open. Rights in streets or highways granted to public service corporations are at all times held in subordination to the superior rights of the public, the court ruled.

The municipality, in contracting, has not the same capacity in giving its property as an individual, and there can be no implication that the streets may be left in a torn-up condition, according to this decision. It is held further that, as there was no adequate remedy at law, the resort to injunction is proper.

Key System Deficit $219,626

Report for 1918 Filed with Commission Shows Loss Despite Fare Increase

The San Francisco-Oakland Terminal Railways, Oakland, Cal., suffered a net loss of $219,626 for the calendar year 1918 and closed the year with a deficit of $751,126, according to the annual statement of the company just filed with the State Railroad Commission.

The net loss is recorded despite the fact that for the last six months of the year the company had the benefit of increased fares on both the Key and Traction systems. The commission early in June last year granted a 6-cent fare on the traction lines and an 11-cent fare for the transbay trip.

Railway operating revenue for the year amounted to $5,100,030, and railway operating expense totaled $4,025,876, leaving a net revenue from railway operation of $1,074,154. The gross income was $1,152,691, but deductions reached a total of $1,373,319, or $219,626 more than the gross income. The principal items making up the total deductions were $821,336 for interest on funded debt, $274,551 interest on unfunded debt, and $269,767 taxes on railway operations.

The detailed income statement for 1918 follows:

Railway operating revenue		$5,100,030
Railway operating expenses		4,025,876
Net revenue—railway operation		$1,074,154
Auxiliary operations—net		60,355
Net operating revenue		$1,134,509
Non-operating income		18,183
Gross income		$1,152,692
Deductions:		
Rentals	$1,650	
Miscellaneous taxes		
Taxes on railway operations	269,768	
Interest on funded debt	821,336	
Interest on unfunded debt	274,552	
Miscellaneous deductions	5,013	
Total deductions		$1,372,319
Net loss for year		$219,626
Debit balance year ended Dec. 31, 1917		375,764
Miscellaneous additions 1918		22,451
Miscellaneous deductions 1918		178,186
Dividends		
Appropriation to reserves		
Deficit Dec. 31, 1918		$751,126

Hearing on Dissolution

The first hearing of Willard N. Baylis, as referee, to inquire into the condition of the Huntington (N. Y.) Railroad, operating from Halesite to Amityville, Long Island, was held on June 10. Referee Baylis is also to decide if it is to the best interest of the creditors and stockholders for the road to dissolve. At the meeting no opposition to the project to dissolve appeared.

Testimony was given favoring dissolution to the extent that the Long Island Railroad, which controls the property, had loaned up to Nov. 30, 1918, the amount of $609,319; that besides this there is a bonded indebtedness of $26,000, owned entirely by the Long Island Railroad, and that the capital stock is $30,000, owned by the Long Island Railroad with the exception of $1,000, which is owned by a private estate.

The testimony showed that since 1912 the revenue of the road has been constantly decreasing so that from $251,238 seven years ago it has dropped to $41,200, computed during the year of 1918. Against this the operating expenses during the year 1918 were shown to exceed the revenue by $16,650. Jitneys and automobiles were blamed for the decrease in the revenue. The hearing will be continued.

Sale Unifies Power Supply

The Northern Virginia Power Company, Winchester, Va., has announced the sale of all the stock of that company to interests allied with the operation of public utilities in Western Maryland and parts of West Virginia. Between $1,500,000 and $2,000,000 is said to have been paid for the properties. The effect of the sale will be a unified system of the various plants of the Hagerstown & Frederick Railroad, the Potomac Light & Power Company, and the Northern Virginia Company. Physical connections will be made between the lines of the latter two, which operate half a dozen steam and water power plants.

Emory L. Coblentz, president of the Central Trust Company, Frederick, Md., is also president of the three companies. He states that the consolidation and elimination of competition assure efficient service. President Lewis F. Cooper and Directors E. V. Weems, S. L. Hoover and A. Moore of the Northern Virginia have resigned. The new board is composed of Emory L. Coblentz, Frederick, Md.; Shirley Carter, T. B. Patton and R. Gray Williams, Winchester; R. P. Chew, Charlestown, W. Va., and Harry C. Warden, Berryville, Va. Colonel Chew is vice-president, Mr. Williams general counsel, and Mr. Carter secretary and treasurer. M. A. Poole is general manager.

T. H., I. & E. Feels War Costs

The gross earnings of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., in 1918 were $3,731,287 as compared with $3,386,364 in 1917, an increase of $334,923, or 10.8 per cent. Operating expenses for 1918 were $2,472,219, an increase of $334,746, or 18.43 per cent, over 1917. Net earnings in 1918 were $1,259,067 as compared with $1,298,891 in 1917, a decrease of $39,823. In 1917 taxes paid amounted to $179,362, these payments increasing in 1918 to $232,536. These figures reflect war conditions which prevailed in 1918, the heavy increase in cost of material and increased wages having more than absorbed the increase in gross earnings.

For maintenance of ways and structures $328,638 was spent in 1918, an increase of $40,629 over 1917. Maintenance of equipment cost $239,754, an increase of $47,154 over 1917. The company's interurban lines carried 8,603,196 passengers in 1918 and the city lines carried 12,984,413. The company handled a total of 108,416 tons of freight.

The Terre Haute, Indianapolis & Eastern Traction Company has made a speciality of transporting live stock, 705 carloads having been hauled to the Indianapolis market from surrounding towns. The freight on these amounted to $15,000. The carrying of hogs, sheep and cattle from points on the Crawfordsville division—principally from Crawfordsville, Linnsburg and Linton—which was begun in the winter of 1917-1918, continued during the whole of 1918 and proved to be a very profitable part of the freight business.

The restoration of peace conditions and the attendant welcome home celebrations and the like have added largely to the gross earnings from Jan. 1, 1919, to June 1, 1919, the increase being 20 per cent over the same period in 1918. Against this, however, is the still prevailing high cost of material and the increased wages, which absorb a large part of the increase in gross earnings.

Chicago Elevated Unprepared to Redeem Notes

The National City Bank and the National City Company, New York, have decided that the situation of the $13,601,000 extended notes of the Chicago (Ill.) Elevated Railways is such that the formation of a protective committee is imperative. Hence the following committee has been chosen: C. E. Mitchell, president National City Company, New York, chairman; George M. Reynolds, president Continental & Commercial National Bank, Chicago; John H. Mason, president Commercial Trust Company, Philadelphia; T. Hartley Given, president Farmers' Deposit National Bank, Pittsburgh, and R. Floyd Clinch, of Crerar Clinch & Company, Chicago. Holders of the securities are invited to deposit their notes either with the National City Bank, New York, or with the Continental and Commercial Trust and Savings Bank, Chicago.

The Chicago Elevated Railway notes, which matured on July 1, 1918, and were extended, are again due July 1. The company, it is said, cannot pay them; although it has provided interest money due on July 1, there appear to be only two courses open to the noteholders — foreclosure or extension. Some of the Chicago holders have agreed that an extension should be accepted on the theory that the present management is better qualified to operate the property than any receiver or trustee.

When the notes were last extended the company paid a bonus of 1½ per cent, increased the interest from 5 to 6 per cent, and added to the security behind the notes by increasing collateral and by subordinating claims of the Commonwealth Edison Company. The company is represented to be in no position to repeat such concessions although confident of ability to meet interest payments.

Financial News Notes

Receiver Makes Road Pay.—Harrison B. Freeman, receiver for the Hartford & Springfield Street Railway, Warehouse Point, Conn., has reported to Judge Haines in the Superior Court that since April 1 the road has been more than paying its operating expenses.

Deposits Asked.—The June 1 interest on the 5 per cent collateral trust notes of the Washington (D. C.) Utilities Company having been defaulted, a protective committee has requested the noteholders to deposit their notes with the Metropolitan Trust Company, New York, N. Y., or the American Security & Trust Company, Washington, D. C., depositaries.

Payment of Interest Authorized.—Judge Julius M. Mayer, of the United States District Court, has directed Job E. Hedges as receiver of the New York (N. Y.) Railways to pay the semi-annual installment of interest, $37,500, due on July 1 on the improvement and refunding mortgage 5 per cent bonds of the Twenty-third Street Railway and also to expend $23,625 in repairing the tracks of that line, besides settling certain tax bills.

Mr. McCook Named Special B. R. T. Master.—Judge Julius M. Mayer has entered an order in the United States District Court naming Philip J. McCook as a special master to pass upon tort claims to succeed to ex-Judge Van Vechten Veeder, who was appointed some weeks ago. There are claims amounting to more than $1,000,000 from the Malbone Street disaster alone and under the judge's ruling it will be necessary for them to be proved before a special master.

1918 Results in London.—The traffic receipts of the London County Council Tramways for the year ended March 31, 1919, were £3,479,154, an increase of £613,465 over the previous year. What the working expenses, etc., amount to will not be known exactly for some time, but for the preceding year the net surplus was only £95,559. The additional change owing to the adoption of the forty-eight-hour week is estimated at £360,000 a year.

Offering of Commonwealth Notes.—Bonbright & Company, New York, N. Y., are offering at prices ranging from 99 to 94 and interest, to yield from 7 to 7.55 per cent, according to maturities, $750,000 of secured serial 6 per cent gold notes of the Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., dated June 1, 1919, due serially, $100,000 annually, June 1, 1920, to 1923 inclusive, and $350,000 June 1, 1924.

