

ELECTRIC RAILWAY JOURNAL

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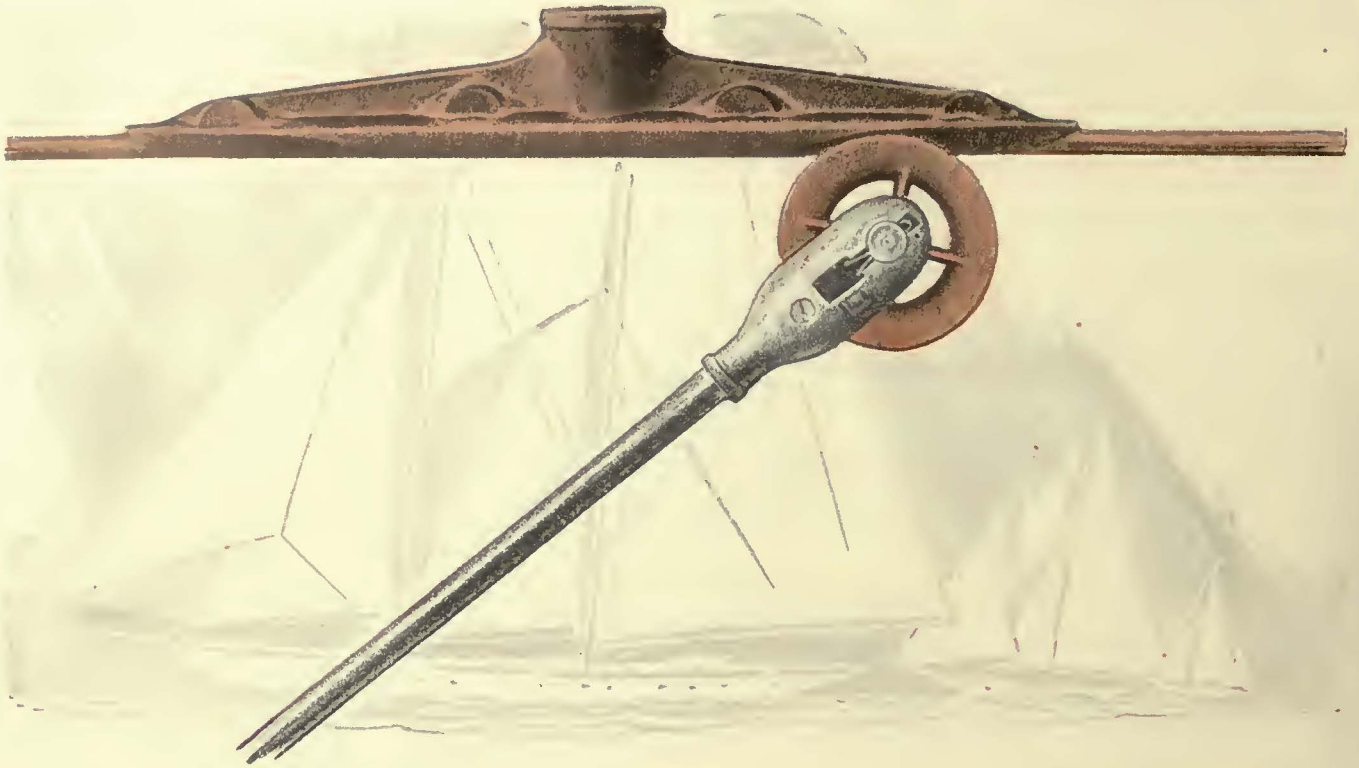
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ELECTRIC RAILWAY JOURNAL

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Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

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Chicago
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Washington
W. C. HEBBON
Pacific Coast Editor
ALEX McCALLUM
London, England

Vol. 75, No. 8

JOHN A. MILLER, JR., Editor

Pages 393-444

Fifty Years of Progress

THAT'S what the Annual Convention Number of Electric Railway Journal will record. Covering every phase of the industry's development, from the earliest transportation undertaking, and pointing out the significance of these advances in terms of what the future holds in store, this Number will be one of the most informative, interesting and valuable issues ever published.

September 15

is the date for which
to watch!

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1931

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Get the right wheels and blocks

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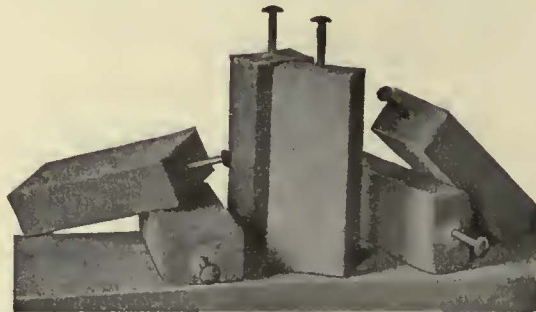
Buy your rail grinding wheels and blocks from the world's rail grinding equipment headquarters.

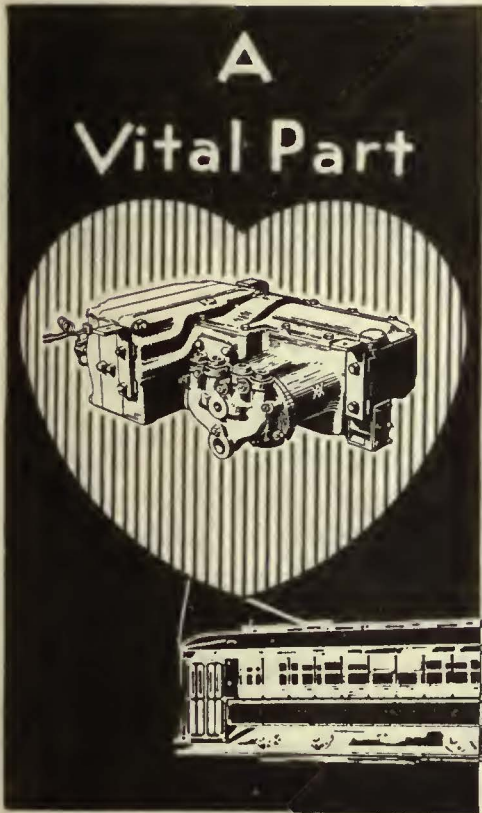
Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

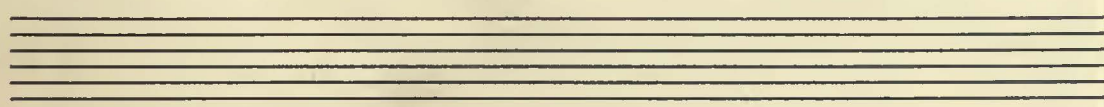
AGENTS

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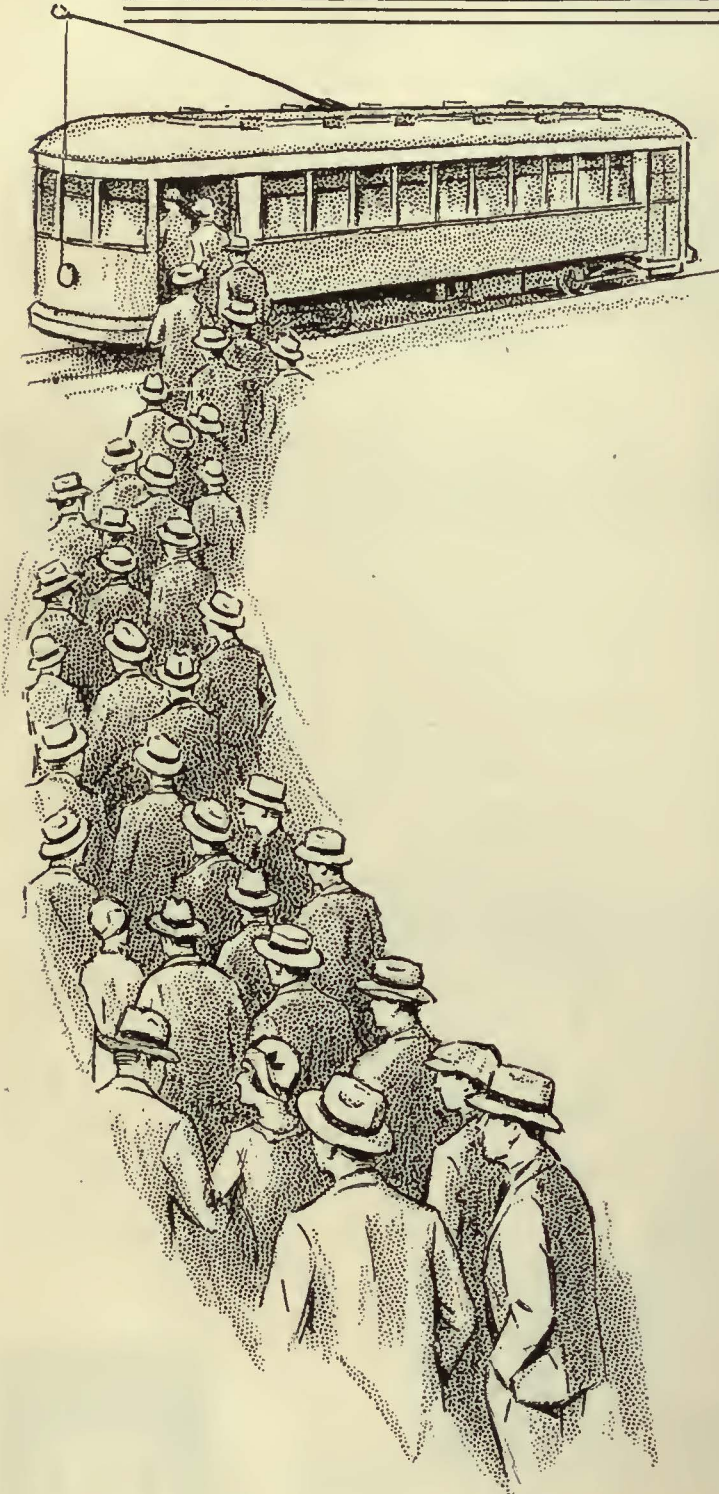


The air compressor is an integral part of every air brake equipment—and VITAL . . . Just as the heart functions to pump life blood through a human organism so does the compressor provide vital "fluid" for actuating the brake . . . Westinghouse compressors have no "organic" defect, require only reasonable attention to avert "functional" trouble, and, if kept in normal health, will need no "doctoring" to assure a long and useful life . . . The DH Compressor, built in four sizes, 10, 16, 20, and 25 cu. ft. displacement is noted for its compact design, light weight, accessibility, and dependable performance . . . For extremely light weight requirements, compressors made of aluminum are available . . . WESTINGHOUSE TRACTION BRAKE CO., General Office and Works, Wilmerding, Pa. » » » » » »



WESTINGHOUSE TRACTION BRAKES

EACH DOLLAR SAVED *in* = EQUALS PROFITS FROM



BASED on average fares and earnings, an electric railway property earns one dollar from 200 passengers. Obviously, each dollar saved in maintenance costs equals the profits from 200 passengers.

Maintenance costs, both for labor and material, are most frequently reduced by buying ample material, but buying it on the basis of dollar-cost-per mile; dollar-cost-per thousand car passes; or dollar-cost-per-years of service.

A splendid illustration of this is found in the experience of a large eastern property. By adopting O-B Wheels as standard, they save \$3,799 per year on wheel costs. In order to match these profits with passenger revenue, it would require hauling 759,936 extra passengers.

Similar economies can be carried out in the discreet selection of line and track materials. Marathon Ears, for example, will reduce maintenance costs of ears because of their tapered, bumpless ends. Or O-B Bonds, because of their durability and high conductivity, will lower the cost of maintaining the track return circuit.

Thus, properties which are finding it difficult to adequately increase their car riders are, to some extent, offsetting the additional revenue problem by reducing the cost of maintenance. And at such times, they find it desirable to turn their attention to O-B products.

1443RL

MAINTENANCE COSTS

200 EXTRA PASSENGERS

Many Have Saved Dollars With These Materials

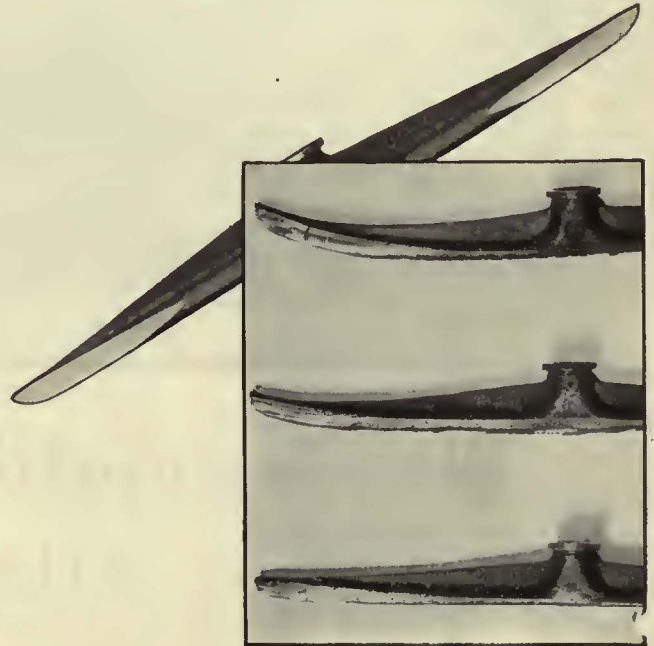
Improved Marathon Ears

Based on experience, there is the conviction among numerous overhead superintendents, that Marathon Ears render the greatest amount of service expressed in number of wheel passes. The tapered approach and leave eliminate bumping and arcing of the wheel as it enters and leaves the ear, and protects not only the center section of the ear, but the wheel and wire as well. One superintendent estimates that wire "cupping" at the ends of the ears has been reduced fifty per cent since the tapered sides have been adopted. Every dollar saved on ear, wire and wheel costs is equal to the profit earned from hauling 200 additional passengers.

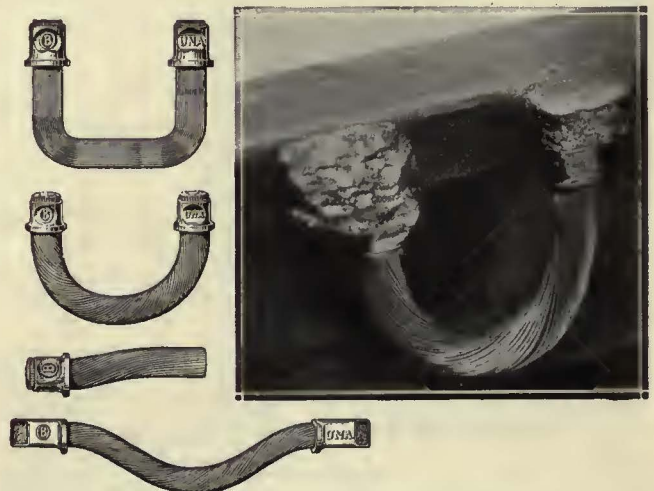
O-B Una Bonds

The excessive costs which are paid for high resistance track circuits represent a premium which is seldom exceeded in any other branch of the system of an electric railway property. Poor bonding quickly becomes poorer and the power loss from loose bonds often runs as high as 40 cts. per bond per year.

More than 160 progressive electric railway properties are constantly demonstrating in daily experience that it is profitable to maintain efficiency in return circuits with O-B Una Bonds. High conductivity, low cost of application, and strong homogeneous welds make rebonding a money saving procedure. And each dollar rescued from power loss or equipment damage has the same profit-value as 200 extra passengers.



Here is proof of the extra life value of the tapered end. Three Marathon Ears removed from service on three different properties show a negligible amount of wear on the tapered portions. This indicates that the ends hold without curling even after the center section is worn out. It further demonstrates the elimination of wheel bumping and arcing as it enters and leaves the ear.



Toughness, ductility, and tenacity are the characteristics of O-B copper arc-weld Una Bonds. Power losses decrease where these bonds are properly used.

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Mansfield,  Ohio, U. S. A.

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The fourfold advantages of Atlanta's Treadle Cars



Passengers enter at the front. White passengers may use the exit door at the front.



Colored passengers use the N.P. Treadle operated exit door at the rear.

Atlanta's one-man treadle cars have proved 35-7% safer than two-man cars.

One-man cars are 9% faster in average service.

One-man cars are far more economical to operate.

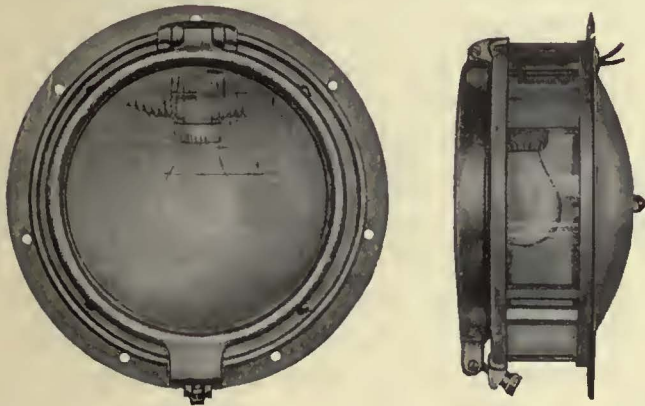
One-man cars, by segregating the races, have practically eliminated racial friction in Atlanta's street cars.



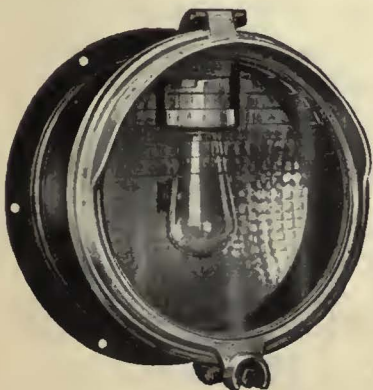
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Golden Glow Flood-Headlight, Type FH 916, illuminates dash. Built with plain or prismatic crystal glass mirror reflectors for either suburban or urban service.



Type FH 916, equipped with 9 in. reflector, refracting lens and circular side lens. Takes one standard series lamp 23 to 94 watts. Also listed with two extra sockets for maximum dash illumination.



Type DGB 918, with 9 in. prismatic glass mirrored reflector and refracting front lens for city use. For surface or semi-flush mounting.

MORE LIGHT ON THE DASH

For greater safety—to identify rail cars from other vehicles—to make advertising cards readable at night—you should floodlight the dash as well as illuminate the track.

GOLDEN GLOW HEADLIGHTS

accomplish this two-fold purpose—put a well diffused beam on the track and reflect a substantial amount of light on the dash. Can be had with two additional lamps if desired.

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**OUTSTANDING
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IN FIVE years, General Electric engineers have reduced the weight per horsepower output of electric drive by 35 per cent. They have made possible a 40-passenger gas-electric bus that accelerates from standstill to 20 mph. with full seated load in 11.5 seconds—20 per cent better performance than was obtained in 1926. ● Furthermore, this reduction in weight and improvement in acceleration were not obtained by sacrificing reliability. In fact, the G-E equipped buses placed in service during 1930 are demonstrating even greater dependability than those built in 1926. And that means *service*—more reliable and more desirable service than can be obtained with any other type of transmission. ● The 1931 G-E equipped bus is far in advance of its predecessors. It is maintaining the high standard of electric drive for two reasons: First, General Electric has originated several major improvements in the design of its equipment. Second, almost every advance in mechanical design—four-wheel brakes, 6- and 8-cylinder engines, large pneumatic tires, greater capacities—has increased the desirability of electric transmission. ● When you have considered these facts, you will want the complete story of gas-electric drive. It is all-important to the operator who plans always to obtain the utmost service at the least cost, especially from large buses in heavy city traffic. Ask your nearest G-E office or address General Electric Company, Schenectady, N. Y.

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SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

GENERAL  ELECTRIC
 TRANSPORTATION EQUIPMENT

390-73

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New York,
August, 1931

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A McGraw-Hill Publication—Established 1884

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Number 8

JOHN A. MILLER, JR., Editor

Bringing Order Out of Chaos

LOCAL transportation is a community problem. The Massachusetts public control act recognizes it as such. The Cleveland and other similar service-at-cost grants recognize it as such. The efforts to effect co-ordination in London and New York recognize it as such. And the recent Chicago settlement recognizes it as such. These should be harbingers of a better day, not only for those who perform the public function of supplying transportation—but for the public itself.

But even where the responsibility has thus been recognized it has not been assumed by the local authorities to the extent it should have been. Order will never be brought out of chaos in local transportation until there is better planning. That is not to say that the local transportation industry has not done its part. It has done the best it could, but the problem has become too complex to be solved by the industry alone. Before further progress can be made, there must be more general recognition by the local civic and political bodies of their responsibility to the public and to the agencies that furnish local transportation.

In the early days, this industry, of itself, rose to meet the needs of the situation. After the orgy of competitive building which is always concomitant with an industry during the promotional stage, the era of consolidation set in as a matter of self-preservation. Weak systems were eliminated or nurtured until they became strong. The problem now is to preserve the existing systems and to turn them to the greatest public advantage under public safeguard and supervision. There can be no doubt that organized transportation agencies, regulated by public bodies, will continue to transport the vast majority of people in all communities of fair size, but the great need is for civic recognition of the fact that rapid transit trains, trolleys, buses, and taxicabs must be co-ordinated to better advantage.

Certainly, civic consciousness is lacking in courage that charges an industry with responsibility and then does not play its full part. There is little planning in the civic sense in an order of things that calmly contemplates the problem of the parked car, permits unlimited use of the streets by taxis and countenances competition by other forms of carriers that is ruinous, sanctions imposts of paving taxes and other obligations both onerous and archaic and does not take the question of local transporta-

tion fully into consideration as a factor in city planning.

In recent times this industry, by and large, has improved service, avoided politics and been frank with the public. But its remarkable technical progress has been largely negated in the cauldron of conflicting political and personal ambitions. There have been a few isolated instances, such as those cited, where consideration of the transportation needs of the community has risen above political truckling, but real order will not be brought out of chaos until the instances have been multiplied many fold.

Waste in industry—in any industry—is a crime against society. Too often waste has been imposed on this industry in the form of duplication of facilities—imposed as a result of political pettifogging on the part of those charged with responsibility to the public. The saying is just as true now as it was when first uttered that small minds and a great empire go ill together. And it is the small minds of men in public life that have prevented the local transportation industry in most places from reaching the stature of a great empire—its proper destiny.

Scientific Fare Study Needed

NEED for increased revenue to meet the greater costs of operation that became apparent almost as soon as the World War started in 1914 has been back of the rate increases that have been practically universal on transportation systems of all kinds in recent years. On both steam and electric lines passenger fares have been revised upward with widely differing results. On the steam railroads, with a flat advance and the elimination of various special classes of fares, the riding has fallen off so greatly that, in many instances, the gross passenger revenue is less than it was before the war. Of the street railway systems which have increased rates, some show revenues of more than twice as much as they were at the end of the war, while others with fare increases as great or greater show an actual loss in revenue. Certain properties on which the 5-cent fare has been retained show a decided gain in business. Detailed results in nineteen cities are given by John A. Beeler elsewhere in this issue.

Care must be taken in interpreting the results in the

various cities. Changes have occurred in the population served, first by actual growth in the same area, second, by addition of new routes, and third by annexations of territory. But even after making allowances for these differences, the discrepancies in results obtained with similar fare revisions are so great that it is evident that other factors than the fare itself have a tremendously important bearing on the situation.

At one time it was generally thought that the determination of the revenue that would be obtained with a given rate of fare required no more than a simple mathematical calculation. If that ever was true, it is true no longer. Every day electric railway operators are coming to realize this more clearly. To determine in advance the probable effect of a change in fares a thorough scientific analysis of all related factors is absolutely essential.

Hidden Sources of Income

WHEN a railway management is straining every nerve to make ends meet, a few thousand dollars more in the net income may be of vital importance. After all the thought that has been devoted to the subject of economy, it would seem that no stone could have been left unturned that would cover a chance to make a saving in operating expense. Yet in almost every company there are hidden possibilities. Sometimes things that should be obvious continue to be overlooked because the situation is accepted as a matter of course and changes are not given a thought. Perhaps after an investigation a minor economy is effected, when a more searching analysis might have shown a still greater saving by the use of a better method. Often an improvement made only a few years ago, excellent though it was when adopted, has become obsolete, and a further adjustment should be made at once to meet the conditions of today.

Not only in major items should account be taken of such possibilities for reduction of costs. What appear to be small items soon mount up to large totals. As an example, an opportunity for saving that easily may be, and often is, overlooked, is in the use of fuel for incidental purposes about a railway property. Carhouses, shops, and miscellaneous buildings must be heated, and there are various uses for fuel in larger or smaller amounts. On the average property, plants of different types have been installed at different periods, and a variety of fuels must be purchased and distributed. Illustrating what one company can do, the Montreal Tramways, through an analysis made by a consulting fuel engineer, last winter was able to cut 27 per cent from a fuel bill of \$55,241. The economies will be carried still farther next winter as the result of other changes, so that the total saving will be about \$22,000. Beside these savings in miscellaneous uses, a standby steam power

plant has been rearranged to burn oil, cutting the fuel cost from \$17,000 to \$6,000. The savings were made with practically no capital expenditure, and were due either to better choice of fuel or better instruction as to methods of firing.

Similar opportunities undoubtedly exist on other properties. No saving is too small to be worth while. The cumulative total of numerous minor economies cannot fail to affect the annual operating statement favorably.

The Car Is the Key to the Problem

ANY analysis of the present situation of the street railway industry leads inevitably to the conclusion that there must be substantial improvement in the type of rolling stock operated. No one can deny that a considerable portion of the cars now used in passenger service are obsolete in design, noisy, expensive to operate and to maintain, and utterly without rider appeal. Because the majority of them were built to special order in small lots, their first cost was comparatively high and their carrying charges are a continuing burden. The car unquestionably is the key to the problem of increasing traffic and reducing expenses.

That a group of leading operators, car builders and equipment manufacturers have formed a voluntary association to develop a car or cars which will overcome these various objections is a matter of the greatest significance to the entire industry. The Electric Railway Presidents' Conference Committee is such an association. Organized last September in a time of business depression and uncertainty, it has encountered some delays in getting its program under way. The major preliminary difficulties have now been disposed of, however, and the committee's engineers are fairly launched upon the task which has been assigned to them.

It goes without saying that this task is no easy one. Many of the inherent ideas of both the car builders and operators may have to be scrapped in the process of developing a unit which will adequately meet present-day requirements. Comfort, appearance, riding qualities, noise reduction, lighting, ventilation, and all the prejudices and preferences of a critical public, must be taken into consideration. Faster acceleration, faster braking, reduction in weight and in energy consumption, are some of the objectives sought. Withal, there must be no compromise with safety, and due regard must be had for existing and probable legislative enactments affecting design and operation.

The committee is under no illusions as to the speed with which the task may be accomplished. Progress involving the process of trial and error and patient investigation, must necessarily be slow. But speed is not so necessary as thoroughness, and the industry will be content to await the result with the assurance that accomplishment, when achieved, will be worth while. A "first model," as called for in the committee's plans.

will in all probability embody no more than the best of present design and apparatus. Subsequent models are expected to include the results of research into new fields.

In the meantime, the industry must not stand still, nor should orders for rolling stock be held up pending the committee's conclusions. The last word in car design will never be spoken, nor will perfection be attained either by this generation or the next. Consequently, the prospective purchaser of rolling stock, who has carefully studied his own requirements and who is guided by the best of present practices in the choice of materials, equipment and design, may place his order in all confidence that he will get a vehicle far better than those of a few years ago and one that will compare well with any likely to be developed in the near future.



Be Sure that Renewal Parts Manufacture Pays

CIRCUMSTANCES sometimes appear to favor the manufacture of certain simple kinds of renewal parts by the electric railways. With shops, tools and a skilled maintenance personnel available, it is easy to build up a department for the manufacture of renewal parts. But the danger lies in the tendency to keep the department busy regardless of whether the added work can be justified economically. Especially is this true at a time like the present when the railways are faced with the problem of cutting their maintenance force because of a sharp drop in riding. To wish to hold as many men on the payroll as possible by shifting them from regular maintenance to the manufacture of parts is praiseworthy. But to assume that the home-made parts are cheaper than the marketed products, without having accurate cost records, is a dangerous error.

Sometimes railways produce cost records showing that they are making parts at costs that are well below the prices of the manufacturers. Such records are almost invariably incomplete. An investigation of one company disclosed that the cost of parts was arrived at without including direct overhead charges, such as superintendence, insurance and rentals, that amounted to 48 per cent on labor and 20 per cent on materials. This error is a common one because the railways have no regular accounts for manufacturing work. Manufacturers of renewal parts, on the other hand, must determine their costs accurately, or else they will find themselves doing this business at a loss.

Since the railway need not include selling expenses or profits in the final cost, possibly under a set of favorable circumstances it can manufacture parts cheaper than it can buy them. In view of the highly efficient methods employed by large manufacturers, however, it is open to serious question whether many of them really do so. Quality and service considered, it usually is better to leave the production of parts to concerns that make a specialty of manufacturing.

The New Declaration of Independence

JUST prior to July 4 readers of one of America's most widely circulated dailies were urged to sign a new declaration of independence—to declare themselves "independent of train, buses, subways and street cars." And they were to do this by buying good, used cars, selling right now at the lowest cost in automotive history.

The happy possessor of one of these vehicles was assured he would have no time-tables or schedules to annoy him; that he would be master of his own transportation problem. There were pictures of a man who had missed his train, a bus in which there was no more room, a subway jam and a trolley crush. To cap the climax there was a picture of a runabout with a man at the wheel who simulated the appearance of an auto racer.

Of course, subway jams are not unknown; neither are trolleys in which there is a crush, or buses in which there is no room. But the picture of rolling one's own—a second-hand one, at that—intended to portray the happiness of the man who had declared himself independent of trains, buses, subways, street cars—that was the work of an imaginative artist.

Those who do roll their own know that there is no such ease in driving as this advertisement sought to convey, except in the most remote regions. Wisdom will come quickly to the man who hopes to declare himself independent of trains, buses, subways, street cars, by buying an automobile, particularly "a good used car." Under some circumstances, the auto may be a badge of independence, but as a substitute for mass transportation, it will prove a snare and a delusion.



Decorating Cars with Good Intentions

REALIZING the value of attractive appearance, many railways have been active of late in repainting and in redecorating their rolling stock. Sometimes, however, their zeal has outrun their discretion. This is particularly true concerning the decoration of car interiors. The outside painting scheme of cars is usually fairly well standardized on each property, and changes are made only after careful consideration. But the scheme of interior decoration often is left to the judgment of the shop foreman or master mechanic, and the results thus obtained sometimes have been sadly lacking in artistic effect. Decorating the interior of a street car does not, of course, demand the same degree of artistic skill as decorating the drawing-room of a millionaire's mansion, but it does require some knowledge of color values and how to employ them. If it is worth while to redecorate car interiors at all, it is worth while to do it well. Moreover, it costs no more to make effective use of paint than to use it ineffectively.

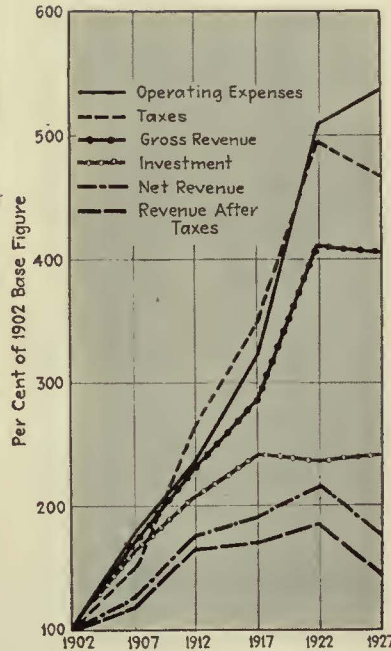
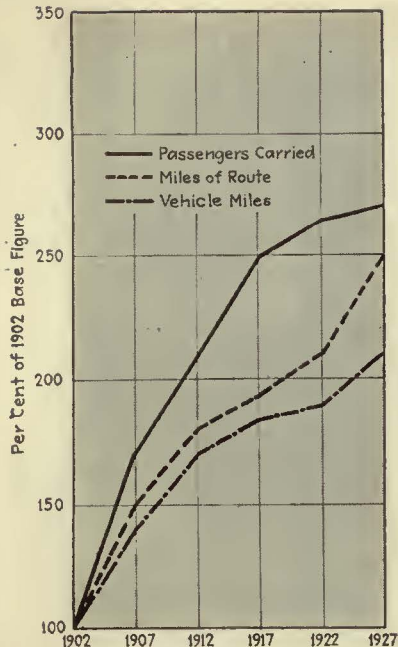
MASS

TRANSPORTATION

By

Francis H. Sisson

Vice-President Guaranty Trust Company
New York, N. Y.



Mass transportation service has continued to show a steady growth despite the increased use of private transportation, but the financial returns in recent years have been far from satisfactory

ADEQUATE mass transportation service is a vital necessity to business and industry in every city. It is no less essential to community life under present-day conditions than is gas and electric service. Yet the electric railways of the United States stand out in sharp contrast to the other public utilities in that for many years their operations have been for the most part unprofitable. This branch of the public utility industry, taken as a unit, earned a total net income in 1927, after payment of taxes, equal to only 3.1 per cent of its property investment, according to the latest United States Census of Electric Railways. In many individual cases, the income remaining after payment of operating expenses, taxes and fixed charges is practically negligible. On account of the inability to earn a reasonable return on the capital invested it is extremely difficult for the companies to finance improvements and the maintenance of a high standard of service is manifestly impossible.

This situation is set forth in detail in an accompanying table, which shows the financial results of electric railway operation at five-year intervals since 1902, as reported by the Census Bureau. Although figures could be estimated for years subsequent to 1927, on account of the different derivation they would not be strictly comparable with those shown. Moreover, conditions during the past two years have been affected by the general business depression, and, to that extent, are not significant in connection with the long-term trend. The same figures are shown graphically in two charts, in which the various totals have been reduced to percentages of the 1902 levels for comparative purposes.

The first chart shows a steady increase in passengers carried, miles of route served, and vehicle-miles operated. It is especially significant that, despite the enormous development of the private automobile, the business of furnishing mass transportation in cities and towns has shown this constant growth throughout the 25-year period covered. The continuous upward movement of all the curves on the chart furnishes striking evidence of the essential character of community transportation service.

Detailed figures covering different classifications of traffic show even more clearly the importance of mass transportation today. Where there has been a slight downward trend in the total number of passengers carried, the loss has been principally in off-peak, Sunday, holiday, and pleasure riders. Rush-hour traffic has tended to increase. This has created a serious problem for the operating companies, but the growth in rush-hour traffic establishes them more firmly than ever as essential elements in urban life.

Taking Boston as an example, we find that the total number of passengers carried by the Boston Elevated Railway in 1930 was slightly smaller than in 1920, but that the number of passengers carried between 5 and 6 p.m. on an average week day was 133,235 in 1930, as compared with 124,761 in 1920. This gain shows clearly the increased importance of the service at the most critical period of the day. In Chicago, the number of passengers carried daily by the surface lines is greater than the number of telephone calls. The total number of passengers for the industry as a whole is greater than the number of postage stamps sold in this country.

The second chart shows the increases and decreases from 1902 to 1927 in operating expenses, taxes, gross revenue, total investment, net revenue, and income available for interest and dividends. It will be noted that

Must Be Placed on a

Firm Financial Basis



Francis H. Sisson

operating expenses and taxes have increased much more rapidly than gross revenue. The net revenue showed a moderate increase until 1922, as did the income available for interest and dividends. Since then, both have declined sharply. In connection with taxes, it should be noted that various imposts, such as paving charges, etc., which are of the nature of taxes, are included under operating expenses, rather than directly under taxes. It might also be mentioned that by far the largest element in operating expenses is wages, which have been greatly increased.

No single factor can be pointed out as the main reason why electric railways have failed to earn adequate returns in recent years. In some instances, street car lines were constructed as a result of civic pride and ambition, rather than in response to any real need for new transportation systems, and were therefore doomed to failure from the start. A large proportion of the bankruptcies, forfeited charters, and abandoned rights-of-way have been reported in small cities and towns, suggesting that the average rates of return for the industry as a whole have been consistently pulled downward by the unsatisfactory results achieved by companies that never should have been organized in the first place. In other instances, trouble has been wholly or partly due to incompetent management.

Such conditions, however, are evident only in isolated cases and fail to explain the almost uniform lack of satisfactory earnings by the country's mass transportation agencies. The low rates of return that have been shown with increasing regularity during recent years are probably due, for the most part, to two factors: (1) higher costs due to the rise in prices and wages, combined with the difficulty of obtaining commensurate advances in fares, and (2) increasing competition due to the swift growth of automotive transportation.

WITH a background of experience in journalism, advertising, utility management and banking, Francis H. Sisson is in a position to understand thoroughly the difficult problem of furnishing mass transportation. He is a graduate of Knox College and Harvard University. After spending some years as reporter, editorial writer, and editor of a daily newspaper at Galesburg, Ill., he joined the staff of *McClure's Magazine*, New York. Thereafter he devoted his attention for a time to advertising work. From 1916 to 1918 he was assistant chairman of the Association of American Railway Executives. Since then he has held the post of vice-president of the Guaranty Trust Company of New York. In this article he draws upon his broad experience to suggest possible means of placing essential mass transportation on a sound financial basis.

The problems thus created have been the more perplexing by reason of the fact that the remedy commonly adopted by industrial concerns confronted with a depressed market—namely, curtailment of operations—is not available to the electric railways. The first reason for this is that the investment in plant is so large that curtailed operations fail to earn its carrying charges. The second reason is that operating schedules, like rates, are a matter of contract between the companies and the municipalities or are otherwise subject to review by public regulatory bodies, so that, even if curtailment of operations were economically possible, it would not be permitted.

There can be no doubt that one very important cause of the difficulties of electric railway companies has been the oppressive and arbitrary treatment they have often received at the hands of public officials. The railways,

being protected monopolies, are subject to regulation "in the public interest." In its historical application to the specific problems of electric railway management, this supposed "public interest" has often taken the form of a demand for cheap and efficient transportation, regardless of financial returns to the companies.

In so far as the difficulties of electric railway companies are due to competing forms of transportation, it appears that the private automobile has been the most important factor. Bus transportation is, of course, in a sense, a more direct form of competition; and there can be no doubt that the use of buses has profoundly affected the development of mass transportation in this country in the last decade. In a few localities, the buses have virtually supplanted the electric cars. More often, however, it has happened that the two agencies have operated together, either in competition or in a mutually supplementary relationship. In many instances the buses themselves are operated by the electric railway companies, although sometimes the union has been effected only after a period of severe competition that has almost ruined either or both of the rival systems. As far as can be seen at present, it appears unlikely that either form of transportation will entirely displace the other. In crowded districts, where street space is at a premium, the electric car will probably remain indefinitely as the backbone of the transportation system.