New West End Bond Issue.—The Massachusetts Public Service Commission has approved the issuance by the West End Street Railway of $1,581,000 of coupon or registered bonds to be payable not exceeding thirty years from date thereof and to bear interest at not to exceed 7 per cent, for the purpose of refunding outstanding bonds which become due on Aug. 1.

Cleveland Tax Value Boosted.—The Ohio State Tax Commission has increased the valuation of the Cleveland Railway property $6,000,000. Secretary Henry J. Davies was in Columbus recently to file a protest against this increase. He said that car riders will be compelled to pay $96,000 more in fares to meet the tax on this sum, if it is allowed to stand. The new appraisal increases the valuation from $28,000,000 to $34,000,000. This is considered excessive.

Car Trust Certificates in Maine.—The Public Service Commission of Maine has authorized the Bangor Railway & Electric Company, Bangor, Me., to issue thirty-six promissory notes, each for the sum of $1,465.75, dated April 23, 1919, maturing monthly, interest at 6 per cent, secured by a car trust mortgage in a sum representing the aggregate of the notes and generally providing that the title to the cars shall not pass until the last of the notes shall have been paid.

Offering of Two-Year Gold Notes.—Bonbright & Company, New York, N. Y., are offering for subscription at 91½ and interest, to yield 7.30 per cent, $279,000 of bond-secured 7 per cent gold notes of the Arkansas Valley Railway, Light & Power Company dated June 1, 1918, and due Dec. 1, 1920. The bonds are redeemable as a whole or in part at any time after Dec. 1, 1919, at 100½ and interest. The proceeds from the sale of the notes will be used in part to refund $450,000 of 6 per cent notes which come due on July 1.

Approves Increase in Operating Allowance.—Following a request for an increase in the operation allowance of service-at-cost lines in Youngstown, Ohio, from 22 to 31 cents a mile, made two months ago by the Mahoning & Shenango Railway & Light Company, City Commissioner W. L. Sause advises a rate of 27 cents. Headed by Chairman J. C. Sullivan of the railway committee, some Councilmen oppose voting an increase in operating allowance, preferring to see the question arbitrated.

Court Approves Lease.—H. R. Freeman, receiver for the Hartford & Springfield Street Railway, Warehouse Point, Conn., has obtained from the court permission to lease from the New York, New Haven & Hartford Railroad 4¾ miles of the electric railway in Suffield, extending to the Massachusetts State line, with a view to securing an improved service. The lease is to run yearly until discontinued by either party giving thirty days' notice. The plan to negotiate the lease was referred to in the issue of the ELECTRIC RAILWAY JOURNAL for June 14, page 1191.

Wants Commission's Approval.—The Selma (Ala.) Electric Railway has asked the Alabama Public Service Commission to approve the sale of the property and franchises of the Selma Traction Company to the Selma Electric Railway and also to approve the execution and delivery by the Selma Electric Railway of its bonds, aggregating $50,000, secured by a first mortgage on the franchises and property. A hearing will be held on the matter on July 7. The application is made in connection with the plans for a reorganization following sale under foreclosure, to which reference has been made previously in the ELECTRIC RAILWAY JOURNAL.

Deposit Agreement Extended.—More than three-fourths of the first mortgage 5 per cent bonds of the Colorado Springs & Cripple Creek District Railway, Colorado Springs, Col., due on Jan. 1, 1930, having been deposited under the deposit agreement dated Jan. 22, 1919, notice is given that additional bonds will be received without penalty until July 1, 1919, after which date no bonds will be accepted except under such terms as the committee may prescribe. James Timpson, vice-president of the Mutual Life Insurance Company, New York, N. Y., is chairman of the committee. The Central Union Trust Company, New York, N. Y., is depositary.

Service Abandoned in Tiffin.—The Tiffin, Fostoria & Eastern Electric Railway, which operates the city lines in Tiffin, Ohio, anounces that it will not resume operation of city cars, which have been out of service for some time. It is stated that the tracks will be torn up and all activity on the city line suspended. The reason assigned is that the company has lost an average of $400 a month for the last year in operating its city lines. Service was suspended once before, but later an arrangement was made with the city calling for a readjustment of fares under which service was restored. This matter has been referred to in the issues of the ELECTRIC RAILWAY JOURNAL for Aug. 17, Sept. 7, Oct. 12 and Dec. 14, 1918.

To Vote Funds for Improvements.—A special meeting of the common stockholders of the Nova Scotia Tramways & Power Company, Halifax, N. S., will be held on June 24, to authorize an issue of $2,000,000 unsecured three-year notes, of which half is to be put out upon approval by the Public Utilities Commission of Nova Scotia. Following this meeting preferred stockholders will meet to sanction the notes. Active management of the property has been turned over to Stone & Webster, Boston, Mass., according to A. S. Pratt, the newly-elected president. The proceeds of the proposed note issue are to be utilized to buy additional cars and other equipment and for improvements and repairs.

Abandonment Threatened.—Officials of the Reno (Nev.) Traction Company have declared to Mayor Stewart, members of the City Council and the State Industrial Commission that the Sparks line is the only paying line they have. They threaten to abandon all lines in Reno if the city insists on holding the corporation to the terms of the franchise in the matter of street improvements. Two propositions have been submitted to the City Council by the company. One is to abandon all the lines in the city of Reno and pay 3 per cent of the gross earnings of the Reno-Sparks line. The other proposition would continue the lines as at present, but under a new charter, removing the clauses requiring the company to pave certain portions of the streets in the city.

Reorganization Plan Before Commission.—Jesse H. Steinhart, counsel for the reorganization committee of the Oakland, Antioch & Eastern Railway system, Oakland, Cal., on June 2 outlined to President Edgerton of the Railroad Commission the details of the plan agreed upon for reorganizing and refinancing the roads. Three railroads are involved in this reorganization, viz.: the Oakland & Antioch, the Oakland, Antioch & Eastern, and the San Ramon Valley Railway companies. The plan which has been ratified by more than 92 per cent of the bondholders of the component roads contemplates the organization of a new corporation, to be known as the San Francisco, Oakland & Sacramento Railway. The proposed capitalization and the disposition of the securities of the new company have been reviewed previously in the ELECTRIC RAILWAY JOURNAL.

Foreclosure Suit Brought. — The Farmers Loan & Trust Company, New York, N. Y., as trustee, following the consent of Judge Julius M. Mayer, in the Federal District Court, has brought a foreclosure suit in the Federal Court against the New York Railways, Job E. Hedges, receiver, and the American Brake Shoe & Foundry Company. The action is based on an adjustment mortgage, dated Jan. 1, 1912, made to secure an issue of $33,000,000 of 5 per cent thirty-year income gold bonds. Default in the payment of interest on the bonds, of which $30,616,487 are outstanding, and that the company is insolvent and wholly unable to pay its debts, are alleged in the complaint. It is further asserted that property and premises covered by the adjustment mortgage are and constitute very inadequate securities for the payment of principal and interest on the bonds. The mortgage properties, it is explained, are so situated that they cannot be sold in parcels without great injury to the holders of the bonds and scrip secured by the mortgage. It is said that the suit has been brought for the purpose of securing all legal rights of the trust company and that it will not necessarily be brought to a conclusion.

Successor Company at Mauch Chunk. —The Mauch Chunk & Lehighton Transit Company, Mauch Chunk, Pa., has been organized as the successor to the Carbon Transit Company and its securities have been approved by the Public Service Commission. The equity above the first mortgage, a bond issue of $100,000 of the Carbon Transit Company, was purchased principally by a majority of the former shareholders and the second mortgage bondholders at receiver's sale on Feb. 15. The new company has $150,000 of common stock, all issued; $50,000 of preferred stock authorized and $37,500 issued; $150,000 of 6 per cent forty-year bonds authorized and $100,000 issued and $150,000 of Carbon Transit Company first lien 5 per cent bonds, all issued, making the total capital liabilities $437,500. The officers of the company are: Ben Branch, president; William Dods, vice-president; Dr. George H. Mayer, treasurer; V. M. Wolff, secretary; C. A. Secor, comptroller; Granville Rehrig, superintendent, and Dennis Duga, assistant to the superintendent.

Hearing on B. R. T. Application.— Lewis Nixon, Public Service Commissioner for the First District of New York, held a hearing on June 19, on the application of Lindley M. Garrison as receiver of the Brooklyn Rapid Transit Company, the New York Municipal Railway Corporation and the New York Consolidated Railroad for authority to issue and sell immediately $15,000,000 in receiver's certificates. This application is made under the recent order of Federal Judge Mayer permitting the issuance of $16,000,000 in such certificates, of which $15,000,000 might be issued immediately. Transit Construction Commissioner John H. Delaney sat with Commissioner Nixon, as the former, in whom the rapid transit duties formerly exercised by the Public Service Commission for the First District has an interest in the financial arrangements and expenditures of the three companies named. A considerable part of the money obtained by the sale of receiver's certificates will be expended in construction and equipment of portions of the dual system of rapid transit.

St. Louis Receiver Reports.—Rolla Wells, receiver of the United Railways, St. Louis, Mo., during the week ended June 14 filed with the Federal District Court his first report of receipts and disbursements covering the period from April 12, when he took charge, to April 30. The report shows receipts of $1,378,362 and disbursements of $300,467 during this period. The latter item includes only wage expenditures and $14,496 paid for operating indebtedness incurred prior to the receivership. Judge Dyer has authorized the payment of $750,725 interest on bonds of the United Railways. Of this $667,560 is to be paid on July 1 and the balance on Aug. 1. Charles W. Bates, attorney for Receiver Wells in the United Railways receivership, filed an inventory of the assets of the company and imediately withdrew it to have the matter bound. The work of fixing the values of the various properties of the company, ordered by Judge Dyer, still is under way. The inventory as filed ccntains a description of the properties, but makes valuations only in certain cases.

Electric Railway Monthly Earnings

ATLANTIC SHORE RAILWAY, SANFORD, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., May, '19	$11,305	$14,260	†$2,955	$508	†$3,463
1m., May, '18	17,225	10,572	6,653	475	6,178

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., Apr.. '19	$148,997	*$111,941	$37,056	$21,317	$15,739
1m., Apr., '18	145,620	*107,066	38,554	30,996	7,558
12m., Apr., '19	1,857,935	*1,455,911	402,024	267,195	134,829
12m., Apr., '18	1,503,319	*1,279,649	223,670	364,362	†140,692

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.

1m., Apr., '19	$203,517	*$150,858	$52,659	$56,164	†$3,505
1m., Apr., '18	246,126	*169,013	77,113	71,158	5,955
12m., Apr., '19	3,114,017	*2,159,120	954,897	798,441	156,456
12m., Apr., '18	3,090,145	*2,150,267	939,878	841,377	98,501

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

1m., Apr., '19	$2,007,033	*$1,259,433	$747,600	$537,564	$210,036
1m., Apr., '18	1,721,352	*1,122,208	599,144	494,273	104,871
12m., Apr., '19	23,386,932	*15,430,562	7,956,370	6,253,856	1,702,514
12m., Apr., '18	20,311,495	*13,326,305	6,985,190	5,504,730	1,480,460

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Apr., '19	$82,390	*$55,017	$27,373	$20,730	$6,643
1m., Apr., '18	74,840	*44,032	30,808	19,557	11,251
12m., Apr., '19	957,407	*628,273	329,134	242,213	86,921
12m., Apr., '18	89',032	*530,058	366,974	232,075	134,899

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m., Apr., '19	$332,311	*$288,019	$44,292	$69,748	†$25,456
1m., Apr., '18	321,032	*245,482	75,550	67,686	7,864
12m., Apr., '19	4,362,780	*3,447,611	915,169	824,197	90,972
12m., Apr., '18	3,806,380	*2,728,789	1,077,591	795,086	282,505

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1m., Apr., '19	$264,051	*$196,060	$67,991	$39,655	$28,336
1m., Apr., '18	218,862	*134,603	84,259	40,490	43,769
12m., Apr., '19	3,081,964	*2,154,543	927,421	477,878	449,543
12m., Apr., '18	2,488,835	*1,604,642	884,193	489,375	394,818

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

1m., Apr., '19	$706,244	*§$423,930	$282,314	$192,280	$90,034
1m., Apr., '18	616,280	*§366,427	249,853	178,385	71,468
12m., Apr., '19	8,095,204	*§5,426,797	2,668,407	2,254,400	414,007
12m., Apr., '18	6,530,330	*§3,961,029	2,569,301	2,134,071	435,230

* Includes taxes. † Deficit. § In April, 1919, $21,026; April, 1918, $18,518; twelve months, 1919, $551,870; twelve months, 1918, $252,848, included for depreciation

Traffic and Transportation

Mobile Withdraws Appeal

Company There Decides Upon a Policy of Watchful Waiting Rather Than Commit Itself to Improvements

The Mobile Light & Railroad Company, Mobile, Ala., has withdrawn its appeal to the Council for a 6-cent fare. The reasons are best explained in the company's statement, which follows:

We hereby ask for the withdrawal of our petition for an increased fare.

While our petition asked for a 6-cent fare in the city division, no increase in school tickets, and no increase in the county divisions, the president of our company informed the members of the City Commission that we would accept a rate on tickets less than 6 cents, therefore, we cannot expect at this time a straight 6-cent fare.

After considerable investigating and the making of conservative estimates on the increase in gross revenue from an increase in rates to the slight extent provided for under the ticket proposition, we have come to the conclusion that the increase in revenue would not justify us in putting into practice a rate schedule that would be difficult to handle and under which we would be expected to spend a large amount of money for track extensions, carhouses, cars and power-house machinery, and the inability to complete these improvements under a year with the possibility that by the time they were completed there would be no real need for them.

Improvements needed would cost at present more than $300,000, about $125,000 above what we believe would be the cost of this work a year from now.

The statement submitted to you for six months from Oct. 1, 1918, to April 1, 1919, was for a period when the shipbuilding plants were extremely active. This statement showed a deficit from operating of $7,136. A careful estimate for one year from the date of any grant allowing an increased fare on a ticket proposition figured on the basis of the six months' statement for an unusually heavy period of transportation would increase the gross revenue of our company less than $40,000 for one year, or after deducting the deficit for one year, on the basis of the deficit shown for six months, would leave only about $25,000 net income for a year, or only one-fifth of the excess cost above normal of the improvements mentioned.

We prefer rather than run the risk of financial embarrassment by adding such a large amount to our investment which may not be needed eighteen months from now, to continue the present schedule of rates and wait and see what the future has in store as regards the volume of our business and the cost of power-house machinery, cars, tracks and the cost of building additional carhouses.

We appreciate the almost universal opinion of the citizens of Mobile that we were entitled to an increase in fare. We further appreciate the fact that the transportation system of any growing city has to be prosperous in order to help the prosperity of the city, and we do not feel like risking the investment of our stockholders by contracting for improvements that we might not be able to pay for, when the stockholders are not at this time receiving any return on their investment. We will do the best we can with our present plant and equipment but cannot extend the same under present conditions.

State Supreme Court Upholds Commission

The Supreme Court of Wisconsin on May 27 handed down a decision upholding the order of Aug. 23, 1912, made by the Railroad Commission of Wisconsin, requiring the sale of thirteen city fare tickets for 50 cents. Coupons issued in lieu of the extra tickets ordered by the commission while the case was on appeal must now be redeemed by the company. S. B. Way, vice-president of the company, is quoted as follows:

The company will not attempt further appeal and will promptly redeem coupons, if presented at its office at 4 cents each in cash. The company interprets the decision as requiring it to refund to holders of coupons the value of a ride when purchased in lots of thirteen or twenty-six during the period while the commission's order of Aug. 23, 1912, was in effect in respect to commutation ticket rates.

Wants Ferry-Railway Transfers Stopped

Staten Island residents are hopeful of obtaining a modification of Federal Judge Julius M. Mayer's ruling which abolishes the transfer privileges on a 5-cent fare between the Staten Island municipal ferries and the Manhattan surface lines.

The court's decision to curtail the present 5-cent fare arrangement was announced after a hearing on a petition filed by Henry L. Stimson, counsel for Job E. Hedges, receiver of the New York Railways. It was contended by the company that under the present high cost of transportation the railway could no longer operate under the terms of the contract with the city and make a profit.

Judge Mayer announced, however, that he would consider a proposal from Corporation Counsel William P. Burr on behalf of the city to pay the traction company an increased share on each 5-cent fare This proposal is to be submitted during the week of Aug. 18. It provides that the city allot 0.0375 cent on each fare to the railway instead of 0.03644 cent as heretofore. With this it is expected that Staten Island residents will urge the retention of the 5-cent fare with a transfer at least during the week days to protect the commuters.

Transfer System in Use Since 1914

The system of transfers has been in operation between the municipal ferry running from the Battery to Staten Island and certain surface lines, since Sept. 9, 1914. Under the agreement of the New York Railway and the city, out of the 5-cent fare paid by a passenger using both car and ferry the railway received 3 cents and the ferry 2 cents.

After the expiration of the first six months the agreement provided that the system may be terminated by either party to it at the end of any calendar year six months from the date of its commencement by giving to the other party three months' notice of its intention to do so.

Six Cents in Memphis

After Many Vicissitudes, the Memphis Street Railway Is Allowed Increase by New Commission

It was announced on June 13 that beginning on June 16 the Memphis (Tenn.) Street Railway would charge a 6-cent fare. Both the company and the public appeared to be pleased at the change, although the 7-cent fare was strongly opposed. Residents of Memphis have come to look upon the fare matter from the standpoint of more tracks, more cars, and more interurban service being what Memphis needs to become a metropolis. As one resident put the matter, "the Memphis public are not sticklers over pennies, but they want first-class cars and frequent schedules and the congregation seated in whole rather than some having to stand on their heads or be suspended from crutches." Thus general approval is being expressed of the decision of the new State utilities commission, under whose ruling of June 12 the company will probably be enabled to overtake in part the burden of increasing costs. The order follows:

IT IS ORDERED, That the receivers of the Memphis Street Railway, during the time it shall remain in the hands of the receivers, and the Memphis Street Railway, after the receivership shall have terminated, be and

THEY ARE HEREBY AUTHORIZED, To establish on June 16, 1919, upon notice to this commission, and to the Memphis public, by one day's filing and posting in the manner prescribed in the rules and regulations of the commission, and thereafter until otherwise ordered by this commission, to maintain and apply to the transportation of passengers over its lines, a rate of fare, not to exceed 6 cents per person, where 5 cents or less is now charged, as an emergency rate. The tariff schedules for said railway shall show in plain terms that said 6-cent rate of fare is an emergency rate.