It is generally agreed that the principal cause of the loss of traffic has been the private automobile. In general, the traffic diverted in this way has been non-necessity traffic. While its loss has created a serious problem for the operating companies, it has not lessened the essential importance of mass transportation service in the economic life of the community.

In this situation the general attitude of business men and the public at large has been one of indifference. The most influential people in the community are probably those who use mass transportation service the least. Another large element in a community clings to the idea that, because some electric railways made large profits in bygone days, the industry must still be making them, and that pleas for relief are only thinly disguised efforts to fatten the already bulging pockets of the stockholders.

The companies have tried in many ways to improve their financial position, with only indifferent success. The most obvious remedy, of course, was to seek higher fares. Two powerful factors have operated against the success of these efforts. The first, as has been pointed out, is the powerful political opposition that has usually developed among property owners, passengers and demagogic politicians. The second is that higher fares often fail to bring about the expected increase in gross revenue. In many communities, there is apparently a fairly large body of marginal passengers who either do less traveling or adopt other means of transportation when the fare is increased. These two factors combined have prevented the average rate of fare from increasing in anything like a corresponding proportion to the advance in cost of operation.

In some cities, relief has apparently been found in the so-called indeterminate franchise providing for service at cost—with, of course, a reasonable rate of return to investors included as a part of the cost. This plan partly relieves the service of the danger of political interference and assures the public of transportation rates representing the approximate cost of the service. At the same time, by assuring the company of an opportunity to earn

a reasonable return, it encourages the investment of new capital and facilitates improvements and extensions of service. While the plan is subject to the criticism that it provides something in the nature of a guaranteed return, and may, therefore, be held to remove the incentive to efficient operation, it appears that this difficulty has not yet been encountered where the system has been tried. One reason for this probably is that the fear of a loss of traffic in case the fare becomes too high provides a strong inducement for the company to endeavor to operate profitably with as low rates as possible.

In so far as management has been able to accomplish it, operating expenses have been reduced. There are, however, many elements of expense of questionable justification over which the railways have little or no control. In some instances, the companies are compelled to pay the salaries of traffic policemen stationed on the streets where they operate. In other instances, the railways contribute substantial amounts to the upkeep of the public parks. Almost everywhere, they pay large sums for the installation and maintenance of paving that is used only by others. Income and gross receipt taxes are assessed in varying amounts. It is estimated that imposts of these kinds take, in some cases, more than 60 per cent of the net revenue of the companies.

Viewed in the large, the operation of electric railways, like that of many other public works, involves a combination of economic and social interests that frequently come into conflict. In some respects the situation is similar to that which has frequently been encountered in connection with the administration of highways. Privately owned toll roads have almost completely disappeared, because it has been found that the public interest is best served by a socialized method of operation—that is, by a free use of the roads and by the payment of construction and maintenance expenses by taxation. In principle, the same method might be regarded as ideal in electric railway administration. But the latter is so enormously more complex than highway maintenance, and the managerial capacity of governmental bodies has so frequently been found inadequate to cope with even the relatively simple problems presented by the administration of the highways, that public opinion has almost invariably rejected the idea of governmental operation of utilities.

The best solution of the problem, like its causes, will probably be found to vary with local conditions. One course that would seem to offer great possibilities is to place the real situation squarely before the public and to make business men think about it. The transportation companies have been trying to do this, but their efforts have often been regarded as insincere. Few leaders of business and industry and few organs of public opinion have interested themselves in this tremendously important problem.

A second step would seem to be to relieve the transportation companies of their present unreasonable burdens and reduce to the lowest practicable point the taxes they have to pay. This will mean that compensating increases in taxes must be secured from some other source. Opposition to such a plan, however, should not be insurmountable if the public thoroughly understands the situation.

A third step that has been suggested is that of assessing benefited property for a part of the original cost of transportation facilities, as is done for such other public services as water mains, sewers and pavements. By this

means, the capital investment upon which the transportation company must earn a return would be substantially reduced.

More radical suggestions have sometimes been advanced. A combination of private ownership and public operation has been tried in a few cases. This method, however, appears to expose the carriers to the dangers of both public and private control, without fully realizing the benefits of either.

The opposite possibility—that of public ownership and private operation—has been suggested as a possible means of combining the advantages of socialization and operating efficiency. It is maintained that this system would offer possibilities of economy, first, in the use of capital at low interest rates; and, second, in the incentive to private gain on the part of the management. Presumably the enterprise would be entirely owned by the city or state, which would employ expert managers to operate the system on some sort of profit-sharing basis. The

for the most part, either makeshift devices that fail to strike at the economic conditions lying at the root of the problem, or methods so drastic in their nature and so uncertain in their effects that they would not be resorted to unless the situation should become truly desperate. It should not be necessary to look so far afield for an equitable solution. In communities where the electric railways are really essential, intelligent co-operation between public officials and company managers should be able to place the utilities on a self-supporting basis. Where they are not, it is as well to face the fact that no conceivable set of operating conditions could enable the companies to make money.

Some light may be thrown on the problem by an examination of the rates of fare and the rates of return shown in the accompanying table. In 1902, with an average fare per passenger of 4.24 cents, the industry earned a return of 5.3 per cent on its total property investment. In 1922, with an average fare of 6.65 cents, the rate of

Summary of Electric Railway Operations, 1902-1927

(Including affiliated bus operations 1922 and 1927)

	1902	1907	1912	1917	1922	1927
Passengers carried.....	5,837,000,000	9,837,000,000	12,135,000,000	14,507,000,000	15,395,000,000	15,776,000,000 ^(a)
Vehicle-miles.....	1,144,000,000	1,618,000,000	1,922,000,000	2,140,000,000	2,153,000,000	2,437,000,000 ^(a)
Route-mileage.....	16,645	25,541	30,438	32,548	34,004	42,247
Investment.....	\$2,308,000,000	\$3,779,000,000	\$4,715,000,000	\$5,532,000,000	\$5,459,000,000 ^(b)	\$5,517,000,000 ^(b)
Gross revenue.....	\$247,554,000	\$418,188,000	\$567,512,000	\$709,825,000	\$1,023,719,000	\$995,895,000 ^(a)
Operating expense.....	\$142,313,000	\$251,309,000	\$332,896,000	\$452,594,000	\$734,495,000	\$760,231,000
Net revenue.....	\$135,241,000	\$166,879,000	\$234,615,000	\$257,230,000	\$289,224,000	\$235,662,000
Taxes.....	\$13,079,000	\$19,756,000	\$35,028,000	\$45,757,000	\$64,988,000	\$60,689,000 ^(b)
Ratio of taxes to net revenue.	9.7 per cent	11.9 per cent	14.9 per cent	17.8 per cent	22.5 per cent	25.8 per cent
Revenue after taxes.....	\$122,162,000	\$147,123,000	\$199,587,000	\$211,473,000	\$244,236,000	\$174,973,000
Rate of return.....	5.3 per cent	3.9 per cent	4.2 per cent	3.8 per cent	4.1 per cent	3.1 per cent

^(a) 1927 shows an increase in passengers carried and vehicle-miles operated, while the gross revenue has declined. This is probably due to the use of co-ordinated bus service by passengers who get free

transfers, or transfers for less than full rate of fare. ^(b) 1922 and 1927 show decreases in investment due probably to abandonment of unprofitable rail lines. While they have been replaced to some extent by

buses, and bus extensions have also made in new territory, the added investment has been less than that of the abandoned rail property. This is reflected in slightly lower taxes in 1927.

rates would be fixed; profits would be divided between the municipality and the managers; and deficits would be met from the public treasury. In this way, a partial separation would be effected between revenue and expenses, and there would be no opportunity for demagogic appeals to the detriment of the legitimate interests of owners of the enterprise. In one respect, the incentive to efficiency might be even stronger than under ordinary private ownership, since the gains from economical management would accrue directly to the managers responsible for those gains, instead of to a large and partially inert body of stockholders more or less ignorant of the problems of management.

On the other hand, the system would undoubtedly be found subject to some of the weaknesses inherent both in public and private administration. The large amounts of capital subject to the control of public officials, and the correspondingly large potential gains, would offer very strong temptations to fraudulent practices—not only in the form of collusion between officials and utility managers, but through unsound business policies on the part of the management designed to show unduly large earnings, with swollen profits for the administrators. Moreover, it is likely that large individual earnings resulting from exceptional efficiency would, as under the present system, raise the cry of profiteering. But it is not certain that any of these weaknesses would be more pronounced than under the now general system of private operation and ownership under public regulation.

These and other suggestions that have been made are,

return was 4.1 per cent. In 1927, the average fare was 6.31 cents and the rate of return 3.1 per cent. If the average fare in 1927 had been 7.06 cents and the number of passengers had remained the same, the return would have been 5.3 per cent, the same as in 1902 (under the not quite valid assumption that taxes would have remained the same). In other words, an increase of three-quarters of a cent in the average fare would have increased the rate of return from 3.1 to 5.3 per cent. Such an increase would surely not impose a heavy burden on passengers, nor should it divert a very large volume of essential traffic.

The weakness of an analysis of this sort, of course, lies in the fact that it treats the industry as a homogeneous unit, instead of a combination of many individual units operating under widely differing sets of conditions. In many localities, no doubt, the utilities face a competitive situation where any increase in rates sufficient to place them on a self-supporting basis would defeat its own purpose by causing many passengers to use other forms of transportation. Elsewhere, however, a fairer attitude on the part of the public in the matter of rates and taxes would place the companies in a much stronger financial position than they are in at present. In such communities, an aggressive and intelligently conducted campaign of publicity, designed to place the true situation before the people, should be thoroughly worth while. The public must be brought to the realization that transportation service, like every other service, must be paid for, and that unprofitable service is necessarily bad service.



Congestion on a street in Kansas City where the curb is lined with parked automobiles despite a sign which says "No Parking Day or Night"

Lax Enforcement

A Prevalent Cause

Despite the universal demand for relief of congestion, the movement of vehicles in the streets of most cities continues to be obstructed through willful violation of traffic regulations

an inalienable right to leave his vehicle standing in the street for as long a time as he desires.

In a recent study of the parking problem in the central business district of Washington, D. C., 22,815 owners of automobiles were asked whether they would be willing to pay for the use of off-street garage space to relieve congestion in the downtown streets, and if so, how much they would be willing to pay. A total of 17,103, or three out of every four, stated that they would not be willing to pay anything. The remainder indicated that they would be willing to pay a small amount, 10 cents being the most popular figure with 15 cents next, and a scattering few willing to pay amounts between 25 cents and 50 cents. These ideas are typical of millions of automobile owners everywhere. They are firmly convinced of their right to free use of the public streets for the storage of their automobiles and avail themselves of it regardless of restrictions and warning signs.

Statistics are not needed to prove that traffic regulations are being violated every day in every city in the country. It is a matter of common knowledge. Examples of violations in a dozen different cities are shown in accompanying illustrations. These pictures were secured quickly and easily by representatives of *ELECTRIC RAILWAY JOURNAL*. Nowhere was any difficulty encountered in finding obvious violations.

Violations of the time limit where parking is permitted for stated periods are also of frequent occurrence. It is rather difficult to measure the exact extent of this abuse, but data collected in a survey by the writer in conjunction with the Citizens' Street Traffic Committee of the City of New York are probably typical of conditions in most cities. In this survey, a check was made at hourly intervals of automobiles parked on various

TRAFFIC congestion is costing the people of the United States \$2,000,000,000 a year, according to figures of the National Conference on Street and Highway Safety. In the opinion of that body, the greatest single cause of congestion is automobile parking. Some progress toward relief has been made through the enactment of parking restrictions, but the violation of these restrictions is so frequent that a large part of their beneficial effect is being lost. Many automobile drivers pay little heed to traffic regulations. Despite signs prominently displayed to inform them of parking restrictions, they park where they please. All movement of persons and merchandise through the streets is hampered by the selfishness of those who violate the traffic rules, but the violators are seldom punished.

More than a hundred years ago, Baron Ellenborough, Lord Chief Justice of England, laid down the principle that "No one shall be permitted to use the King's highway as a stable yard." Fifty years ago most cities had ordinances forbidding horse-drawn vehicles to stand unattended on busy public streets. With the advent of the automobile, however, precedents were forgotten and the idea grew up that the driver of an automobile has

of Traffic Rules of Congestion

By

JOHN A. MILLER, Jr.

Editor

Electric Railway Journal

streets in the midtown shopping district where one-hour parking is allowed. Of 16,468 vehicles checked, 4,775, or approximately 30 per cent of the total, overstayed the hour time limit. Automobiles to the number of 2,109 were parked more than two hours; 1,094 more than three hours; 635 more than four hours; 379 more than five hours; 245 more than six hours; 152 more than seven hours and 78 more than eight hours.

It is evident that an enormous number of automobile drivers will not voluntarily obey traffic regulations, and that efforts now being made to enforce the regulations fall far short of success. Two possible ways of improving the situation present themselves. One way would be to secure greater voluntary observance of the rules. The other would be to devise more effective methods of enforcement.

Much might be said in favor of encouraging voluntary adherence to traffic regulations. The automobile owner who creates congestion by his failure to observe parking restrictions unconsciously pays his share of the enormous cost of congestion. If the total cost were distributed evenly among the entire population of this country, it would amount to nearly \$100 per family per year—a sum that would pay for a great deal of off-street parking. Were it possible to impress the facts on the owners of automobiles, they might see the matter in a new light.

The costs of conges-



Automobiles parked along a street in Detroit regardless of numerous "No-Parking" signs

tion are mostly hidden, however, and it is difficult to convince the average man that he is really paying them. The shipper of merchandise whose vehicles are delayed by traffic congestion passes on to the ultimate consumer as much as possible of the cost. But when it is finally paid, it is so intermingled with other costs that the consumer does not recognize it. Congestion adds also to the costs of municipal government, which are borne by the

tax payers and the rent payers. But here, again, the part which is attributable to congestion is so mixed in with a multitude of other costs that it is unrecognizable.

An educational campaign to bring the facts home to the general public would undoubtedly result in better observance of traffic regulations. There would always be a certain number of individuals, however, who would place their own immediate convenience above the general welfare and who would violate



Signs evidently mean little to automobile drivers in Cleveland

Automobiles parked solidly along the curb of a Boston street where parking is forbidden



An example of failure to observe parking regulations in downtown St. Louis



At left — Failures to observe the "No-Parking" rule in the area between the street car loading platform hampers vehicular traffic in Washington, D. C.



A violation of the parking rules in Newark, N. J.

Typical street scene in midtown New York where "No-Parking" signs are generally ignored





Traffic movement is hampered in Cincinnati, too, by failure to observe parking restrictions

At left—Rush-hour parking is forbidden in Los Angeles but the rule is not observed. One parked car completely blocks the extra traffic lane which should be available for moving vehicles



the regulations anyway. The action of these few individual violators would go a long way to offset the benefit resulting from better observance by the majority. A single automobile parked at a critical point will create a bottle neck that impedes all traffic movement on the street no matter how well traffic regulations are obeyed at other points. For that reason, it appears unlikely that the problem can ever be solved entirely by encouraging voluntary observance of traffic regulations. It is necessary also to adopt more effective methods of enforcement.

At present there are two principal obstacles in the way of effective enforcement. The first is the difficulty frequently experienced in serving a summons on a viola-

tor of traffic rules. The second is "ticket killing." Many drivers of automobiles feel safe in disobeying the regulations because they have enough influence to have a summons cancelled if they are unfortunate enough to get caught.

The practice in regard to serving a summons for a violation of traffic regulations varies in different localities. In some cities it is deemed sufficient for a police officer to tie a summons tag on the vehicle found violating the rules. This procedure is not altogether satisfactory however, because it gives the driver of the vehicle an opportunity to claim that he never saw the tag, that it was blown away or removed by some mischievous urchin or disappeared in some other way. Other cities require



Two languages is evidently not enough to secure attention for this "No-Parking" sign in the Province of Quebec



Parking violations near the busiest street intersection in New Haven

that the summons be served personally on the driver. For a police officer to do this involves the expenditure of a great deal of time, and very much limits his effectiveness in enforcing the regulations. One possible way to overcome this difficulty might be to seal a summons tag on the offending vehicle with a seal similar to those used on electric meters, etc. This plan would facilitate the issuing of summonses and would reduce the possibility of the autoist denying knowledge of the summons. Experiments are now being made along this line, but the plan has not yet been widely adopted.

Most of the trouble, however, arises after the summons has been issued. Nearly everyone has a friend, who has a friend, who knows somebody influential in the police department or the municipal government. By means of a little discreet wire pulling it is very often possible to get a parking ticket killed. Probably no one dislikes this practice more heartily than the police themselves, for it goes a long way to nullify their hard work. But the practice has become so well established everywhere that it would be asking too much of the police

to expect that they should put an end to it themselves.

A practical solution of the problem appears to be the use of a triplicate tag system, such as is now in effect in a number of cities. Under this plan one copy of the summons goes to the driver of the offending vehicle, a second to the traffic bureau of the police department and the third to the judge of the municipal court. With this arrangement in effect the driver of an offending vehicle must do his wire pulling not only in the police department, but also in the court. Moreover, his activities in each place will be known in the other, and the difficulties in the way of getting a summons cancelled will be greatly increased.

The twin evils of non-observance and non-enforcement of traffic regulations are growing steadily worse. With an ever-increasing number of vehicles on the streets, more and more restrictions are becoming necessary. But they cannot afford relief of congestion when they are neither observed nor enforced. Aggressive leadership in remedying existing conditions is needed if complete stagnation of traffic is to be avoided.



Vehicles parked in restricted zone opposite a fire house in New York

WANTED—

A More Productive Fare Basis

An analysis of trends in fares, riding habit and passenger revenue 1918-1929 on electric railways serving nineteen important cities

By

JOHN A. BEELER

Consulting Engineer

DETERMINATION of a satisfactory fare structure is one of the major problems confronting the local transportation industry today. The structure should be one that will encourage and stimulate the use of the service, and, at the same time, provide sufficient revenue to cover the cost of operation. Enough reserve must be available from earnings to keep the transportation properties abreast of the times and give safe, comfortable and attractive service to the cities where they operate.

For a number of years but a few companies have earned sufficient revenue to accomplish this purpose. As a basis from which to consider this problem, it is interesting to study the trends in fares, riding habit and revenue between 1918, when practically all lines were operating at a 5-cent fare, and 1929, when the average rate of fare was much higher. Results of such a study in nineteen cities are shown in accompanying charts and in tables. The statistics are confined to surface line operations, or where surface lines are unified with rapid transit.

Each chart has three curves for the period from 1918 to 1929, showing the relation of each successive year to the 1918 figure, which is used as the base. These curves included for each city show: (a) the average fare; (b) the number of revenue passengers carried; and (c) the total passenger revenue.

It will be noted that, as a general proposition, when the fare was raised the number of revenue passengers declined, and when it was lowered the passenger curve went higher. The passenger revenue, however, generally climbed higher with a raise in fare. In most instances when the rate reached a point about 45 per cent above the base, the fare curve passed through and above the passenger revenue curve. It appears that fare increases in excess of 45 per cent of the 1918 rate usually failed to increase the revenue. In the cities which retained the 5-cent fare during the entire period, the increase in both revenue and rides has been between 30 per cent and 35 per cent.

In the accompanying tables the change in population, a factor of vital importance, is taken into consideration. The following information is tabulated by years for each of the cities, showing: (a) average rate of fare; (b) total number of revenue passengers; (c) annual passenger revenue; (d) population; (e) revenue rides per capita; and (f) the passenger revenue per capita per annum. The trend of each of the foregoing items in

Fares, Riding Habit and Passenger Revenue per Capita—1918 and 1929 Compared

City	Company	—Rate of Fare, Cents—				Fare Trend*		Rides per Capita		Passenger Revenue per Capita			
		—1918—		—1925—		Cash	Aver.	1918	1929	Trend*	1918	1929	Trend*
		Cash	Aver.	Cash	Aver.								
Surface Lines													
San Francisco...	Market St. Ry. and Municipal Ry.	5	4.97	5	4.90	100	99	405	426	105	\$20.10	\$20.85	104
Brooklyn.....	Brooklyn surface car lines only....	5	4.78	5	4.98	100	104	175	184	105	8.36	9.17	110
Covington, Ky..	Cincinnati, Newport & Covtn. Ry.	5	4.99	5	4.99	100	100	278	311	112	13.90	15.50	111
Portland, Ore..	Pacific Northwest Public Service Co.	6	5.85	8	7.69	133	132	293	186	63	17.00	14.29	84
Los Angeles....	Los Angeles Railway only.....	5	5.00	7	6.30	140	126	248	184	74	12.40	11.55	93
Milwaukee.....	Milwaukee Elec. Ry. & Light Co.†	5	4.66	7	6.24	140	134	258	213	82	12.06	13.27	110
Newark.....	Public Service Co-ord. Transport..	5	5.52	5	5.40	100	98	152	206	136	8.40	11.20	133
Cleveland.....	Cleveland Railway.....	4-5	4.44	7	7.18	155	162	324	230	71	14.35	16.50	115
Washington....	Capital Traction Company only...	5	4.43	8	7.34	160	166	187	118	63	8.28	8.67	104
Omaha.....	Omaha & Council Bluffs St. Ry.‡	5	4.91	10	6.70	200	136	296	184	62	14.55	12.33	85
Denver.....	Denver Tramway.....	5-6	5.17	8	7.48	145	144	245	172	70	12.67	12.86	101
Atlanta.....	Georgia Power Co. (Atlanta only).	5	5.00	10	7.71	200	154	354	231	65	17.65	17.75	101
St. Louis.....	St. Louis Pub. Serv. & Peoples Motorbus Co.....	5-6	5.49	10	8.15	200	148	300	276	92	16.45	22.51	137
Houston.....	Houston Electric Company.....	5	4.88	10	7.77	200	159	243	155	64	11.85	12.00	101
Pittsburgh....	Pittsburgh Railways.....	5	5.84	10	8.01	200	137	202	189	94	11.83	15.11	128
Buffalo.....	International Railway.....	5	4.96	10	8.41	200	169	219	180	82	10.87	15.10	139
Cincinnati....	Cincinnati Street Railway.....	5	4.99	10	8.56	200	171	263	204	78	13.10	17.55	134
Unified Rapid Transit and Surface Lines													
Philadelphia....	Philadelphia Rapid Transit System	5	5.19	8	7.69	160	148	332	328	99	17.28	25.23	146
Boston.....	Boston Elevated Railway.....	5-7	5.84	10	9.28	171	159	318	287	90	18.50	26.25	144

*Indicates relation of 1929 to 1918, the latter taken as 100

†Metropolitan district

‡Omaha only

Houston—Houston Electric Company—Houston Railway and Bus

Year	Average Fare Cents Index	Revenue Passengers Number Index	Pass. Revenue Amount Index	Population Number Index	Revenue Rides Per Capita Number Index	Pass. Revenue Per Capita Amount Index
1918	4.88	100	31,098,142	100	243	11.85
1919	4.87	100	35,169,346	113	266	12.95
1920	6.28	129	35,222,621	114	255	16.00
1921	6.82	140	30,646,686	99	200	13.65
1922	6.64	136	29,476,521	95	175	11.65
1923	6.47	133	31,169,801	100	170	11.00
1924*	6.45	132	38,028,371	123	192	12.35
1925	6.42	131	39,874,216	129	187	12.00
1926	6.49	133	42,171,850	136	184	11.95
1927	7.28	149	41,264,223	133	169	12.30
1928	7.81	160	41,783,980	134	161	12.60
1929	7.77	159	42,409,591	137	155	12.00

*Buses began operation April 1924.

Fares: To April 4, 1920—5 cents, transfers free.

April 4, 1920—7 cents, transfers free.

Feb. 22, 1922—7 cents, 4 for 25 cents, transfers free.

June 13, 1927—Local 10 cents, 4 for 30 cents; 25-cent weekly card allowing rides for 5 cents; children 4 cents. Express bus fare 10 cents, children 5 cents; transfers free except from local to express service.

Pittsburgh, Pa.—Pittsburgh Railways

Year	Average Fare Cents Index	Revenue Passengers Number Index	Pass. Revenue Amount Index	Population Number Index	Revenue Rides Per Capita Number Index	Pass. Revenue Per Capita Amount Index
1918	5.84	100	232,823,184	100	202	11.83
1919	6.70	115	240,659,991	103	206	13.75
1920	7.51	128	277,215,089	119	234	17.52
1921	7.94	136	265,059,155	114	220	17.54
1922	7.97	136	261,850,401	112	216	17.14
1923	7.93	136	279,478,055	120	228	18.03
1924	7.94	136	272,315,161	117	219	17.39
1925	7.96	136	269,345,924	115	214	17.00
1926	7.96	136	267,721,759	115	210	16.71
1927	7.98	137	262,061,272	112	204	16.22
1928	8.00	137	251,784,571	108	193	15.47
1929	8.01	137	248,451,956	107	189	15.11

Fares: To Jan. 22, 1918—5 cents.

Jan. 22, 1918—6 cents, 2 for 11 cents.

June 20, 1918—5-cent and 7-cent zones; tickets in 7-cent zones 8 for 55 cents.

Aug. 1, 1919—10-cent zones, 4 tokens 30 cents.

Sept. 1, 1920—10 cents, 3 for 25 cents; pay transfers at 234 points, free transfers at 71 points.

Oct. 26, 1924—25-cent Sunday and holiday passes added in city zone.

March 1, 1925—40-cent Sunday and holiday inter-zone pass added.

June 1, 1925—\$1.50 weekly pass added.

July 24, 1926—5 cents without transfer on one route for four months.

Buffalo, N. Y.—International Railway—Bus and Street Car

Year	Average Fare Cents Index	Revenue Passengers Number Index	Pass. Revenue Amount Index	Population Number Index	Revenue Rides Per Capita Number Index	Pass. Revenue Per Capita Amount Index
1918	4.96	100	108,141,180	100	219	10.87
1919	4.95	100	131,202,855	121	262	13.00
1920	5.83	117	136,242,730	126	269	15.67
1921	6.21	125	124,237,484	115	242	15.03
1922	6.22	125	84,945,745	79	163	10.16
1923	6.23	126	113,191,762	105	214	13.39
1924	6.23	126	121,787,497	113	229	14.23
1925	7.29	147	113,867,070	105	211	15.39
1926	7.54	152	113,533,546	105	208	15.67
1927	7.97	160	106,762,268	99	193	15.38
1928	8.41	169	103,093,581	96	184	15.49
1929	8.41	169	101,648,139	94	180	15.10

Population—Prorated from given population for years 1920 and 1930.

Fares: To April 18, 1920—5 cents.

April 18, 1920—7 cents, 4 for 25 cents.

March 3, 1925—8 cents, 2 for 15 cents.

July 1, 1927—10 cents, 3 for 25 cents.

Bus fare 10 cents, except one line at street car fare. Transfers car to car or bus to bus free; from car to bus free with 10 cent fare.

Cincinnati—Cincinnati Street Railway

Includes buses operated by Railway Company but excludes buses operated by Independents

Year	Average Fare Cents Index	Revenue Passengers Number Index	Pass. Revenue Amount Index	Population Number Index	Revenue Rides Per Capita Number Index	Pass. Revenue Per Capita Amount Index
1918	4.99	100	112,400,000	100	263	13.10
1919	6.28	126	117,200,000	104	270	16.95
1920	7.44	149	118,000,000	105	268	19.90
1921	8.18	164	106,527,800	95	238	19.50
1922	7.52	151	107,528,700	96	237	17.85
1923	7.64	153	108,625,600	97	236	18.10
1924	9.15	183	100,839,300	90	218	19.75
1925	9.60	192	90,629,900	81	192	18.40
1926	8.55	171	93,597,745	83	196	16.70
1927	8.55	171	100,822,449	90	208	17.75
1928	8.54	171	102,349,759	91	208	17.75
1929	8.56	171	101,901,708	91	204	17.55

Population includes Cincinnati, Norwood, St. Bernard, Elmwood Place, Cheviot.

Fares: To Jan. 1, 1919—5 cents.

Jan. 1, 1919—6 cents, tickets 5½ cents.

April 1, 1919—6 cents.

July 1, 1919—7 cents, tickets 6¼ cents.

Oct. 1, 1919—7 cents, 5 for 35 cents.

June 1, 1920—8 cents, tickets 7½ cents.

Sept. 1, 1920—8 cents, 5 for 40 cents.

Dec. 1, 1920—9 cents, 6 for 51 cents.

Aug. 1, 1921—8 cents, 5 for 40 cents.

Nov. 1, 1921—8 cents, 2 for 15 cents.

Oct. 1, 1923—8 cents.

Jan. 1, 1924—9 cents, 6 for 51 cents.

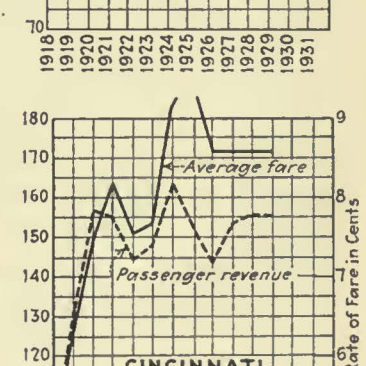
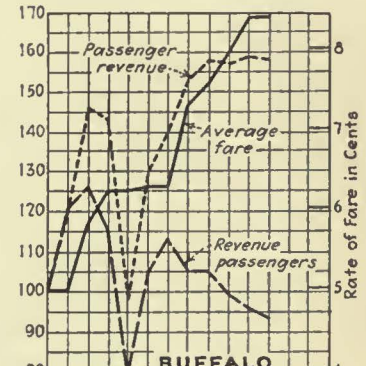
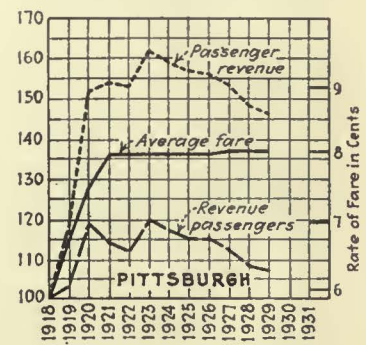
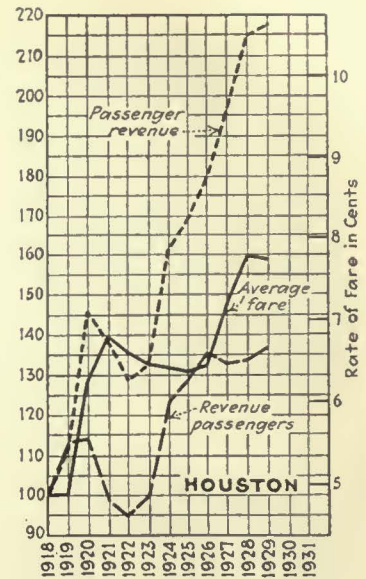
April 1, 1924—9 cents.

July 1, 1924—10 cents, 6 for 57 cents; children 5 cents, 4 for 19 cents.

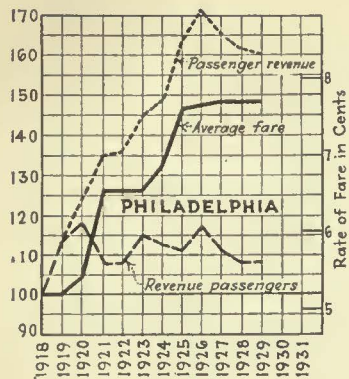
Nov. 1, 1925—10 cents, 3 for 25 cents; children 5 cents, 6 for 25 cents.

Nov. 14, 1926—Sunday pass, 25 cents, added.

Transfers free throughout.



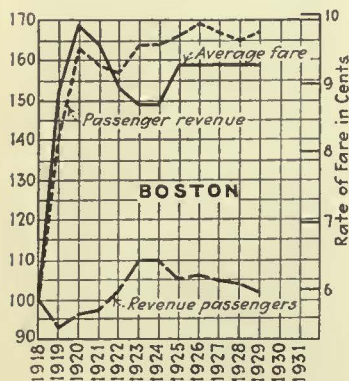
Philadelphia—Philadelphia Rapid Transit System—Surface Rail, Subways & Elevated, and Bus Lines



Year	Average Fare Cents	Fare Index	Revenue Passengers* Number	Pass. Revenue Amount	Revenue Index	Population Number	Per Capita Index	Revenue Rides Per Capita Number	Per Capita Index	Pass. Revenue Per Capita Amount	Per Capita Index
1918	5.19	100	588,744,416	\$30,568,788	100	1,768,824	100	332	100	\$17.28	100
1919	5.20	100	655,841,381	34,739,590	113	1,796,301	101	371	112	19.34	112
1920	5.46	105	699,169,280	37,989,623	124	1,823,779	103	383	115	20.83	120
1921	6.54	126	633,614,768	41,416,998	135	1,836,497	104	344	104	22.55	130
1922	6.51	126	635,971,042	41,664,742	136	1,849,215	104	344	104	22.53	130
1923	6.53	126	676,606,277	44,234,060	145	1,861,933	105	363	109	23.76	137
1924	6.84	132	663,322,967	45,299,370	148	1,874,651	106	354	107	24.16	140
1925	7.56	146	659,477,206	49,892,965	163	1,887,369	107	349	105	26.44	153
1926	7.61	147	688,298,970	44,234,060	172	1,900,087	107	362	109	27.62	160
1927	7.66	148	656,693,274	50,362,420	165	1,912,805	108	344	104	26.33	152
1928	7.70	148	639,255,580	49,163,230	161	1,925,523	109	332	100	25.53	148
1929	7.69	148	635,986,263	48,898,612	160	1,938,242	110	328	99	25.23	146

*Passengers using 3-cent exchanges considered revenue passengers.
 Fares: To July 1, 1920—5 cents with 3-cent exchange and certain free transfers. Sept. 25, 1924—8 cents, 2 for 15 cents, 3-cent exchanges eliminated except in central district; rate in suburban zones 5 cents.
 July 1, 1920—Fare zones on suburban lines increased. Nov. 1, 1920—7 cents, 4 for 25 cents.

Boston—Boston Elevated Railway



Year	Average Fare Cents	Fare Index	Revenue Passengers* Number	Pass. Revenue Amount	Revenue Index	Population Number	Per Capita Index	Revenue Rides Per Capita Number	Per Capita Index	Pass. Revenue Per Capita Amount	Per Capita Index
1918	5.84	100	348,664,700	\$20,352,412	100	1,098,692	100	318	100	\$18.50	100
1919	8.86	152	324,758,685	28,767,544	93	1,111,990	101	292	92	25.80	138
1920	9.87	169	335,526,561	33,108,946	161	1,125,290	102	298	94	29.40	159
1921	9.56	164	337,252,080	32,253,630	159	1,137,259	104	296	93	28.45	145
1922	8.93	153	356,593,942	31,834,023	157	1,149,228	105	310	98	27.75	145
1923	8.71	149	382,149,697	33,297,952	164	1,161,197	106	329	104	28.65	155
1924	8.73	149	382,888,848	33,419,172	164	1,173,166	107	326	103	28.50	154
1925	9.26	159	365,036,286	33,790,442	166	1,185,135	108	308	97	28.50	154
1926	9.27	159	371,218,401	34,393,954	169	1,197,104	109	310	98	28.75	155
1927	9.27	159	366,938,908	34,000,571	167	1,209,073	110	304	96	28.15	152
1928	9.29	159	362,005,033	33,616,877	165	1,221,042	111	296	93	27.55	149
1929	9.28	159	354,214,990	32,885,588	167	1,233,011	112	287	90	26.65	144

Population includes—Boston, Brookline, Watertown, Cambridge, Belmont, Somerville, Arlington; and one-half of: Medford, Malden, Everett, Chelsea.
 Aug. 1, 1918—7 cents. Fares: To Aug. 1, 1918—5 cents.
 Dec. 1, 1918—8 cents. Nov. 5, 1924—10 cents, certain surface line short hauls 5 for 30 cents.
 July 1, 1927—10 cents, certain surface line short hauls 4 for 25 cents.
 July 10, 1919—10 cents. Transfers: Free throughout on full fares, none on short hauls.
 Nov. 14, 1921—10 cents, certain surface line short hauls 5 cents. School tickets: Since Dec. 1, 1918, 5 cents, transfers free.

its relation to the 1918 base figures, taken as 100, is likewise shown.

It will be seen that in the group of surface line cities where the 5-cent fare has been retained during the intervening years the revenue per capita has increased 5 to 10 per cent or more, while in the cities where the fares have been raised it has shown an average increase of 15 per cent. The more recent increases have not been as successful in raising the revenue curve as were the earlier increases.

The trend in revenue rides per capita has been upward to the extent of 5 per cent to 10 per cent or more in the 5-cent fare cities, but downward in the other cities, approximately 26 per cent. While the 5-cent fare has a greater appeal to patrons than the higher fares and builds up traffic, unfortunately it does not produce sufficient revenue under existing conditions. This is especially true when it is employed as a city-wide fare rate. In certain cities where unusual conditions prevail, exceptions to this rule may exist, but such instances are few and far between. In communities where the 5-cent fare continues in effect, the average number of rides for each inhabitant is about 40 per cent greater than in the other cities.

In Philadelphia and Boston, where a unified system of rapid transit and surface lines are operated under one management, the riding habit is notably higher and the passenger revenue per capita is higher than in cities served by surface lines alone. This is undoubtedly due to the faster service afforded by the rapid transit arteries in combination with the surface lines as feeders.

To secure increased revenues, the necessity of increasing and building up the riding habit is apparent. That this is possible is fairly well evidenced by the results

obtained in the communities where 5-cent fares are still in vogue. While various factors have contributed to this result the 5-cent fare has apparently been one of the most influential in attracting business. For, whether it be San Francisco, Covington, or Brooklyn, the per capita riding habit shows a similar upward trend, regardless of the steady increase in automobile competition and other adverse factors.