IT IS FURTHER ORDERED, That an examination be made into the amount or amounts invested in the property of the Memphis Street Railway, upon which it, or its receivers, are entitled to a reasonable return, and that said examination be made by experts, one to be appointed by this commission, and one by the receivers, who shall be paid by the receivers or the company, and that the municipal authorities of the city of Memphis shall have the right, if they see proper to exercise it, of appointing an expert at their own expense, to act with the experts appointed by this commission and the railway, or its receivers, and that reports shall be filed with the commission by the experts, within four months from July 1, 1919, the reasonable cost of such examination and reports shall be paid by the receivers or the company. The reports of said experts may be joint or several, as determined by them, and upon filing of said reports, the right is reserved to the parties to the record in this case, to make application for such other and further relief as to them may appear to be reasonable and equitable.

Council Approves Fare Advance

The Public Utilities Commission of Colorado has granted permission to the Colorado Springs & Interurban Railway to file a tariff increasing the fare in Colorado Springs from 5 cents to 6 cents. The increase becomes effective on June 8. The action of the commission follows receipt of a resolution passed by the City Council of Colorado Springs requesting the commission to permit the railway to advance fares.

W. H. Taft Advocates Higher Fares

Increased Costs of Maintenance and Operation and Advanced Wages of Platform Men Practical Facts to Be Faced

A brief notice was published in last week's issue of an editorial article in the Philadelphia *Public Ledger* for June 12, by Ex-President William H. Taft, on the necessity for higher fares on city railways. The full text of this article, which is copyrighted, 1919, by the Public Ledger Company, follows:

The financial situation of the general steam railroad system of the country is bad enough, but it is far better than that of the electric street and suburban railway systems. There are several reasons for this, the last and perhaps the most influential of which has grown out of the war.

Some Mistakes Made

In the first place many electric lines were built through territory which did not and could not furnish traffic enough to pay the expenses of operation at the time of construction, and they have never paid since. Many were built to develop the settlement of subdivisions, in the exploitation and sale of which directors and others were interested. Common councils and other municipal bodies also pressed for their construction, and they were undertaken without careful business foresight. An important element now interfering with the business in both city and suburban lines is the use of the automobile. The jitney business, which for a time threatened destruction to the street railways, has not survived; but the normal use of automobiles has increased so much as to constitute a serious reduction in railway receipts.

On city railways the fare has generally been 5 cents for all distances, the theory being that the volume of the business would reduce the cost per head of passenger in such a way as to make the fixed single fare profitable. Indeed, in some cities 3 and 4-cent fares have been forced. The public has thus been trained to regard anything more than 5 cents as an infringement upon its rights and privileges and an unjust swelling of the profits of traction capitalists. This feeling has been intensified among the people by the knowledge of the use of sinister and corrupt methods in originally securing franchises. The result is that in every community, however honest and earnest the present owners may be, they have an inheritance of popular distrust and hostility that works greatly to their detriment when they ask for justice at the hands of the public.

Five Cents Not Reasonable Compensation

Five cents under present conditions is generally not reasonable compensation for the service rendered in any city. The great percentage of increase in the cost of every material that enters into maintenance and operation requires, as a mere matter of fairness and equity, that the fares be increased. Coal, wire, rails, oil and cars have gone up with the price of other commodities in the community. Indeed, this condition was coming on before the war. One important element of the cost of operation has long been kept down simply through the necessitous circumstances of the street railways. That was the cost of labor. With their backs to the wall, the street railway managers refused to advance wages as wages advanced in other fields of labor. The platform men of street railways perform a semi-skilled service, the value of experience in which the companies themselves recognize by wages graded according to years of training. In order that the men should live upon the wages granted them at all, they have generally had to work from ten to twelve hours a day, seven days in the week. The unequal demand for service through the hours of the day and the "peaks" between 6 and 9 in the morning and 4 and 7 in the afternoon prevented runs of continuous hours for many of the men and required intervals in their periods of service, so that between the time of the beginning and the end of the daily runs of many fourteen to seventeen hours elapsed. This time was technically known among street railway men as the "spread."

Why Labor Board Advanced Wages

When the war came on, the issue of wages on street railways came within the jurisdiction of the National War Labor Board, because the service of street railways all over the country was necessary to maintain maximum production in the factories where war supplies were made. Without street railway labor could not reach the places where it was employed. The National War Labor Board was asked to fix the wages of street-car men in many cities. Generally the street railway companies, obeying the patriotic impulse, submitted to the arbitration of the board. The slightest examination of the wages paid and the hours employed developed the fact that street-railway labor had been underpaid and that the hours were generally too long.

It was objected that the increase in wages and the reduction of hours would prevent companies from operating at a profit and might lead to bankruptcy. The attitude of the board, or of the two joint chairmen who usually sat as arbitrators, was that the question of wages in an arbitration like this was not one which could be affected by the question of profit of operation; that it was like fixing the price of coal or of any other element that entered into the cost of operation; that it must be governed by the range of wages for similar services in the same community and by minimum limitation as to the cost of living. The result was that the maximum wages were advanced in most cases from about 33 or 34 cents an hour to 48 cents an hour in the case of large cities, with variation down to 40 cents an hour in cities where the cost of living was less.

A Measure of Recognition

This increase, of course, added materially to the necessary expenditures of the railway company and the burden of the cost of operation; but it was only one of many elements which cut down dividends and interfered with the payment of the fixed charges on bonds and other securities. The National War Labor Board did not hesitate to recommend in every case an increase of the fares as only just to the owners of the street railway companies. A number of utility commissions of the various states responded to the recommendation and increased the fares. This action was noteworthy in Massachusetts and in Boston.

But often the statutes were in such form that state commissions had no jurisdiction to make the increase. The rates were fixed in a municipal franchise and could only be varied by the action of the common council or by a referendum to the people, and such referendums always resulted in a popular vote against the increase of fares beyond 5 cents.

Another difficulty was that too great increases in fares reduced the number of persons carried and left conditions as bad as before. The result for the companies was the grinding of them between the upper and the nether millstones, and that grinding is going on to-day, with the inevitable result of bringing the street railway companies and the suburban lines into receiverships and bankruptcy and a permanent injury and loss to a most useful and indispensable public agency of intercommunication.

Joseph K. Choate, in New York, representing a number of electric railways of that State, has asked the State authorities to recommend legislation looking to a relief of this situation. The capital invested in that State, he says, is more than $1,250,000,000. It is to be hoped that Mr. Choate's petition on behalf of his clients will be granted, that the whole subject may have the most thorough investigation and that action be taken by the State Legislature, which has the power to ignore franchises and other limitations now in the local laws and to do justice to the companies under existing conditions.

Municipal Ownership Not a Solution

There are those who believe that the situation can only be relieved by municipal ownership. This seems to many and to the writer to be a short-sighted conclusion. Such a change of ownership will not reduce the cost of operation. Instead, our experience is that it will greatly increase it if ownership is to include municipal operation. The

intervention of politics always increases the cost of operation and leads to unwise business management. Many who favor municipal operation admit that the present system cannot be continued by municipal and state governments without a constant loss. They propose that the losses be made up by taxation. The theory is that, as the community is taxed to build roads and bridges and other means of communication, the same principle might easily be extended to actual transportation. But our experience in public control of that kind of active and complicated business management has not been fortunate. It foreshadows such lack of economy and increase in cost of operation as to make the change most unwise. It is far better that we should pay as we go. It is far better that we should measure the cost by a system of service at cost, with close public supervision and an increase of fare as the actual operations demand it, and with a small reasonable compensation for the use of capital, than that we should turn over to political control the conduct of such business enterprises, which need the best talent for their economical management.

But whatever the remedy to be undertaken, the condition of investments now reaching at least five billions in the country is so serious that public attention should be aroused to the necessity of devising ways and means to meet the crisis.

New York Fares Up Again

Mayor Unmoved by Receiverships, but First District Commissioner in Mood for Mutual Concessions

Both Mayor Hylan of New York and Public Service Commissioner Nixon have made statements recently in regard to the fare situation in New York City. The Mayor discussed the matter because of gossip to the effect that if the Board of Estimate of New York City refused to authorize an increase in fare the next Legislature would be asked to take the matter out of the hands of the city administration. The Mayor promised to do what he could to have elected to the Legislature only men who would oppose a higher fare. The Mayor's statement read:

I will oppose an increased fare and if the transit corporations refuse to operate the lines the city will operate them in the interest of the people. It was stated in the press that if the Board of Estimate would not consent to an increased fare an appeal would be made to the Legislature of 1920 for a law which would take the power out of the hands of the city administration.

I want to say now that the people should ask the designees of both parties of every Senatorial and Assembly district before primary day in September if they are for or against an increased fare to the transit corporations of the city, and if they refuse to take a stand against an increased fare they should be opposed in the primary and on election day regardless of party affiliations.

I will take an active part in any Senatorial or Assembly district campaign to help defeat any candidate who refuses to take a stand against increased fares.

Mr. Nixon discussed the fare question for the purpose of correcting erroneous ideas growing out of his recent speech before the Brooklyn Chamber of Commerce. Mr. Nixon explained that many versions had been given to what he said in his Brooklyn speech, but that what he intended to say was that he thought further electric railway receiverships would be bad for the city, state and nation, and that every effort should be made to avoid them. If he had been vested with power to adjust fares to meet the situation, he would have acted by now. It was his idea that in any adjustment made there should be give and take from both sides. No adjustment could be one-sided. He said he desired to make clear the fact that nothing would be done by him under any circumstances except in co-operation with the Mayor.

Mr. Nixon explained that any amendment to the rapid transit contracts would be a matter for the attention of the rapid transit commissioner and that he would be interested only so far as the service and management were concerned. Mr. Nixon said that when the equipment and service were affected because of lack of funds it became his duty to present his views. From this viewpoint he discussed the fare question and the leases under the dual system and what might be considered as desirable changes in the rapid transit contracts. He is quoted as follows:

The amendment of the rapid transit contracts is a matter for the Transit Construction Commissioner and the Board of Estimate to determine. If the demand for a higher fare were simply a question of operating costs the whole matter could be determined at once, as the increase in such costs is known to all. Much light has been thrown upon the other elements entering into the matter by existing receiverships. It has been pointed out that underlying leases and mortgages carried with them influences that might be most harmful in the future. Already we find certain of these properties demanding separation.

But the companies ask that their deficiencies be made up by higher fares. Whether the city should pay the carrying charges on its investments out of taxes or increased fares is a matter of municipal policy. If, however, a permanent and equitable settlement of the present situation in all of its phases can be secured through an increase in fares and concessions in return on the part of the companies, there exists a compelling reason for such increase.

There must, however, as the matter presents itself to me, be a readjustment of present conditions and an advance in the position which the city's investment takes under the dual contracts in the distribution of earnings.

If the right to raise fares to meet an emergency exists, which right can only now be exercised by the city, it should in turn be assured of the right to reduce them when earnings advance.

With such a situation clearly met it would seem that investments made in traction properties will have an assurance of certain return, and the interest paid should be on the basis which safe and guaranteed investments merit.

If on account of permanent or long-term franchises certain provisions were forced into the dual subway contracts such provisions must be modified in the interest of the city in a fair adjustment.

We cannot see the great system of transportation now so vital to our growing population jeopardized through physical deterioration, and while within two years the present fares may pay, a present need is facing us which cannot be met by drifting without general impairment.

On June 19 it was announced that the Public Service Commission for the Second District had refused the request of J. K. Choate, chairman of the committee on ways and means to obtain additional revenue of the New York electrical railways, for an investigation of the traction situation in New York State, with a view to recommending remedial legislation for the next Legislature.

At the suggestion of Governor Smith, to whom application for the appointment of a commission to investigate the situation had been made, Mr. Choate wrote to Chairman Charles B. Hill of the Second District Commission on June 3, calling attention to Governor Smith's suggestion and making a formal request for an investigation. Under date of June 6, Chairman Hill replied in part as follows:

I observe that Governor Smith very naturally suggested that inasmuch as the State now has two public service commissions whose duty it is to investigate and to propose remedial measures connected with the subject matter it would seem that these commissions should be able to present suggestions on the subject, and that you present your claims to them and ask that they give the same consideration.

I am greatly surprised, however, that you entirely ignore the fact that this commission anticipated both your suggestion and that of the Governor in the most comprehensive, explicit and public way, without urging by the electric railway interests, in its official report to the last Legislature. That report and its recommendation received very wide publicity in the press and very direct attention from the members of the Legislature. It was followed by the introduction of a bill designed to enlarge the powers of the commission in the respects recommended by the commission, and this bill also received great publicity and was much discussed both in the press and in the Legislature, and was the subject of a special joint session of the legislative committee held in the Assembly Chamber, at which former Governor Hughes appeared and spoke. This was probably the most largely attended hearing before any of the legislative committees.

I am sending you under separate cover, a copy of the commission's annual report to which I have referred, with those portions marked which bear directly upon the question.

As pointed out, this commission has anticipated your suggestion by one full legislative year. If a further hearing would produce additional facts on which to base suggestions for any different or further remedial legislation the commission will, as suggested in the Governor's letter, conduct such a hearing on the petition of any interested party.

Regarding your suggestion of joint action by the two commissions, we feel that, in view of the great difference in character of the railroads in the two districts, the commission in the first district would probably much prefer to act upon its own initiative.

Immediately upon receipt of this communication, Mr. Choate sent a letter to Chairman Hill in part as follows:

The committee of which I am the chairman was, of course, fully cognizant of the very valuable constructive work done by your commission in the matter of legislation. All of its members felt that your commission was fully alive to its duty in the matter, and had your suggestions been carried out, there would, of course, have been no occasion for further action in the premises.

However, the Legislature adjourned without passing any remedial legislation, and the situation was left as it had been, except that the condition of the companies was, by the cumulative effect of the burdens they are bearing, in worse shape than ever before.

The committee believes that unless something is done the State is threatened with a practical destruction of its system of electric railways.

It was for that reason that it made its first suggestion to Governor Smith. It was for that reason, too, that it very gladly accepted Governor Smith's suggestion that such investigation could well be made by the commissions. The committee believes that the publicity which is necessary in order to create a public opinion that will result in the enactment of legislation, could, to a very large extent be secured if the two Public Service Commissions hold public meetings and the true picture of the industry's plight is thus presented.

The committee believes, however, that the work can be done much more effectively if it could be undertaken by the commissions on their own initiative, rather than on formal application for a hearing coming from either the committee or any particular company.

It agrees with you that the problems of the Second District are in a measure distinct, and it was for that reason that it suggested that the investigations be conducted separately. However, it is of the opinion that the remedy is in both cases very much the same, and that the solution which the commissions might arrive at separately, would be the same.

I still hope that your commission will be able to see its way clear to conduct such an investigation.

Under date of June 13, Chairman Hill, in reply, communicated to Mr. Choate, the decision of the commission not to hold the investigation.

Mr. Choate expressed himself as very much disappointed over the outcome.

Mr. Taft Warns Denver Mayor

Chairman Taft of the National War Labor Board wired the Mayor of Denver from New York on June 14 as follows:

Consider it is unjust and a breach of faith to pass the ordinance reducing the fare on the Denver street railway from 6 cents to 5 cents. A careful examination of the condition of the railway and its finances demonstrates that even with a 6-cent fare no dividends and no allowance for depreciation can be provided for, for the reduction to 5 cents will throw the company into bankruptcy. This is certain to introduce a wage discussion and will reflect on the fairness and honor of the city.

The telegram of Mr. Taft had its origin in connection with a letter of Frederic W. Hild, general manager of the Denver Tramway, in which city officials were asked to allow the 6-cent fare to continue as provided for in the ordinance passed by a former administration. In reply to this letter from Mr. Hild, Mayor Dewey C. Bailey on June 5 pointed out that a fare greater than 5 cents will not be considered during his administration.

Coincident with the reply letter, which was made public, came the statement from the Mayor that the proposed ordinance for the restoration of the fare to 5 cents would be introduced in the Council on June 9.

Mr. Hild wrote to the Mayor and asked him to refrain from reducing the fare to 5 cents at this time, declaring that such action would mean the "utter ruin and bankruptcy" of the company. The ordinance for a 6-cent fare, unless repealed, will remain in effect until twenty-one months after peace has been consummated.

The Mayor has based his reply on the provisions entered into between the tramway company and the city in its franchise.

Ten-Cent Fares Expected at Boston

It is understood that the trustees of the Boston (Mass.) Elevated Railway have practically decided to start a 10-cent fare on July 1. A decision will be announced on June 25, with a public statement reviewing the conditions and giving the reasons for the increase. The failure of the bill for the purchase of the Cambridge subway by the State and the fact that the cost of service is more than 9 cents per passenger appear to leave the trustees no other choice but to establish a fare in excess of the existing 8-cent rate.

Transportation News Notes

Village Refuses Increase in Interurban Fare.—The Village Council at Fairport, Ohio, has refused to approve an increase in the rate of fare between Painesville and Fairport, as requested by the Cleveland, Painesville & Eastern Railway. The rate has been 15 cents a round trip. The railway company asked that it be raised to 10 cents each way.

Returns to Five Cents Temporarily.—Benjamin S. Hanchett, president of the Grand Rapids (Mich.) Railway, voluntarily consented on June 13 to charge a 5-cent fare during July. The reduction of the fare is for a test only, and if the report of the company at the end of the month shows that it cannot continue operation and "break even" with less than a 6-cent fare, the City Commission promised its support.

Bankers Urge Fare Action.—New York bankers in the closing session of the twenty-ninth annual convention on June 13 adopted resolutions favoring the early return of the railroads to private control, with compensation from federal funds to place the properties in normal physical condition. Communities or cities were urged in another resolution to amend present laws and regulations to enable electric railways to increase fares.

Traffic Ordinance Revised.—The traffic ordinance prepared by the Corporation Counsel of Seattle, Wash., regulating traffic on the streets of Seattle was sent back to the Corporation Counsel for redrafting, after a three-hour discussion in which representatives of various automobile associations, team and truck owners' associations, municipal railway and corporation counsel's office participated. The revised ordinance is to be somewhat less drastic, and to provide certain parking privileges for automobiles on downtown streets.