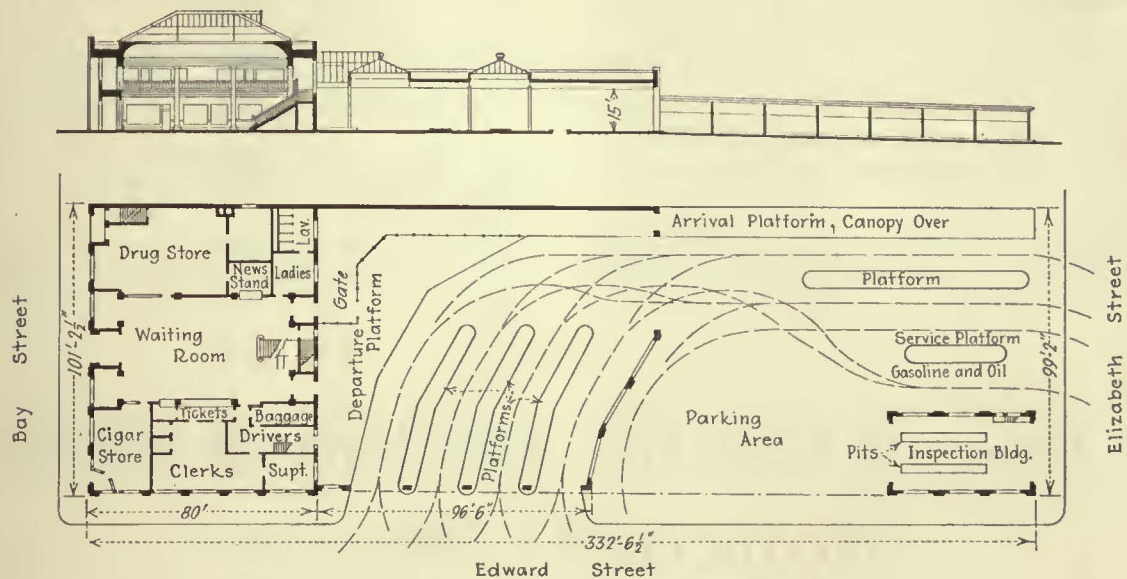
Horizontal fare raises unfortunately have had the cumulative effect of lowering the riding habit, encouraging competition, and stimulating walking. This loss in patronage has resulted in many instances in insufficient revenues, even where the rate of fare is regarded by the management as a maximum.

I believe the railways must hold fast to what they have and seek to regain the class of riders whose patronage has been lost through the policy of flat fare increases. Generally, the largest losses have been among the short riders. The short 5-cent zone method offers an opportunity to stimulate this class of riding. Already astonishingly large increases in zone patronage have resulted in a number of cities where the plan has been tried out.

This method is more flexible than the inner and outer zone plan which in many instances has been regarded as discriminatory by the public, and proved generally unpopular with the residents of the outer zones particularly. Again, zones based on distance alone, while technically fair and proper, have not been well received.

A system of unit 5-cent zones, properly laid out and superimposed upon an adequate basic city-wide fare, offers potential short-haul riders a more equitable and attractive fare without putting an undue burden on those who ride longer distances, and makes for greater simplicity of fare structure than other zone systems.

Toronto to Have Modern Bus Terminal



This modern interurban bus terminal is being erected to serve all the lines centering in Toronto

CONSTRUCTION of a modern terminal for interurban motor coaches, at an estimated cost of \$195,000 has been decided on by the Toronto Transportation Commission. Now the majority of the interurban coach lines running into Toronto operate from an uncovered loading area owned by the commission, at Bay Street and Edward Street. Passenger facilities are provided in rented premises adjacent. The growth of the business has been such that these facilities are inadequate, and construction of the new terminal on the same site will be commenced immediately.

The terminal will occupy a site 100x332 ft. on the south side of Edward Street stretching from Bay Street to Elizabeth Street. This site, purchased in 1928 for \$250,000, is extremely favorable, as it is located on Bay Street, one of the main north and south thoroughfares. It is removed from the congested traffic district but is within easy walking distance of the principal retail and business centers. It is only a few feet from one of the main cross-town street car intersections.

The main terminal building will be a two-story structure having a frontage on Bay Street of 100 ft. and a depth on Edward Street of 80 ft. At the rear, will be a one-story covered loading area, containing four driveways separated by concrete platforms. On the corner of Elizabeth and Edward Streets, there will be an inspection building containing two pits. The remainder of the property will be occupied by the arrival platforms, gas and oil facilities, and parking area for coaches.

Coaches will enter from Elizabeth Street, and passengers will be discharged at a covered arrival platform. Coaches will then proceed to the departure platforms in the covered area and will make their exit on to Edward Street. If a stopover is required, the coach, after unloading its passengers, will circle back into the parking area, or into the inspection building, or to the service platform, as required.

Entrance for passengers will be from Bay Street and access to the loading platforms will be at the opposite end of the building. The central waiting room will extend to

the full height of the building, with an ornamental skylight in the ceiling. The waiting room will be surrounded by an open mezzanine gallery which will be used as a lounge by passengers, access being obtained by a staircase at the west of the waiting room.

Information and ticket counters, baggage room and dispatcher's desk will be located along the north side of the waiting room. The remainder of this wing will accommodate the superintendent's office, clerical office and drivers' reporting office. Restroom and lavatory for women will be on the main floor and lavatories for men will be in the basement. The drivers' restroom and lavatory will be on the second floor, with direct access from their reporting room.

Space for a cigar store, a combination drug store and lunch counter, and a news stand have been reserved. With the exception of the drivers' accommodation, the entire second floor is available for rental as offices or showrooms, opening from the mezzanine gallery, but with direct stair to the street. It is anticipated that the rentals will pay a considerable proportion of the carrying charges of the terminal.

The exterior of the building will be faced with Queenston limestone, and the windows and spandrels, store front and street doors will be polished aluminum. The interior walls, columns and floors of the public space will be finished in Roman Travertine and all railing and other metal fittings will be aluminum or monel metal.

The companies at present using this terminal comprise the Gray Coach Lines, subsidiary of the Toronto Transportation Commission, the Toronto Greyhound Line, Collacutt Lines, Colonial Coach Lines and Toronto Bus Lines. The terminal facilities will be rented to the various coach lines. Ticket sales will be handled by the terminal staff on a percentage basis.

Coach movements at present average about 130 per day, with a passenger movement of 2,500. It is anticipated, however, that this will be substantially increased when the new terminal facilities are available, probably about Dec. 15, 1931.

In designing this terminal, the principal points kept in view as desirable were:

1. Through operation for the coaches without the necessity for backing up or maneuvering on the property.
2. Separation of incoming passengers from outgoing passengers. It will be noted that this is effected by means of an iron fence between the arrival platforms and the departure platforms, with separate door to each group.
3. Passenger platforms entirely roofed over to provide protection in all weather.
4. Adequate accommodation for parcel and baggage handling. Baggage will be handed by the passenger through the wicket between the waiting room and the

baggage room, where it will be checked and delivered to the driver or baggage porter at another wicket leading in to the drivers' reporting room and thence conveyed direct to the departure platform.

5. Restroom and lavatory accommodation for drivers and mechanics separate from public facilities.
6. Parking accommodation for coaches making short stopovers.
7. Covered inspection and servicing facilities for coaches, located as far as possible from the passenger loading area.
8. Reservation of as much area as possible in the building for rental to concessions and stores.

Cost of Fuel for Auxiliary Services Reduced 27 Per Cent

Study of fuel consumption for heating offices, shops, carhouses, substations, etc., of the Montreal Tramways has resulted in substantial savings

By F. A. COMBE

Consulting Fuel and Steam Engineer
to Montreal Tramways

HOW substantial savings can be effected by special attention to the operation of auxiliary services is shown by the results of a study of the fuel and heat consumptions and costs at the various plants, offices, shops, carhouses, substations, etc., of the Montreal Tramways. With the assistance and advice of a fuel and heating specialist acting in co-operation with the company's officials and staff, a concerted effort was made to reduce costs of this kind during the past winter. Without any expenditure for new equipment and with but minor changes made to grates and furnace settings by the company's maintenance department to permit the use of different fuels, the reduction in fuel costs for the winter season of 1930-1931 amounted to nearly \$15,000, or 27 per cent of the previous figure. An incidental benefit has been the almost complete elimination of smoke.

Efficiency and economy in the burning of fuel and usage of heat is dependent, to a great extent, upon the

Comparison of Fuel Costs 1929-1930, and 1930-1931

	1929-30	1930-31	Saving
Carhouses.....	\$32,724.77	\$24,239.10	\$8,485.67
Youville shops.....	11,704.00	8,684.00	3,020.00
William Street garage.....	3,399.50	2,393.79	1,005.71
Substations.....	3,156.54	1,963.30	1,193.24
Ticket offices.....	1,998.70	1,376.85	621.85
Yard buildings and shanties.....	2,257.89	1,761.32	496.57
	\$55,241.40	\$40,418.36	\$14,823.04

NOTE: The average outdoor temperature in Montreal for the heating season, from Oct. 1 to April 30, was 31.5 deg. F. for 1929-1930, and 33.2 deg. F. for 1930-1931—a difference of 1.7 deg. F.

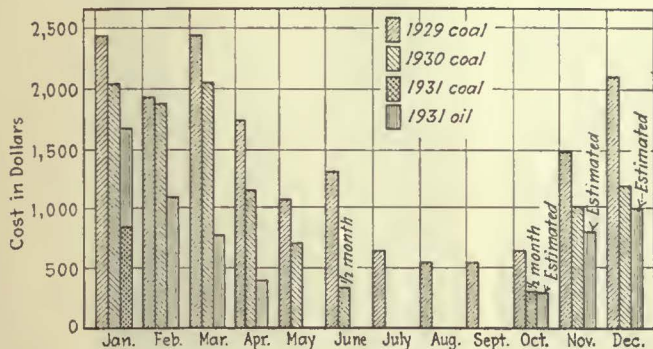
personal element rather than the design of equipment. Even with the best selection of fuel, boiler settings and heating systems, much must depend upon the "man behind the gun," in the regulation of supplies, supervision of operation and use of steam, heat and power.

In this campaign, the general storekeeper, acting in collaboration with the consulting engineer, was entrusted with the supervision and regulation of fuel supplies to the different heating plants and the utilization of the cheaper fuels in substations, offices and small buildings. The chief operating steam engineer was responsible under the consulting engineer for the operation of the main steam station and boiler plants. Care was taken by the car barn superintendents and those in charge of offices and buildings in the regulation and use of steam and heat.

At four of the six carhouses, and at the Youville shops, the heating plants are old, with horizontal return-tubular boilers set low and hand fired. The fuel used in the past was bituminous r.o.m. coal alone, or mixed with anthracite screenings. These boiler plants, although not efficient, are typical of the large majority of heating plants in general use on the property. The two other carhouse boilers are fired with fuel oil.

The fuel was changed to coke breeze mixed with bituminous slack at three of the coal-fired carhouse boilers and at the William Street garage, with modifications to the grates where necessary. No change was made to the oil-fired boilers, nor in the fuel for Youville shops and one carhouse, as extensive remodeling was under consideration at these plants.

The boilers at the Youville shops which are worn out are being replaced this summer by a modern oil-fired boiler plant. It is planned also to change the grates to burn coke breeze at the remaining carhouse. With these and other modifications, overhauling, and oil delivery cost reductions, it is estimated that a further saving will be made next heating season in excess of \$7,000, making a total reduction of 40 per cent on past years fuel cost.



Fuel costs of stand-by service at Hochelaga Power House have been reduced from \$16,892 in 1929 to \$10,702 in 1930 and an estimated figure of \$6,000 for 1931

In the substations, ticket offices and small buildings, a change in fuel from the high-priced grades of anthracite previously used to a lower priced coke was made wherever possible. This change was made by trial during the course of the heating season, and will be made more general next winter as the operators become accustomed to its use. Many of the savings made with the smaller furnaces were due to careful supervision and instruction irrespective of change in fuel.

An example of one of the minor items, not included in the foregoing figures, was saving made in heating of domestic water for the company's head office building. During the summer months when the steam heating system is not in service, water for lavatory and washing purposes had been heated by an automatic gas heater costing about \$100 per month. A jacket heater was installed to burn a small grade of anthracite in place of the gas heater, with the result that the cost has been reduced to about \$20 per month.

The Montreal Tramways uses hydro-electric power entirely for the ordinary operation of their system, with a steam station for partial stand-by service held in reserve. Last summer, the steam plant was closed down for three months during the time when the chance of interruption to the hydro power would be remote. In order to reduce the banking fuel charge when the station was in reserve service, two of the smaller boilers in the plant were changed over to burn fuel oil with booster oil burners installed under two of the large coal-fired boilers to enable steam to be raised quickly in case of emergency.

As a result of these changes, together with other operating economies, the fuel cost for the year 1929 was \$16,892, for 1930 \$10,702, and for the present year (partly estimated) it will be around \$6,000.

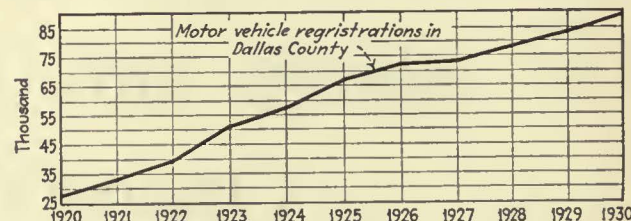
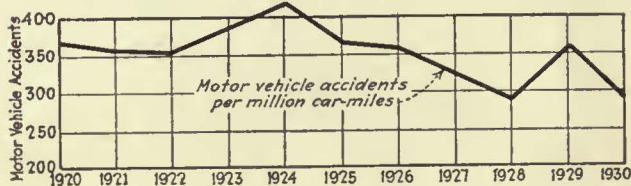
A study made of the possible utilization of off-peak hydro-electric power shows that under the conditions existing on this system, it would be profitable to install electric steam boilers in conjunction with oil-fired boilers at some plants of higher steam pressure, and to use electric boilers or heaters with steam or liquid storage

accumulators at other points as best suited to the local requirements and where conditions are favorable.

At the Youville shops, where power lines and sufficient transformer capacity is available, the cost of installation of an electric boiler with connections would be approximately \$9,500, and it is estimated that the saving resulting from its use in conjunction with the new oil-fired boilers would amount to \$3,550 per year. With a deduction of 14 per cent for fixed charges on the investment, this leaves a net clear saving of \$2,220 per year. The selection of new boiler equipment being installed this summer has been made to suit such a combination with electric steam generation, but it is not proposed to install the electric boiler at the present time.

Many other opportunities exist for savings and economies in the auxiliary services of fuel, power and heat. Improvements to and tuning up of the heating piping systems and method of heat supply are being taken care of steadily without big expenditures. The policy is to work forward step by step. Each step taken in the way of major boiler replacements, new equipment or change to fuel oil, as at the steam stand-by station and some carhouse plants, is in line with a definitely considered final plan.

Accidents Reduced with One-Man Operation at Dallas



Accidents have been reduced at Dallas despite higher operating speeds and a large increase in motor vehicle registrations

HIGHER speed of street cars with fewer motor vehicle collisions is shown in the ten-year record of the Dallas Railway & Terminal Company, in spite of a tremendous increase in motor vehicle registrations. As approximately two-thirds of the car-miles are operated by one-man cars, this is another demonstration of what can be accomplished with cars of this type. The purchase of safety cars of both the Birney and Peter Witt types has played an important part in this record. Double-truck, two-man cars have also been rebuilt for one-man operation in the shops of the company. A comprehensive program of track rehabilitation and regular maintenance has been carried on and equipment is consistently maintained.

It is a notable fact that this achievement is not the result of specific safety campaigns so much as it is the result of care shown in selecting and training operators. Constant vigilance is exercised by the management and drastic action follows when there is a violation of rules.



Results of Wear on Open-Point Mates in Cleveland

1. Cast-steel, keyed-in, hard-center mate which was placed in service in Cleveland April 27, 1914, the photograph being taken Feb. 2, 1931. This mate is designed with the long floor tapers, which practice has been discontinued. During the time it has been in service, the operation over the straight run has been practically negligible, being limited to occasional work train operation or relatively infrequent emergency rerouting. As nearly as can be determined,

the curved run has carried approximately 4,525,000 wheel passes, while that over the straight run has only been about 20,000 wheel passes. It has never been welded and, so far as can be determined, has never been ground.

2. Mate with present standard floor depths and tapers. This was installed on May 21, 1928, the photograph being dated Jan. 22, 1931. At the latter date, the straight run had carried approximately

1,866,000 wheel passes, while the curved run had carried only about 7,800 wheel passes.

3. Another mate in the same layout as that shown in Fig. 2, and installed at the same time, but where there has been a more uniform distribution of car movements between the curved and straight runs. In this instance the straight run has carried about 548,000 wheel passes, while the curved run has carried approximately 342,000 wheel passes

Flange and Tread Wear on Open-Point Mates

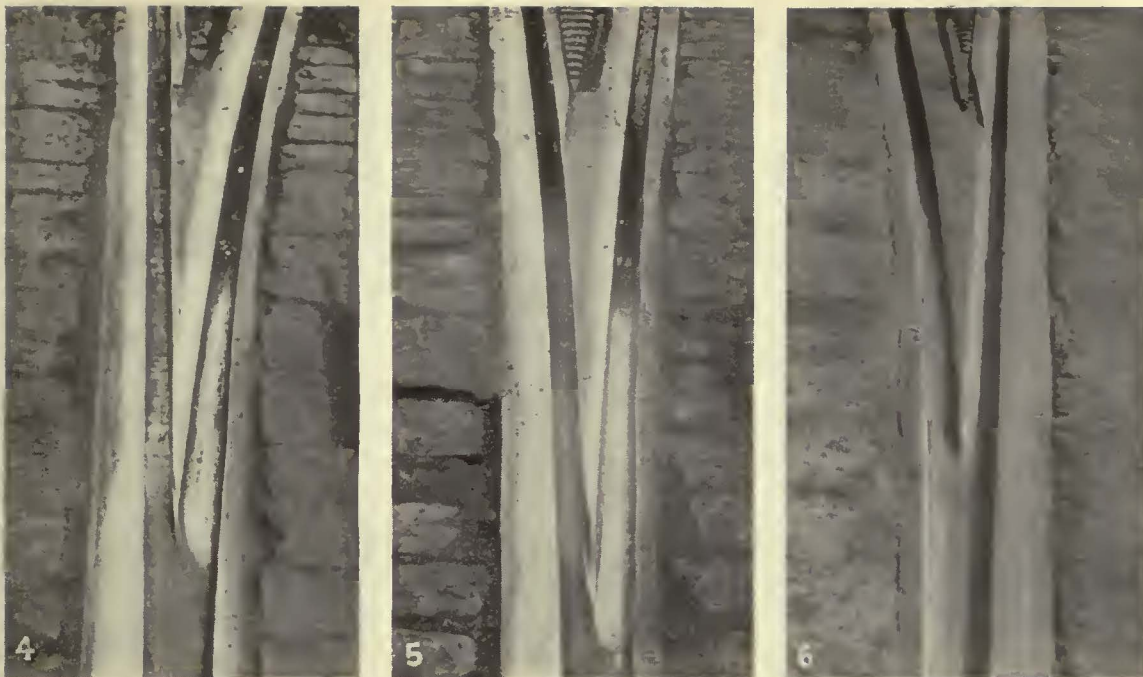
By H. H. GEORGE

Superintendent of Way
Cleveland Railway

PROBLEMS of maintenance arising from flange and tread wear on open-point mates or open-point switches have always been more or less troublesome. The problem is more serious where car movement predominates to a marked extent through one run with only occasional operation through the other. If such occasional operation is confined to emergency rerouting, it quite often happens that grooves worn by the wheel flanges in the mate floor have progressed to the point where the wheels will not take the opposite run, in which event serious delays may result.

It has been customary to provide either a level flange-bearing floor through both the straight and curved runs past the mate point, or a floor-level in the straight run only slightly below the flange-bearing level in the curved

run, easing these off by means of various tapers to the full groove depth in each direction. There has been considerable variation in the distance that the respective floor levels have been carried in each direction from the mate point before starting to taper down to full depth of groove. Every street railway maintenance engineer knows that where the original design provided initial flange bearing through both curved and straight runs, and operation predominates through the straight run, it is only a short time before an appreciable groove is worn in the floor of this run. If the normal maximum traffic is through the curved run, then the wear is in the form of a double groove in the mate floor in the curve, the front-wheel flange cutting a groove close to the gage side of the rail, while the rear-wheel flange cuts its



Results of Wear on Open-Point Mates in Cleveland

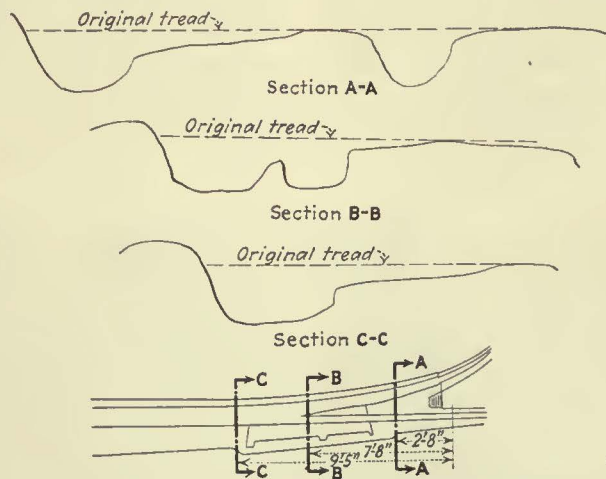
4. Mate at another location in Cleveland where the distribution of wheel movements has been in a somewhat different ratio. This mate was installed on May 14, 1929, the photograph showing the condition as of Jan. 25, 1931. In this instance, the straight run has carried approximately 1,850,000 wheel passes, while those through the curved run equal about 785,000 wheel passes.

5. A 20-ft. equilateral mate where the traffic distribution through the two runs has been practically uniform. This mate was installed Sept. 30, 1918, the date of the photograph being Feb. 2, 1931. The right-hand run in this case had carried about 1,040,000 wheel passes, while the left-hand run had carried about 1,200,000 wheel passes.

6. Mate under traffic confined almost entirely to the straight run. This was installed Nov. 2, 1924, the photograph being taken on Feb. 25, 1931. During this time, the straight run has carried approximately 6,850,000 wheel passes. The movements over the curved run have been limited to an occasional work train or a rather infrequent emergency rerouting.

groove close to the guard side. As flange wear progresses on the guard side of the switch tongue opposite the mate, the rear wheel flange will gradually tend to wear down the ridge between the two grooves, while the front wheel flange will gradually widen the groove next to the gage. The characteristic wear will, of course, vary with the wheel contours and diameters, as well as with the varying relation between the track gage and truck wheelbase, but the condition described will be found in a modified form in every instance where the operation is of the kind mentioned.

As flange wear develops in the floor leading to the curved run, flange bearing finally disappears entirely and tread bearing comes into play, with the wheel treads gradually cutting into the top of the mate as the width of tread bearing is gradually decreased by reason of the wheels moving over into the curve. On some properties, an attempt has been made to improve conditions by making the mates flange-bearing through the curved run only. Various means are used to accomplish this, differing principally in the distance ahead of and back of the mate point that the flange bearing is continued, and also as to the taper used to run off this flange bearing area.



Wear profiles of various sections through mate with long floor tapers shown in Fig. 1

A number of years ago, the Cleveland Railway began some experiments with a mate design where flange bearing was provided in the curved run only. This flange bearing was curved well ahead of the mate point, and was tapered off to meet the floor level in the straight run by means of a long taper, which brought the two floor levels together well out in the straight run. While this was an improvement over the old practice of flange bearing in both runs, it was still found that, when the heaviest traffic followed the straight run and head wear progressed, it was only

a short time before a groove began to develop in the straight run floor, and that grinding or welding had to be resorted to in order to operate through the curve. Where the heaviest traffic was through the curve, the double groove previously referred to made its appearance much sooner, and because the two floor levels came together well out towards the straight run, car operation through the opposite run was affected much sooner. It was recognized that this feature of the mate design was responsible for the rapid flange wear.

After a thorough trial of this design, it was decided to carry the experiment still farther by shortening the

length of the level floor in the curved side ahead of the mate point and also by appreciably shortening the distance in which this flange-bearing floor level was tapered down to the level of the floor in the straight run. The level in the mate floor in the curved side was ended opposite the $\frac{3}{8}$ -in. point, the depth of groove in the raised floor section of the curve being $\frac{1}{2}$ in. or $\frac{1}{8}$ in. less than the flange depth. From the $\frac{3}{8}$ -in. mate point, this flange bearing in the curve was tapered down to the $1\frac{1}{8}$ -in. depth of floor in the straight in a distance of $5\frac{1}{2}$ in. The $1\frac{1}{8}$ -in. floor depth in the straight was determined by adding $\frac{3}{8}$ in. to the $\frac{7}{8}$ -in. depth of the interurban flanges. The flange bearing level in the curved run was continued back of the mate point for a distance of $19\frac{1}{2}$ in., and was

then tapered down to the $1\frac{1}{4}$ -in. groove depth of the rail section in a distance of 3 ft. The $1\frac{1}{8}$ -in. depth in the straight run was continued for a distance of 17 in. ahead of the point where the taper from the curved run ended, and this was then tapered off to the $1\frac{1}{4}$ -in. groove depth of the rail section in a distance of 15 in.

This design is proving very satisfactory. In no case has it been found necessary either to weld or grind any of these mates during their period of service. A careful inspection in the field shows that we could either reverse the direction of operation or could change the operation to the opposite run without the slightest risk of derailment and without the necessity for any welding or grinding.

Mercury Rectifier Substation Operates on 25 or 60 Cycles

By R. D. BRACKETT

Transportation Engineering Department
General Electric Company

VERSATILITY of the mercury vapor rectifier is seen in its adoption by the Eastern Massachusetts Street Railway for use on either a 25-cycle or a 60-cycle alternating-current circuit in its Fall River substation. The installation is unusual in that power may be furnished either from the 13,200-volt 25-cycle system of the railway or from the 22,900-volt, 60-cycle system of the Fall River Electric Light Company. The rectifier operates equally well on either frequency, and the transformers were designed to give successful service on either frequency at about the same cost as standard 25-cycle transformers. In the present instance, the numerical relation existing between the two voltages made it possible to transfer quickly from 25 cycles to 60 cycles by disconnecting the high-voltage winding of the main transformer and changing from a delta to a Y connection. Since the control power frequency is also changed, some of the rectifier auxiliaries must be changed over by a double-throw lever switch in the control circuit. Each of the three rectifier equipments forms a complete independent unit, consisting of the rectifier tank and auxiliaries, main transformer, interphase transformer and manual switchgear equipment. The main connections are shown in the diagram. The substation installation also includes a bake-out transformer, bake-out resistor, resonant shunt, direct-current negative reactor and 25-cycle and 60-cycle single-phase auxiliary power transformers as part of the rectifier equipment.

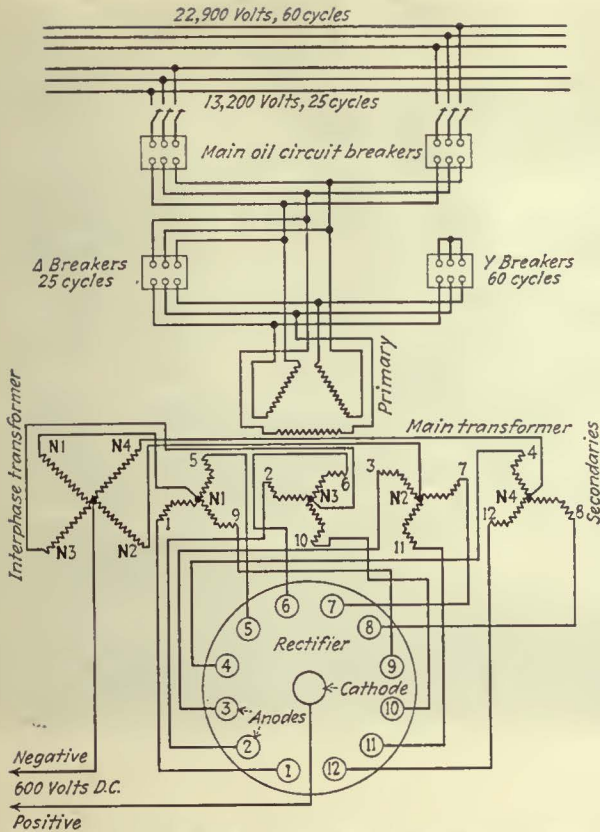
The three mercury arc rectifiers are each rated 1,000 kw. at 600 volts. They are General Electric Type RDW twelve-anode tanks. They are of standard construction, and carry the standard railway load guarantees of 150 per cent load for two hours followed by 200 per cent load for one minute. Direct-current excitation for each rectifier is furnished by a 60-volt, $\frac{1}{2}$ kw., d.c. generator direct connected to both a 25-cycle and a 60-cycle, 220-

volt single-phase motor. The rotary vacuum pump also has two separate motors.

Main and interphase transformers for each rectifier are of the oil-immersed, self-cooled outdoor type. The main transformers are each rated 1,065 kva. nominal, 13,200/22,860 volts. Both ends of each phase of the high-voltage winding are brought out so that either delta or Y connection may be made at will. Four taps approximately $2\frac{1}{2}$ per cent below normal for full kva. capacity with ratio adjusters are provided in the high-tension winding. There are four low-voltage windings, each of one-fourth capacity, arranged quadruple zig-zag for twelve-phase connection to the main anodes. The four neutrals are brought out for connection to the interphase transformer.

The resonant shunt consists of six resonant circuits tuned to trap the interfering harmonic frequencies. Each of these circuits is made up of an inductance in series with a capacitor, connected between the positive bus and the negative bus on the rail side of the d.c. negative reactor. Since the rectifiers operate on 25 or 60 cycles, three of these tuned circuits are provided for each. For 25 cycles they are tuned for 300, 600 and 750 cycles, or the twelfth, 24th and 30th harmonics, and for 60 cycles they are tuned for 360, 720 and 1,080 cycles, or the sixth, twelfth and eighteenth harmonics. By proper design of the six inductance coils it is possible to use the same set of capacitors on either frequency, so the change-over may be made with a triple-pole double-throw lever switch.

The three d.c. rectifier switchboard panels are standard, as are the d.c. feeder panels. The auxiliary control equipment for each rectifier is located on the a.c. and d.c. auxiliary panels. The switchgear equipment is for manual operation, although there is provision for automatic control of the anode heaters after the control switch is closed and the rectifier is in operation, and



Comparatively simple connections make it possible to operate the Fall River substation at either 25 cycles or 60 cycles

for automatic control of the rotary oil-seal vacuum pump by means of the vacuum regulating equipment. Special equipment on these panels includes 25-cycle and 60-cycle underload relays to control the anode heaters, 25-cycle and 60-cycle auxiliary anode heater contactors, and 25-cycle and 60-cycle auxiliary contactors for the rotary vacuum pump motors.

A separate control transfer panel carries a four-pole double-throw lever switch and four fusible cutouts. In

one position this switch connects the 220-volt side of the 13,200-volt, 25-kva., 25-cycle, single-phase auxiliary transformer through fuses to the 25-cycle or 60-cycle common control bus and the 25-cycle control bus. In the other position it connects the 220-volt side of the 22,900-volt, 25-kva., 60-cycle, single-phase auxiliary transformer through fuses to the 25-cycle or 60-cycle common control bus and the 60-cycle control bus.

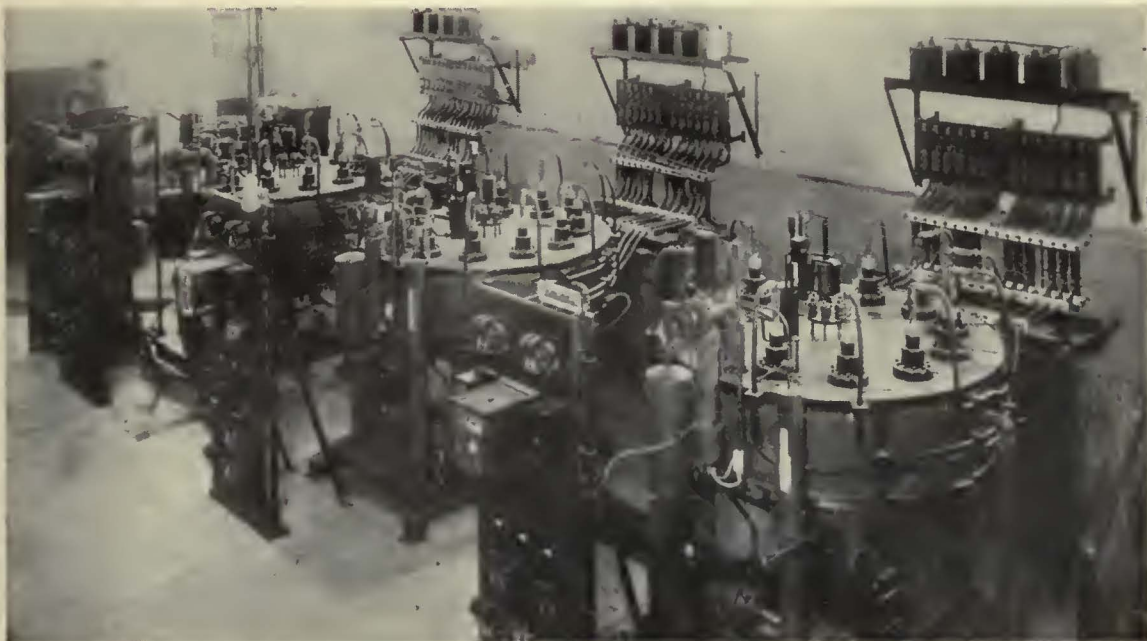
Three 60-cycle and three 25-cycle a.c. transformer and rectifier panels are located alternately beginning at the left end in the steel a.c. switchboard. Upon each are mounted ammeters, watt-hour meters, overload relays and twin pull-button control switch.

Since the 60-cycle system has a grounded neutral there are three overload relays for the 60-cycle panels. The 25-cycle system is not grounded, so there are only two overload relays.

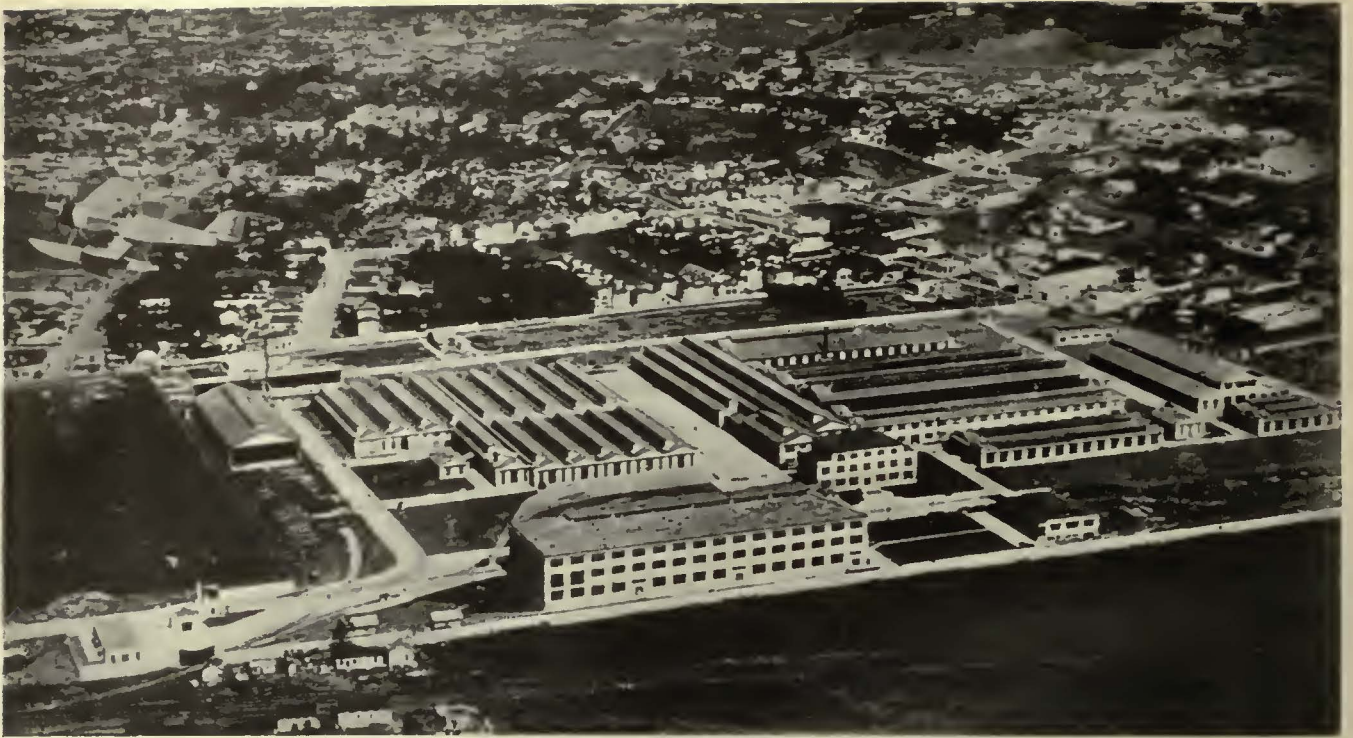
Each of the rectifier equipments has four oil circuit breakers, consisting of a 25-cycle and a 60-cycle motor-operated main breaker and two solenoid-operated non-automatic breakers for changing connections. These breakers are electrically interlocked so that when one set of circuits is closed it is impossible to close the other.

Manual control of these rectifier equipments is made simple by means of the different control buses. In addition to the 125-volt, d.c. control bus from the station battery, three separate 220-volt a.c. control buses are provided, only two of which are used at one time. One of these is a common 25-cycle or 60-cycle control bus used on either frequency to supply power through insulating transformers to the mercury condensation vacuum pump heaters and to the anode heaters. The 25-cycle control bus supplies power to the 25-cycle motor of the rotary vacuum pump, the 25-cycle motor of the arc-striking set, and the 25-cycle tungar rectifier used for charging the small 6-volt storage battery which furnishes excitation for the thermal vacuum gage. The 60-cycle bus supplies a similar set of devices.

The main advantages of rectifiers over synchronous converters for this substation are their adaptability to operation on either 25 or 60 cycles, higher over-all efficiencies at the lighter loads, and no noise or vibration.



Standard mercury vapor rectifiers are used without modification



Erection of modern railway shops marks a step in the industrial progress of the Brazilian capital

New Shops *for Rio de Janeiro*

REPAIR and maintenance of cars and buses, and the repair and maintenance of heavy machinery, generators and transformers, as well as the manufacture of many parts of equipment and supplies used by the Rio de Janeiro Tramway, Light & Power Company, Ltd., and its associated companies have been centralized in an extensive new plant. The company controls and operates the public utilities in Rio de Janeiro, including the street railway, bus system, lighting, power, gas and telephone services. The new plant, completed in 1930, was built on 35 acres of land. It was planned for efficient production methods and equipped with modern machinery to meet the demands of the extensive operations of the company and to provide amply for future growth. The stores department, which previously operated at six locations, will also be centralized with its general offices at this new plant.