May Have to Increase Cleveland Fare.—Should the advance in wages be allowed to the employees of the Cleveland (Ohio) Railway which is referred to elsewhere in this issue, the rate of fare may have to be advanced to 6 cents. Recently it was announced that the rate would be slightly reduced on July 1. At that time, there was no indication that employees would ask for an increase, since they are now working under an award of the Federal War Labor Board and it was supposed that they would continue at present wages until the expiration of their contract next May.

Another Kentucky Hearing.—Another hearing was set for Louisville, Ky., on June 20, in connection with the controversy between the Louisville & Interurban Railway and the Suburban Protective Association, representing the suburban passengers. The case is being carried on before the Kentucky State Railroad Commission. The legal advisors of the railway contend that recent holdings of the commission in reducing fares are illegal, as the commission exceeded its authority, in arranging a general schedule, instead of taking up singly complaints of rates on certain lines, from specified stations.

Chicago Fares Inadequate.—The increase of 1 cent in fare granted to the Chicago (Ill.) Elevated Railways last November by the Public Utilities Commission has proved altogether inadequate to meet the increased cost of operation, and the company is hoping for favorable action on its petition for a 7-cent fare. The report for the first three months of operation at 6 cents shows an increase in revenues of $248,849, while the operating expenses increased $588,351 over the same period of the previous year. Meanwhile the Chicago Surface Lines are operating at a 5-cent fare, and while increased traffic has helped to a certain extent this will not meet the cost of service. The company is waiting for a hearing in the courts on its appeal from the commission ruling which refused an advance in rates.

Eight-Cent Fare in Peekskill.—The Public Service Commission for the Second District of New York has granted permission to the Putnam & Westchester Traction Company to charge an 8-cent fare in Peekskill and 2 cents for a transfer in Peekskill to the Peekskill Lighting & Railroad Company. The new rates of fare to be established under the schedule to be filed may also provide an 8-cent fare outside Peekskill affecting zones 1 and 2. The order is to remain in effect for five years from May 24, 1919, unless the commission determines on investigation that conditions have so changed as to warrant a reduction or change in the fares. There was no opposition to the company's petition at the hearing and the commission approved the action of the Peekskill authorities in amending the company's franchise. The new tariff becomes effective on one day's notice.

Personal Mention

H. J. Van Buren has been appointed chief electrician of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., succeeding G. W. Twyford.

George M. Evans has been appointed chief electrical engineer of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., succeeding F. H. Gregg.

Keith Randolph has been appointed general freight and claim agent of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., to succeed H. J. Enders.

Frank Wendle has been appointed assistant superintendent of transportation of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., succeeding C. L. Osborne.

H. E. Chubbuck, vice-president executive of the Illinois Traction System, Peoria, Ill., has been elected a trustee of the Bradley Polytechnic Institute, Peoria, to succeed the late Judge Leslie D. Puterbaugh.

F. Arthur Harrington, connected with the claim department of the Bay State Street Railway at Lowell, Mass., has been promoted to the office of assistant claim agent of the Quincy division of the company.

Martin Schreiber, chief engineer of the Public Service Corporation of New Jersey, Newark, N. J., has been elected a member of the committee on electrolysis, representing the American Railway Engineering Association.

Richard E. Lyman, Providence, R. I., who has been appointed master in chancery to untangle the affairs of the Rhode Island Company, is an attorney of prominence. When the Central Trust Company, Providence, failed a number of years ago, Mr. Lyman was made receiver. He is well known in Rhode Island and quite conversant with the financial difficulties the Rhode Island Company has encountered.

E. Burt Fenton, for the last two years publicity agent of the Northern Ohio Traction & Light Company, Akron, Ohio, has resigned that position. He was formerly publicity manager of the W. S. Barstow & Company properties, and for some years past has specialized on matters pertaining to the public relations of utilities. Mr. Fenton is the author of several papers and magazine articles on this subject which have attracted wide attention and received favorable comment. He has not announced his plans for the future.

Godfrey Goldmark, who became chief counsel of the Public Service Commission for the First District of New York on Jan. 1, has sent his resignation to Commissioner Lewis Nixon with the request that it be accepted at once. At Mr. Nixon's request, Mr. Goldmark will continue until July 1. Mr. Goldmark's first service with the commission was as secretary to Oscar S. Straus, former chairman of the commission. He then became assistant chief counsel, and later succeeded William L. Ransom. Mr. Goldmark is to become the junior member of a new law firm of which Col. William Hayward and Maj. Holley Clark are the other members.

Hudson R. Biery, recently appointed purchasing agent of the Union Traction Company of Indiana, Indianapolis, Ind., was born and reared in Scottsburg, Scott County, Indiana. He worked for the Indianapolis & Louisville Traction Railway in 1906 during the construction of that road. In 1908 he became storekeeper for the company and in 1909 was made clerk to the superintendent of that property. The reorganization of the company in 1911 resulted in the reduction of the force and the consolidation of the duties of traffic manager and purchasing agent with those of superintendent under the title of assistant to the general manager and to this position Mr. Biery was promoted.

Lieut.-Col. Henry M. Byllesby, president of H. M. Byllesby & Company, Chicago, Ill., who served as purchasing agent for Great Britain and Scandinavian countries with the American Expeditionary Forces, headquarters in London, has just been advised that the English Distinguished Service Order has been conferred upon him. The minister of munitions of the British government, in advising Colonel Byllesby, writes as follows: "I have just learned with great satisfaction that the King has approved of the award to you of the Distinguished Service Order, a much coveted distinction, of which any officer may be proud. From the moment of your arrival in Great Britain you made it quite clear that you were determined to carry on and largely extend the assistance rendered to my department by your organization, and throughout the whole period of our cooperation with you our personal relations have been of the most cordial character. Please accept my warm congratulations on this well-deserved recognition of the great work you have done."

Cornelius S. Sweetland, Providence, R. I., who, as noted elsewhere in this issue, has been appointed by Presiding Justice Tanner of the Superior Court temporary receiver of the United Traction & Electric Company, Providence, has had exceptional experience in receiverships in the past. He was born on July 15, 1845, and after attending the public schools of the State, was graduated from Brown University in the class of 1866. He entered the banking business and was later made president of the Jackson Bank, which has since gone out of existence. He was receiver of the Inter State Street Railway, Attleboro, Mass., and when the holdings of the Union Railroad, Providence, were consolidated with other electric railway properties in the State and the United Traction & Electric Company formed, Mr. Sweetland was made treasurer. He was vice-president of the Union Trust Company, Providence, and when that bank closed its doors during the 1907 panic he was appointed one of the receivers. In 1889 Mr. Sweetland succeeded Zachariah Chaffee as trustee of all the property represented in the failure of A. & W. Sprague Manufacturing Company, one of the largest cotton mill properties in New England, the failure of which in 1873 startled the country. Mr. Sweetland's private business activity is represented in his holding a vice-presidency in the Rumford Chemical Works and as a trustee of the Alfred Anthony Land Company, both of Providence. In 1892 he was made a trustee of Brown University and eight years later was appointed treasurer, which position he holds at present.

Obituary

Paul M. Einert, for twenty years foreign supervising auditor of the Westinghouse Electric & Manufacturing Company and since last January special assistant to Guy E. Tripp. chairman of the board of directors of the Westinghouse Company, is dead.

J. T. Hury, traffic manager for the Birmingham Railway, Light & Power Company, Birmingham, Ala., died on June 3 at Asheville, N. C., after a protracted illness. The funeral was held from his residence in Birmingham on June 5. Mr. Hury was fifty-two years of age. He had been connected with the Birmingham Railway, Light & Power Company for the last twenty-eight years and for several years past he had been traffic manager.

Paul Leake, secretary of the Detroit Stock Exchange, is dead at his home after an illness of two months. Mr. Leake was widely known in financial and newspaper circles in Detroit and Grand Rapids. He was financial editor of the Detroit *Free Press* for a number of years, later going to Grand Rapids where he became publicity manager for the American Public Utilities Company, operating about fifteen public utilities in various parts of the United States. He was born in New York.

Manufactures and the Markets

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

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Signs of Better Traction Purchasing

Need for Rehabilitation and Certainty of Higher Prices Apparently Back of Activity

Reports from here and there indicate unmistakably that the tide of electric railway purchasing is on the turn. No large business is looked for but better business is on the way. This business is being placed apparently because the roads are beginning to realize the futility of holding off. Before another winter sets in a whole lot of work must be done to the road, the rolling stock and the overhead system.

Incidentally not a few managers realize that goods can be purchased at lower prices to-day than will prevail in August and September. Paints and oils may go higher, especially leads and zincs. Wire is advancing and, there are reasons for believing, will go at least 10 to 15 per cent higher during the next quarter. Rails can be expected to be higher before they are lower. Some concessions have been reported, but indications are that the steel market will be very tight shortly.

Managers may find it best to lay in coil winding supplies and all metal supplies well ahead of time.

Line Materials Expected to Go Higher

Advancing Prices of Copper and Lumber Make it Advisable to Place Orders Now

Prices of distribution and transmission-line material are lower at this writing than they probably will be at any time later in the year. Railways that are contemplating the extension or rehabilitation of lines or the building of new ones would not be making a mistake if they placed their orders for required material prior to July 1.