The new shops were designed and constructed by Dwight P. Robinson & Company of Brazil, Inc., a division of United Engineers & Constructors, Inc., after a careful study, made in co-operation with the company officials, of possible operating economies which could be obtained by centralization of activities. The requirements of the new shops were outlined as follows:

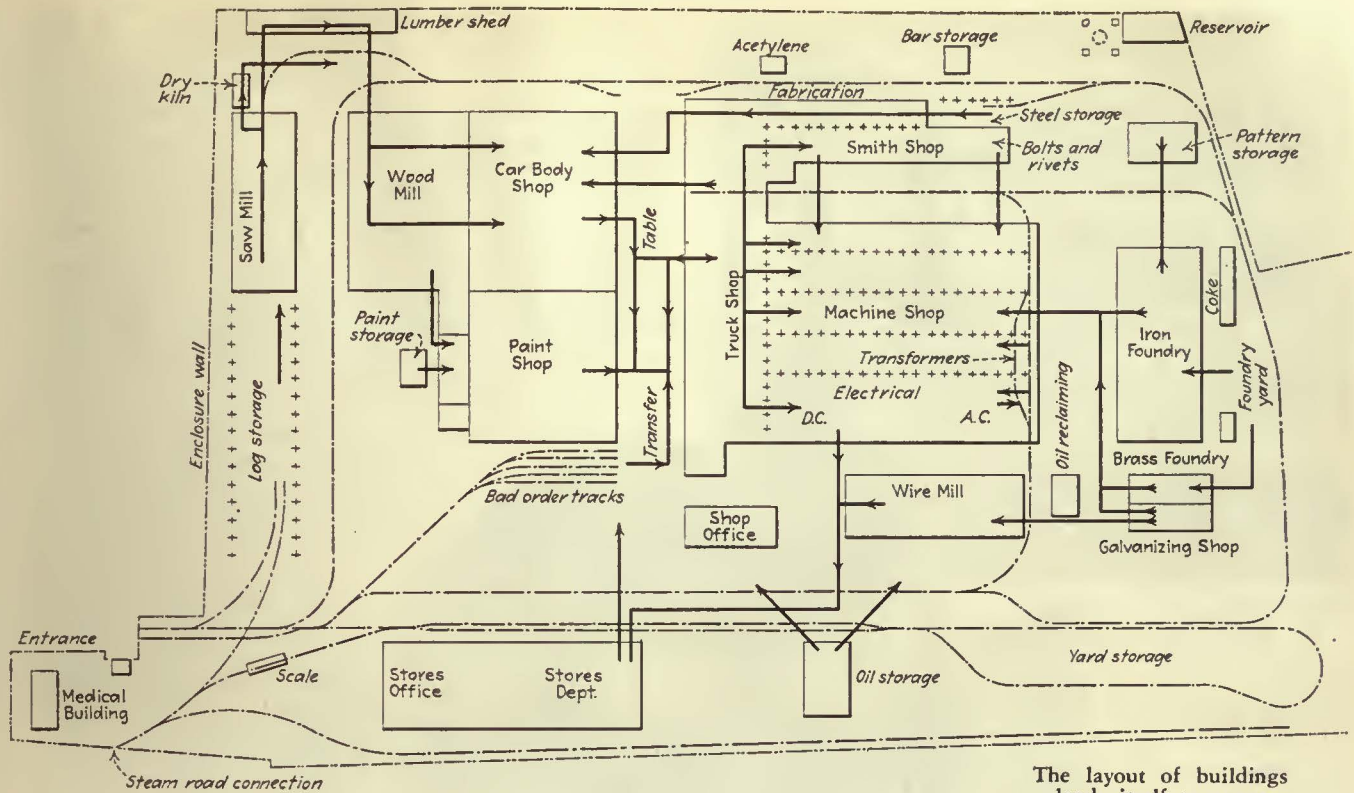
1. Maintenance of 1,000 cars
2. Maintenance of 200 buses
3. Construction of new steel cars and buses
4. Repair and maintenance of heavy machinery, generators, motors, transformers and an exclusive variety of equipment

Maintenance and manufacturing activities have been grouped in one extensive plant. Lay-out developed to co-ordinate activities and to secure all possible economies

5. Manufacture of equipment and supplies used by the associated companies
6. A complete mechanical and testing laboratory
7. Centralization of the general stores and stores offices in close contact with the new shops

In the layout of the new shops, including the grouping of buildings, locating the various departments in each building and the arrangement of machine tools and mechanical equipment, every possible advantage was taken to apply the principles of modern production methods to the maintenance and construction of cars and buses, and the manufacture of a great variety of parts and supplies. Studies of the flow of work throughout the plant were made, and particular attention was given to the grouping of buildings and departments so that all work in process would move progressively and rapidly from one operation to the next with a minimum of interference, cross routing or back tracking.

The machine tools and mechanical equipment throughout the plant consist of approximately 700 items, of which 475 are new equipment. All new machine tools are individually motor driven, and embody the latest



The layout of buildings lends itself to a properly co-ordinated system of production control

Planned and Equipped to

Reduce Costs

improvements and time-saving devices. The grouping of the machine tools was determined by the character of the work. Where processes are continuous, the tools are arranged in a continuous line; where the work is varied, as in the general machine shop, machine tools are grouped by kinds, such as lathes, drills, milling

machines, etc. Ample space has been made available for additional tools of like kind in their respective groups.

Careful consideration was given to the movement and handling of raw material and work in process. Service tracks reach all parts of the yard and extend into several departments. Siding connections with narrow and standard-gage steam railroads are provided for the stores department and the log storage yard. Several departments are equipped with overhead cranes, jib cranes or monorails. A fleet of storage battery lift trucks is used for the movement of material throughout the plant; these are supplemented by hand-lift trucks for handling work in process. All departments have spacious aisles to permit rapid and easy handling of material in or through the departments. All buildings of the plant are connected by concrete-paved roadways.



Machine shop for car and bus repairs. On the mezzanine floor is the sheet metal shop

The buildings were designed for



Special equipment is installed in the wood mill to handle the native hard woods

At right — The non-ferrous foundry has three 200-lb. electric crucible furnaces



a tropical climate, providing ample ventilation and light, but shutting out as much as possible the direct rays of the sun. This was accomplished by the use of saw-tooth roof construction on the one-story buildings, with vertical glass facing south or east. Most of the shop buildings are one story high, with structural-steel frames. The inclosing walls consist of reinforced-concrete base walls surmounted by brick walls, having stucco on the outside and plaster on the inside. All floors are laid on a base of reinforced concrete. The concrete floor bases in the machine shop, truck shop and galvanizing building are surfaced with treated wood blocks to resist the heavy wear and trucking in those departments. In the saw mill, wood mill, car erecting shop and wire mill, floors are surfaced with asphalt. In all other departments, the floor base is surfaced with a cement finish.

The roofs of the shop buildings, having a slope of $4\frac{1}{2}$ in. in 12 in., consist of precast interlocking cement tile supported directly on the steel purlins. The storehouse, oil storage, pattern storage, medical building and gate house are of reinforced concrete construction.

Most of the new tools are driven by individual motors on a 220-440 volt, three-phase, 50-cycle power circuit. Group drive through shafting was used in some cases. The machine tools in the old shops were driven by motors on a 220-volt, three-phase, 50-cycle power circuit. As it was planned to transfer the more modern machine tools to the new shops, a study was made of the relative economy of 220-volt and 440-

volt operation. The use of 440-volt power was found to be lower in first cost and more economical. It was, therefore, decided to adopt 440 volts for the new shops and to rewind the old 220-volt motors which were transferred from the old shops. The hazard of the higher voltage was eliminated by grouping the control equipment out of reach of the machine operators.

POWER SUPPLY AND DISTRIBUTION FOR SHOPS

The electrical installation consists of two incoming 6,000-volt lines and four outgoing feeds to the power and lighting transformers, fire pumps and high-tension testing department. The main switchboard is divided into three separate sections, one for 6,000 volts, one for 440 volts and one for 217-125 volts for lighting. The high-tension board controlling the duplicate incoming 6,000-volt lines is separated from the low-tension board by a fireproof wall. Both the incoming 6,000-volt feeders and the low-tension feeds are lead-covered and run in underground ducts.

The high-tension board is equipped with heavy-duty oil circuit breakers and hand-operated rear-mounted disconnecting switches. The low-tension power and lighting boards are divided into two groups facing each other. This compact arrangement permits lining up the switchboard with the bank of outdoor transformers. The substation is located close to the

load center of the group of shop buildings.

The fire-pump motors take their power from a third independent 6,000-volt overhead feeder which does not enter the shop. This power is stepped down to 440 volts through step-down transformers. With a connected power load of approximately 5,000 kva., the new load factor was estimated to be 30 per cent as compared to the observed load factor of 27 per cent in the old shops. The connected lighting load is 800 kva., and provision was made for a load factor of 75 per cent. The entire electrical installation was made in accordance with the National Board of Fire Underwriters' electrical code.

Following the policy of the company to provide



All machine tools in the wheel and axle shop are served by jib cranes or by the large overhead crane

attractive working conditions for the employees, the equipment of the plant includes a medical dispensary with a first-aid room and a doctor in attendance, who also prescribes for the families of the employees. Cafeterias with complete kitchen equipment were installed for furnishing luncheons at low cost to the workmen. The locker rooms are equipped with individual lockers of precast reinforced-concrete slabs. Circular wash fountains and shower baths have been placed in all buildings. Washrooms, toilets and drinking fountains are placed at locations easily accessible from all parts of the shop. Floors and walls of the locker rooms are finished in tile so that they may be cleaned readily as an aid to sanitation.

ROUTING WORK IN CAR MAINTENANCE AND REPAIR

In car repairs and scheduled overhauling, cars enter the truck shop by way of the transfer table, where the car bodies are raised by hoists and the trucks removed directly to the truck repair stand. The car bodies are then lowered on dummy trucks and pass across the transfer table to the car repair shop for body repairing. From there, the cars are taken to the paint shop for cleaning and painting, and are returned to the truck shop, where they are placed on the repaired trucks. The truck shop is two bays wide, having sixteen tracks in the first, or outside, bay. Five of these tracks are equipped with car body hoists. The floor in this section is 18 in. below the top of the track rails to permit easy access to the equipment under car bodies. Four tracks are equipped with drop pits, and one with a car body straightener. A sandblast room is located in one corner of the truck shop.

Trucks removed from the car pass into the second bay, where they are placed on stripping stands by a 10-ton crane. Stripping is done by jib cranes with electric hoists. The motors are removed and passed to the motor-overhauling section. Mounted wheels pass through the wheel and axle shop, closely adjacent to the stripping stand, where all wheel and axle work is done. Trucks are cleaned and dip-painted in tanks located near the stripping stand.

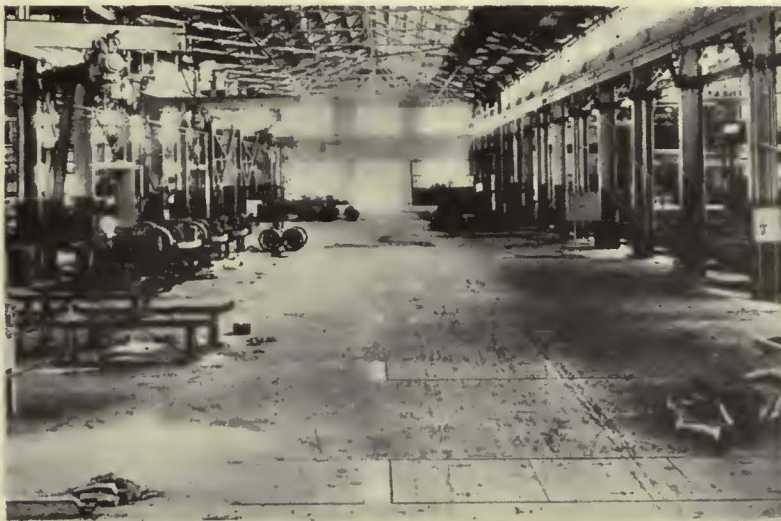
Wheels with badly worn flanges pass to the welding section of the smith shop, where the flanges are built up by automatic electric welding machines. Badly worn journals are similarly built up. The parts are then annealed in a car-type annealing furnace and returned to the wheel shop for machining. Worn or damaged miscellaneous car and truck parts are repaired in the welding shop, which is equipped for both oxy-acetylene and electric welding.

Air-brake equipment is removed from cars in the truck shop and transported to the air-brake overhaul depart-

ment, where air compressors, cylinders, valves, etc., are reconditioned and tested and then returned to the truck shop. The equipment and facilities in both the air compressor overhaul section and the air-brake department are arranged in a straight line for progressive operation.

The wheel and axle shop is equipped with two wheel lathes, two journal-truing lathes, two wheel borers, an electric tire heater, two wheel presses, an axle centering machine, an axle straightener, two Lo-Swing axle lathes with multiple tools cutting simultaneously, an axle grinder and a wheel grinder. All of the above equipment is of the heavy-duty, high-production type, arranged for a minimum handling of material between operations. All tools are served by jib cranes or an overhead crane.

The motor overhaul section is equipped with facilities for overhauling and testing motors. Housings are removed from the motor frames and pass to the bearing press where the bearings are removed. The armatures pass directly to the armature overhaul section of the



Five tracks in the truck shop are equipped with car body hoists

electrical repair shop, where they pass progressively through the following operations: cleaning, stripping, rewinding, banding, baking, commutator turning, smoothing and slotting. The armature baking ovens, which are of the latest type with full automatic heat control, are in a fireproof room located in the production lines. In this room are also located the coil-impregnating tanks and the varnish tanks for dipping

armatures. Armatures when rewound are returned to the motor overhaul section where they are assembled and put on test. The coil winding department supplies new armatures and field coils when needed, and repairs controllers, circuit breakers, switches, brush holders and other items of electrical equipment.

All machine work for car repair is done in the south end of the light machine bay, adjacent to the truck shop. This department is fully equipped with suitable machine tools and assembly benches. A well-equipped sheet metal shop is located on the mezzanine floor in the light machine bay. On this floor are also located the trolley bow repairs, fare register and coin box sections.

When car bodies are delivered to the car repair shops, the controllers and other items of electrical equipment, fare registers, curtains and trolley bows are removed from the cars and delivered to their respective departments for replacements or repairs. Car body repairs are expedited by keeping reasonable stocks of standard wood body parts, storage for which has been provided in the car body shop. Parts not carried in stock are quickly obtainable from the wood mill. The curtain and upholstery shop is located on a mezzanine in the wood mill.

When body repairs are completed, the cars are trans-

ferred to the paint shop, which is equipped for either brush or spray painting. All cars, however, are brush painted as they are of the cross-bench open type. Buses are spray painted with Duco in a room equipped with the latest ventilation system. Spray booths are provided for painting miscellaneous parts of cars and buses. Paints are stored and mixed in a separate building adjacent to the paint shop.

The company operates approximately 200 buses, including single and double-deck types. While the buses are maintained at the company's main garage, the manufacture of replacement parts and repairs to various units are done at the new shops. Part of the output of the general machine shop is for motor, transmission, drive and other miscellaneous bus parts. Included in the equipment for doing this work are milling machines, broaching machines, gear hobbers, automatic turret lathes, etc. The electrical repair shop does all the repair work for the starting, lighting and ignition system. The sheet-metal shop supplies miscellaneous body parts; this department is equipped with special tools for automobile and bus body work, including a Crown rolling machine for forming bus fenders. The forge shop, foundry and electroplating departments also devote a portion of their activities to the maintenance and repair of buses.

The saw mill supplies lumber for the shop and for other requirements of the system. Logs are received in the log yard either by truck, steam railroad or service cars. They are unloaded and stored by overhead cranes which, in turn, deliver them to the handsaws. Finished lumber from the saw mill passes either to the lumber storage shed or to the wood mill. Dry kilns are provided for drying lumber. The lumber destined for outside use is loaded directly from the saw mill or lumber storage shed into trucks or cars for delivery.

The wood mill is equipped with the latest type of machinery, specially selected for working the native hard woods. Shavings, sawdust and wood refuse from the wood mill and saw mill are collected by an exhaustor system and used as fuel in furnishing steam to the dry kiln and for other shop uses.

Close by the machine shop, but in a separate section of the building, is the forge and steel shop, which, in addition to equipment for maintenance work, is equipped with bolt, nut, rivet and nail making machinery. Heat-treating and annealing furnaces are used in the manufacture of car and bus springs and the heat treatment of special steels for miscellaneous parts. This shop is equipped to fabricate steel underframes and superstructures for new cars. The shop also fabricates parts

for steel transmission towers, and other miscellaneous structural steel work.

In the layout of the machine shop, an effort was made to segregate maintenance and manufacturing activities; the maintenance work is confined to the south end close to the truck shop, while manufacturing work occupies the north end. The machine shop is divided into bays for light and heavy work. The bay devoted to the heavy work is served by a 30-ton crane, while the other bays devoted to lighter work are served by 5-ton cranes.

The foundry department is divided into two sections, one for iron castings and the other for non-ferrous castings. The output of the iron foundry ranges from brakeshoes to machine castings, and, at times, includes ornamental iron work such as street light posts. The equipment includes one No. 6 and one No. 3 cupola with positive pressure blowers, sand-mixing equipment, molding machines, sandblast cleaning equipment and a complete core-room equipment.

The brass foundry is called upon for brass, bronze and aluminum castings of different compositions, for car and bus, and machine and electrical purposes. The equipment in the brass foundry includes three 200-lb. electric crucible furnaces, molding machines and accessory equipment.

Transformers and alternating-current electric equipment are repaired in the opposite end of the shop in which the car maintenance work is done. Transformers to be repaired enter the north end of the heavy machine shop on cars, where they are handled by a 30-ton overhead crane. The old oil is drained before the transformers are repaired, and dried in electrically heated ovens. After testing, the transformers are refilled with oil and returned to service. The old oil is piped to the oil purification building. The purified oil is pumped directly from the oil storage building to the test stand in the repair shop.

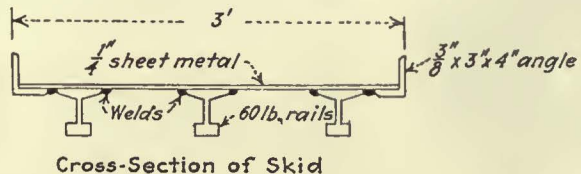
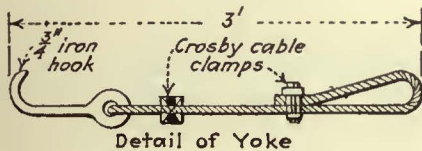
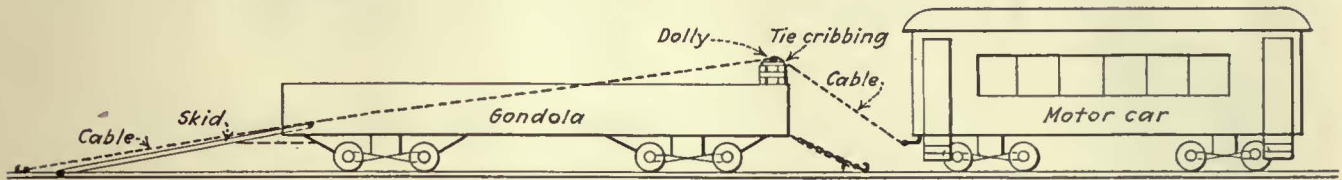
The stores department, which is separated from the shop buildings by a fence, replaces the several stores previously located in different parts of the city, and brings them together with the general offices of the stores department. It has siding connections with steam railroads and with the tramway tracks. The stores department presents a different problem from that encountered in the United States as the distance from manufacturing centers makes it necessary to carry larger inventories and more complete lines of stock. In this respect, the location at the shops is a desirable feature, as many of the parts manufactured there pass directly to the stores department.

Small Capacity Bus Used at Omaha

For service where traffic is extremely light the Omaha & Council Bluffs Street Railway is using this small-capacity Ford bus. It has seats for sixteen passengers and will carry 30 in rush hours. Operation was commenced Feb. 1 of this year.



Practical MAINTENANCE Ideas



The New Orleans Public Service removed rails from 12 miles of open track by pulling them onto gondolas

Rail Removal at Low Cost

BY A. H. GUILLOT
Chief Engineer, Roadway Department
New Orleans Public Service

REMOVAL of 12 miles of track was recently accomplished by the New Orleans Public Service with speed and economy by the use of a novel method of loading rails into gondolas. Near one end of the line was an interchange track, and scattered along the line were sidings at intervals of about 1 mile. Arrangements were made with the steam railroads to place drop-end gondolas on the interchange tracks where an old inter-urban motor car transported the gondolas over the line.

The rails were loaded into the gondola by means of a steel skid and a cable. One end of the skid was placed on the gondola and the other rested on the ground. The skid was fastened to the gondola by means of a hook and cable. On the end of the gondola nearest the motor car, a tie cribbing was placed, to which was fastened a wooden dolly with cable guards. The cable for pulling the rails was anchored to the motor car, and ran over the dolly.

Before removing the rails, the bolts were burned through the joint plates, and the joint was broken in order to insert the hook of a yoke in the bolt hole. The yoke was a $\frac{3}{8}$ -in. piece of flexible cable, 3 ft. long, one end of which was fastened to the hook and the other end was made into a loop with Crosby clips. The motor car pulled this rail up to the next rail in the track, and the yoke attached to this rail was fastened to the cable hook without stopping the movement of the first rail. This procedure continued until four rails were fastened to the pulling cable by means of yokes and pulled in directly on the gondola, sliding up the skid.

After loading the four rails, the motor car was again coupled to the gondola by means of a quickly detachable hook and chain, and pulled the gondola ahead so that four more rails could be loaded. The interval of each movement of the gondola was about 6 min.

On the average, about 9,000 ft. of rail per day were loaded on the gondola. The crew worked ten hours, of which $8\frac{1}{2}$ hours constituted actual working time while $1\frac{1}{2}$ hours were spent in switching operations. The crew con-

sisted of one foreman, one burner, one motorman, and ten laborers, resulting in a total labor cost of \$50.30 per day. On this basis, the cost was 1.1 cent per track-foot, or 53 cents per ton for removing and loading the rails. These cost figures are accurate only for tangent track. Where special work was encountered the speed was reduced to approximately 3,000 track-feet per day.

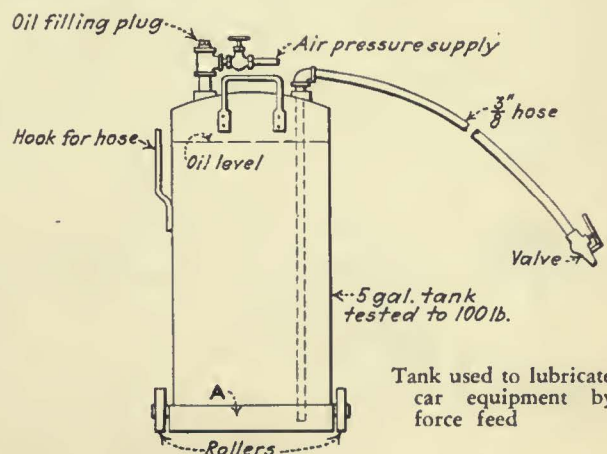
Pressure Tank for Car Oiling

BY HENRY CORDELL
Master Mechanic
Chicago, North Shore & Milwaukee Railroad

FEEDING of oil by air pressure has been adopted by the Chicago, North Shore & Milwaukee Railroad to replace the old oil can, funnels and pails used by the oiler or inspection forces.

The pressure feeding is accomplished by a $\frac{1}{8}$ -in. steel tank, 12x24 in., which holds 5 gal. of oil. After filling with oil, the tank is charged with 70 lb. of air, which is sufficient to empty the oiler. Strap A on the base of the tank provides a means of fastening axles for rollers used in moving the oiler from car to car. The oil is fed to the armature, axle and journal bearings through a $\frac{3}{8}$ -in. hose and a Dossert valve.

This device not only speeds up the work of oiling, but eliminates the spilling and waste of oil as well as keeping out the dirt.



Tank used to lubricate car equipment by force feed

Full Composition Insulator for Feeder Wires



Composition prongs in this feeder wire insulator have reduced accidents

FOR many years the standard insulator used in Brooklyn for supporting overhead weatherproof insulated feeders was the ordinary saddle top type with a body of insulating material supporting a metal cap with prongs, between which the wire rested. The only places where full composition insulators were used were at corners or similar locations where it was necessary to use the side groove. Occasionally, however, men were burned by touching simultaneously the metal cap of the insulator and some

grounded metal, such as the trolley pole or a portion of the elevated structure. Of course, this occurred only when the weatherproof insulation of the wire had been worn completely through and the cap has thus been made alive.

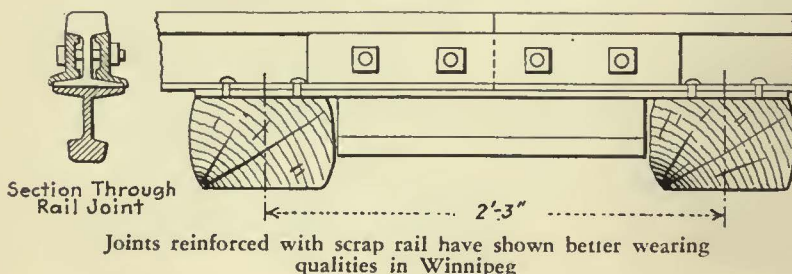
To avoid such accidents, even though they occurred infrequently, it was decided to standardize on an insulator similar to the one in use, but without the metal cap. At that time there were no insulators of the desired type on the market, but a satisfactory design was developed, the new insulator being a modification of the ordinary top and side groove insulator, the prongs having been made longer so as to do away with tying in the wire on straight line work. These insulators have proved satisfactory in service and the railway has standardized upon them.

Joint Booster Saves Track*

BY M. W. WALES
Engineer of Way and Structures
Winnipeg Electric Company

DURING 1930, we reinforced 300 joints with scrap rail, as shown in the illustration, on one of our open track lines where 70 per cent of the joints were low and 10 per cent were badly cupped. When these boosters were installed the track was put in first-class operating condition. Joints were tightened and built up by welding and grinding. The boosters were made from scrap rail of the same weight as the rail in the track. The total cost of each booster, including the installation,

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.



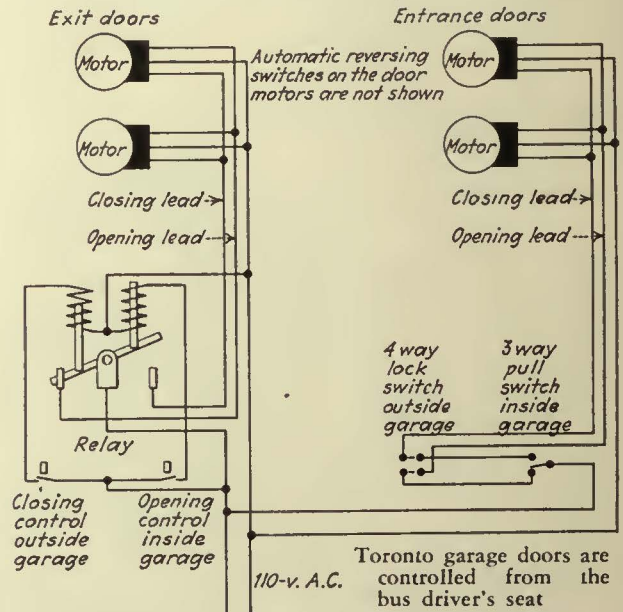
the labor necessary for cutting the rail and the scrap value, was 65 cents.

When the tracks were inspected this spring, it was found that where joint boosters were installed, the joints were still in first-class condition. On the other hand, joints without boosters on the same line were beginning to go bad again, and will need considerable repair. As a result of this trial, we are planning to install at least 300 more joint boosters.

Modern "Sesame" Opens Garage Doors*

BY J. C. DE LA ROSA
Toronto Transportation Commission

DURING the severe cold weather we experience in Toronto it is urgent that garage doors be kept shut except for short intervals to permit entrance and exit of buses. To accomplish this without an attendant at



the doors a scheme was devised to open garage doors by inserting a key in a four-way lock switch located at the point of entrance within reach of the operator while sitting in the bus. After the bus has been driven into the garage and clear of the doors they are shut again by pulling a cord on a three-way pull switch conveniently located. A similar arrangement is provided for the exit doors. A cord controlling a single-pole momentary-contact pull switch can be made to energize a solenoid which closes a switch in the control circuit of the exit door. When this cord is pulled, the exit doors will open. After driving out of the garage and clear of the doors a momentary-contact push button is found, which can be made to energize another solenoid and thus close the doors. The closing switches of both solenoids at the exit doors are operated on a balanced principle so that when one switch is closed the other is opened.

As part of the door mechanism at both the entrance and exit, a mechanical switch automatically opens the circuit upon the completion of one operation, and at the same time closes the other circuit for the succeeding operation. Entrance to the garage can be had only with a key, and then only through the entrance door.

Control Equipment Profits by ADEQUATE INSPECTION

By G. L. MOSES

Renewal Parts Engineer
Westinghouse Electric and Manufacturing Company

LIGHT inspection of car control equipment should be made frequently enough to discover incipient defects and so prevent road failures. The periods which have been found satisfactory are 1,000 miles or one week, depending on whether the time or the mileage basis is used. Only minor repairs should be made on the car during inspection. Major repairs should be made by replacing the faulty apparatus with new or repaired parts, making the necessary repairs at the bench on the parts removed.

All apparatus should be kept free from dust, dirt, grease, gum, moisture and injurious oils and acids. Equipment may be cleaned by blowing it out with compressed air, but moisture in the air must be avoided. Insulated bolts supporting parts should be kept clean. The leads should be inspected for signs of overheating or breakage. If such are observed the cause should be determined and corrected at once.

During inspection and repair power should be kept off the car by pulling down the trolley and opening the main

Inspection Detail Outlined

K Controllers

1. Check cover for fit and make sure that the latch holds it securely.
2. Check interlock between main and reverse drum to make sure that reverse handle cannot be removed with reverse drum thrown in either direction and that main drum cannot be operated with reverse drum in "off" position.
3. Check play in drum bearing (not to exceed $\frac{3}{32}$ -in. total in any one bearing).
4. Inspect arc deflector and replace any plates burned to a depth of $\frac{1}{8}$ in. or more.
5. Inspect main and reverse drum segments and arcing tips and replace those burned or badly worn ($\frac{3}{32}$ in. deep).
6. File smooth and clean any segments that are slightly burned or have burrs.
7. Replace fingers with as much as $\frac{1}{8}$ in. to $\frac{3}{16}$ in. worn off the contact.
8. File clean any fingers with slight burrs or burned spots which may be continued in service.
9. Adjust fingers to have $\frac{1}{8}$ in. rise from free position to position on drum. Check in all notches.
10. Check finger pressure (on old style fingers 6 to 8 lb.; on compensating fingers $3\frac{1}{2}$ to $5\frac{1}{2}$ lb.)
11. Lubricate drum segments with light oil by means of brush or cloth, wiping off surplus.
12. Lubricate bearings with light machine oil.
13. Operate controller several times, checking for ease of action and positive notching.

Handle Switches

1. Remove cover and inspect.
2. Replace burned contact carriers and clutch fingers.
3. Check drum segments and fingers and replace where worn or burned.
4. Check alignment and clearance between upper and lower clutch. This should be $\frac{3}{32}$ in. to $\frac{1}{16}$ in.

5. Check drum for tightness of set screw fastening it to controller shaft.
6. Operate several times with power on and note both electrical and mechanical action.

Platform Circuit Breakers

1. Remove cover and arc chute and inspect wearing, burning and current-carrying parts.
2. Inspect contacts and arcing horns. Contacts should be replaced when $\frac{3}{32}$ in. material has been worn or burned away.
3. Replace arc chute parts which are burned as much as half way through the material.
4. Operate several times to check freedom of movement.

Line Switches and Switch Groups

1. Check for tightness of covers.
2. Replace contacts when worn or burned away as much as $\frac{1}{8}$ in.
3. Replace badly burned arcing horns.
4. Replace arc chute parts when burned half way through.
5. Tighten all terminal bolts and current-carrying connections.
6. On switches with main wiring compartment, carefully blow out all dirt and foreign matter with clean dry air.
7. Check alignment and freedom of operation of all moving parts.
8. Clean all insulation, particularly on bolts supporting the apparatus.
9. Inspect interlocks for wear or burning of contacts and fingers, replacing any damaged parts.
10. Check overload relay for ease of movement, setting of trip and burning of contacts.
11. Inspect resistor tubes for signs of overheating.
12. Use control voltage (and air for pneumatic equipment) operate switches to make sure that each has positive action and is not sluggish either in opening or closing.

Master Controllers

1. Check to insure that it operates freely and yet notches positively in each position.
2. Check the interlock between the main drum and reverse drum.
3. Inspect and test tension of all fingers. Tension should be from $1\frac{1}{2}$ to 3 lb. according to the type of finger. Fingers must make good contact in all positions.
4. Replace fingers which show signs of stubbing or have burrs from arcing.
5. Smooth up the drum if it has any rough or burned spots.
6. Lubricate drum segments with light machine oil.
7. Lubricate bearings with machine oil.

Reversers

1. Check covers for tightness of fit and positive latching.
2. Inspect for overheating of drum contacts and fingers.
3. Replace fingers that are worn $\frac{1}{8}$ in. deep, are burned or show signs of losing contact pressure.
4. Lubricate drum contacts with light machine oil with brush or cloth, and wipe off excess.
5. Lubricate bearings with light machine oil.
6. Operate by hand and by power to check ease of movement.

Fuse Boxes

1. Observe fuse to see if it is burned or shows obvious signs of heavy overloads; replace if badly oxidized or broken.
2. Check tightness of clamps holding fuse in place.

Main Knife Switches

1. Inspect for signs of overheating.
2. Check contact between blade and jaws.
3. Check for alignment and tightness of all parts.

Resistors

1. Look for burned-out resistor elements.
2. Inspect for signs of overheating.
3. Check for loose bolts and connections.
4. Remove any dirt accumulations.

knife switch. When power is absolutely necessary for checking the action of the apparatus extreme care should be exercised.

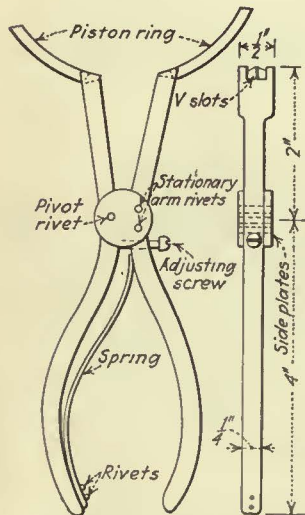
With pneumatic control the air supply should be checked and all valves and joints inspected for leaks. Drain cocks should be opened to discharge moisture.

Upon completion of detail inspection and repairs a sequence test should be given the control to make sure that all apparatus functions properly and the sequence of operation is correct. With K type control, the car should be operated in both directions, making sure that the line switch comes in and drops out properly and that the car accelerates correctly. On remote control equipments, the switches should be operated with the main knife switch open and the car operated in both directions to make sure that the car accelerates properly.

Details to be observed in inspection of control are given in the instructions.

Expander Saves Piston Rings*

By CHARLES HERMS
General Foreman
San Diego Electric Railway



This piston ring expander has a stop that prevents stretching the rings too far

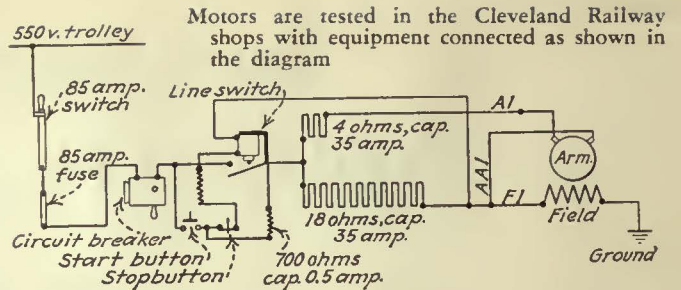
screw is set for this limit. The other rings can then be expanded without fear of breakage.

Testing Railway Motors in the Shops*

By CHRIST REINKER
General Foreman Mechanical Department
Cleveland Railway

REPAIRED motors are now tested thoroughly in the shops of the Cleveland Railway before they are mounted on the car. Previously, when the motors were tested on the cars some of them passed the short-circuit test, but failed later in operation because it was impossible to locate all defects. With the present method, the workman determines immediately if the motor is in satisfactory condition. The method also saves time, since if a defect is apparent, it is not necessary to dismount the motor from the truck and return it to the repair room.

The motor to be tested is placed on a stand and is



connected up as shown in the diagram. The resistance grids are mounted overhead along with the circuit breaker, so that they are out of the way of the workmen. When the motor has been connected, the workman presses the starting button. The armature should reach full speed almost immediately. It is allowed to run and carefully watched. Overheating of bearings indicates that they are fitted too tight. If the motor speed is too high, too low, or irregular, defects are indicated which must be corrected. Failure to start indicates an open field, in which event the line switch does not close.

The approximate cost of this equipment is \$110

Philadelphia's Trolley-Break Record Continues at High Level

By H. S. MURPHY
Staff Engineer
Philadelphia Rapid Transit Company

RECORDS of trolley breaks are always of interest to electric railway operators. The last report of the Trolley Wire Committee of the American Electric Railway Engineering Association shows that during 1929, on approximately 11,000 miles of electric railway lines, there was an average of nine trolley breaks every two days. This is one break for every 250,000 car-miles.

The Philadelphia Rapid Transit Company has shown a consistently good trolley break record ever since the Trolley Wire Committee started to accumulate data on breaks in 1921. This property for the last seven years has had an average of one trolley break every 4½ days, or one break for each 828,000 car-miles. This includes breaks due to all causes. The record for breaks under the control of line maintenance forces, usually called breaks due to wire and fittings, is one for every 9.8 days, or every 1,910,000 car-miles. During this seven-year period 499,000,000 car-miles were operated. This figure includes 1,400,000 trolley bus-miles. The present length of line on a single-track basis is approximately 567 miles of rail and 13 miles of trolley-bus line.

The record for each year, both as to number of breaks and breaks per 100,000 car-miles, is shown in the table. During the first five months of 1931, there have been only four breaks all due to causes beyond the control of the line maintenance forces. Approximately 30,000,000 car-miles were operated during this period.

Year.....	Trolley Breaks Due to Wire and Fittings		Trolley Breaks per 100,000 Car-Miles Due to Wire and Fittings	
	Total	Total	Total	Total
1924.....	95	39	0.128	0.053
1925.....	87	36	0.130	0.054
1926.....	114	54	0.168	0.080
1927.....	86	40	0.118	0.055
1928.....	85	35	0.121	0.050
1929.....	76	36	0.114	0.054
1930.....	59	21	0.093	0.033
	602	261	0.121	0.052

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Market, Chestnut and Walnut Streets in downtown Philadelphia are three of the heaviest traffic streets in the world. No trolley breaks from any cause have occurred on Market Street since 1927, and none have occurred on the other streets since 1923. This means that 1,200,000 cars have passed under the Market Street wire and 3,600,000 cars under the Chestnut and Walnut Street wire since the last break. The normal life of the wire under this heavy service is between 1,600,000 and 2,200,000 car movements.

These results have been attained without excessive expense for maintenance or renewals of trolley wire. The amount of wire used for replacements has been steadily decreasing. The principal contributing factor has been a maintenance force trained to prevent breaks by knowing the heavy-wear spots, and making simple inexpensive repairs in time to avoid trouble. A large portion of the responsibility has been placed on the linemen, who are the only men who can prevent trolley breaks. The results, in my opinion, show that this confidence has not been misplaced.

In recent years a number of companies have made trolley-break records somewhat better than this, but we know of no equal sustained performance over so long a period. If there are any other records as good or better than this it would be interesting and instructive to hear about them.

Uniform Classification Proposed for Bus Pull-Ins

TO MEET the present need for a uniform method of recording the cause of equipment failures in bus operation, *Bus Transportation* suggests a classification of vehicle parts as a basis upon which to form a standard. The system of classification is flexible so that it can be made to serve the needs of large or small companies.

"Equipment failure" has been adopted as the designation for all kinds of failures on the road. The following definition was given:

An equipment failure includes any instance where the bus fails to fulfill the run assigned without special attention or repairs, or arrives at destination more than five minutes late due to mechanical failure.

Classification of Vehicle Parts for Equipment Failure Records

Engine and Related Units (Except Electrical)	132. Gasoline system (a) Vacuum tank or fuel pump (b) Gas line (c) Gas tank (d) Gage	Chassis GROUPS 210 to 240	312. Starter 313. Battery 314. Voltage regulator 315. Heavy duty cable 316. Ammeter	422. Speedometer 423. Fare box or register 424. Heater 425. Other
GROUPS 110 to 160	133. Accelerator	210. Springs 211. Leaf 212. Air	320 Ignition system 321. Coil 322. Distributor 323. High-tension wiring	510. Tire trouble
110. Engine proper	140. Cooling system	220. Steering gear	330. Body electrical units 331. Lights (Sub-divide according to circuits, if desired)	Miscellaneous GROUP 610
111. Shaft bearings (a) Rod (b) Main	141. Radiator	230. Axles and wheels	332. Horn 333. Bells or buzzers	610. Out of gas, oil or water 611. Gas 612. Oil 613. Water
112. Piston pins	142. Water system (a) Water pump (b) Hose connections (c) Gage	231. Rear axle assembly (a) Differential (b) Final drive (c) Shafts (d) Axle housing	Body and Accessories GROUPS 410 to 420	Not Chargeable GROUP 710
113. Camshaft	143. Fan assembly (a) Fan and hub (b) Belt	232. Front axle 233. Wheels (a) Bearings (b) Wheel proper (c) Rims	410. Body proper 411. Doors 412. Seats 413. Other	710. Not chargeable
114. Valve mechanism (a) Cam followers (b) Lifters (c) Valves proper (d) Rocker arm assembly	150. Air system	240. Brakes 241. Service 242. Emergency	420. Body accessories 421. Windshield wiper	711. Accident 712. Stuck in snow or mud
115. Oil system (a) Frozen engine (b) Low pressure (c) Gage	151. Compressor 152. Tank, fittings and gage	Electrical System GROUPS 310 to 330		
116. Gaskets (a) Head (b) Other	160. Drive line (to rear end)	310. Main electrical units 311. Generator		
120. Spark plugs	161. Transmission 162. Clutch 163. Shaft 164. Universals			
130. Fuel feed				
131. Carburetor				

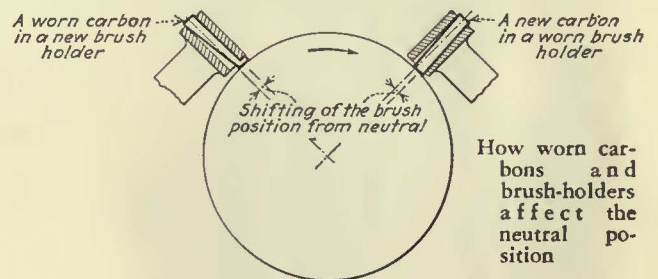
Effect of Worn Carbons on Motor Commutation

By JOHN S. DEAN

Renewal Parts Engineer

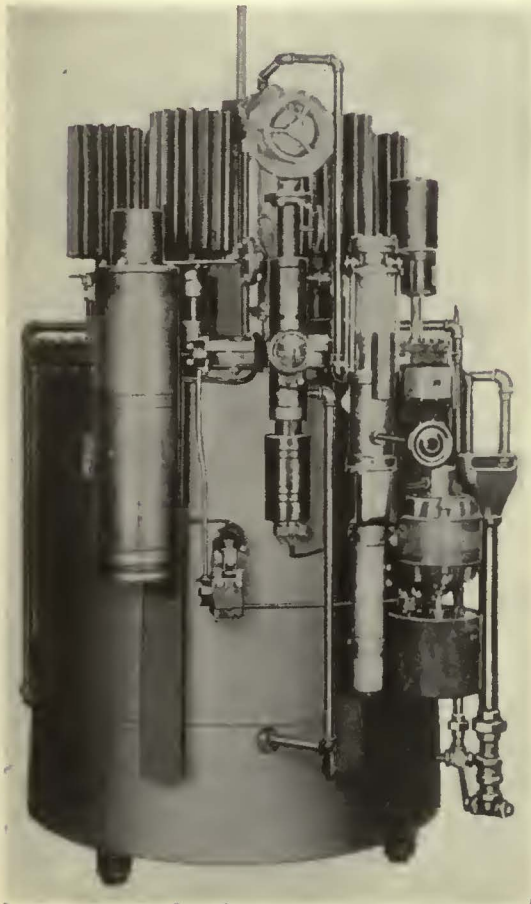
Westinghouse Electric & Manufacturing Company

IN DIRECT-CURRENT railway motors the current must be led into the armature windings at definite points commonly called the neutral positions. These are determined by the throw of the leads of the armature coils and with some few exceptions this places the brushes along the center line of the main field coils. The brush-holders of most railway motors are permanently located in the neutral positions, which must always be maintained exactly in order to obtain the least sparking at the brushes.



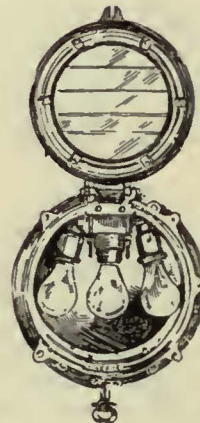
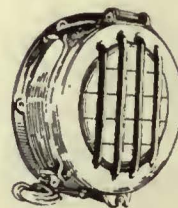
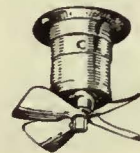
The condition of the brush-holder boxes and carbons plays an important part in good commutation. If the motor brushes have developed considerable side wear, they may be shifted ahead as much as $\frac{1}{8}$ in., throwing them out of the neutral position by that amount. Further, if the inside of the carbon-way of the brush-holder is badly worn, even though a new brush is used, it may be shifted ahead about $\frac{1}{16}$ in. When a motor is operated with a combination of badly worn brushes in worn carbon-ways, the brush contact may be shifted ahead as much as $\frac{3}{16}$ in. from the neutral position. If the brush of a motor is shifted ahead of the neutral position or in the direction of the rotation of the armature, the commutation tends to become very poor. Inspection and brush renewals are essential to prevent the development of bad sparking, which may finally cause the motor to flash over and blow to ground.

NEW PRODUCTS *for Use by* the Railways



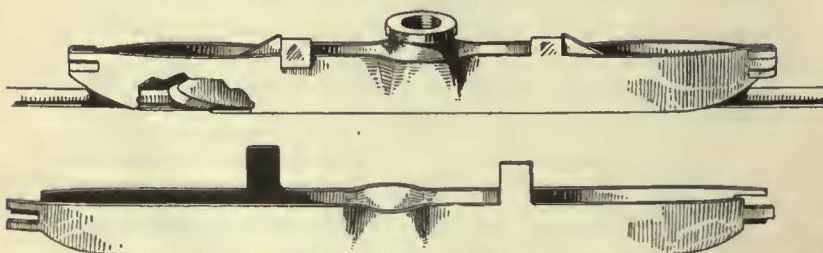
Steel Tank Mercury-Arc Rectifier is designed for the conversion of alternating to direct current over wide ranges of voltage and current. The rectifier consists of a mercury pool cathode and anodes inside a steel tank with facilities for condensing the mercury vapor, and the necessary auxiliary apparatus for maintaining the proper vacuum and temperature conditions. *Manufacturer:* Westinghouse Electric & Manufacturing Company.

Bus Ventilator consists of a top portion pressed from lead-coated steel designed to give maximum velocity of air, and a motor wound for 12 volts to which is attached a fan blade to exhaust the air at 160 cu.ft. per minute with the bus at rest, and 200 cu.ft. per minute at 10 to 15 m.p.h. The motor and fan are removable and replaceable by loosening two screws. *Manufacturer:* Electric Service Supplies Company, Philadelphia, Pa.

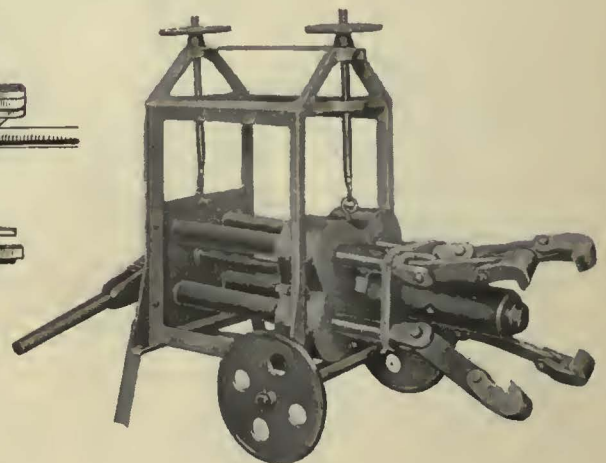


Dash-Illuminating Headlight is recess mounted and employs an auto-type ray-deflecting lens that projects a diffused light well in front of the car. A circular side lens of Pyrex heat-resisting glass for illuminating the dash eliminates the need for additional lighting where dash illumination is desirable. *Manufacturer:* Ohio Brass Company, Mansfield, Ohio.

Gear and Pinion Puller can develop a force of 125 tons or 225 tons by means of a ratchet wrench. A secondary ratchet wrench can take up all the slack by developing a force of 15 tons. The power plant proper can be raised or lowered with the two wheels at the top to give a vertical adjustment of 10 in. *Manufacturer:* Clark Manufacturing Company, Bird Haven, Va.



Trolley Ear has been designed for use with renewable copper sheaths. The ear is of cast bronze metal, having lips that peen over the wire in the usual manner. The renewable copper sheath is attached to the ear by lugs, which are easily lapped over to form the locking position. The sheath can be renewed without disturbing the bronze ear casting. *Manufacturer:* Electric Railway Equipment Company, Cincinnati, Ohio.



NEWS of the Industry

Improvement Projects

Hopewell, Va.—The new rail and bus terminal being erected by the Petersburg, Hopewell & City Point Railway here is nearing completion. The building will add materially to the appearance of the business section. On the main floor will be waiting rooms for white and colored patrons and a modern and up-to-date lunch stand and magazine store. The restrooms will be on the second floor. The building represents an investment of more than \$12,000.

Providence, R. I.—The United Electric Railway has petitioned the Public Utilities Commission for permission to lay double tracks in that part of North Main Street between Benefit Street and Doyle Avenue. Authority has been asked also to install a double turnout in Manton Avenue, between Glenbridge Avenue and Raritan Street, and a single turnout on Manton Avenue between Florence and Joslin Streets.

Vancouver, B. C.—The British Columbia Electric Railway has commenced a new track-laying project here on Granville Street. This work is all being done between midnight and 8 a.m.

Fare Changes

Jacksonville, Fla.—City councilmen have been petitioned to adopt a resolution asking the Council's Public Service Committee to negotiate with the Jacksonville Traction Company with a view toward establishment of a 5-cent zone fare.

Baltimore, Md.—Mrs. Eva A. McGreevy has asked the Public Service Commission to direct the United Railways & Electric Company to reduce the number of fares from two to one between the city and Spring Grove Hospital, a state institution. She contends that many poor persons who go to the hospital to visit relatives are unable to pay two fares.

Vancouver, B. C.—The city has decided against a survey of the British Columbia Electric Railway's system at an estimated cost of \$35,000. Instead, the city's outside auditor will check the company's books preliminary to negotiations for a renewal of a three-year contract covering fares.

Bus Operations

Schenectady, N. Y.—The Public Service Commission has approved the action of the Schenectady Railway under its order of July 1 in substituting bus service for railway service between Schenectady and the village of Scotia, and in the towns of Rotterdam and Glenville.

(Late News Continued on Page 432)

414 Buses Now Used by Pacific Electric Railway

Growth of Operation at Los Angeles Recited by Official at Interstate Commerce Commission Hearing. Interesting Comparative Statistics

R. A. SMITH, passenger traffic manager of the Pacific Electric Railway, outlined before the Interstate Commerce Commission at Los Angeles some time ago, the reasons for the operation of motor coach passenger service by the Pacific Electric Railway and its affiliated organizations, also the extent of such operations. Operations of rail lines, as well as motor coach lines, comprise a service both between communities and cities, as well as a local or street car service within several cities and communities.

Effective May 10, 1917, by enactment, the California Railroad Commission was given control of motor coach lines to the extent among other things of requiring the securing from such commission of a permit of necessity and convenience for the operation of new lines, except where operation was entirely within the corporate limits of an incorporated city. However, such enactment permitted the continued operation of such lines as were operating in good faith prior to May 10, 1917.

Prior to the date of enactment, a number of independent motor coach lines competed with the Pacific Electric. In some cases such competition was by directly parallel lines, and in other cases competition was between important terminals, the routes traversing a different intervening territory.

Since May 10, 1917, no parallel operation by independents has been estab-

lished in competition with the Pacific Electric, although a number of lines have been established between terminals, but run over what might be said to be non-competitive territory.

The Pacific Electric Railway felt that its rail lines were giving good service and at reasonable rates and should be protected, but the tremendous increase in population in the general territory served by its lines, together with the development of territory in districts a considerable distance away from established lines, offered very attractive fields for independent operators into newly developed territory, frequently in direct competition to existing lines of the Pacific Electric Railway. In order to protect the citizens and communities, using and depending upon a continuation of good service at reasonable rates, from an inferior service at higher rates, as well as to preserve its property and business the Pacific Electric Railway began to establish lines of its own. The first operation of the company was the purchase in 1917 of an independent motor coach line operating between San

(Continued on Page 437)

Coral Gables Went in for Municipal Ownership!

A plan for refinancing the entire bonded and floating debt of Coral Gables, Fla., has been agreed upon after a series of conferences with the City Commission, according to the Bondholders' Protective Committee. The entire debt is to be refunded by bonds and corporate stock bearing 6 per cent interest. The bonds will be due in 40 years. Provision will be made for amortization of the bonds beginning in the sixth year. It was deemed doubtful whether, prior to that date, the city can raise more than the interest charges, but if funds in excess of interest charges are raised during these years, the surplus is to be paid into a special account for the benefit of creditors.

The corporate stock is intended to permit creditors to benefit by any recovery on the part of the city from the present level. The obligations are payable solely from the corporate stock trust fund and the physical properties of the public utilities are pledged to this fund. The city also agrees to include in its budget a proper depreciation reserve for utilities in an amount to be agreed upon; and the premiums for insurance against liabilities incurred in the operation of the municipal street railway and bus lines and other utilities.

Coming Meetings

Aug. 6-8—Pacific Claim Agents Association, Stockton, Cal.

Aug. 13—Transportation Section, Wisconsin Utilities Association, Hotel Retlaw, Fond du lac, Wis.

Aug. 14—Annual Convention, Wisconsin Motor Coach Association, Hotel Retlaw, Fond du lac, Wis.

Sept. 9-10—Central Electric Railway Master Mechanics' Association, Cincinnati, Ohio.

Sept. 26-Oct. 2—Annual Convention, American Electric Railway Association, Atlantic City, N. J.

Sept. 28-29—Annual Convention, National Association of Motor Bus Operators, Atlantic City, N. J.

Jan. 27-29, 1932—Electric Railway Association of Equipment Men, Southern Properties, Richmond, Va.

Bus Operations

(Continued from Page 431)

Pittsfield, Mass.—The Pittsfield Yellow Cab Company has petitioned the City Council for a franchise to operate buses on six routes at 5-cent fares in territory now covered by the Berkshire Street Railway with trolley service. The Yellow Cab had previously asked for a permit to run between Pittsfield and Dalton.

Milwaukee, Wis.—Extension of the bus service of the Milwaukee Electric Railway & Light Company on Fond du Lac Avenue from the present terminus at North 60th Street to Hampton Road, in Wauwatosa and Granville, has been denied by the Public Service Commission. The extension was asked by 112 residents of the district affected. The commission found that the bus line was operated at a loss last year.

Kansas City, Mo.—The Warwick bus route, downtown trunk line of the Kansas City Public Service Company, was discontinued on July 4, the buses, thoroughly overhauled, being placed on the Benton line. The Warwick line lost \$165,000 in five years, and its revival is unlikely. The discontinuance leaves three downtown trunk lines. Fourteen Twin Coaches, ordered by the Kansas City Public Service Company in June, probably will be used to replace double deckers on the Armour-Paseo line.

Beverly, Mass.—The Eastern Massachusetts Street Railway has been granted a permit to operate bus service from Centerville to the railroad station here at a 5-cent fare. Taxi drivers opposed the permit.

Monroe, La.—Advisability of adopting trolley buses for use in the northern part of Monroe will be considered by the City Commission, which is in charge of the Monroe Municipal Railway, when it becomes necessary to remove street car tracks from Louisville Avenue to clear the right-of-way for the new traffic bridge across the river.

Springfield, Mass.—The Springfield Street Railway plans to operate a bus line between Westfield and Springfield to supplant the present trolley system. Petitions have been filed with West Springfield Selectmen to cover the route in that town. The railway has made trial bus trips to ascertain better traffic approaches in Springfield.

Service Changes

Chicago, Ill.—Additional rail-air service is afforded North Shore Line customers in travel to points east and south of Chicago, under a hook-up with the Century Air Lines, Inc. This new service materially reduces the running time between the cities served. It supplements hook-ups already established with the National Air Transport, and the American Airways on the route formerly known as the Universal Air Lines. Under the new arrangements, direct service is operated between North Shore Line communities and Detroit, Mich.; Toledo and Cleveland, Ohio; South

Cincinnatus

A COLLEGE professor, driving through Kentucky, was kind to two strangers on the road. They desired a lift and he took them into his machine. Then, having him in their power, they killed and robbed him, drove off with his car.

Cincinnatus never picks anyone up, as much as he admires the exemplary act of Good Samaritan on the road to Jericho. The unhappy fate of the gentle college professor has been suffered also by others in these past years. The cautious motorist prefers loneliness to the company of strangers.

—Cincinnati Post.

Bend, Ind., Springfield, Ill., and St. Louis, Mo. Schedules for the through trip to any of the cities embraced in the new hook-up are arranged by the North Shore Line ticket agents in the four cities.

Seattle, Wash.—The Lake Burien street car service, long maintained by the Municipal Railway, has been permanently abandoned between White Center at the south city limits and the end of the line at Seahurst. Transportation will be handled by privately owned buses. According to railway officials, the Lake Burien service has been operated at a loss for several years. The Supreme Court recently approved abandonment.

Laurel, Miss.—Crews of the Mississippi Power Company are engaged in tearing out the tracks of the interurban line between this city and Ellisville under an agreement made recently between the city of Ellisville and the company. Tracks are to be removed to the city limits of Laurel but service in the city is to be continued.

Sydney, N. S.—The Public Utilities Board has been holding hearings here and in Halifax on the petition of the Cape Breton Electric Company, to be permitted to withdraw electric railway service in Sydney. The company's electric lines consist of 16½ miles of track within Sydney and 16½ miles of single-track line operated as the Sydney &

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Glance Bay Electric Railway. The reduction in the tram receipts are attributed to the increase in the use of the private auto, and to the introduction of so-called "jitneys" in Sydney and Glance Bay. The application to withdraw service is being opposed by the city of Sydney, but its plea for delay in the consideration of the matter has been rejected by the commission.

Los Angeles, Cal.—The Los Angeles Railway has been authorized by the Railroad Commission to reroute its motor coach line now operated along Mines Avenue and Whittier Boulevard.

Memphis, Tenn.—Service on the Fair Grounds line of the Memphis Street Railway on Madison Avenue has been speeded up by the addition of more cars and the abolition of trailer trains. The morning service from 6 to 9 o'clock has been increased from a five to two-minute headway, as has the evening service from 5 to 7 o'clock. The midday headway on this line continues at six minutes.

Marion, Ohio—The Columbus, Delaware & Marion Electric Company has petitioned the Ohio Public Utilities Commission for authority to file a new time schedule reducing from eight to four its railway round trips per day, between Marion and Bucyrus. The petition will be heard on July 29.

Alliance, Ohio—Immediate abandonment of freight service between Canton and Salem by the Stark Electric Railroad has been authorized by the Public Utilities Commission. With the abandonment of the Youngstown & Ohio River Railroad and the partial withdrawal of service by the Northern Ohio Traction, the Stark Electric now has no outside connection.

Birmingham, Ala.—Due to construction of underpasses for Twentieth Street, the Birmingham Electric Company has been forced to reroute several of its railway lines. On completion of the underpasses Twentieth Street will open a clear route with rail crossings eliminated. The maze of steam railroad tracks at grade on Twentieth Street, from Morris Avenue to Powell Avenue, has long constituted a tremendous handicap in maintaining railway schedules.

Rockland, Me.—The Central Maine Power Company abandoned the 16-mile Rockland, Thomaston & Camden Street Railway on July 25. This route was built in 1892-93. Freight transportation was discontinued last August. Bus service may be substituted, but not by the Central Maine Power Company.

Birmingham, Ala.—Prior to the recent opening of Birmingham's new municipal airport the question of handling traffic to and from the field became paramount. Since the rail lines of the Birmingham Electric end from 2 to 3 miles from the port, the situation was all the more acute. Happily a solution was found and put into effect. The Birmingham Electric Company has agreed to run buses from their lines on regular schedule. It is expected that eventually this 615-acre airport will be served by trolley and bus.

\$500,000 Milwaukee Project Started

Construction will be started immediately on the Lakeside belt line, a 6-mile electric railway project of the Milwaukee Electric Railway & Light Company through parts of the towns of Lake and Greenfield. All contracts for grading, concrete work and steel fabrication are being placed with Milwaukee firms, and it is specified that local labor be employed exclusively. The estimated cost of the project is \$500,000.

Grading contracts have just been awarded to four firms, which will proceed simultaneously on as many sections of the job. In the meantime, several Milwaukee structural steel firms will fabricate the bridges, and other contractors will place the concrete bridge abutments.

The plan is to complete the grading, concrete and bridge work by early winter so that the new roadbed can settle during the winter. Track laying is expected to be done next spring.

The new line will run east and west just south of and parallel to Howard Avenue. It will connect the present Lakeside belt line near South Sixth Street, with the company's main rapid transit system at a point west of Woodlawn Avenue.

The line will be entirely without grade crossings. The right-of-way on which this railway is to be built is of sufficient width to accommodate electric transmission lines to provide needed additional outlets for power generated at the Lakeside power plant.

Insull's Indiana Properties Co-ordinated

Operation of the Terre Haute, Indianapolis & Eastern Traction Company as a subsidiary of the Midland United Company, an Insull holding company, was begun at midnight on June 30 by Elmer W. Stout, receiver. Approval of the sale of the properties to B. P. Shearon, secretary of the Midland Company, at a foreclosure sale held in Indianapolis on June 23, was given on June 29 by Judge Ryan of Marion Superior Court. The purchase price was \$2,500,000.

Actual supervision of the operation of the T.H.I.&E. properties was taken over July 1 by Indianapolis executives of the co-ordinated Insull management. Henry Bucher, vice-president of the Indiana Railroad and operating chief of other lines comprising the Indiana Railroad System, has been appointed railway executive for the T.H.I.&E. properties, and other officials of the co-ordinated lines have been assigned to similar positions on the T.H.I.&E.

The Indiana Railroad petitioned the Public Service Commission on July 2 for authority to acquire the interurban lines formerly owned by the T.H.I.&E. between Indianapolis and Brazil, between Indianapolis and Richmond and between Dunreith and Newcastle, and the city railway system in Richmond.

The Public Service Company of Indiana, another subsidiary of the Midland United Company, simultaneously asked permission to acquire all electric light and power facilities controlled by the T.H.I.&E. as well as the street railway system in Terre Haute and interurban lines between Terre Haute and Brazil and between Terre Haute and Paris, Ill.

Although the receiver now has pending before the commission a petition to aban-

don the 62-mile Terre Haute, Indianapolis & Eastern's eastern division from Indianapolis to Richmond, he has proposed in an amended petition a new route which would be over the Indiana Railroad line from Indianapolis to Newcastle, thence over the T.H.I.&E. spur line from New Castle to Dunreith and over the T.H.I.&E. eastern division from Dunreith to Richmond. Thus, only that part of the eastern division from Indianapolis to Dunreith, or about 39 miles of track, would be abandoned. The proposed route between Indianapolis and Richmond would be about 18 miles longer. The city of Greenfield recently protested against the proposed discontinuance of service. The T.H.I.&E. car shops are located at Greenfield.

Program of Entertainment for Atlantic City

Guy C. Hecker, general secretary of the American Electric Railway Association, urges all chairmen of subcommittees to turn in any copy matter intended to be included in the printed program for the meeting of the association at Atlantic City Sept. 26 to Oct. 2. Attention is also directed by Mr. Hecker to the fact that copy matter for any special signs desired is to be in the hands of the director of exhibits at least 24 hours before the signs are to be used, with instructions as to when, where, and to whom, such signs are to be delivered. He also reiterates the fact that the chairman of all subcommittees are to meet with the general chairman, at the office of the director of exhibits at 7 p.m., Sunday, Sept. 27. As developed up to this time the program of entertainment is as follows:

- Golf tournament, Sunday.
- Ladies tea, Monday afternoon.
- Ladies musicale and tea, Tuesday afternoon.
- Ladies tea, Wednesday afternoon.
- Ladies tea, Thursday afternoon.
- President's reception, Monday night.
- Formal dance, Thursday night.
- Informal bridge Monday afternoon.
- Informal bridge, Tuesday afternoon.
- Ladies bridge tournament, music, Wednesday afternoon.
- Informal bridge, Thursday afternoon.
- Advisory council, Tuesday night.
- Special entertainment, Wednesday night.

Agitation to Make Binghamton All Bus

The Common Council of Binghamton, N. Y., plans to hold a public hearing upon the question of substituting bus transportation in Binghamton for trolley cars to ascertain the wishes of the people of the city. Alderman Chubbuck, who proposed the resolution, said the move was suggested by reports that such action would be recommended by the City Planning Commission. Should opinion, as expressed at this hearing, favor the change the matter will then be taken up officially with the Triple Cities Traction Corporation.

General Manager Burley, of the Triple Cities Traction Corporation, said the company is willing to co-operate in every possible way with city officials and the public at large to improve transportation service. As far as he could now see, without extensive investigation, the company would have little to gain in a financial way since to change to buses on all lines, it would be necessary to purchase a large number of buses. Upon the main lines, it would be necessary to install all new equipment and he has no idea of the number which

would be required properly to handle the passengers now carried by trolley. Even taking into consideration the probable saving in paving taxes, the actual saving would be more apparent than real. Without having made any investigations, Mr. Burley estimates the cost of making the change and the purchase of new equipment would be \$750,000.

"Mayor Walker Might Well Smile Sardonicly"

Postponement of rapid transit unification in New York for at least another year is recommended in a report submitted to Mayor Walker by a subcommittee of his Committee on Taxation. The report urges that steps be taken at once to provide a competent operator, under a lease or contract, to run the new Eighth Avenue subway line which is expected to be ready for service in December.

As the New York Times sees it, the appeal of the Mayor's Committee on Taxation to go slow with subway unification sounds very much like urging the turtle not to rush ahead and beat the hare. The Times does not think that any one can accuse the unifiers of having been precipitate. For months and even years they have gone forward, if at all, only at a snail's pace. With all of Mr. Untermyer's energy and drive and ability to get competitors to agree, he was able to work out his plan of unification only after efforts kept up through several years. Since his withdrawal as special counsel to the Transit Commission, that body, working in harmony with Chairman Delaney, was supposed to be moving rapidly ahead with a unification plan of its own. It was to have been presented to the Board of Estimate on July 21, but unexplained delays occurred and presentation has been put off for a month. The Times says: "This is fully in line with the hope deferred which has marked, over long periods, all the stages of the transit negotiations. Mayor Walker might well smile sardonically when asked not to allow the affair to be hurried."

Co-ordination Under Constant Study in Newark

Public Service Co-ordinated Transport has no present intention of going along with the suggestion that it take the cars off the streets of Newark, N. J., between 10 a.m. and 4 p.m. According to the Newark News, it does, however, intend, with the completion of the City Railway, to work out a system under which between 35 and 40 per cent of the trolley trips will be off the streets downtown. Buses will handle short-haul traffic on streets where trolleys no longer run.

As a part of the changes now under way, bus lines are being shifted to streets parallel to trolley line streets as a means of better co-ordination of facilities. It is regarded as economically unsound, as well as unnecessarily congesting traffic, to operate buses and trolleys on the same streets.

When City Railway is ready for operation under lease by the city to Public Service, trolley cars from many lines will use it. Cars eastbound on Warren Street, Central Avenue, Orange Street and Bloomfield Avenue will dip into the new subway line at the intersections of those thoroughfares and the railway and proceed to the Pennsylvania Railroad Station.

Mitten Estate Is to Be Turned Over to P.R.T.

Dr. A. A. Mitten has turned over to the Philadelphia Rapid Transit Company virtually the entire estate of the late Thomas E. Mitten, to which he was sole heir. The estate is valued at close to \$1,000,000.

As indicated in *ELECTRIC RAILWAY JOURNAL NEWS* for June 18, the announcement was made by John A. McCarthy, vice-president of the Real Estate Trust Company, and one of the six directors named to the P.R.T. by Judge McDevitt, following surrender of Mitten Management, Inc., in the city's equity suit on May 11.

All assets of Mitten Management, Inc., also have been placed at the disposal of P.R.T. by Dr. Mitten. Mr. McCarthy made a statement in which he said:

As nearly as can be now ascertained, the liquidation of the estate will result in approximately the payment of \$1,000,000 to P.R.T., subject to annuities to seven annuitants of \$3,000 each.

The estate also owns 70 per cent of the stock of Mitten Men & Management, Inc., the remaining 30 per cent is the personal property of Dr. A. A. Mitten, son of Thomas E. Mitten. Whatever assets there are in Mitten Men & Management, Inc., remaining after the payment of the obligations of that corporation will also be turned over to P.R.T. From such investigation as the committee in charge has been able to make of Mitten Men & Management, Inc., it is not believed that these assets will pay an appreciable dividend to P.R.T.

Dr. Mitten's letter to the P.R.T. board turning over the Mitten estate to the P.R.T. follows:

There is one class of readjustments contemplated by Judge McDevitt's adjudication for which I want to ask the attention of the board in the hope that prompt disposition of them may be made.

As to a number of past transactions, the adjudication holds that Mitten Management or the Mitten estate may be held surchargeable by P.R.T. The original decree nisi entered by Judge McDevitt called for the appointment of receivers, who were to have full authority over all such surcharges, and under Paragraph 3 of the decree were authorized:

"To institute suits at law or in equity for the recovery of any estate, property, damages or demands existing in favor of the said Philadelphia Rapid Transit Company, and in their discretion to compound and settle with any debtor of the company, with persons having possession of its property, or in any way responsible at law or in equity to the Philadelphia Rapid Transit Company, upon the terms and in such manner as they shall deem just and beneficial to the Philadelphia Rapid Transit Company."

In presenting to Judge McDevitt the revised plan, whereby directors were substituted for receivers, one of the moving grounds was the offer on behalf of both Mitten Management and the Mitten estate to place all of the assets of both at the disposal of the reorganized board. In this connection, Senator Pepper, speaking for all defendants in presenting the plan to Judge McDevitt in open court, stated:

"We hope that under the plan now outlined all constructive results can be obtained without adverse action. All the Mitten assets, including those of Mitten Management and of the Mitten estate, are in fact and in law the assets of Dr. Mitten. By his statement, made public immediately after the probate of his father's will and now repeated, through me, in open court, all of those assets in any way related to the P.R.T. situation are pledged and will be applied to the strengthening of P.R.T. in such way as the reorganized board of directors and the court shall approve. This statement is subject only to the qualification that there are a few small legacies or annuities under the will which the court will no doubt desire to protect."

The plan as presented by Senator Pepper

was accepted by the court on May 13, 1931, and by order of that date the decree nisi was modified, but only "so far as relates to the appointment of receivers."

For both Mitten Management and the Mitten estate, I hope very much that the board will take up promptly the question of the disposition of the assets thus placed at their disposal in settlement of the suggested surcharges under the authority of Paragraph 3 of the decree nisi and as contemplated in Senator Pepper's presentation of the plan. If the board will designate the committee or representatives whom it wishes to go into this matter, I will be glad at once to lay before them detailed analyses of the assets and present worth of both Mitten Management and the estate.

Financial News

Philadelphia, Pa.—A majority of the 15,000 employees of the Philadelphia Rapid Transit Company have voted down a proposal that the trustees of the P.R.T. Wage Fund pledge the latter's assets to permit payment of the usual 3½ per cent wage fund dividend on Aug. 15.

Buffalo, N. Y.—The International Railway has deeded its roadbed, tracks, poles and wires in Lancaster to the village and given \$5,000 toward their removal and for paving. The village board had recommended to the Public Service Commission that the I.R.C. be permitted to abandon the line. The trolleys ceased operation two months ago. They have been replaced by buses. When the tracks in Sawyer Avenue have been removed and the bed paved, another highway will connect Lancaster and Depew.

Charlotte, N. C.—Purchase of the Plaza Railway Company's short line here for \$8,000 by the Southern Public Utilities Company has been announced. The Plaza company operates the street car service over about 2 miles of track through the populous Plaza section of Charlotte. The transaction terminated negotiations which have been in progress several weeks. It ends the receivership ordered a few days after the death of H. B. Heath, wealthy Charlotte business man and executive head of the Plaza company.

The Business Outlook

DESPITE disappointment regarding the default of decisive measures to meet the European crisis, there are signs of slight strengthening in the domestic business situation. Business opinion is apparently responding to symptoms of domestic convalescence reflected in replacement demand at prevailing low prices and the rapid rise in electric power production since early June. Commodity price levels have shown stability for six weeks. Second quarter earnings reports reflect increasingly successful readjustment of corporate operations to new conditions. The construction, equipment and correlated industries still lag but persistent, large-scale pressure toward lower long-term domestic money costs, through aggressive Federal Reserve open market policies, could correct this situation and speed recovery.

—*The Business Week.*

Regulation and Legal

Washington, D. C.—Exercising authority granted by Congress last session, the District of Columbia Public Utilities Commission has ruled that interstate buses must provide off-street loading facilities in some section removed from the congested downtown area so as to do away with the loading and unloading of passengers along the streets in the business district. The new ruling will not go into effect until Aug. 1, 1932.

Columbia, S. C.—Attorneys who conducted the prosecution of the Columbia Railway, Gas & Electric Company and secured a ruling requiring the company to restore transportation service here, are seeking to have the company pay the legal costs in the four-year fight. The South Carolina Supreme Court authorized Referee Perrin to hear their contentions.

Richmond, Va.—Bus lines licensed through the State Corporation Commission must meet the same general liability requirements as for-hire vehicles licensed through the division of motor vehicles. So H. Lester Hooker, member of the commission, has ruled. Mr. Hooker stated that buses are required to post \$10,000 liability bond or insurance and trucks \$5,000, and that the conditions surrounding the liability protection are identical with those of for-hire vehicles. According to him, under the new law, which became effective on Jan. 1, it is mandatory that the commission require either insurance or bond with surety to be filed with and approved by the commission. Under the old law the commission could waive bonds, but the new law does not permit any discretion.

Columbus, Ohio—The Eastern Michigan Railway has been ordered to continue operation of its interurban line from Toledo to the Michigan-Ohio boundary until authority to discontinue is given by the Ohio Public Utilities Commission, which says the railroad had not filed an application for abandonment either with the state commission or the Interstate Commerce Commission.

Washington, D. C.—The Public Utilities Commission has denied the petition of the people's counsel for a rehearing of the school children's 3-cent car fare case. At the same time, the commission directed its counsel to prepare an answer to the appeal from the commission's order filed in the District Supreme Court by the Washington Railway & Electric Company, the Capital Traction Company, and the Washington Rapid Transit Company.

Atlanta, Ga.—Constitutionality of the Georgia license tax law on buses and trucks in intercity operations has been upheld by Judge Howard, in Fulton Superior Court. The operators attacked the law on the grounds that it was not uniform and was discriminatory. In his decision, Judge Howard said he was "not altogether free from doubt in regard to one or two grounds of attack, but in cases of doubt the law makes it my duty to decide in favor of constitutionality." The decision may be appealed to the Supreme Court.

Ordinance Against One-Man Cars Restrained

A temporary injunction restraining the city of Atlanta from putting into effect an ordinance forcing the Georgia Power Company to put a motorman and conductor on the street cars of that city has been signed by Judge Underwood, of the Federal District Court. Judge Underwood issued an eight-page opinion in which he said he was impelled to approve the application for temporary injunction because failure to grant such an order was likely to cause "irrecoverable loss."

No date for hearing on the permanent injunction has been set.

City Council passed the ordinance on May 7, specifying that street cars be operated by two men within the city fire limits, "in the interest of public safety and speed." The injunction suit attacks the ordinance as unconstitutional and amounting to confiscation of railway property.

Taxi Fares Increased in San Francisco

The San Francisco Board of Supervisors passed to print July 13 an ordinance setting minimum and maximum rates to be charged by taxicab operators. The new minimum rate will be 15 cents for the first quarter mile, and 10 cents for each additional two-fifths mile, with a charge of 10 cents for the trip for each passenger more than one. The minimum rate also includes a charge for each 2½ minutes of waiting time. Previous to this the average minimum rate has been about 30 cents for the first mile. The charge for additional passengers is also a new feature, as five have been able to ride for the price of one. The maximum fare is 25 cents for the first quarter mile, with 10 cents charged for each additional one-fifth mile, 25 cents for each passenger over one, and 10-cent charge for every two minutes of waiting time. It is hoped that through this increase in the rate charge the wage situation, particularly the \$5 a day minimum for operators, will prove self-correcting.