Wire is advancing steadily. At this writing weather-proof is on a 20-cent to 22-cent base and bare wire on a 19½-cent to 20-cent base.

Copper is being quoted at 17¾ cents for early delivery. In fact, there is every indication now that the copper will go as high, if not higher than, 20 cents a pound during the early fall months.

Wire, in other words, can be expected during the next quarter to advance further from 10 to 15 per cent or more.

Poles and cross-arms are due to advance from 10 to 15 per cent by the first of July, and in some instances cedar poles are advancing this week.

Pole-line hardware is undoubtedly as low as it is going. As soon as steel begins to stiffen in price, and that will probably happen the next thirty to fifty days, hardware may be expected to go higher.

Insulators show no tendency downward. In fact, it would not be surprising if, in view of possible higher transportation and labor charges, the price of insulators advanced before the fall months.

Guy lines, anchors and transmission towers will probably be guided largely by the price of steel. Inasmuch as steel is expected in some quarters to go slightly higher in July or early August, there seems to be no good reason for believing these products will go lower.

Transformers, it is learned on good authority, will go no lower this year. In fact, it is not improbable that costs may mount so rapidly that higher charges must be made.

Lightning arrester prices appear to be very steady. Cement for tower and pole ground work is also very steady.

No Reduction in Outdoor Switching Equipment

Prominent Manufacturer Holds that Reductions Will Come Only as a Result of Heavier Buying

In a conversation held by a representative of the ELECTRIC RAILWAY JOURNAL with a prominent manufacturer regarding price trend of outdoor substation and switching equipment, the manufacturer gave it as his opinion that prices could be lowered if production could be stimulated through buying. If his organization was to be kept together, after so much necessary expenditure to bring it to its present development, it was impossible to reduce the overhead. Consequently, with the low production due to curtailed buying in the last two years, the same overhead had to be distributed over a smaller number of units produced, thereby increasing the cost of each unit. If it were desired to let go of the trained organization over the short period of low production, then prices could be adjusted.

"The economic way to reduce the cost of the apparatus is to get back to quantity production," said the manufacturer. "That means that the power companies must get out of the rut of holding until prices lower. Prices will lower through buying, not through holding off. Peace is about to be concluded, the Victory loan is safely by, and Congress is now in session. This should have some stabilizing influence on industry.

Wire and Cable Sales Picking Up Rapidly

Indications Now Point to Full Capacity Production of Mills During the Coming Fall Months

Wire and cable manufacturers report a steady increase in orders booked. For a while incoming business was rather slow, particularly in the East. The Middle West and the South have been purchasing more steadily. Last week some very nice cable orders were placed in the East, and the manufacturers are of the opinion that better business is on the way.

Rubber-covered wire demand began to pick up perceptibly about five or six weeks ago and has gathered momentum ever since. Each time the price advanced the buying appeared to go ahead faster.

With advancing copper prices and assurances of 10 to 15 per cent higher prices by the early fall the wire market should rapidly become better. In addition, construction work is getting larger every day.

There is every reason to believe that by September the copper wire mills of the country will again be running at full capacity.

Transformer Prices Not Expected to Go Lower

War Increases in Raw Materials Do Not Reflect Prices for Finished Products

In the opinion of those in close touch with the manufacturing of transformers, the bottom has been reached in prices of such equipment. It is pointed out that labor costs show no tendency whatever to decrease. Some material costs are running lower than during the height of the war.

Thus, magnetic steel is now costing the transformer manufacturer about 9 cents per pound, compared with 14 cents in the period of maximum demand and allowing for wastage in the fabrication of lamination sheets of the proper shape. The maximum cost of this steel was practically equivalent to the price of copper the year before the war.

Considerable stocks of copper and steel which were purchased at prices in excess of ruling quotations are yet to be worked up at the factories. The overhead cost in transformer manufacture and the labor cost are to-day probably not far apart. Insulating materials are a little easier in price than last year, but with present high labor

and overhead charges, with existing high cost of maintaining sales work in the field and with outputs far below the capacity of the factories, it is held that no reasonable basis for price reduction exists, bearing in mind always that the price advances of transformer equipment during the war did not exceed about 50 per cent compared with from two to five times that advance in many other manufactured commodities. There is no certainty that the prices of steel and copper will not advance materially during the present year, and neither is it positive that no further increases in the cost of labor will be registered.

Little is being heard of guarantees covering price reductions this year in the transformer quotations now being offered. Since the prices of such equipment did not follow the advances in material cost during the war, it results that very substantial drops can take place in raw-material costs before any sympathetic fall in product prices may be expected. Possibly in the future mass production on the basis of greatly increased labor efficiency may allow a moderate recession to be established, but the prospects are that prices now current will form the basis of quotations for a long time hence.

British Import Restrictions Removed

The War Trade Board announces that copper wire and copper-clad wire may be imported into Great Britain without individual license.

Pump Manufacturers Combine

The entire pumping machinery business of the Canton-Hughes Pump Company, Wooster, Ohio, has been purchased by the Chalmers Pump & Manufacturing Company, Lima, Ohio, which company is a reorganization of the Chalmers Manufacturing Company, with increased capital and manufacturing facilities necessary for the new business. The officers of the Chalmers Pump & Manufacturing Company are C. S. Brown, president; Frank D. Shumate, vice-president and sales manager; Fred Biszanta, secretary and treasurer. Messrs. Brown and Biszanta, as executives of the Chalmers Manufacturing Company, have been active as founders and builders of machinery.

Mr. Shumate, of Chicago, who has become associated with the new organization, brings to it a broad experience in the engineering and sales field of pumping machinery, gained through his connection with the Worthington Pump & Machinery Corporation for the past thirteen years throughout the Middle West, Southwest, Mexico and Canada. The Canton-Hughes Pump Company has built pumping machinery for many years and has a full line of single and duplex steam and power pumps, air compressors, jet and surface condensers for medium vacuum work, and many pumps for special purposes. The manufacture of the line will be continued actively.

The general offices and works will be at Lima, Ohio, with agents in all of the principal cities.

Rolling Stock

Indianapolis Traction & Terminal Company, Indianapolis, Ind., has reported to the Public Service Commission of that state that since the order of the commission on Dec. 28 it has converted 150 cars into cars of the prepayment type and that 100 more cars will be changed.

Franchises

Cleveland, Ohio—The City Council of Cleveland has granted the Cleveland Railway three franchises to construct a single track extension on West Seventy-third Street, from Denison Avenue S. W., to Linndale Road S. W.; double track extension on Broadview Avenue S. W., from Pearl Road S. W. to Tate Avenue S. W., thence to the intersection of Schaaf Road S. W., and a double-track extension in the southeastern part of the city, beginning at Union Avenue S. W., to South View Avenue S. E., via East 116th Street and Corlett Avenue S. E.

Track and Roadway

Calgary (Alta.) Municipal Railway.—The Calgary Municpal Railway plans to construct 1 mile of new track in the city of Calgary, and will use the rails, etc., from the line which was laid to serve the military camp on the Sarcee

NEW YORK METAL MARKET PRICES

	June 5	June 18
Copper, ingots, cents per lb.	16.62½	17 75
Copper wire base, cents per lb.	18.25 to 18 75	20 00 to 20 50
Lead, cents per lb.	5.25	5 40
Nickel, cents per lb.	40.00	40.00
Spelter, cents per lb.	6.47½	6.90
Tin, cents per lb.	†72.50	†72.50
Aluminum, 98 to 99 per cent, cents per lb.	32.00 to 33.00	33.00

† Government price in 25-ton lots or more f.o.b. plant.

OLD METAL PRICES—NEW YORK

	June 5	June 18
Heavy copper, cents per lb.	14 50 to 14 75	15 00 to 15 50
Light copper, cents per lb.	11.75 to 12 50	12 00 to 12 75
Heavy brass, cents per lb.	8.00 to 8 50	8 50 to 9 25
Zinc, cents per lb.	5 00 to 5 50	5 25 to 5 50
Yellow brass, cents per lb.	7 25 to 7 75	7 50 to 8 00
Lead, heavy, cents per lb.	4 50 to 4 60	4 75 to 4 87½
Steel car axles, Chicago, per net ton	$23 00 to $24 00	$23 00 to $24 00
Old carwheels, Chicago, per gross ton	$21 00 to $22 00	$21 00 to $22 00
Steel rails (scrap), Chicago, per gross ton	$16 50 to $17 00	$18 50 to $19 00
Steel rails (relaying), Chicago, gross ton	$16 50 to $17 00	$19 50 to $20.00
Machine shop turnings, Chicago, net ton	$6 00 to $6.50	$6 50 to $7 00