Relief Proposal Before Omaha

A hearing on July 13, before the Omaha City Council resulted in a decision to have City Attorney Moriarty draw up various ordinances relating to the proposals of the Omaha & Council Bluffs Street Railway for the elimination of the company's occupation tax and for relief from paving burdens, and to invite the public to take part in full discussion of them before any action is taken.

Officials of the tram company state that the purpose of the occupation tax, first imposed nineteen years ago, was to divert part of the profits of the company to the city, but that now there are no profits and therefore the tax is unjust.

J. N. Shannahan, president of the railway, said:

We must have immediate relief either through elimination of the special taxes or by an increase in fares. This relief must come this year or the company cannot avoid a receivership. We do not want to increase fares, therefore we have asked the Council to submit to the voters the question of eliminating the occupation tax and the paving tax.

It is necessary, however, that the question be decided soon. We cannot wait for the next general election in 1932. If the Council decides not to submit the question

or the people vote it down, the alternative is application for higher fares.

City Attorney Moriarty stated that legally the people cannot decide by vote whether the tax is to be eliminated. He said:

This would have to be done by action of the City Council, but of course the Council can submit the question to a vote of the people in order to get the popular sentiment.

Car Design Progress Program Fully Outlined

At the call of the chief engineer of the Electric Railway Presidents' Conference Committee, a number of leading electric railway equipment engineers, constituting the equipment advisory committee of that organization, met at New York recently. This committee will constitute one of several groups which will act in an advisory capacity to C. F. Hirshfeld, chief engineer for the Presidents' Conference Committee, the program of which calls for the development of a more generally acceptable type of low-cost car.

Mr. Hirshfeld outlined the program which had been organized under his direction to carry out the committee's objectives.

According to the organization chart Mr. Hirshfeld displayed, there are to be two manufacturers' advisory committees, one composed of car builders and one of electrical manufacturers. Two more manufacturers' committees will be organized later if it is found advisable. One of these will consist of air brake manufacturers and the other of the manufacturers of miscellaneous appliances which enter into the construction of street cars. Provision is also made for two committees to be chosen from the ranks of operating companies. One of these, the Equipment Advisory Committee, composed of operating men, has already been selected, being the group in attendance at the meeting, supplemented by several others who were unable to be present. The other advisory committee will consist of men interested primarily in transportation problems.

These committees are to undertake parts of the program and offer ideas and suggestions of value.

On the chief engineer's staff, provision is made for an engineer in charge of the collection of data, an engineer in charge of analytical work, and an engineer in charge of tests and experiments, together with necessary assistants and consultants. The work now underway includes the collection of existing information and statistics relating to the performance of present equipment, as well as the collection of new information and data, and the analytical study of factors effecting car design and performance.

Among the subjects to be studied are design factors as affecting first cost, maintenance, life, appearance, etc.; structural strength, starting resistance and acceleration, power requirements, riding qualities, noise reduction, safety features, ventilation and heating, and lighting, legislation affecting car design and operation, fare collection, loading and unloading practices and the esthetic appeal of car design.

Following the regular meeting those in attendance were taken by bus to Brooklyn, where the field laboratory, which has been made available through the courtesy of the Brooklyn & Queens Transit Corporation, was inspected.

Engineers Favor Buses for Some Columbia Routes

The special board of engineers appointed by the Supreme Court to inquire into the transportation needs of Columbia, S. C., favors buses over street cars in Olympia and Shandon. Its recommendations are substantially the changes sought by power company attorneys. The board suggests that buses be operated by the Columbia Railway, Gas, & Electric Company on Olympia Avenue and Whaley Street in the Pacific mills community and on Divine Street from King to Heath's corner.

Attorneys for the transportation company and Broad River Power Company submitted the request for authority to substitute buses for street cars at the last court term in conjunction with favorable petitions from dwellers in the affected area.

Meanwhile, authority has been asked by the company to charge extra fare on the proposed bus line between Heathwood and the location of the veterans' hospital farther down the Garner's Ferry Road.

Five-Cent Zones in Gary

Short-haul 5-cent fare zones were placed in effect for a 30-day trial period on five divisions of the Gary Railways, Gary, Ind., on July 26. One zone is in effect in the city of Hammond between Subway Road, east of the city, and the end of the line at the Nickel Plate tracks in downtown Hammond. Another short-haul zone is established on the Indiana Harbor division between 145th Avenue junction and Michigan and Guthrie Streets, the end of the line in central Indiana Harbor.

Decision to establish other short-haul 5-cent fare zones was made following a test of the low rate for a month on Broadway between Twentieth Avenue and North Broadway loop.

Seattle's New Mayor to Tackle Railway Problem

Robert H. Harlin, newly elected Mayor of Seattle, Wash., succeeding Frank Edwards, recalled, announces that the most perplexing problem confronting the city administration is the future of the Municipal Railway. Mayor Harlin was formerly a member of the city utilities committee, which has in hand the city railway problem, and he stated that he will cooperate to the fullest extent with the committee.

The position of superintendent of utilities, from which George B. Avery resigned, upon request from the new Mayor, has not been filled. Mayor Harlin states that since this position entails the operation of the Municipal Railway, it is extremely important, and he is withholding appointment until the Council has determined whether or not a position of manager of street railways, with such broad powers as are necessary, may be substituted for the public utilities head. Meantime, E. A. Pierce, first assistant superintendent of utilities, is in charge of the department. Mayor Harlin said:

The need of the municipal railway is to bring the cost of operation within the revenues, leaving a margin to be paid on principal and interest on bonded indebtedness in an amount mutually satisfactory to the city and the bondholders. In my mind, this entails an expert survey first to determine the needs and second to do those necessary things developed in the survey.

New Wage Policy Is Announced for Brooklyn Men

Company officials announced on July 18 a new wage policy which will affect about 10,000 men in the employ of the Brooklyn-Manhattan Transit Corporation, but they declined to estimate the annual saving involved. The entire schedule of wages and hours, upon which the new policy will be based, will be incorporated in a new one-year agreement to supersede the two-year contract which will expire on Aug. 1. The official statement follows:

The existing two-year arrangement with employees of the B.-M.T. system with reference to wages and working conditions expires in August of this year, and the arrangement for the coming year has been under discussion with the representatives of the respective groups of employees during the last three or four weeks, and a definite understanding has been reached with practically all of the groups of employees, including motormen, both on rapid transit and surface lines.

The arrangement agreed upon with the representatives with reference to employees now in service involves no reduction in the hourly rate of wage for the respective classes of work, but changes have been made in working conditions so as to change the regulation with reference to bonus allowance, reducing maximum bonus allowance and also reducing for some classes of employees the hours worked per day and hours worked per week so as to continue to furnish employment to as many employees as possible.

At present surface car motormen receive 65 cents an hour and trainmen on the subway and elevated lines 60 cents an hour. They receive the \$5 bonus for each 30 days of operation unmarred by accident. The halving of this bonus, it was estimated, would cut the wages of all motorman, trainmen and conductors, excluding subway and elevated motormen, by one cent an hour.

The basic eight-hour day is to be retained, but several classes of employees will have their working time cut several hours a week. The company, it was said, had made it clear to representatives of the men that reduced hours offered the only alternative to laying off a large number of employees.

The subway and elevated motormen are, for the most part, members of the Brotherhood of Locomotive Engineers. Their agreement with the company, it is understood, will not be affected by the new policy.

Regulation and Legal

(Continued from Page 434)

Milwaukee, Wis.—The Milwaukee Electric Railway & Light Company has asked the Wisconsin Supreme Court to reconsider its recent decision under which the company was ordered to cease running freight cars over North Fifth and North Sixth Streets on its Milwaukee northern division. The carrying of freight over the city streets was protested by residents before Common Council committees, but the Circuit Court decided in favor of the company. The Supreme Court reversed the lower court's decision. At present, the company is allowed to carry package freight in the vestibules of passenger cars, but is not allowed to run cars for the exclusive use of freight, a right it contends its franchise carries.

Indianapolis, Ind.—Recognition of railroads as heavy taxpayers and entitled to protection against truck invasion of freight routes was given in an order issued June 23 by the Public Service Commission. The policy was outlined in an order denying the petition of the Drake & Houk Transfer Company, Winchester, to operate a freight truck line between Winchester and Portland in competition with the Pennsylvania Railroad.

Rochester, N. Y.—By unanimous action, the City Council has passed an ordinance which authorizes City Manager Stephen B. Story to extend for one year the subway railroad agreement between the city and the New York State Railways dating from Aug. 1. At a previous meeting of Council, the service-at-cost contract, covering the surface and bus lines, was extended for a year.

Richmond, Va.—Objections of Virginia bus companies to the proposed rule of the commission forbidding intrastate lines selling or honoring tickets over interstate lines and banning interline agreements between State and interstate bus carriers have been taken under advisement by the State Corporation Commission.

Chicago, Ill.—Commissioners of Lincoln Park are endeavoring, through the Illinois Commerce Commission, to compel Chicago Surface Lines to remove its tracks from Lake Shore Drive between Chicago Avenue and Ohio Street. Numerous civic clubs, appearing before the commission, say this line is of great convenience to residents of the west side in reaching the municipal pier. The commission is also considering the petition of the Northwest Business Men's Association that the company extend its trolley but line west on Diversey Avenue.

Madison, Wis.—Removal of the street car tracks of the Madison Railways on Regent Street has been approved by the Council's Street Committee. The tracks have been unused since bus service to the cemeteries was substituted for railway service several years ago.

General

Detroit, Mich.—The civil service system to be installed in the administration department of the Detroit Municipal Railway will include all department heads except General Superintendent Del A. Smith.

Boston, Mass.—The 22d convention of the Amalgamated Association of Street and Electric Railway Employees will convene here on Aug. 24 and continue in session until the work of this convention is completed.

Seattle, Wash.—A new magazine is being created to take the place of the *Puget Sound Electric Journal*, and to surpass it. Puget Sound Power & Light Company officials felt that a house organ more nearly typical of the things which the company is accomplishing and hopes to accomplish, was needed. So the *Puget Sound Electric Journal* was "put to bed" for keeps. A prize of \$25 will be awarded to the employee of the company who submits the name selected by a committee of executives as being most suitable for this house organ.

Springfield, Mass.—H. M. Flanders, general manager of the Springfield Street Railway, announces two prizes for the best 500-word article or story by an employee on the subject: "How I Can Increase the Company's Revenue." The first prize will be a cash award of \$10, and the second a cash award of \$5. The contest ends July 31. The nine members of the Safety and Service Committee have agreed to act as judges. Their decisions will be final.

Columbus, Ohio.—The Columbus Railway, Power & Light Company has formed an organization intended to foster co-operation and maintain at a high standard the spirit of fellowship and good will among the foremen of the company. Charles E. Hammon is president.

Philadelphia, Pa.—In discussing editorially the one-man car decision in the Brooklyn case and in drawing a parallel between experience there and in Philadelphia the *Ledger* said that passengers will continue to complain that the one-man cars are inconvenient, but the operators have thus far been able to show that the advantages of their use overbalance any legitimate objections.

Seattle, Wash.—Property valuations have been fixed by the State Tax Commission subject to review before the State Board of Equalization at its regular valuation hearings next September. Street railway valuations lowered were the Seattle & Rainier Valley Railway, reduced from \$700,000 to \$630,000; Grays Harbor Railway & Light, \$150,000 to \$140,000; Spokane United, \$2,000,000 to \$1,750,000; Tacoma Railway & Power, \$1,850,000 to \$1,700,000. Valuation of the Pacific Traction Company remained the same, \$50,000. Five interurban railways were assessed \$1,479,600, one, the Twin City Railroad, receiving a cut from \$15,000 to \$13,500. The unchanged valuations of the other four were: Spokane, Coeur D'Alene & Palouse, \$1,000,000; Portland Electric, \$6,100; Walla Walla Valley, \$110,000, and Yakima Valley Transportation Company, \$350,000.

Baltimore, Md.—A number of drivers of Sun Cab Company vehicles went on strike on July 20, a spokesman for the men declaring that they did so in protest against paying \$6 a day rental for the cabs. He said they want this charge cut to \$5. Officials of the company declared only a few of the men had given up their jobs.

Birmingham, Ala.—Trainmen of the Birmingham Electric Company have devised a plan whereby every man holding a regular run, regardless of seniority, would voluntarily lay off one day in every ten days. This action has resulted in every trainman being able to make a minimum number of hours each week. The "extra board" remains intact.

Louisville, Ky.—The Indiana Railroad System used large newspaper advertising on July 18, to invite the public in Louisville to inspect its new type interurban car on display at the Traction Terminal Building here on July 20 and 21. The company spent \$980,000 for new equipment, described previously in *ELECTRIC RAILWAY JOURNAL*.

Proposed Rome Substitution

The City Commission of Rome, Ga., by a unanimous vote, has rejected the petition of the Georgia Power Company to discontinue the street car service and substitute buses, and has decided to see what legal steps can be taken to compel the pavement of the car area on East Ninth Street by the power company. The vote to disallow the petition to substitute buses was based on an opinion by G. E. Maddox, special attorney for the city, in litigation with the company. Mr. Maddox held that to grant such a request would endanger the future transportation facilities in the city and that the State Supreme Court has ruled that the power company cannot abandon its service piecemeal—that the street car and power and light franchises are one and the same.

The position of the company is that it has always conducted its railway business in Rome separate and distinct from its electric light and power business and that this condition of separate operation was true when the two separate and distinct businesses were owned and conducted by its predecessors. The company does not

believe it can legally or constitutionally be compelled to continue to operate its railway lines in Rome and vicinity when it not only receives nothing whatever on the property used and useful in performing such service, but monthly and yearly incurs an actual operating loss in rendering this service. It holds that to compel service under such conditions, its property is being taken without due process of law in violation of the fourteenth amendment.

Referendum on Taxi Bill

W. Preston Lens, Jr., attorney-general of Maryland, has ruled that the petition for a referendum on the taxicab bill passed by the last session of the Maryland General Assembly conforms with law, and it will therefore be passed upon by the voters. The bill was signed by the Governor. It is designed to place the taxicabs of Baltimore under the supervision of the Maryland Public Service Commission, effective on Jan. 1, 1932. The petition will prevent it from going into effect at that time. The vote will be taken at the Congressional election next year.

large extent competitive with that of the Pacific Electric Railway particularly between important cities and towns, although much of the route of many lines operated is through non-competitive territory. The Motor Transit Company was operated as an extensive feeder to Pacific Greyhound Lines, Inc. On Jan. 1, 1930, Pacific Greyhound Lines, Inc., purchased one-third of the capital stock of the Motor Transit Company, the Pacific Electric Railway purchasing the other two-thirds of the capital stock. Service of the Motor Transit Company is being co-ordinated with that of the Pacific Electric Railway rail and coach lines, with joint tickets and optional use of either line between common points.

Motor coach operations of the Pacific Electric Railway directly and through affiliated organizations, include several lines operated as protection against competition, lines operated as feeders in newly developed territory, and also lines to territory not adequately served by other rail or motor coach lines. In a few instances where rail lines needed to be rebuilt and where traffic has been comparatively light, motor coaches have been substituted.

In Pasadena the Pacific Electric Railway operates a completely co-ordinated and unified system of local motor coach and street car service.

The Pacific Electric Railway has 141 motor coaches in operation; Los Angeles Motor Coach Company, 148 coaches; Motor Transit Company, 125 coaches; making a total of 414 coaches under operation by the Pacific Electric Railway and affiliated organizations.

Climatic conditions at Los Angeles are particularly good for the operation of automobiles, and roads and highways have been constructed commensurate with their very extensive use. The ratio of automobiles to population in the southern part of California is greater than in any other section of the United States. Of the total competition afforded by both private automobile and passenger motor carrier, Mr. Smith estimated that at least 85 per cent of such competition is due to the private automobile and 15 per cent to the passenger motor carrier.

Pacific Electric Bus Operation

(Continued from Page 431)

Bernardino and Highland which competed directly with a rail line. Extensive operation of motor coaches did not commence until 1923, a year of great activity in residential building. Lines were established to ward off competition and also to run into newly developed territory as feeders to rail lines.

In 1923 the Los Angeles Railway, operating an extensive rail system in Los Angeles, and the Pacific Electric Railway were confronted with extensive, direct motor coach competition by an independent operator. In order to forestall this threatened competition, the Los Angeles Motor Coach Company was organized, and motor coach lines were established. While to a certain extent this operation is competitive with the rail service of the Los Angeles Railway and the Pacific Electric Railway it serves in

a general way to connect districts of Los Angeles with a direct or crosstown service. Los Angeles Railway and Pacific Electric Railway each purchased one-half of all equipment and facilities of the Los Angeles Motor Coach Company and each shares one-half in revenues and expenses, but a separate operating organization is maintained. In 1924 ownership of motor coach lines operated by the Pacific Electric Land Company was transferred to the Pacific Electric Railway.

MOTOR TRANSIT ACQUIRED

During a period of several years there had grown up in southern California in the territory served by the Pacific Electric Railway an extensive system of motor coach lines, known as the Motor Transit Company, giving service to a

Passenger Motor Coach Operations of Los Angeles Motor Coach Company, Years 1923 to 1930 Inclusive, of Pacific Electric Railway

Year	Total Passengers	Total Miles	Total Revenue	Revenue per Coach-Mile, Cents
1923.....	911,052	321,834	\$56,851.02	18
1924.....	6,798,844	2,071,999	444,310.01	22
1925.....	8,473,285	2,146,628	583,067.99	28
1926.....	9,363,474	2,366,745	667,485.50	29
1927.....	10,138,576	2,404,424	719,937.37	31
1928.....	14,205,979	3,421,927	1,065,702.25	32
1929.....	18,890,480	4,260,498	1,481,519.68	35
1930.....	19,418,933	4,473,874	1,509,131.14	34

Passenger Motor Coach Operations, Years 1921 to 1930, Inclusive, of Pacific Electric Railway

Year	Total Passengers	Total Miles	Total Revenue	Revenue per Coach-Mile, Cents
1921.....	78,698	75,746	\$11,361.76	14
1922.....	84,635	76,009	10,290.40	14
1923.....	2,115,432	708,164	103,390.11	15+
1924.....	9,385,294	3,552,388	487,507.52	13
1925.....	9,931,192	4,181,679	597,041.59	15
1926.....	9,855,898	4,018,964	627,588.38	16
1927.....	9,703,980	4,211,735	690,816.56	16+
1928.....	9,688,211	4,286,441	653,018.07	15+
1929.....	9,723,174	4,345,381	655,567.40	15
1930.....	9,616,059	4,790,235	663,091.87	14

Rail Line Passenger Operations, Years 1921 to 1930, Inclusive, of Pacific Electric Railway

Year	Total Passengers	Total Miles	Total Revenue	Revenue per Coach-Mile, Cents
1921.....	101,617,806	28,920,417	\$11,958,762	41+
1922.....	99,896,776	28,905,634	12,885,511	44+
1923.....	112,676,570	31,047,829	14,469,041	46+
1924.....	103,337,029	28,541,612	12,961,419	48
1925.....	94,786,503	26,929,056	11,710,007	47
1926.....	93,547,738	26,588,735	11,387,020	46+
1927.....	92,583,546	26,116,561	11,133,938	46+
1928.....	93,176,241	26,131,126	10,346,948	40
1929.....	94,711,990	25,989,257	10,259,037	40
1930.....	87,598,162	24,870,497	9,293,939	40

Passenger Motor Coach Operations of Motor Transit Company, Year 1930, of Pacific Electric Railway

Year	Total Passengers	Total Miles	Total Revenue	Revenue per Coach-Mile, Cents
1930.....	3,593,750	5,075,171	\$1,135,450.44	22+

London Co-ordination Plans Making Progress

When the joint committee of the Houses of Lords and Commons resumed consideration on June 9 after the Whitsuntide recess of the London passenger transport bill announcement was made of a settlement in the case of the London County Council Tramways. The promoters originally proposed that the transfer of these and other municipal tramways within the London traffic area should be by the board assuming the outstanding capital liabilities of the undertakings. On the resumption of the sittings of the joint committee, it was announced that a more definite arrangement had been reached between the promoters and representatives of the London County Council.

Wilfrid Greene, K.C., counsel for the promoters, said that, subject to confirmation by the County Council and, of course, to the approval of Parliament, an arrangement had been reached to the following effect:

A special class of stock will be issued to the amount of the net outstanding debt on March 31, 1932, which, in the case of the London County Council, has been agreed at a round figure of £8,500,000. The stock will bear interest at the rate of 4½ per cent and will rank immediately after the "T.F.A." stock and in front of the "B" stock of the boards. The stock will be a trustee security, to be redeemed at par at the end of 90 years or at any time after 1975 at the option of the board. The Council will undertake not to put stock upon the market for a period of ten years. In regard to other local authorities which operated tramways in the London traffic area, the promoters were willing to agree to an issue of the special stock to the amount of their net outstanding debts.

LONDON COUNTY COUNCIL POSITION

Evan Charteris, K.C., counsel for the London County Council, said that in their position against the bill, the London County Council stated that after consultation with their expert advisers, they were satisfied that a settlement on the basis of a transfer of the undertaking, as and from April 1, 1932, in exchange for £8,500,000 would embody principles they had in mind. In deciding to recommend to the Council subject to Parliament, acceptance of these terms, they had been influenced by the knowledge that by such an arrangement the council would retain control of its sinking fund arrangements. It would be understood that the settlement was subject on both sides to agreement being reached on consequential and safeguarding matters. With regard to the method of appointment and the powers of the board, the council remained of the opinion that proposals in the bill under that head were contrary to sound local government principles.

THE GOVERNMENT POLICY

On the following day, June 10, Herbert Morrison, Minister of Transport, explained his department's policy on the bill. He said that the bill provided for the unification of London passenger transport—a thing desirable in the interests of providing for London an efficient passenger transport service. Consolidation of the ownership of the undertakings was necessary to assure that degree of efficiency which was essential to the success of London passenger

transport. As to unification in the hands of a private concern, he believed that to be politically impracticable. He was anxious to lift London passenger transport out of the danger of political controversy.

THE MUNICIPAL IDEA

In regard to a suggestion of municipal ownership, Mr. Morrison said that municipal management, at its best, would be management by one municipal corporation. The only conceivable one they could have would be the London County Council, of which he was a member. But the L.C.C. only covers 117 square miles, whereas the London traffic area is approximately 1,800 square miles. If the undertakings in the traffic area were transferred to the L.C.C., nobody knew better than the L.C.C. what a furious row there would be with the other authorities if the L.C.C. ran their traffic for them. So that was ruled out. He was not enthusiastic over a joint municipal authority. This thing had to be run as a business undertaking, capable of effective and swift action. Therefore, he came back to the business board, to be appointed by the Minister, on the basis of business ability and business management. The scheme must stand or fall on the test of business efficiency and public service. He wanted the board to be a corporate entity. The preponderance of the evidence was all on the side of a small, corporate business body. He deliberately framed the bill to prevent himself, or any other minister, from interfering with the day-to-day management of the board.

THE INDEPENDENT BUSES

On a subsequent day, Mr. Morrison was cross-examined on behalf of the independent bus owners, a comparatively small body. He said an effect of the bill would be to abolish competition, but he could not agree that independent companies should be compensated on the basis of profits made in unfair competition with the legitimate carriers. In reply to a point raised that it was proposed to compensate the London General Omnibus Company on the basis of its present position, Mr. Morrison said that company had devoted part of the proceeds of its business to the maintenance of the "tube" railways—essential to London passenger transport. Were it not for that assistance, there would be a risk of the tube railways withdrawing service.

THE POSITION OF THE TRANSPORT BOARD

Mr. Morrison said that members of the proposed transport board would be free from financial interest in competitive transport undertakings. The board would act as trustee to the public with complete managerial freedom, but with the responsibility for initiative. The board would not be subject to the control of the Minister of Transport. As to fares, the board could not disturb the present general level without either going to the Railway Rates Tribunal or subjecting itself to opposition from the local authorities. As to buses, there would be officers of the board who would devote the whole of their time to the running of the buses as cheaply as they could.

LONDON COUNTY COUNCIL AGREES

At a meeting on June 16 the London County Council agreed to the terms of settlement for its tramway undertaking, as

outlined above in the proceedings before the Joint Parliamentary Committee.

At a later date, Sir William McLintock, the accountant who is the Government's financial adviser on the scheme, handed in to the joint committee on the bill a statement showing the application of the revenue of the London Passenger Transport Board in accordance with the terms of the bill, in which the capital stocks to be issued by the board at its inception are estimated as follows: 4½ per cent "A" stock, £24,280,589; 5 per cent "A" stock, £12,403,950; 4½ per cent "T.F.A." stock, £12,583,000; 5 per cent "B" stock, £23,557,818; "C" stock, £26,753,423.

Sir William's statement shows that the estimated net revenue of the board is sufficient from the outset of the board's activities to provide for the interest on the amounts of "A," "T.F.A." and "B" stocks referred to therein, interest at the rate of 5 per cent per annum on the amount of "C" stock referred to therein, and a sum of £399,622 for reserve. When 6 per cent is paid on such "C" stock, the sum available for reserve would be £132,928.

It is anticipated that consequent upon the natural expansion of traffic and upon the economies to be expected from unification, the net revenue of the board will be sufficient to provide for the sinking funds, which will become effective from 1942 onwards, and also to provide for further reserves and other purposes of the board.

AGREEMENT WITH "INDEPENDENTS"

At a sitting of the joint committee on June 23, another agreement—namely, one with a number of bus companies operating on the boundaries of the London traffic area—was announced. Mr. Greene, counsel for the promoters of the bill, stated that by agreement the Transport Board's powers to extend services beyond their monopoly area would be subject to the same condition which applied to everybody else—namely, that they could obtain road service licenses. It was proposed now to limit the board's powers to operate to a definite line outside its operating area of 10 miles.

In the arrangement three areas were contemplated. Within the smallest of these the Transport Board would have a monopoly. Outside that area the board would have the right to run services subject to obtaining road service licenses in competition with everybody else. For 10 miles outside the new line, the board would have power to enter into working agreements. The main-line railways agreed with the proposal. The Transport Board would take over from the agreeing bus companies the services which the latter were at present running within the proposed operating area. Regarding overheads, which would remain as a result of the division of the services, the principle accepted was that the nature of these overheads was to be ascertained by arbitration, failing agreement.

Sir Leslie Scott, K.C., on June 24, addressed the committee on behalf of the Metropolitan Railway in opposition to the bill, saying the company was profoundly sceptical about unified ownership. It would prefer to be included in the pooling policy of main-line railways.

At a sitting of the committee on June 30 it was announced that a settlement had been reached between the promoters of the bill and Hertfordshire County Council, which owns tramways operated by the Metropolitan Tramway along with the Middlesex County Council Tramways.

PERSONAL MENTION

C. B. Short Portland Railway Manager—Other Changes

Coincident with the arrival at Portland, Ore., on July 1 of Carlton B. Short to take the general managership of the railway department of the Pacific Northwest Public Service Company, other personnel and functional changes in that company and its subsidiary, Portland General Electric Company, were announced by Franklin T. Griffith, president.

William H. Lines, vice-president of both companies and for several years manager of the railway department, was appointed treasurer of both companies and given broader responsibilities in both. W. S. McCullough, vice-president and treasurer, Central Public Service Corporation, Chicago, the holding company for the Port-

With respect to the news of Carl Short's impending departure from Roanoke to a post of greater responsibility in the far Northwest, it is in order to express commingled regret and felicitations—regret that Roanoke is to lose him as a citizen and that he is no longer to be numbered among the very satisfactory managing executives of public utilities doing business here; felicitations to Portland on acquiring a transportation executive who "knows his stuff" and will deliver if given half a chance to do so.

Mr. Short entered the service of the Roanoke Company as stenographer to the general manager in 1907. A few years later he was made claim agent. In 1917 he left the service of the company, but returned on Jan. 1, 1924, as assistant to the general manager. Two years later he was



At left—Carlton B. Short, new general manager railways, Pacific Northwest Public Service Company, Portland, Ore. At right—William H. Lines, vice-president, Pacific Northwest Public Service Company, Portland, whom Mr. Short relieves as active head of the railway department.

land company, and Ray E. Brennan, general auditor of the Portland company, were appointed assistant treasurers of the two companies. Cassius R. Peck, of the legal department in Portland, was appointed secretary of both companies, succeeding R. W. Shepherd, resigned. Clarence D. Phillips, also of the legal department, became assistant secretary.

For a number of years, Mr. Short was secretary and assistant to J. W. Hancock, his predecessor as manager of the Roanoke Railway & Electric Company. During the three years he was at the managerial helm there, Mr. Short has been called on to confront a number of difficult and delicate problems. That he has handled them to the satisfaction of his superiors is amply attested in his transfer to a larger post in the service of the public utilities group which owns the Roanoke company. The *Roanoke Times* said:

made assistant general manager and this position he occupied until the Central Public Service Company acquired the property early in 1928, at which time he was made manager.

H. C. McNaught Manages New London Division

Harry C. McNaught, appointed recently to succeed Samuel Anderson, resigned, as manager of the New London division of the Connecticut Company with offices at Norwich, Conn., entered street railway work in 1904 immediately after leaving high school. He served first as stenographer in the office of the superintendent of the Norwich Street Railway, which later merged with other local street railways and became a part of the Connecticut Company, known as the New London

division, with headquarters at Norwich, Conn. Since then Mr. McNaught has been employed continuously as timekeeper, paymaster, cashier, chief clerk, with that company, and with the Shore Line Electric Railway, which leased the properties from 1913 to 1920. In 1920 the lease was terminated and operation resumed by the Connecticut Company, and on April 1, 1920, he was appointed assistant to the manager of the New London division of the Connecticut Company. From that post he was advanced to succeed Mr. Anderson.

G. K. Jeffries Resigns Indiana Post

George K. Jeffries, for 22 years general superintendent of the Terre Haute, Indianapolis & Eastern Traction Company, has submitted his resignation. The Terre Haute, Indianapolis & Eastern Traction Company was bought at receiver's sale recently and will be tied in with other operations of the Insull interests in Indiana. Mr. Jeffries started his career as a railroad telegrapher in the employ of the Big Four Railroad at Shelbyville and prior to becoming connected with the Terre Haute, Indianapolis & Eastern Traction Company in 1906 he was engaged as a railroad dispatcher and trainmaster and as superintendent of the Indianapolis & Northwestern Traction Company at Lebanon.

R. P. Woods Heads Mid-West Electric Rail Association

At the annual convention in Denver of the Mid-West Electric Railway Association, July 16 and 17, Robert P. Woods, receiver for the Kansas City, Clay County & St. Joseph Railway, was elected president. He succeeds C. A. Semrad, vice-president of the St. Joseph Railway, Light, Heat & Power Company.

Mr. Woods has been president of the Missouri interurban since January, 1928. Before that he was vice-president of the company for eight years. Between 1914 and 1918 he was city representative of the Kansas City Railways board of control. In this work he had supervision over many of the improvements made by the company. He continued as consulting engineer to the board as he was in a position to direct the carrying out of the extensive traffic improvements which were then being made under the direction of John A. Beeler.

Mr. Woods has had a long career in railway work. In 1901 he was made chief engineer in charge of construction of the Wabash River Traction Line. One year later he was appointed to a similar position with the Indianapolis-Shelbyville interurban. From 1902 to 1904 he served the Indianapolis & Northwestern Traction Company as chief engineer. Later, he was consultant in charge of design and construction of the Lebanon-Thornton Electric Railway, Lebanon, Ind. When the line was completed he was made vice-president and general manager. This position was followed by his becoming president of the company. From 1911 to 1913 he had charge of the building of the 80-mile line of the Kansas City, Clay County & St. Joseph Railway.

Mr. Woods was born in Buffalo, N. Y., in 1870.

Seven Operating Groups for Essex Division

The Essex division of Public Service Co-ordinated Transport, Newark, N. J., has been divided into seven operating groups instead of four districts. The change will provide improved supervision of the various carhouses and garages and the lines operating out of them.

James M. Symington continues as manager of the division, and Aaron H. Hill has been appointed assistant manager. Mr. Hill had been superintendent of the Southern district of this division.

The following appointments as group superintendents and supervisors were announced:

Bloomfield group—Spencer G. Harvey, superintendent; Harry Brown and James Foley, supervisors. Mr. Harvey had been superintendent of the Orange district; Mr. Brown supervisor in Bloomfield, and Mr. Foley, supervisor at South Orange carhouse.

Orange group—John B. McCallum, superintendent; Jeff Lyons and Harold B. Whitman, supervisors. Mr. McCallum had been superintendent of the Northern district; Mr. Lyons, supervisor in Orange, and Mr. Whitman, passenger agent in charge of chartered bus service.

Irvington group—George Klements, superintendent. Mr. Klements had been assistant manager in Central Division.

Ironbound group—John Anderson, superintendent; Albert Bedwin, supervisor. Mr. Anderson had been supervisor at Lake Street garage and Mr. Bedwin had been supervisor at Second River garage.

Kearny group—Joseph H. Moore, supervisor; Alfred Paulson, supervisor. Mr. Moore had been supervisor at Sixteenth Avenue carhouse, and Mr. Paulson, supervisor at Harrison carhouse.

Broad group—James H. Stone, superintendent; Harry E. More, supervisor. Mr. Stone had been supervisor at Orange and Passaic Valley carhouse and garage; Mr. More, supervisor at Sherman Avenue garage.

Weequahic group—Joseph F. Sturm, superintendent; Edward Cone, supervisor. Mr. Sturm had been supervisor at Miller Street carhouse, and Mr. Cone had been superintendent of Bloomfield district.

Associates Honor I. R. Carson

I. R. Carson has just finished his 25th year of service with the Kansas City Public Service Company, Kansas City, Mo. He is assistant superintendent of transportation. He has never owned a motor car and "still rides the street cars." His associates gave him a watch and chain.

E. C. Morris Named to West Virginia Commission

Appointment of Earle C. Morris, a valuation engineer of North Dakota, as its chief engineer, effective July 1, has been announced by the Public Service Commission of West Virginia.

Mr. Morris will have charge of work on valuation of utilities under regulation by the commission and James Imboden, of Kanawha County, who previously had held the title of chief engineer, will remain in the commission's engineering department and continue his present work upon other technical phases of utility engineering.

Mr. Morris is a graduate of Purdue Uni-

versity. For eleven years he has been head of the engineering, valuation and statistical department of the board of railroad commissioners of North Dakota. Prior to

joining the North Dakota board in 1920 he served for three years as assistant engineer of the Public Service Commission of Indiana.

W. B. Potter, Engineer and Inventor, Signally Honored

While in Erie recently, W. B. Potter, consulting engineer for the General Electric transportation department (retired) was presented with a set of three volumes containing more than 200 letters from former associates. The letters are reminiscent of many former associations both within and without the General Electric organization. Among the numerous letters are communications from England, Germany, France and Australia. Each letter is neatly mounted and accompanied by a portrait of the writer. The three volumes are attractively bound in morocco, and the

Northern and Southern Pacific lines. During one of his foreign trips he studied the London Underground then being converted to electric operation. Later, the Butte, Anaconda & Pacific, Chicago, Milwaukee & St. Paul and Victorian Railways work was carried out under his supervision.

W. B. Potter is a native of Connecticut. Up to the age of fourteen he lived on a farm, but during his vacations and following graduation from high school he satisfied a craving for electrical machines by working in the shops of the Seth-Thomas Clock Company. Upon leaving school he began service as a machinist apprentice with Sawtele & Judd, Hartford, Conn. After four years' apprenticeship, he was designated to look after all repairs and engines of the Hartford Electric Company. Foreseeing the future of the electrical industry, he secured employment with the Thomson-Houston Company at Lynn and, as a result of studying reports of Frank J. Srague's work with the trolley, decided to follow electric railroading. His first task in this field was in installing equipment for the West End Street Railway, Boston. Experience gained in Boston, Albany, Utica, Saratoga and San Antonio, resulted in Mr. Potter being taken into the engineering department under J. B. Calhoun, in 1890. In 1895, when Walter H. Knight, then engineer of the department, left, Mr. Potter was made chief engineer.

A man of strong opinions, unusually well-informed along lines other than those of his own endeavors, Mr. Potter's numerous inventions show that the new and the untried have a strong appeal for him, and he has always been quick to lend sympathetic aid to others engaged in working out their problems, aid that was in many cases most helpful since the range of the man's own knowledge and his enthusiasm seemed unbounded. Moreover, he has the faculty of communicating his enthusiasm to others. This is a most important attribute, particularly in a man charged with responsibilities such as his have been—a man who contributed liberally of his time to the affairs of technical associations, particularly the American Institute of Electrical Engineers and the American Electric Railway Association.

There is nothing of the scientific reclusive about Mr. Potter. Neither has there ever been any sign of showmanship. If his enthusiasm has sometimes led to his holding to ideas with insistence that others thought was too tenacious, then in the light of experiences that proclivity has in most cases proved to be a virtue rather than a vice. Men of an inventive turn of mind need to be tenacious—otherwise they are frequently lost. If that were not true Mr. Potter would not have achieved what he did, and the hundreds of letters of reminiscences, reflecting kindly feeling for him and proclaiming his work, would not have been written. The form of the presentation was unusual, but the tribute is well deserved.



W. B. Potter

letters include messages from numerous high executives, not only of the General Electric Company but of other organizations.

This was a fine tribute paid to an eminent engineer—a man who played a most important part in electrical development, particularly in the application of electricity to railroading. Even among those who know Mr. Potter well, the fact will probably come as a surprise that more than 130 patents have been issued to him for various inventions, including the series-parallel controller, the surface contact system, the three-wire system of railway operation, electro-pneumatic contact control system and the otheograph. Other patents relate to electric switching, motors, generators, third rail, electric braking, air brakes and various schemes of motor control. This is a mere list, but it does serve to convey an idea of the range of the man's wide technical accomplishments more forcefully than could any prosaic portrayal of them in detail. Mr. Potter conceived the idea for the series-parallel controller in connection with a study of electric railway equipment, in 1892. This has since been used almost universally in control for electric railway motors.

Among projects which engaged his attention were the Manhattan Elevated Railway, Baltimore & Ohio, and Paris-Orleans electrifications, New York Central terminal electrification, and the use of electricity for propulsion on the West Jersey & Sea Shore Railroad, Detroit Tunnel, Great

Duties of Lake Erie Railway Officials Being Rearranged

Changes in the operating personnel of the Cincinnati & Lake Erie Railroad, and its subsidiaries, the Lima City Street Railway and the Hamilton city lines, have been announced by Dr. Thomas Conway, Jr., president.

The scope of duties of Truman Curtiss, at present general superintendent of interurban railway operations of the Cincinnati & Lake Erie, has been expanded to include all interurban divisions, as well as the Lima and Hamilton city lines.

Claude Porter, former division superintendent of the Cincinnati and Columbus divisions of C. & L. E., has been made assistant general superintendent and his duties under Mr. Curtiss will include all divisions, as well as the city operation of Lima, Hamilton and Dayton.

James S. Duncan will supervise operation on the Cincinnati and Columbus divisions of C. & L. E., as well as the Hamilton city lines, under the title of superintendent. Mr. Duncan succeeds, at Hamilton, A. C. Starkey, who has been manager of the local line there since 1927.

Thomas E. Haldeman, of Springfield, has been appointed superintendent of the Toledo division of C. & L. E., and manager of the Lima City Street Railway, to succeed Harry G. Mason, resigned. Last year, Mr. Haldeman rounded out a service of 25 years as motorman on the Columbus division of C. & L. E. He has an exceptionally fine record for safe operation, good conduct, and courtesy.

Joseph Bowman, superintendent of the Lima city lines, has entered train service on the Toledo division. His duties will be assumed by Mr. Haldeman.

F. A. Healy, assistant secretary of C. & L. E., has resigned. Mr. Healy has a background of many years in executive capacities with both steam and electric railways. He is well-known in the industry and has made a host of friends during his many years of service.

C. W. Randolph has resigned as superintendent of the C. & L. E. Bus Company. Mr. Randolph's career with the interurban system dates back 25 years.

E. R. Butler, assistant to the general superintendent, was temporarily relieved from present duties and assigned to the passenger traffic department, where he will devote the major part of his time to the solicitation of party and group riding, conventions, special events, etc.

John Fishvogt, assistant to the passenger traffic manager, has been made ticket agent at Cincinnati.

The rest of the executive personnel remains the same: W. L. Butler, executive vice-president; J. Harvey McClure, vice-president in charge of public relations; H. C. Donecker, vice-president in charge of operation; Richard Breckinridge, vice-president in charge of traffic; and J. M. Pogue, vice-president in charge of purchases and bus operation.

George J. Kuhrts, president of the Los Angeles Railway, has been appointed by John C. Porter, Mayor of Los Angeles, as a member of a special committee of nine citizens to conduct a thorough investigation of operations of the Los Angeles Department of Water

& Power in order to put at rest rumors concerning the department, and particularly concerning the power bureau. The appointment of the committee has been ratified by the City Council.

A. G. Ellaway, an alderman at Birmingham, has been elected president for the ensuing year of the British Municipal Tramways & Transport Association. Mr. Ellaway is the sole surviving member of the original Birmingham Tramways Committee founded about 25 years ago.

J. S. Tritle in Important Westinghouse Post

J. S. Tritle, elected vice-president and general manager in charge of manufacturing, sales and engineering operations of the Westinghouse Electric & Manufacturing Company, has long been connected with that company and is unusually well-informed, not only on the phases of its business which come within his immediate purview, but with the history of the company and its fiscal and other policies.



J. S. Tritle

Mr. Tritle was born in Virginia City, Nev., in 1872. He received his early schooling in New Haven, Conn. From preparatory school he entered Yale University, from which he was graduated in 1893 with a degree in science. In 1895 he entered the electrical engineering contracting business in which he continued for eight years. At the outset of the World's Fair in St. Louis he accepted the position as chief of construction. At the close of the fair, he became manager of the Kansas City district for the Westinghouse company. In 1915 the St. Louis and Kansas City offices were consolidated, Mr. Tritle assuming charge of both.

In 1922 the scope of his activities with the company was again widened. He was made manager of the merchandising division of the general sales department of the company. In 1925 when a separate department was made of the merchandising business, Mr. Tritle was made general manager of the merchandising department, overseeing engineering and manufacturing, as well as sales work, with headquarters in Mansfield, Ohio, where most of the merchandising products are made.

From Mansfield Mr. Tritle was moved to East Pittsburgh on May 1, 1929, as vice-president in charge of manufacturing operations. In his new position as vice-president and general manager, Mr. Tritle will retain his headquarters in the Westinghouse company's main works at East Pittsburgh, Pa. He reports to the president, F. A. Merrick.

G. W. Woodruff on Penn- sylvania Commission

George W. Woodruff, attorney general under the former administration of Governor Pinchot of Pennsylvania, and more recently legal adviser to the Governor in public utility matters, has been appointed to the Public Service Commission by Governor Pinchot, succeeding Charles H. Young, whose term of office has just expired.

During the heat of the bitter strife that was waged over the Governor's recent attempt to abolish the Public Service Commission and substitute a "Fair Rate Board" of his own choosing, Mr. Woodruff declared, before the House committee investigating the Pinchot charges against the commission and its functioning under the existing statute, that it was his conviction that the Pennsylvania Public Utility Act was the best in the country.

W. H. Horn Made Manager at Roanoke

W. H. Horn, superintendent of transportation of the Roanoke Railway & Electric Company, Roanoke, Va., has been appointed to succeed C. B. Short as general manager of the company. Like Mr. Short, Mr. Horn is a product of the Hancock school of efficiency and his long connection with the company entitles him to the well merited promotion that has come his way. The *Roanoke Times* said:

"Bill" Horn is one of us, knows our people and their temperament, knows how to get along with them. He will do well to study the frank and direct methods of his predecessor in the field of public relations, so essential to the successful conduct of a public utility in these modern times. The railway is an admirable example of a public utility that "gets on" with the community in which it is located. That fact is a tribute to managerial common sense as well as to managerial skill.

Gordon Starr has been made traffic agent of the Winnipeg, Selkirk & Lake Winnipeg Railway, affiliated with the Winnipeg Electric Company. Mr. Starr was formerly in the purchasing department of the latter company, and has been employed there for eight years.

E. J. Mehren has resigned from the McGraw-Hill Publishing Company, Inc., to assume the presidency of the Portland Cement Association. His new responsibilities carry with them great opportunities for service. Mr. Mehren was associated with McGraw-Hill for more than twenty years. He played an important part in the development of its properties, and of the institution itself. Among his conspicuous service with the company was his work as editor of *Engineering Record* and of *Engineering News-Record*.

G. L. Harris has been appointed manager of office systems of the Westinghouse Electric & Manufacturing Company. For the last three years, he has been manager of office systems for the Philadelphia Electric Company. Previously, he was manager of office systems for the Georgia Railway & Power Company, Atlanta, and for several years organized and installed office systems in the Insull properties at Chicago. In his new position, Mr. Harris will report to President Merrick.

OBITUARY

T. P. Gaylord

Truman P. Gaylord, vice-president of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., died suddenly on July 5 in Shelby, Mich., where he was born 60 years ago.

The Chicago World's Fair was starting when Mr. Gaylord engaged with the Fair Company as engineer of the underground construction, in which capacity he continued from 1892 to 1893. At the close of the World's Fair, Mr. Gaylord became assistant professor of electrical engineering at Armour Institute of Technology, Chicago, serving there from 1893 to 1898. He was associated with the Commonwealth Edison Company from 1898 to 1899, when he entered the employ of the Westinghouse Company.

He was appointed district manager of the Westinghouse Company's Chicago office in 1902, and occupied that position until he was made acting vice-president in August, 1914. He was elected vice-president in April, 1929.

Mr. Gaylord attended the Allen Academy of Chicago; the University of Michigan, from which he was graduated with the degree of electrical engineer; and Armour Institute of Technology, from which he secured a degree in 1895.

H. L. Hawley

Harry L. Hawley, who represented the Consolidated Car-Heating Company, Inc., in New York for 23 years, died suddenly on July 3, at Summit, N. J., where he made his home during the summer months. Interment was at Waterford, N. Y., on July 6.

Mr. Hawley was born in Saratoga County, New York, and moved to Flatbush, Brooklyn, about 24 years ago, where he had since resided. He was widely known among steam railroad and electric railway officials and among the manufacturers of equipment used in both of these fields.

He is survived by his widow, Mrs. Minnie E. Hawley, his brother, Cornell S. Hawley, the president of the Consolidated Car-Heating Company, Inc., his nephews, Edward B. Hawley, Waterford, and Harold A. Hawley, Flushing, and his niece, Mrs. Chester B. Parkis, Waterford.

Ira M. Cobe

Ira Maurice Cobe, Chicago investment banker, died on July 9 at his summer home in Northport, Me. He was 64 years old.

In October, 1914, Mr. Cobe resigned all his Chicago connections and withdrew permanently to his home. At that time the Chicago Surface Lines announced the resignation of Mr. Cobe as chairman of the executive committee of the surface lines, as chairman of the executive committee of the Chicago City & Connecting Railways, and as a member of the board of operation of the Chicago Surface Lines. At the same time, Mr. Cobe tendered his resignation as member of the board of directors and executive committee of the Northwestern Elevated Railway and of the governing committee of the Chicago Elevated Railways. He also withdrew

from the directorate of the Chicago Title & Trust Company.

A native of Boston, where he was graduated at Boston University, Mr. Cobe was admitted to the Massachusetts bar in 1888 and practiced law in Boston four years. In 1892 he joined in organizing the firm of Cobe & McKinnon, investment brokers, in Chicago, and in rapid succession became president of the Assets Realization Company, chairman of the board of the Chicago Railways, director of the Chicago Title & Trust Company, director of the Calumet & South Chicago Railway, chairman of the Hammond, Whiting & East Chicago Railway, director of the National Bank of the Republic, director of the Financial Corporation of America and chairman of the governing commission of the Chicago City & Connecting Railways.

W. H. Whiteside

Walter Hunter Whiteside, 70, corporation executive, died unexpectedly at his home in Los Angeles, Cal., on July 18. Mr. Whiteside retired in 1926 from the position of Pacific Coast representative of the Westinghouse Electric & Manufacturing Company, with which he had been connected in Pittsburgh and New York for many years. He left Westinghouse in 1904 to become president of the Allis-Chalmers Company, but resigned from Allis-Chalmers in 1911 to take the presidency of the Stevens-Duryea Company, automobile manufacturers. The latter post he held until he returned to Westinghouse in Los Angeles in 1916. Mr. Whiteside was born in Wabash, Ind., and was graduated from Wabash College.

R. L. Crump

Ralph L. Crump, associated with Ford, Bacon & Davis for many years, died in Philadelphia on July 17. Mr. Crump attended Pennsylvania State College, and entered the electric railway field with the Johnson Company, now the Lorain Steel Company, in Atlanta, Ga. He next was employed by William Wharton, Jr., & Company, Inc., as engineer on track construction in Philadelphia. In 1896 he became resident engineer of Ford, Bacon & Davis on the reconstruction of the Canal & Claiborne Railroad in New Orleans, and then served successively as resident engineer on the New Jersey & Hudson River Railroad & Ferry Company, New Orleans & Carrollton Railroad, Kansas City Railway & Light Company, Memphis Street Railway and the American Cities Railway & Light Company. During the World War he was an engineer in the transportation and housing division of the United States Shipping Board. About ten years ago Mr. Crump retired from active business.

George Fillmore Swain

George Fillmore Swain, McKay professor emeritus of engineering at Harvard and an authority on hydraulic engineering, died on July 1 at his summer home in Holderness, N. H., at the age of 73 years.

Professor Swain taught civil engineer-

ing at M. I. T. and later at Harvard, and was a consulting engineer of national reputation, serving many public service commissions. As a member of the Boston Transit Commission, of which he later became chairman, he had much to do with the construction of the subway and elevated systems. His interests extended beyond engineering; he was a linguist, a student of literature, and a patron of art.

Born in San Francisco, Professor Swain was graduated from the Massachusetts Institute of Technology in 1887 and continued his studies at the Royal Polytechnic School in Berlin, New York University and the University of California honored him with LL.D. degrees.

He was a past president of the American Society of Civil Engineers, the Boston Society of Civil Engineers, and the Society for the Promotion of Engineering Education. In addition he was a member of many technical societies.

Edward A. Pearson, who developed large real estate holdings in the Oranges in the '80s, built the Orange & Bloomfield Crosstown Railway, now included in the system of the Public Service Co-ordinated Transport, and was active in banking and insurance, died at Newark, N. J., on June 27. He was 92 years old. Mr. Pearson was a founder of the Hydrogen Company of the United States, which concern pioneered in the production of gun metal.

Dr. William T. Riley, connected with the United Railways & Electric Company of Baltimore for 28 years, died at his home in Baltimore on July 7. He served as a coroner of Baltimore for 30 years. Dr. Riley was one of the three physicians of the United Railways Association, the welfare organization of the company. He also was surgeon for the Pennsylvania Railroad and Western Maryland Railway, and medical examiner for the Metropolitan and Continental Life Insurance Companies.

John A. Miller, former District Court judge at Newark, N. J., son of John A. Miller, head of the original Newark & Bloomfield Street Railway, now included in Public Service Co-ordinated Transport and father of John A. Miller, Jr., editor of ELECTRIC RAILWAY JOURNAL, died at Glen Ridge, N. J., on July 12. He was one of the oldest members of the New Jersey Bar and for many years before his retirement, about ten years ago, was prominent in the practice of corporation and real estate law. He was a graduate of Rutgers College and Columbia Law School.

Dick S. Ramsey, former president of the East River Savings Bank and at one time prominent in civic and business affairs in Brooklyn, died on June 27. He was in his 85th year. He was a former member of the board of directors of the Kings County Trust Company, one of the original Brooklyn Bridge Commissioners and a former member of the board of the Brooklyn City Railroad, now included in the Brooklyn-Manhattan Transit System.

Clement J. Ferneding, 85 years old, vice-president and treasurer of the Dayton & Xenia Railway, Dayton, Ohio, and for many years a leading business man of Dayton, died on June 27.

INDUSTRY MARKET AND TRADE NEWS



New White buses with standard Bender bodies for Birmingham

Birmingham Purchases Buses for Irondale Line

Bus service has been instituted by the Birmingham Electric Company along the Gate City-Irondale line. This line was originally built in 1886 and operated with a steam dummy. It was electrified July 28, 1903. A large portion of it was on private right-of-way, but recently the city of Birmingham passed an ordinance to pave the street, which would entail a cost of \$85,000 to the railway. Rather than make this large expenditure, it was decided to abandon the service and place gas buses on the line. A careful survey showed that the traffic did not justify the expenditure necessary to install trolley buses. Three White buses with Bender bodies were purchased and placed in service in June.

Only 23 seats are installed in the body, which is a 29-passenger model. The seats, by Hale & Kilburn, are leather faced and rattan covered. Both front and rear doors, and the rear treadle, are actuated with National Pneumatic Company air engines.

New Officers for A.S.T.M.

Election of the following officers for the ensuing year has been announced by the American Society for Testing Materials: President, Frank O. Clements, technical director research laboratories, General Motors Corporation; and vice-president, Samuel T. Wagner, consulting engineer Reading Company. Those elected to the Executive Committee are: Arthur W. Carpenter, Kenneth B. Cook, J. B. Johnson, George C. D. Lenth, and O. L. Moore.

Westinghouse Declares Dividend

Following the meeting of the board of directors of the Westinghouse Electric & Manufacturing Company, the following statement was issued by A. W. Robertson, chairman:

Although the earnings for April and May of the second quarter were not sufficient to cover the dividend requirements of the company, yet they were so far improved as to show a small profit as compared with a loss of the three preceding months.

It was the opinion of the directors, that,



Wide aisles speed passenger movement

considering the fine cash position of the company and the substantial surplus which has been accumulated over the past years and not distributed to the stockholders, dividends should be declared. Accordingly a dividend of 2 per cent (\$1 per share) on the preferred stock was declared for the quarter ending June 30, 1931, payable July 31, 1931, to stock of record July 6, 1931, and a dividend of 2 per cent (\$1 per share) on the common stock was declared for the quarter ending June 30, 1931, payable July 31, 1931, to stock of record July 6, 1931.

Montreal Expands Bus Operation

Further expansion in its bus activities is seen in a recent order of Montreal Tramways for twenty new buses. The Associated Equipment Company of Canada will supply fifteen of these, and Leyland Company the remainder. The chassis are manufactured in England and bodies are made by the Canadian Car & Foundry Company, in Montreal.

The company also has on order two diesel direct-drive engines suitable for bus operation. These engines, however, are still in the trial stage in England and it will probably be another year before they will be ready for service.

At the end of last year the company owned 119 motor buses operating over 88 miles of route. Operation of trolley buses for certain lines also has been considered.

Osgood Bradley Gets \$500,000 Contract

An order for twenty cars, amounting to \$500,000, has been received by the Osgood Bradley Car Corporation from the Ferrocarril Terminal Central de Buenos Aires, Argentina. The cars will be used in the operation of the new subway now under construction. They will be similar to the cars operating in the old subway which were built by the Metropolitan Vickers Electrical Company of England. The cars will be ready for shipment in January, 1932.

With a length of 52 ft. and an over-all width of 10 ft. 3½ in., the cars will have a seated capacity of 44. Three doors on each side of the car will speed loading and unloading of passengers. The electrical equipment will be supplied by the General Electric Company, and all door mechanisms by the National Pneumatic Company. Westinghouse air brake equipment will be used. The cars will weigh 71,000 lb. complete with two 125-hp. motors.

H. T. Thompson With Metal & Thermit

Harry T. Thompson, formerly vice-president of the Differential Steel Car Company, Findlay, Ohio, has become associated with the sales department of the Metal & Thermit Corporation in New York. Mr. Thompson was graduated from the Georgia School of Technology in electrical engineering in the class of 1912. After his graduation he was connected with the Westinghouse Electric & Manufacturing Company until he entered the Army in 1917. He served through the war as a captain in the artillery, leaving the service in 1919. He then became connected with the engineering department of the American Telephone & Telegraph Company, but resigned from that company on Dec. 1, 1920, to join the organization of the Differential Steel Car Company, of which company he became vice-president.

General Electric Shows Sales Decrease for First Six Months

Orders received by the General Electric Company for the first six months of 1931 amounted to \$141,428,978, compared with \$190,313,758 for the corresponding period last year, Gerard Swope, president, announced. Sales billed for the first six months of 1931 amounted to \$141,180,891, compared with \$197,229,346 for the corresponding period last year.

Profit available for dividends on common stock for the first six months of 1931 was \$21,523,722, compared with \$29,273,276 for the first six months last year. The profit available for common stock for the six months is equivalent to 75 cents per share in 1931 and \$1.01 per share in 1930 on the 28,845,927 shares outstanding in both periods. The quarterly dividend is 40 cents a share.

The stockholders to whom the July dividend is to be distributed total 133,163, compared with 116,750 at the end of 1930 and with 88,408 a year ago, an increase of 50 per cent over a year ago.

Bus Deliveries

Arkansas Power & Light Company, Pine Bluff, Ark., one White, Model 613.

Boston Elevated Railway, Boston, Mass., ten A.C.F., metropolitan type.

Capital Traction Company, Washington, D. C., two Twin Coach, Model 20.

Capitol District Transportation Company, Albany, N. Y., thirteen Twin Coach, Model 40.

Connecticut Company, New Haven, Conn., eleven Yellow Coach, 38-passenger, Type Z.

Duluth Street Railway, Duluth, Minn., four Twin Coach, Model 20.

Eastern Massachusetts Street Railway, Boston, Mass., eleven A.C.F., metropolitan type; five White, Model 65A; and fifteen Twin Coach, two Model 40 and thirteen Model 30.

Reading Transit Bus Company, Reading, Pa., two Twin Coach, Model 30.

Sault Ste. Marie Traction Company, Sault Ste. Marie, Mich., two Yellow Coach, 21-passenger, Type U.

Scranton Bus Company, Scranton, Pa., four White, Model 54.

Third Avenue Railway, New York, N. Y., ten White, Model 54A.

Virginia Electric & Power Company, Richmond, Va., ten Twin Coach, Model 30.

Williamsport Transportation Company, Williamsport, Pa., six Twin Coach, Model 30.

Worcester Consolidated Street Railway, Worcester, Mass., one Yellow Coach, 25-passenger, Type U.

TRADE NOTES

Westinghouse Electric & Manufacturing Company announces the appointment of M. B. Lambert as sales manager in charge of the transportation department.

U. S. Hame Company of Buffalo has purchased the assets of both the Lawson Manufacturing Company, Cleveland, Ohio, and the Warner Hammer Company of Cromwell, Conn.

DeVilbiss Company has moved its St. Louis sales and service branch to 1937 Washington Avenue, and its New York branch to 25 West 45th Street.

Fusion Welding Corporation, Chicago, Ill., has appointed the Puritan Compressed Gas Corporation of Kansas City, Mo., as distributor for the Weldite line of welding rods.

E. A. McCallum, who was in charge of the San Francisco offices of the Stacey Engineering Company, has been transferred to the Pacific Coast headquarters of the International-Stacey Corporation, now located at 410 Subway Terminal Building, Los Angeles.

Material Prices

JULY 23, 1931

Metals—New York

Copper, electrolytic, delivered, cents per lb.	8.06
Lead.....	4.40
Nickel, ingot.....	35.00
Zinc.....	4.25
Tin, Straits.....	25.00
Aluminium, 98 to 99 per cent.....	22.90
Babbitt metal, warehouse	
Commercial grade.....	34.00
General service.....	28.50

Track Materials—Pittsburgh

Standard steel rails, gross ton.....	\$43.00
Track spikes, 1/2-in. and larger, per 100 lb....	\$2.70
Tie plates, steel, cents per 100 lb.....	1.95
Angle bars, cents per 100 lb.....	2.75
Track bolts, per 100 lb.....	3.90
Ties, 6m x 8m x 8 ft.,	
White Oak, Chicago.....	1.21
Long leaf pine, New York.....	1.00

Waste—New York

Waste, wool, cents per lb.....	11.00
Waste, cotton (100 lb. bale), cents per lb.:	
White.....	7.00-11.00
Colored.....	7.00-10.00

Wire—New York

Bare copper wire, cents per lb.....	9.75
Rubber-covered wire, No. 14, per 1,000 ft....	\$4.22
Weatherproof wire base, cents per lb.....	12.125

Paint Materials—New York

Linseed oil (5 bbl. lots), cents per lb.....	9.60
White lead in oil (100lb. keg), cents per lb....	13.25
Red lead in oil.....	14.75
Turpentine (bbl lots), cents per gal.....	42.00
Putty, com'l grade, 100 lb. tins, cents per lb.	5.50

Hardware—Pittsburgh

Wire nails, per keg.....	\$1.85
Sheet iron (24 gage), cents per lb.....	2.40
Sheet iron, galvanized (24 gage), cents per lb....	2.90
Auto body sheets (20 gage), cents per lb.....	3.10
Fender atock (20 gage), cents per lb.....	3.20

Bituminous Coal

Pittsburgh mine run, net ton.....	\$1.40
Central, Ill., screenings.....	.80
Kansas screenings, Kansas City.....	1.40
Big seam, Ala., mine run.....	1.70
Smokeless mine run, Chicago.....	1.60

Paving Materials

Paving stone, granite, 5 in., f.o.b.:	
New York—Grade 1, per thousand.....	\$120.00
Wood block paving 3 1/2, 16 lb. treatment, N. Y., per sq. yd., f.o.b.....	2.50
Paving brick, 3 1/2 x 8 x 4, N. Y., per 1,000 in. carload lots, f.o.b.....	50.00
Paving brick, 3 1/2 x 8 x 4, N. Y., per 1,000 in. carload lots, f.o.b.....	45.00
Crushed stone, 1/2-in., wholesale, f.o.b. per cu. yd.....	1.75
Cement, Chicago, in carload lots, without bags, f.o.b., cu. yd., wholesale, f.o.b.....	1.35
Gravel, 1/2-in., cu. yd., wholesale, f.o.b.....	1.60
Sand, cu. yd., wholesale, f.o.b.....	1.00
Asphalt, in pkg. N. Y., f.o.b. ref., per ton....	16.00

Scrap—New York

Heavy copper, cents per lb.....	6.12
Light copper.....	5.12
Heavy brass.....	3.12
Zinc.....	1.50
Lead, heavy.....	3.00
Mixed babbitt.....	3.25
Battery lead plates.....	1.13
Cast aluminum.....	9.75
Sheet aluminum.....	10.25
Auto radiators.....	3.12
Tires, standard, mixed, per ton.....	\$5.25
Inner tubes, mixed, per cwt.....	\$1.20

Old Material—Chicago

Steel car axels, net ton.....	\$11.75
Cast iron car wheels, gross ton.....	10.25
Steel car wheels, gross ton.....	10.00
Leaf springs, cut apart, gross ton.....	11.25
Angle bars, gross ton.....	9.50
Brake shoes, net ton.....	6.00
Steel rails (short), gross ton.....	11.25
Relaying rails, gross ton (65 lb. and heavier)	24.50
Machine shop turnings, gross ton.....	3.75
Coil springs, per gross ton.....	11.75
Frogs, switches and guards cut apart, yer gross ton.....	8.75

Conspectus of Indexes for July, 1931

Compiled for Publication in ELECTRIC RAILWAY JOURNAL BY

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last Five Years	
				High	Low
Street Railway Fares* 1913 = 4.84	July, 1931 7.81	June, 1931 7.81	July, 1930 7.77	July, 1931 7.81	July, 1926 7.35
Electric Railway Materials* 1913 = 100	July, 1931 114	June, 1931 116	July, 1930 136	Dec., 1926 159	July, 1931 114
Electric Railway Wages* 1913 = 100	July, 1931 232.9	June, 1931 233.0	July, 1930 231.7	April, 1931 233.2	July, 1926 225.7
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	July, 1931 169	June, 1931 184	July, 1930 198	Nov., 1928 206	July, 1931 169
General Construction Cost Eng'g News-Record 1913 = 100	July, 1931 174.4	June, 1931 187.2	July, 1930 201.0	Jan., 1927 211.5	July, 1931 174.4
Wholesale Commodities U. S. Bur. Lab. Stat. 1926 = 100	June, 1931 70.0	May, 1931 71.3	June, 1930 86.8	June, 1926 100.5	June, 1931 70.0
Wholesale Commodities Bradstreet 1913 = 9.21	July, 1931 8.78	June, 1931 8.64	July, 1930 10.56	Jan., 1928 13.57	June, 1931 8.64
Retail Food U. S. Bur. Lab. Stat. 1913 = 100	June, 1931 118.3	May, 1931 121.0	June, 1930 147.9	Dec., 1926 161.8	June, 1931 118.3
Cost of Living Nat. Ind. Conf. Bd. 1923 = 100	May, 1931 86.9	April, 1931 88.2	May, 1930 97.5	Dec., 1926 105.5	May, 1931 86.9
General Business The Business Week Normal = 100	July 11, 1931 78.1	June 13, 1931 77.6	July 12, 1930 97.5	Oct. 6, 1928 117.6	Jan. 31, 1931 77.0
Industrial Activity Elec. World, kw.-hr. used 1923-25 = 100	June, 1931 104.8	May, 1931 109.8	June, 1930 115.5	Feb., 1929 140.4	Jan., 1931 97.6
Bank Clearings Outside N. Y. City 1926 = 100	June, 1931 71.2	May, 1931 68.6	June, 1930 92.1	Oct., 1929 111.8	May, 1931 68.6

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street

railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 121 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.



Once to Every Car!

THE BIG EMERGENCY,
ANTICIPATE IT WITH

Peacock Staffless Brakes

That one emergency may cost you plenty.
Can you afford to be without braking equip-
ment which functions positively in the
emergency?

National Brake Company

890 Ellicott Square, Buffalo, N. Y.

Canada:—Lyman Tube & Supply Co., Ltd., Montreal

The Ellcon Co., General Sales Representative, 50 Church Street, New York City



THEORY AND PRACTICE



STRIKE A BALANCE

WITH K RIMS

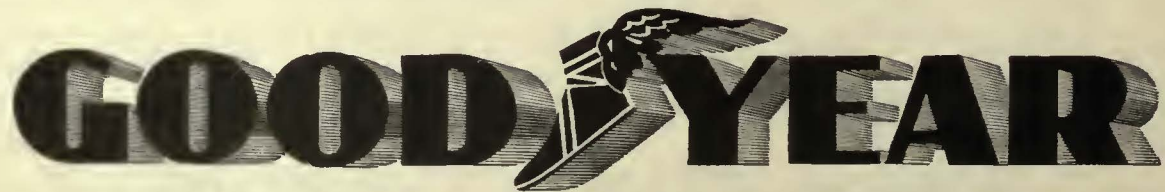


*The Theory
of An Ideal Truck Rim*

*The Practical
Application of Theory in K-Rim*

- | | |
|--|--|
| <p>1 <i>Simple Design</i></p> <p>2 <i>Light Weight</i></p> <p>3 <i>Ample Strength</i></p> <p>4 <i>Ease of Operation</i></p> <p>5 <i>Safety in Service</i></p> <p>6 <i>Interchangeable Mounting</i></p> | <p>Two parts—All sizes</p> <p>Minimum weight obtained by proper distribution of steel which in turn produces</p> <p>Maximum strength at points of greatest strain</p> <p>Open valve stem slot and split base permit easy removal of rim from the tire and prevents injury to casing, tube and valve stem</p> <p>Split base is locked between wheel and continuous side ring—mechanical locked assembly</p> <p>All sizes single bevel 28° or 18° mounting seat permits oversizing and maintains standard spacings</p> |
|--|--|

In combination—these fundamental features of the Goodyear K-Rim are not equaled by any other truck rim



K-28 RIMS K-18

THE MAN WHO CHANGES THE TIRES LIKES GOODYEAR "K" RIMS



12 YEARS IN THE TWIN CITIES

For 12 years Goodyear Tires have been on the wheels of passenger coaches operated in Minneapolis and St. Paul by the Twin City Motor Bus Co.

For 7 years, no tires except Goodyears have been used.

It is a record of service so satisfactory that it has grown through the years—tire mileages highly satisfactory—road delays seldom known.

Such performance as this is the reason for Goodyear's outstanding position today in the tire industry—such experiences as this explain why more people ride on Goodyear Tires than on any other kind.

Why shouldn't you use THE leading make of tire?

THE GREATEST NAME IN RUBBER

GOODYEAR

ON YOUR NEW COACHES SPECIFY GOODYEARS

NO DOUBT ABOUT IT . . .

*Correct transfers
cut minutes from
schedules . . . add
dollars to net . . . and
"double-check" each
fare*

It is but natural that a transfer series, designed for the exclusive use of a railway or bus property, should greatly reduce revenue leaks, avoid fraud, and speed up traffic.

The proof is on file. Many operating companies are saving thousands of dollars yearly with Globe-designed ticket-transfer systems.

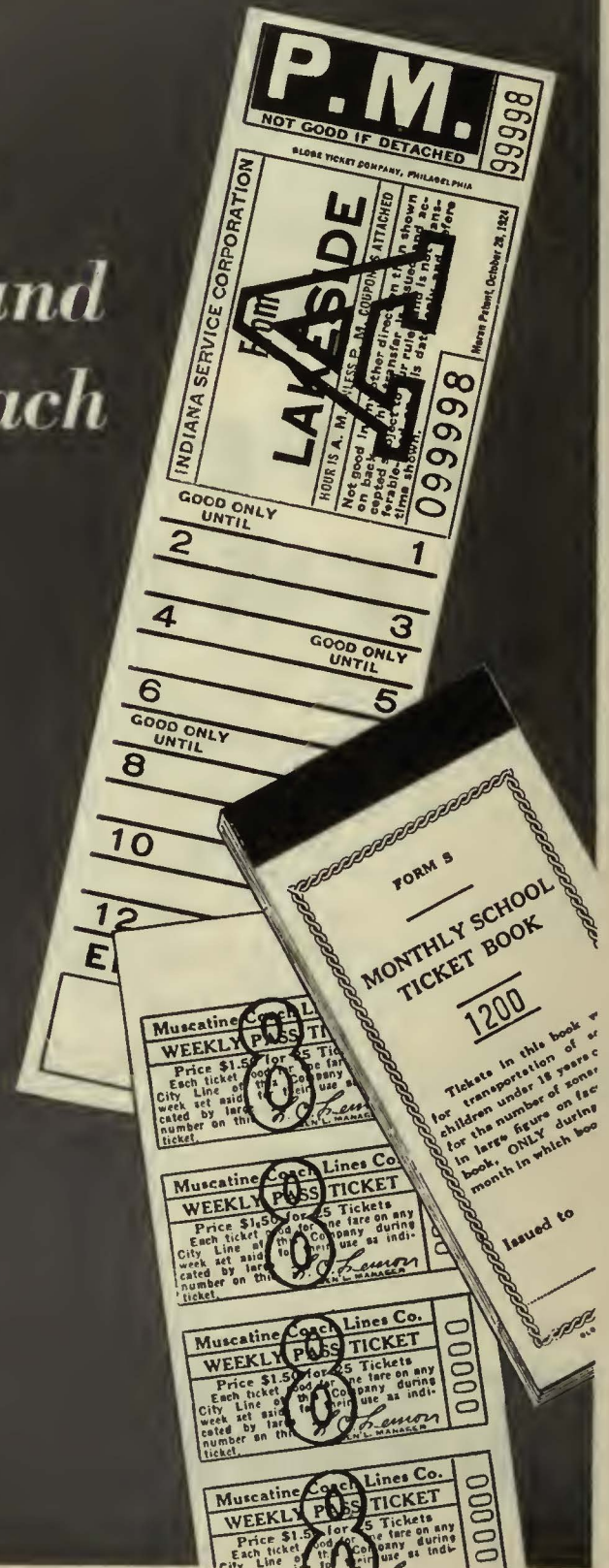
Don't try to do the whole job alone. Let our experienced men help you.

Globe TICKET COMPANY

112 North Twelfth Street
PHILADELPHIA

Additional Factories in

- Los Angeles
- Boston
- New York
- Jacksonville
- Sales Offices
- Baltimore
- Cincinnati
- Cleveland
- Pittsburgh
- Syracuse



REPUTATION
EXPERIENCE
SATISFACTION



- dictate

TIMKEN AXLES

FRONT *and* WORM DRIVE REAR

for *all* traction equipment

THE TIMKEN-DETROIT AXLE CO. DETROIT, MICHIGAN



Your best friends won't tell you . . .



The

METAL & THERMIT

120 Broadway, New York, N. Y.

Pittsburgh

Chicago

Albany

So. San Francisco

Toronto



Do pounding car wheels keep your neighbors awake?



Does rough track add to the discomforts of riding?

but your neighbors and patrons will!

ARE you proud of the street railway system with which you are associated?

Whether employee or stockholder, president or foreman, transportation man or track-man, we all crave praise. We all dislike harsh criticism.

It is not your partner on the golf course, nor the guest at the dinner table who bluntly tells you the defects of your railway service. It is the fellow in the next block whose slumber is broken by the pounding of car wheels over bad joints. It is the chap who rides to work in the early morning rush hour and is tossed around on rough-riding track. It is the fellow who writes his letter of protest to the newspaper, or rises to speak at local indignation meetings. No management need permit bad track to be a source of criticism. Smooth and quiet-riding track need cost no more when joints are Thermit-welded. And it remains "good" throughout the entire life of the rails themselves.

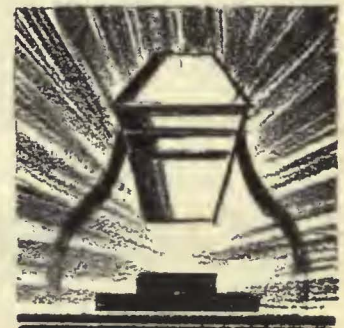
Materials and labor now are at record "lows." A good time, an opportune time, for Thermit-welding.



Has the street railway any friends at indignation meetings?

THERMIT RAIL WELDING HAS SOLVED THIS PROBLEM

Many a road has miles of track, in which the joints are "shot," but the rail and road-bed still has useful life. Thermit-welding has solved this problem for many managements. Old track has been fixed up, and has lasted for ten to fifteen years in good, smooth-operating condition until the rail-head itself has worn down to the limit.



CORPORATION

120 Broadway, New York, N. Y.

Pittsburgh

Chicago

Albany

So. San Francisco

Toronto



1881
/
1931



CELEBRATING
50 YEARS
OF
PROGRESS
IN THE
ELECTRIC
RAILWAY
INDUSTRY



GOLDEN JUBILEE CONVENTION

THE BIG SHOW is little more than a month away. The 50th meeting—Golden Jubilee—of the A. E. R. A. An event that comes but once in an industry's lifetime.

Important industry executives will be at Atlantic City during the week of September 26 - October 2. Important features will distinguish this year's Exhibit—in the great Atlantic City Auditorium—displays recalling the industry's fifty years of progress, as well as the latest modern equipment. And this year, for the first time, the National Association of Motor Bus Operators will hold their annual meeting during the same week, at the same place.

The **CONVENTION NUMBER** of *Electric Railway Journal* will be mailed to subscribers September 15. It will also be distributed at Atlantic City. It will be much more than an ordinary convention issue. The history of the Journal is the history of the industry, and this issue will reflect that fact. It will be an invaluable historical document that every one interested in community transport will want to read and keep.

Advertising forms close September 11!

ELECTRIC RAILWAY JOURNAL
McGRAW-HILL PUBLISHING COMPANY, INC.
Tenth Avenue at 36th St., New York

**CONVENTION
NUMBER**

Electric Railway Journal
Sept. 15

**GOLDEN
JUBILEE
CONVENTION**

A. E. R. A.
Sept. 26 - Oct. 2

**CONVENTION
REPORT
NUMBER**

Electric Railway Journal
Oct. 2

NUMBER of Electric Railway Journal

Forms Close Sept. 11

Some of the 115 Socony fueled and lubricated buses of the North Shore Bus Company at their Flushing, L. I., terminal, one of the largest bus terminals of its kind in the country. Here 850 passengers can be loaded within ten minutes' time. Seventeen buses can be loaded at once.



325,000 Miles a month with **SOCONY!**

AVERAGING 325,000 miles a month, the 115 passenger buses of the North Shore Bus Company, Inc., operating in Manhattan, Queens, and Nassau County, L. I., are fueled and lubricated exclusively with Socony. Efficient, economical operation is why this big company has used only Socony products for the past four years.

Whether your buses operate many miles or few, you will find that Socony gives you better performance and lower repair bills.