ELECTRIC RAILWAY MATERIAL PRICES

	June 5	June 18
Rubber-covered wire base, New York, cents per lb.	21	22
Weatherproof wire (100 lb. lots), cents per lb., New York	23.25 to 24.00	26 00 to 23.25
Weatherproof wire (100 lb. lots), cents per lb., Chicago	24 50 to 24 75	25 75 to 26 50
T rails (A. S. C. E. standard), per gross ton	$49 00 to $51 00	49.00 to 51.00
T rails (A. S. C. E. standard), 20 to 500 ton lots, per gross ton	$47 00 to $49 00	47.00 to 49.00
T rails (A. S. C. E. standard), 500 ton lots, per gross ton	$45 00 to $47 00	45.00 to 47.00
T rail, high (Shanghai), cents per lb.	3	3
Rails, girder (grooved), cents per lb.	3	3
Wire nails, Pittsburgh, cents per lb.	3.25	3.25
Railroad spikes, drive, Pittsburgh base, cents per lb.	3 35	3.35
Railroad spikes, screw, Pittsburgh base, cents per lb.	8	8
Tie plates (flat type), cents per lb.	2.75	2.75
Tie plates (brace type), cents per lb.	2.75	2.75
Tie rods, Pittsburgh base, cents per lb.	7	7
Fish plates, cents per lb.	3	3
Angle plates, cents per lb.	3.90	3.90
Angle bars, cents per lb.	3.90	3.90
Rail bolts and nuts, Pittsburgh base, cents per lb.	4 35	4.35
Steel bars, Pittsburgh, cents per lb.	2 35	2.35
Sheet iron, black (24 gage), Pittsburgh, cents per lb	4 20	4.20
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb	5 25	5.25
Galvanized barbed wire, Pittsburgh, cents per lb.	4.10	4.10
Galvanized wire, ordinary, Pittsburgh, cents per lb.	3.70	3.70
Car window glass (single strength), first three brackets, A quality, New York, discount †	80%	80%
Car window glass (single strength, first three brackets, B quality), New York, discount	80%	80%
Car window glass (double strength, all sizes AA quality), New York discount	81%	81%
Waste, wool (according to grade), cents per lb.	14 to 17	14 to 17
Waste, cotton (100 lb. bale), cents per lb.	8 to 12½	8 to 12½
Asphalt, hot (150 tons minimum), per ton delivered	.....	.....
Asphalt, cold (150 tons minimum, pkgs. weighed in, F. O. B. plant, Maurer, N. J.), per ton	.....	.....
Asphalt filler, per ton	$30.00	$30.00
Cement (carload lots), New York, per bbl.	$2.90	$2.90
Cement (carload lots), Chicago, per bbl.	$3.05	$3.05
Cement (carload lots), Seattle, per bbl.	$3.13	$3.13
Linseed oil (raw, 5 bbl. lots), New York, per gal.	$1.66	$1.83
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	$1 68	$1.75
White lead (100 lb. keg), New York, cents per lb.	13	13
Turpentine (bbl. lots), New York, cents per gal.	94	$1.17

† These prices are f. o. b. works, with boxing charges extra.

Indian Reserve. It is reported that an extension will also be built to Mewata Park, south of the Armories.

Wabash, Chester & Western Railroad, Chester, Ill.—It is reported that arrangements are being made to electrify the Wabash, Chester & Webster Railroad, which extends from Mt. Vernon to Chester.

Kingston, Jamaica—The government of Jamaica is arranging to have a survey made of the water power of the larger rivers in Jamaica, to see if electrification of the railways is now feasible. The cost of coal and the necessity for considerable railroad extension, owing to unexpected agricultural developments, explain the proposed change.

Frankfort & Shelbyville Traction Company, Shelbyville, Ky.—F. W. Hinkle secretary and treasurer of the Frankfort & Shelbyville Traction Company, has announced that plans for the construction of the line from Frankfort to Shelbyville are progressing rapidly and that the line will be in operation by Jan. 1. It is reported that the company has secured options on rails, trolley wire, poles, right-of-way, three steel bridges, prices on grading, ballast, ties, etc., and that arrangements have been made whereby the Kentucky Traction & Terminal Company will provide the rolling stock. [March 8, '19.]

Power Houses, Shops and Buildings

Georgia Railway & Power Company, Atlanta, Ga.—Improvements are being planned by the Georgia Railway & Power Company to its power station at Dalton estimated to cost $6,000.

Union Traction Company of Indiana, Anderson, Ind.—A 36 ft. x 100 ft. tract on Main Street, Anderson, has been purchased by the Union Traction Company for a station site. The company plans to build a terminal and office building next year.

Louisville & Southern Indiana Traction Company, Louisville, Ky.—New freight sheds wiill be constructed by the Louisville & Southern Indiana Traction Company at 441 South First Street, at a cost of $8,000.

Eastern Massachusetts Street Railway, Boston, Mass.—Work has been begun by the Eastern Massachusetts Street Railway on the remodeling of the Middlesex Street carhouse in Lowell into a repair and construction shop which will take care of all the cars on the lines in the Middlesex valley district.

Brooklyn (N. Y.) Rapid Transit Company.—Judge Julius M. Mayer, in the Federal District Court, has authorized Lindley M. Garrison, receiver of the Brooklyn Rapid Transit Company, to purchase power property at Kent and Davison Avenues, Williamsburg, owned by the Brooklyn City Railroad, for about $225,000.

Trade Notes

Crouse-Hinds Company of Syracuse, N. Y., announces that P. A. Fuss has joined its staff in an advertising capacity after a number of years of service for the Thomas Edison Company and the T. G. Plant Company.

Netherlands Legation at Washington has just opened a commercial department for the purpose of fostering trade between the United States and Holland and is in a position to give commercial information about trade between the two countries to American merchants.

Brunswick (Ga.) Cross-Arm Company reports that it is placing orders for two additional fast-feeding machines and intends to build an addition to its plant 50 ft. x 100 ft., about doubling the present size, for the purpose of operating a complete planing mill and catering to export business.

Foster Callahan, recently a first lieutenant of field artillery in the United States Army, has returned to civil life as representative in several Southeastern states of the Safety Insulated Wire & Cable Company. Mr. Callahan formerly covered this same territory in another connection and is well known in the electric railway field.

Carbolineum Wood Preserving Company, Milwaukee, Wis., announces that it has lately centralized its business, doing away with all former branches, distributers and agents, except only the Pacific Coast branch. All distributing will be done from stocks carried at different points with headquarters at the Carbolineum Building, Milwaukee, Wis.

James Leffel Water Wheel Company has sold its plant in the Lagonda district, Springfield, Ohio, to the Robbins & Myers Company, and has acquired more extensive property in Springfield. Engineers and architects are at work on plans for a large, modern and fully equipped plant and construction work will be rushed so that the new plant will be ready for occupancy by Dec. 1. The company found itself cramped for factory space in its old quarters.

H. F. Keegan Company, First National Bank Building, Chicago, Ill., announces its appointment as district sales agent for the Van Dorn & Dutton Company, gear specialist, of Cleveland, Ohio. The company has also secured the sales agency of the Eureka Company of North East, Pa., manufacturer of a complete line of commutators, commutator bars, controller parts, line material, trolley wheels, brushholders and springs and bushings.

Dayton Insulating Die Company, manufacturer of molded insulation products and dies for same, has just purchased the Edgemont Die Casting Company of Dayton, Ohio, manufacturer of white-metal castings, and will consolidate and operate under a new name. C. A. Kurz will be president and I. W. Detamore is also connected with the new organization. Ground was broken during the third week in May for a new plant, about 60 ft. by 120 ft., two stories, steel and concrete, situated at Edgemont, a suburb of Dayton, Ohio.

Roller-Smith Company, New York City, announces that it is now represented in St. Paul, Minn., by A. H. Savage, Pioneer Building. Mr. Savage will handle the company's various lines of instruments, meters and circuit breakers in Minnesota and North Dakota and part of Wisconsin and South Dakota. Mr. Savage prior to 1914 represented the Fort Wayne Electric Works in St. Paul, and in 1914 he became a representative of the Wagner Electric Manufacturing Company of St. Louis, he being now in charge of the St. Paul office of that concern. At the present time Mr. Savage is treasurer of the Dakota Light & Power Company of Flandreau, S. Dak., and is also president of the South Dakota Power Association. He has been in the Northwest for over eighteen years.

New Advertising Literature

Hemingway Glass Company, Muncie, Ind.: Catalog No. 31 on Standard glass insulators.

Underfeed Stoker Company of America, Chicago, Ill.: Pamphlet describing the Jones automatic cleaning underfeed stoker.

Bridgeport Brass Company, Bridgeport, Conn.: Bulletin No. 12 on the reasons for and properties of Phono-Electric wire.

Irving Iron Works Company, Long Island City, N. Y.: A thirty-six-page catalog (2A) covering "Irving subway" fireproof ventilating flooring.

Electrical Manufacturing Company of Cleveland: A sixty-eight-page catalog (D), covering knife switches, panelboards, iron cabinets and switchboards.

Northern Equipment Company, Erie, Pa.: Pamphlet entitled "Proposal and Specifications for the Copes System of Boiler Feed Control."

Waterbury Battery Company, Waterbury, Conn.: Circular illustrating and describing the Waterbury "unit cylinder" primary battery cell (RSA signal cell).

Allis-Chalmers Manufacturing Company of Milwaukee: A monthly bulletin containing a list of the centrifugal pumping units it has available for shipment.

General Electric Company, Schenectady, N. Y.: Bulletins Nos. 47,417, 47,443 and 47,482, describing respectively type FP-7, type FK-13 and type FK-52B oil circuit breakers.

Murray Iron Works Company, Burlington, Iowa: Catalog No. 85 of ninety-five pages, describing and illustrating its Corliss marine, pumping and vertical engines, air compressors, tubular, marine, portable and water-tube boilers, and rocking grates.