SOCONY

BANNER GASOLINE

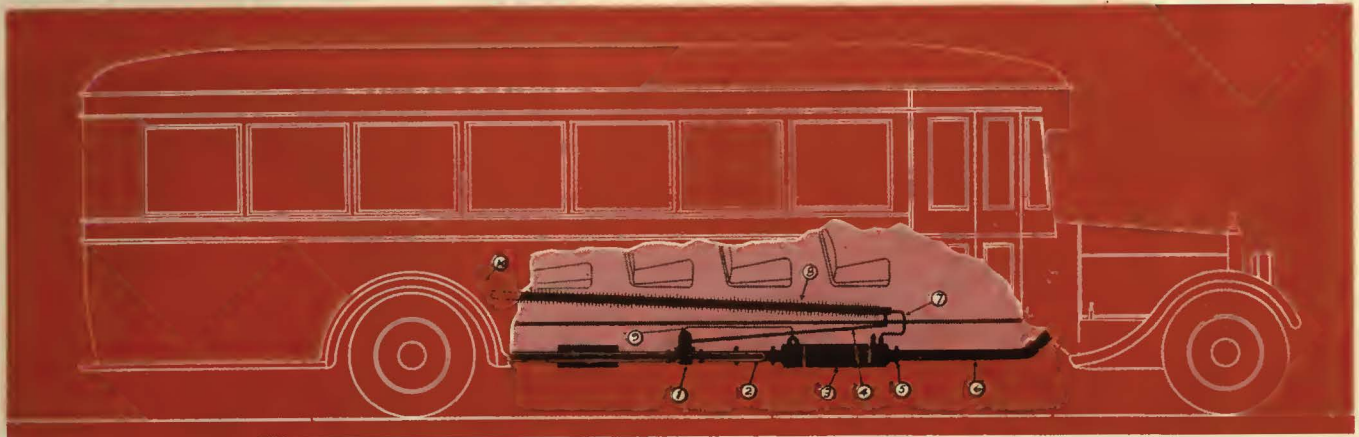
SOCONY DE-WAXED MOTOR OIL

SPECIAL GASOLINE *plus* ETHYL 

STANDARD OIL COMPANY OF NEW YORK

AN EXTRAORDINARY ANNOUNCEMENT

Only **3** CUPS OF WATER
 TO HEAT AN ENTIRE BUS
 . . . without costing a PENNY !



Safe, Cheap, Quickly Controlled Heat, with the New BORDEAUX Steam Generator System

THREE years of intensive research produced this startling advance in bus heating methods! Safe, comfortable, uniform heat . . . yet without a penny's cost.

The new Bordeaux System derives its heat and power from the exhaust gases, and is a super-heated steam system circulating only about three cups of water. Simple in construction as well as in operation. It is sealed throughout, has only two moving parts, and is built of rust-, wear-, and corrosion-resisting materials. The driver regulates the temperature from the dash.

Unlike many heat units, the Bordeaux System is not bulky nor in the way. In-

stallation is permanent: thereafter it is always on the job, ready for those uncomfortable out-of-season cold snaps.

10 IMPORTANT FEATURES in this Radical New Design

(See Numerals Above)

- ① **Pump Unit** . . . from which a regulated flow of water is pumped to the Steam Generator. The Pump is substantially built with only one moving part: a sealed hydrostatic valve.
- ② **Control Unit** . . . consists of a butterfly valve, operated from the dash to regulate the amount of exhaust gas by-passed through the base of the Pump. This determines the rate at which the Pump operates.
- ③ **Generator** . . . spiral alloy around the exhaust conduit. These generate and super-heat the steam.
- ④ **Water Return Pipe** . . . collects the condensation in the radiator and returns it to the Pump.
- ⑤ **Flanged Joint** . . . here the 3" diam. mandrel covered with the generator coils is set into the exhaust pipe. It interferes in no way with the exhaust.

- ⑥ **Steam Pipe Supply** . . . insulated copper tubing conveys super-heated steam to radiator.
- ⑦ **Radiator** . . . only one shown here—but each bus carries two. Consists of seamless copper pipe with steel fins. Runs laterally under each row of seats.
- ⑧ **Water Feed Pipe** . . . carries water from Pump to the Generator.
- ⑨ **Compressor Tank** . . . one at end of each Radiator to take up any air trapped in the system and permit Radiator to heat throughout its entire length, without tapping condensate liquid.
- ⑩ **Pump Exhaust** . . . carries by-passed exhaust gases to rear of bus and dispels them noiselessly.

The Bordeaux System is easy to install and economical to maintain. Every Bordeaux System is guaranteed and entitled to the constant and free supervision of the Bordeaux Laboratory staff of heating experts. For full particulars, write to the Bordeaux Laboratories, Inc., Albany, New York.

SOON . . . See the Bordeaux Demonstrator in Your Locality

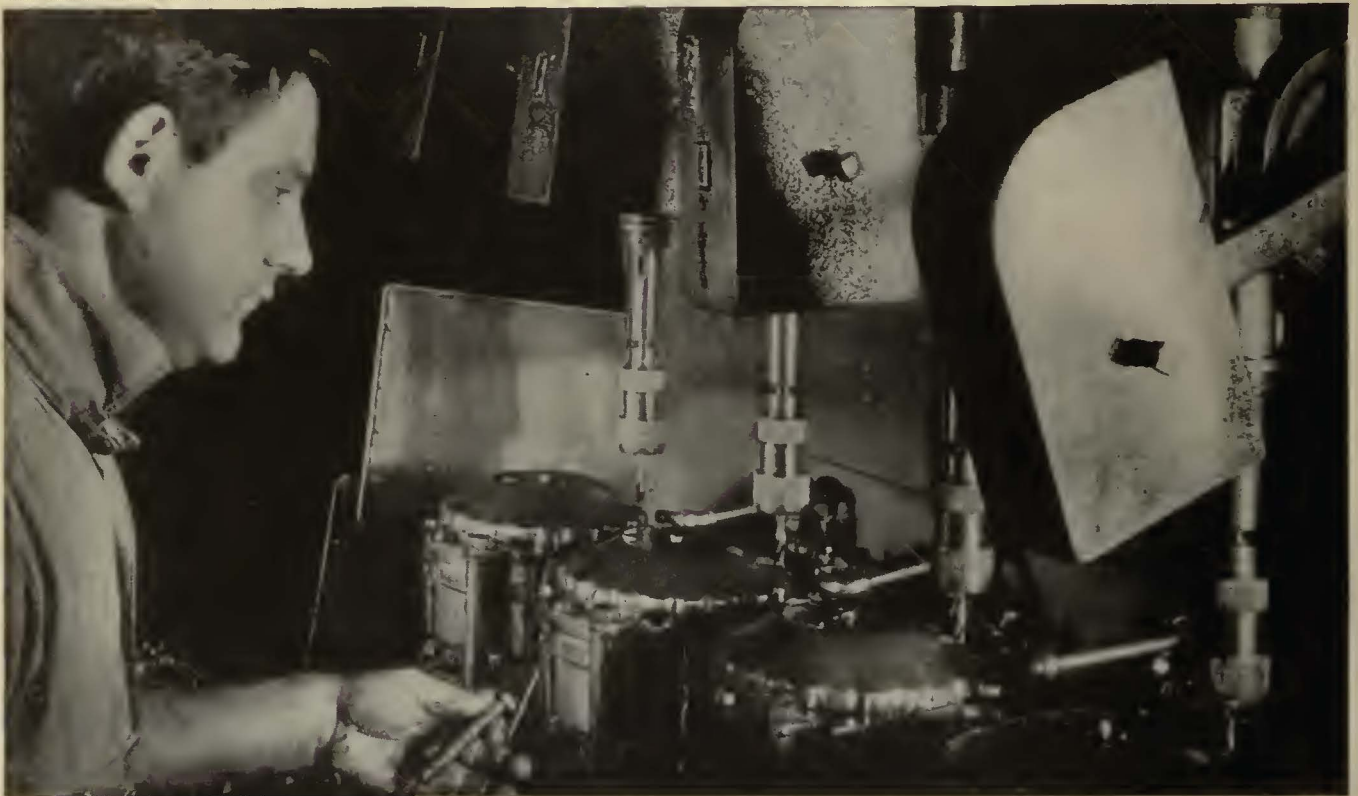
A 16 passenger motor coach, recently purchased by the Bordeaux Laboratories, is being equipped with a Bordeaux Steam Generator System, a recording pyrometer and other test instruments. Dry ice is to be used in the obtaining of low temperatures for demonstration purposes. This Bordeaux Bus is soon to tour Eastern and Middle Western states under the direction of Mr. Wallin, President of Bordeaux Laboratories. A service engineer will demonstrate to all interested transportation officials.

BORDEAUX
STEAM GENERATOR
SYSTEM

AN AUTOMOTIVE TRUST FULFILLED

Leading motor car builders depend on R B & W for entire supply of an important bolt

PHOTO BY MARGARET BOURKE-WHITE



It's an important bolt in motor car assembly. A highly specialized bolt. We make millions of them every year for one of the very largest builders of popular-priced cars. We make this builder's entire supply of these important bolts.

That's confidence on the part of the automobile company. Confidence in quality and uniformity of the product. Confidence in our ability to ship the required volume, day after day, to the company's numerous

assembling plants. Confidence that centering its entire requirements of this important bolt in one supplier will assure a steady volume and that no assembly line will be held up by shortage or defective stock.

Confidence such as that, built up in years of satisfying contact, is significant to every large con-

sumer of bolting material. If you have any manufacturing problems involving the use of bolting material, you are invited to utilize the experience and facilities of the RB&W Engineering Service. It has solved

many interesting problems, including simplification and reduced costs.



RUSSELL, BURDSALL & WARD BOLT & NUT CO.
 ROCK FALLS, ILL. PORT CHESTER, N. Y. CORAOPOLIS, PA.
 Sales Offices at Philadelphia, Detroit, Chicago, San Francisco, Los Angeles, Seattle, Portland, Ore.

already

YELLOW

type V

has achieved nation-wide acceptance

From East and West, North and South, come telegrams praising Yellow Type V performance—and Type V is less than four months old! Such instantaneous response is typical of what happens when Yellow introduces a new type. Promises of greater revenue, easier maintenance, more passenger comfort and exceptional dependability are being realized by Type V users—operators whose faith in Yellow is again quickly justified.

BY DIRECT WIRE FROM
**WESTERN
UNION**

23 82NL WINSTON LEMNAR JUNE 21 1931
H E LISTMAN

GENL MTRS TRUCK CO=PONTIAC MICH=
THE VEE YELLOW COACHES ON OUR MAIN LINE JACKSONVILLE
RICHMOND STARTING REGULAR SCHEDULE JUNE FIRST STOP HAVE
BEEN GREATLY ADMIRIED BY THE PUBLIC ALSO GIVING WONDERFUL
ACCOUNT OF THEMSELVES STOP NO TROUBLE OF ANY KIND NO ROAD
DELAYS THEIR PERFORMANCE IS PERFECT STOP EACH COACH IS
RUNNING OVER FIVE HUNDRED MILES DAILY STOP SINCE STARTING
THE NEW VEE OUR GROSS REVENUES HAVE INCREASED MORE THAN
FOUR CENTS PER BUS MILE STOP JUNE USUALLY OUR DULLEST
MONTH NOW PROMISES TO BE OUR BEST
CAMEL CITY COACH GILMER.

STOULD CHACH UTT



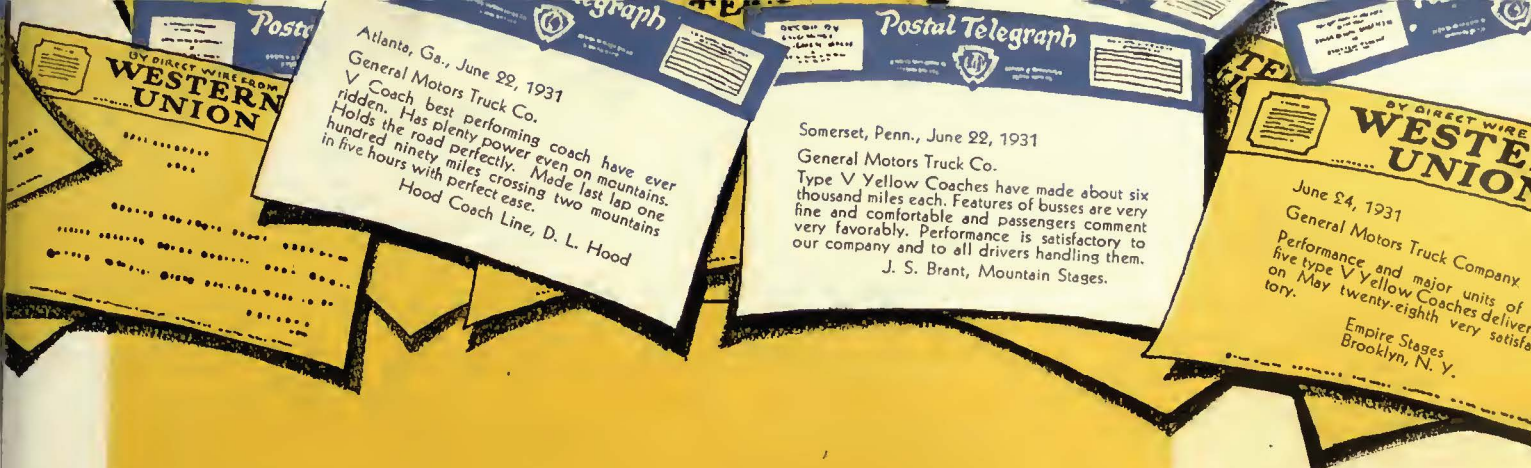
The **GREATEST** *transcontinental*

A caravan of Yellow Coaches a mile and a half long—33 in all, representing an investment of \$300,000 by the Lang Transportation Company of Long Beach, California.

Straight through from the General Motors Truck plant at Pontiac, Michigan, to the Coast, headed this mile and a half long caravan under its own power—following modern highways that once beckoned the covered wagon along their dusty trails.

To the click of news reel cameras and the warning note of police escort sirens, this ultra-modern cavalcade pointed West on June 22nd.

To many en route, the spectacle was but an impressive procession of motor coaches—the greatest number that had ever braved mountainous climbs and desert stretches to the Pacific. To others, whose knowledge and experience led them to look deeper, this \$300,000 train represented an investment in ten million miles of profitable transportation service and symbolized the returning era of business confidence and prosperity.



Such a drive-away called for organization—a supply and commissary coach, sleeping accommodations for the desert country, passenger cars used as scout cars to choose the night parking spots, arrange for police escorts or flag railroad crossings, and to render intercommunication service for the fleet.

Without mishap, every coach in this great transcontinental drive-away reached Long Beach, California, July 3rd, *a day ahead of schedule.*

And early the next morning all were in regular revenue-earning service—16 Type V 29-passenger all metal body city coaches, 9 Type Z 38-passenger all metal body city coaches and 8 Type U 25-passenger city coaches.



drive-away in coach history



The Lang caravan of Yellow Coaches reached Long Beach, California, a day ahead of schedule and were in regular revenue service the morning following their arrival.





Type V Intermediate Yellow with many new chassis features, new body features and new power plant.

Promise fulfilled by performance in this new **TYPE V YELLOW COACH**

On March 10th, Yellow announced a new type of intermediate capacity coach with many original features.

It was promised that this New Type V would establish a *new measure* for motor coach values in (1) design; (2) stronger yet simplified construction; (3) more power with less fuel; (4) easier handling with less effort; (5) faster schedules with greater safety; (6) greater mileage with positive dependability; (7) quicker, easier maintenance at less expense; (8) greater passenger appeal and travel comfort; (9) more value for less money.

Almost before the ink was dry on the announcement, orders received again proved the confidence held by operators toward Yellow's equipment. In less than four months, performance on the road

has won *re-orders*. Almost a million dollars of Type V Yellow Coaches are now in service—all of them performing in a manner above ordinary.

Repeatedly do the telegrams received from Type V owners comment on regularity of service, high mileage per gallon of gasoline, passenger appeal and comfort, power on hills, high daily mileage and increased revenues.

Both in the great transcontinental drive-away just completed and in the fulfillment of promises made for the New Type V, Yellow has written significant records on the pages of motor coach history.

GENERAL MOTORS TRUCK CO.
Pontiac, Michigan
Subsidiary of Yellow Truck & Coach Mfg. Co.

Already an outstanding success
type V YELLOW COACHES

DAVIS "ONE-WEAR" STEEL WHEELS

THE MODERN
STEEL WHEEL
THAT
NEEDS NO
MAINTENANCE



LIGHT WEIGHT—

Due to its special composition steel the Davis Wheel can be made lighter in weight without sacrifice of strength.

STRENGTH—

Heat treatment develops in each part of the Davis Wheel precisely the characteristics needed to best fit it for work to be done.

ONE-WEAR—

Special composition steel and triple heat treatment provide unique qualities that make the Davis Wheel truly "One-Wear."

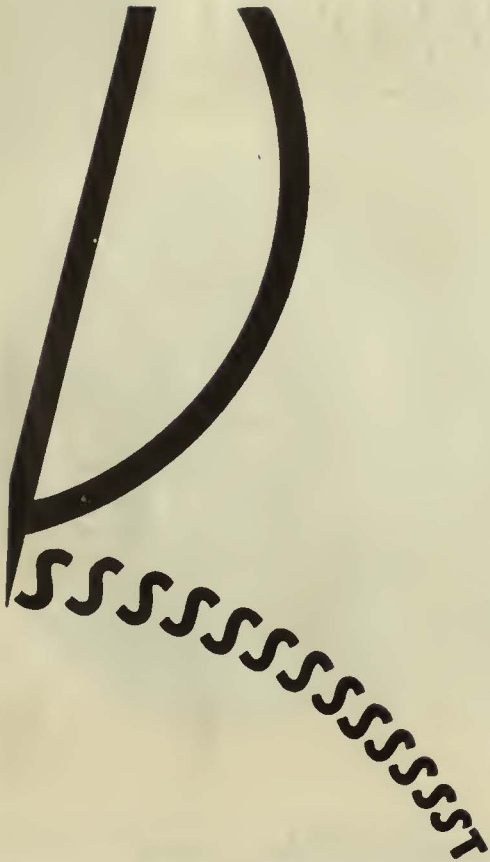


AMERICAN STEEL FOUNDRIES

NEW YORK

CHICAGO

ST. LOUIS



goes the Air Brake . . . and a smooth, positive, tremendously powerful stopping force has spoken ★ A constant assurance of an instant available power-to-stop, this *voice of safety* identifies Bendix-Westinghouse Automotive Air Brakes as the ultimate in modern, flexible control ★ Aside from their many obvious advantages, Bendix-Westinghouse Brakes are traditionally dependable ★ World-wide, their acceptance as standard equipment by practically every prominent builder of modern, heavy duty highway transportation is conclusive evidence of consistently perfect operation ★ Fortunately, due to their extreme simplicity, Bendix-Westinghouse Air Brakes are not limited entirely to factory installation ★ Through a nation-wide network of authorized distributors, any vehicle may be readily adapted to air brake control ★ The result of more than a half century's development and manufacture this modern power braking equipment is available to you . . . a time-tested product of the two greatest names in braking ★ Perhaps you have a question concerning a particular phase of modern power braking, or maybe general information on the subject would be of interest ★ Without obligation, your request will bring an immediate response ★ Address: BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY at Pittsburgh, Pennsylvania.

6294

BENDIX ★ **WESTINGHOUSE**
AUTOMOTIVE ★ AIR ★ BRAKES

SAFETY STANDARD of THE WORLD



Helps to protect
your profits

KOOLMOTOR OIL

Cools as it lubricates

PICNICS, outings, vacationists bring good business in summer-time ... you carry heavy loads ... motors are taxed to capacity—especially in hot weather. To keep your heavy-duty engines in service—working profitably for you during this season of heavy demand they need protection against heat, wear, friction and unnecessary repairs and breakdowns.

KOOLMOTOR OIL—the perfect

Pennsylvania motor oil—offers that protection because it *cools* as it lubricates. Special Cities Service refining processes employing *moderated* temperatures enable KOOLMOTOR OIL to *absorb* searing heat and *carry it away* from hot friction surfaces and bearings.

Remember—unprotected hot engines are costly—they may go out of service just when you need them most. To be safe use KOOLMOTOR

—the oil that does *more than* lubricate—the oil that *cools* as it lubricates. Our representative will gladly call and tell you more about it.

CITIES SERVICE COMPANY
60 Wall Street · New York



Cities Service Radio Concerts
Fridays, 8 P. M., Eastern Daylight Time, W E A F and 37 Associated Stations on N. B. C. Coast-to-Coast Network—Cities Service Orchestras, Cavaliers and Jessica Dragonette.

Cities Service Oils and Gasolene

THE SAFETY CAR CONTROL EQUIPMENT

» » » » INCREASES Safety of Operation

INTERLOCK feature permits centralized operating responsibility . . . prevents opening of doors before car stops, or starting of car before doors close . . . and causes an emergency brake application if controller handle is released due to motorman's negligence or disability while car is in motion.

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:

WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK
WASHINGTON PITTSBURGH





ART RATTAN QUALITY

speaks in terms of

LOWER MAINTENANCE



Type P-112



Type
U-106

Not on appearance alone can you judge a bus seat. You have to dig beneath the surface to see the hidden quality of materials built in—of sturdy construction—of correct design embodied in Art Rattan Seats.

But what does this mean to the operator? Just this. A seat that stands the wear and tear of rough usage with little or no repair costs. Actual cost records, from operating companies, show maintenance expense over a period of years to be *less than a fraction of one percent of the total seat investment.*

In addition, you get a trim appearing seat, offering passenger comfort plus rider appeal in Art Rattan seats.

It will pay you to dig into the facts concerning Art Rattan seats for reducing maintenance and increasing revenue.

Art Rattan Works, Inc

Cleveland, Ohio.....Oakland, California

BUILDERS OF DE LUXE BUS AND STREET CAR SEATS

Mr. Frank Martz, President of the Frank Martz Coach Company, Inc.



Frank Martz finds Silvertowns

..The ultimate in safety and service"



FROM the Atlantic Seaboard to Chicago—up rough mountain trails—over fast, scorching highways—through congested city streets. Over the 3,000,000 miles of this grueling route Goodrich Bus Balloons safeguard the Frank Martz fleet every year.

"For the past ten years," writes Mr. Martz, "I have been using Goodrich Tires. During the past two years I have used Goodrich Silvertown Bus Balloons exclusively. It is a real satisfaction to know that my bus equipment is operating on a tire that is the ultimate in Safety and Service."

The B. F. Goodrich Rubber Co., Est. 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Cal. In Canada: Canadian

Goodrich Co., Ltd., Kitchener, Ont. The International B. F. Goodrich Corp. (Export).

JOIN THE SILVERTOWN SAFETY LEAGUE



Like other leading bus operators, Mr. Martz is an enthusiastic supporter of this nation-wide drive to save lives. Each coach in his fleet bears the shining safety emblem—each driver wears a Safety League button and has pledged support to the nine League rules for safer driving. Show your patrons where you stand. Join the Silvertown Safety League today. Pledges, lapel buttons and emblems for your drivers may be had without cost or obligation from your nearest Goodrich Distributor.



A few of the 125 buses in the Frank Martz Fleet

Goodrich *Bus* Balloons

SPECIFY GOODRICH ON YOUR NEW BUSES



**CAR CARD
ADVERTISING
ALMOST
EVERYWHERE**

SHOPPERS from the suburbs find that Collier Service Car Cards fill a real need. The car cards are last minute reminders and a buyer's catalogue in full color. They are a catalogue of products on which riders may rely—products which have passed a rigid censorship.

Merchants and manufacturers buy Car Card Advertising because they know it helps to increase business. Business is the basis of traffic.

And so Car Card Advertising as a service to riders—as a builder of traffic—and as a source of reliable income to electric railway companies as well—has the support and endorsement of Electric Railway Operators.

**Barron G. Collier
INCORPORATED**



Monotube Pole with ornamental base used for distribution lines and trolley span wire support.

LET'S TALK

about POLE COSTS

COSTS come in for plenty of attention these days. Every dollar must be stretched just a little farther.

About pole costs. Union Metal Monotubes fall in the low price range. Compare them with other steel poles—strength for strength—you'll find the prices right in line.

Then consider the advantages incorporated in Monotubes which you do not get in other poles—one-piece construction, no horizontal joints, choice of two types of anchorage, cold-rolled steel, better appearance—all for the same price as ordinary poles. And because Monotube construction reduces corrosion to a minimum, these poles last longer.

Install Monotubes jointly with other utilities. Use them for distribution lines, trolley span wires, feeder lines, traffic signals or what you will. Monotubes will cut costs for you year after year.

At whatever price you wish to pay for poles or for lighting standards, Union Metal offers you an outstanding buy. The line is complete. There is a pole—Monotube or Fluted Steel—and lighting standard—Pressed Steel or Ferronite (super cast iron)—to match every requirement of style and price. Write us for complete information or request a Union Metal engineer to call.

THE UNION METAL MANUFACTURING COMPANY

GENERAL OFFICES AND FACTORY ♦ ♦ CANTON, OHIO

SALES OFFICES: New York, Chicago, Boston,
Los Angeles, San Francisco, Dallas, Atlanta

Distributors:

General Electric Merchandise Distributors
Graybar Electric Company, Inc.
Offices in all principal cities



Abroad: The Canadian General Electric Co.;
The International General Electric Co. Inc.

UNION METAL MONOTUBE POLES

WHEN People get more
Comfort at lower Cost in Travel
they leave their Cars at home



Put your
BEST
in the
SEAT

Use
KARPEN

KARPEN



No. 10



No. 100

THE KARPEN SAFEL-GRIP

Patent Applied For



SafeGrip

MILLIONS of miles of actual service prove that Karpen Seats are the economical choice for railroad or bus, electric car or trolley coach. For thirty-six years, Karpen has been building better seats for transportation companies...seats whose reputation throughout that long period has been based on *lower costs per seat-mile*. Craftsmanship, comfort and low maintenance,...you are assured of all three in Karpen Seats, for new equipment or for replacement.

S. KARPEN & BROS.

Transportation Seating Dept., Chicago
New York Michigan City, Ind. Los Angeles

No. 318



No. 17



KARPEN

TEXACO LUBRICATES THESE CHICAGO BUSES

■ Texaco Lubricants are making excellent performance records on the modern trolley buses of the Chicago Surface Lines. They have proved their effectiveness in lowering maintenance costs under particularly severe operating conditions.

There are 114 trolley buses now in service. Original service started with 29. All of these buses run upward of 3600 miles per month each. Texaco Lubricants, including Texaco Marfak Grease and Texaco 569 Gear Oil W are used.

This is another fine example of the many notable systems throughout the country which are today Texaco lubricated. There is a Texaco Lubricant for every purpose. Write The Texas Company. Ask about Texaco Lubricants and Texaco Engineering Service.

THE TEXAS COMPANY, 135 East 42nd Street, New York City



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One of 11 stocks of electrical insulations *which assure prompt delivery*

SERVICE is and always will be paramount . . . not alone the promptness with which orders are filled, but also the unsurpassed performance which Mica Insulator Company's products assure.

We offer you one source of supply for practically every commercial insulation. Micanite and Super-Micanite bonded mica; Lamicoid laminated Bakelite; Empire Varnished (Oiled)

Cloths and papers; Mica Varnishes, compounds, tapes and untreated insulations.

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INSULATIONS

A COMPLETE LINE FOR EVERY PURPOSE

\$ 625 for
REO Quality
REO Speed
REO Economy
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 Chassis f. o. b. Lansing, Michigan
 DUAL WHEELS EXTRA



THE new Reo SPEED WAGON sweeps aside all previous work-limitations of trucks in the lowest price class. It fulfills *entirely* the exacting 1½-ton haulage demands of *every* industry.

REO has met the low-price 1½-ton market with the finest truck that sound engineering, extensive factory facilities and ample capital have yet been able to produce. *For comparable quality, size and specifications the new SPEED WAGON is the lowest priced 1½-ton truck in the world!*

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THE NEW
1½ TON

REO
SPEED WAGON

*Extra Size, Extra Strength, Extra Power,
 with assured lower per-mile cost
 of operation*

*4 cylinder engine—5 bearings • 6 cylinder engine—7 bearings • Chromenickel iron cylinders • Extra large piston displacements • Force feed lubrication
 Strong channeled frame—7" deep • Four Speed Transmission • Full floating rear axle • Forged Spoksteel Wheels • Internal hydraulic brakes*

*Two liberal wheelbase lengths
 More loading space behind cab.*

These Buses Average 282,635 MILES

**without
road
delay!**



Washington

*Railway and Electric Company Makes
Big Savings With Firestone Bus Balloons and Firestone Service.*

IN 1930 the 125 buses operated by this company travelled 3,674,266 miles on asphalt and brick with only thirteen tire road delays or 282,635 miles average. Since 1926 mileage has doubled, yet road delays have been reduced from two hundred fifty-four to thirteen—a reduction in time lost from 4,470 minutes delay in 1926 to only 209 minutes in 1930.

Such performance is the result of Firestone's inbuilt construction features, including — Gum-Dipped Cords — Patented Double Cord Breaker — Tough Thick Non-Skid Tread, which provides,—

- 58%** longer flexing life in every cord
- 26%** greater protection against punctures and blowouts
- 56%** stronger bond between tread and cord body
- 25%** longer non-skid wear
- 25 to 40%** longer tire life

See the Firestone Service Dealer near you today. Let him show you how Firestone Bus Balloons and Firestone Service will save you money and serve you better.



Firestone

BUS BALLOONS

TIRES • TUBES • BATTERIES • RIMS • BRAKE LINING • ACCESSORIES

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USE a wheel that will wear long and avoid the expense of changing wheels except after long intervals. In these days of quick starts and stops, high running speeds and heavy loads, the wheel is a very important and often expensive piece of equipment. Standard Steel Wheels are standing up and lasting long—a good investment for all operators.



STANDARD STEEL WORKS COMPANY

GENERAL OFFICE & WORKS:
BURNHAM, PENNA.

CHICAGO
NEW YORK

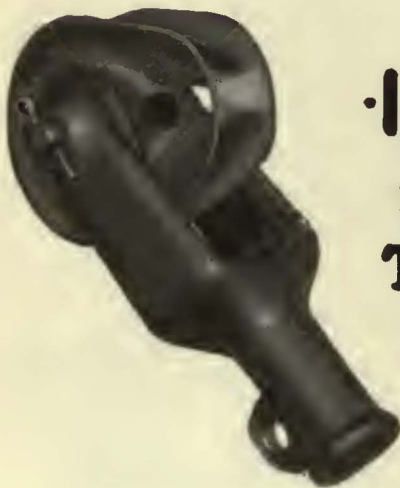
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PHILADELPHIA

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SAN FRANCISCO

Trolley Shoes

pay their own way..

Maintenance engineers experienced in trolley shoe use say very emphatically that the savings effected in wear on overhead equipment—and elimination of trolley brakes—more than pay for the initial installation of



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 Reversible
Trolley Shoes

Let's talk it over

Efficiency Products Corp.
 1203 Barlum Tower, Detroit, Mich.

PANTASOTE

TRADE MARK

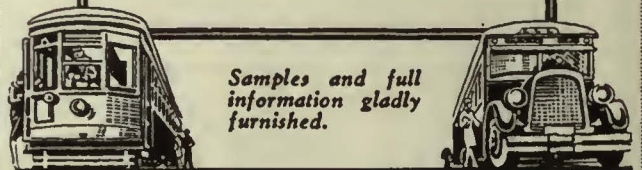
—the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

AGASOTE

TRADE MARK

—the only panel board made in one piece. It is homogeneous and waterproof. Will not separate, warp or blister.

*Standard
 for electric railway cars
 and motor buses*



*Samples and full
 information gladly
 furnished.*

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 250 Park Avenue NEW YORK



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FLEXOLITH

Long Wearing

Even the rough brogans of stamping workmen do not injure the hard, tough surface of Tucolith floors.

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|---------------------|-------------------|
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| 2. Attractive | 5. Sound Deadence |
| 3. Non-Slip Surface | 6. Sanitary |

TUCO PRODUCTS CORP.
 30 CHURCH ST., NEW YORK
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MAINTAIN YOUR SAFETY RECORDS



IN the face of heavy traffic which daily crosses interurban and electric traction lines, these lines have created enviable safety records. Maintain them! At each highway or grade crossing there should be protection not only for automobile or pedestrian

but for the car as well. "Union" Highway Crossing Protective apparatus protects. It speaks a universal language, saying, "A car is coming." It gives this positive service 24 hours each day. And it gives the greatest protection for the least expense.

1881  **Union Switch & Signal Co.**  1931
SWISSVALE, PA.

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For EFFICIENT, ECONOMICAL
JOINTS

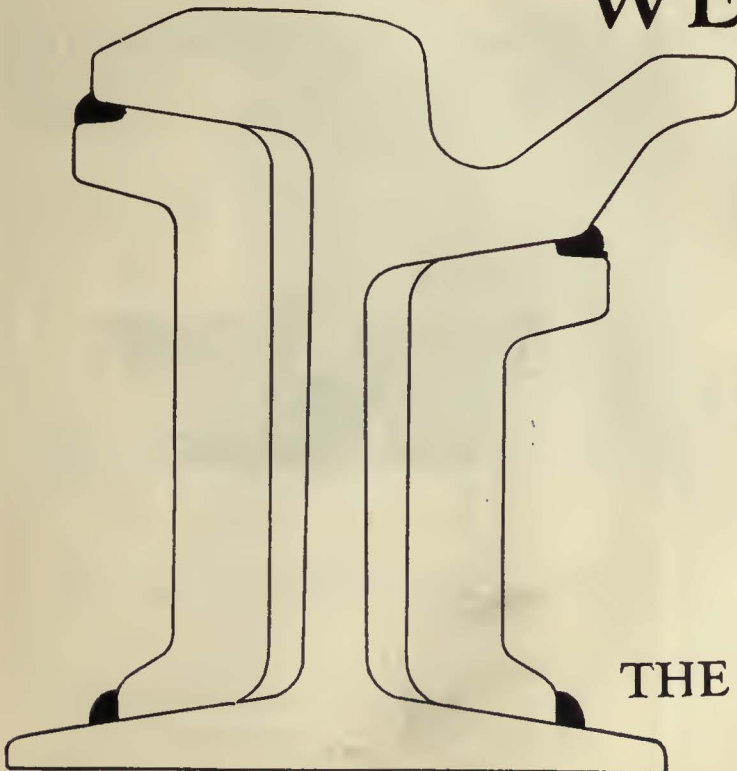
Do you believe in statistics? Rely on performance records? If so, the performance records of the many "Weld Plates" now in use will convince you that they lead the bar-weld joints in efficiency and economy.

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Defective
Bonds!**



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*Bulletin G-200
describes different
types of testers.
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Bulletin.*

Why permit defective rail bonds to interfere with current return through the rails? Why stand for continuous power losses? Why risk electrolysis damage?

Find those broken bonds with a Roller-Smith Bond Tester. It's a one man proposition, accurate, direct-reading, easily handled and fast. Fits every kind of rail-head.

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City and State

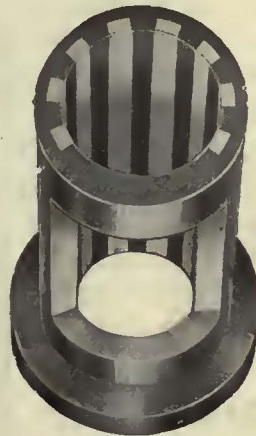
Name of Company

Occupation E. 8-31

(IMPORTANT—Write plainly and fill in all lines.)

**“NATIONAL”
ELECTRIC
RAILWAY
Specialties**

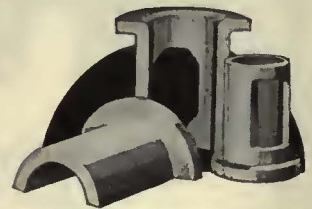
Due to long contact with the industry we have valuable operating data that is available for the asking. Let our specialists cooperate with you. Prices and full details submitted upon request.



The “Vigne” Bimetallic Armature Bearing



“More-Jones” Trolley Wheels and Harps



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“Armature” Babbitt Metal

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A CLEAR indication of the fare paid, the correct registration of the fare paid, the permanent entry on an untamperable printed record of all the facts relating to the fare paid . . . these are Ohmer System essentials inseparable from the use of any kind of Ohmer Fare Registers.

In addition to serving interurban railways, the Ohmer Recording Fare Register is used extensively in city railway operations. It is giving such outstanding operating companies as the Georgia Power Company, the International Railway Company, the Indiana Railroad, and many others, a complete check of the revenue derived from passenger transportation.

A late transportation system to adopt Ohmer Ticket-Printing Registers is the Buckeye Stages, Inc., of Columbus, Ohio. These registers were installed in twenty coaches operating over an area extending from Cincinnati to Cleveland and comprising ten different divisions with ninety-nine fare limits.

OHMER FARE REGISTER CO.
DAYTON, OHIO, U. S. A.



For city service the Ohmer No. 3 Type Register illustrated above is extensively used.



For interurban service the No. 80 Type Ticket-Printing Register shown at the left is especially recommended.

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in Full Chrome or Bark Tannage for Transportation Upholstery

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Makers of the Famous Velvelea and Tried and Proven "00" Leathers

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THERMOSTATIC CONTROL

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COMPLETE PNEUMATIC DOOR AND STEP OPERATING EQUIPMENT

HIGH & LOW VOLTAGE BUZZERS & BELLS

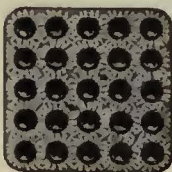
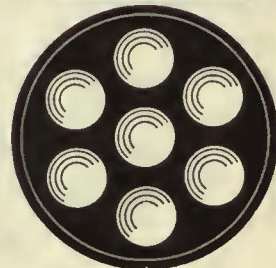
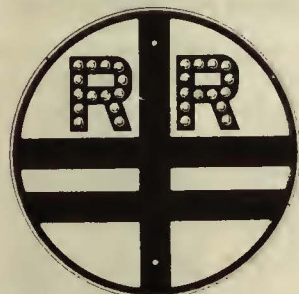
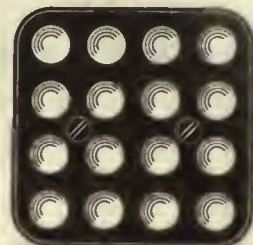
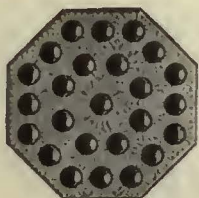
SAFETY SWITCHES

SAFETY SWITCH PANELS

CONSOLIDATED CAR-HEATING CO., INC.
NEW YORK ALBANY CHICAGO

REFLEX SIGNS AND SYMBOLS

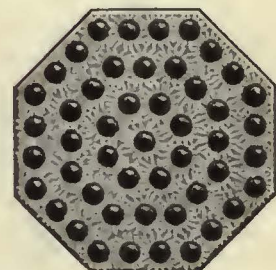
are used on steam and electric roads
advantageously



Crossing Signs; Switch Lamps; Bus Markers;
Safety Isle Markers, Etc.

They save you money

Ask for Bulletin 23-A



LOUISVILLE FROG, SWITCH & SIGNAL CO.
LOUISVILLE, KENTUCKY

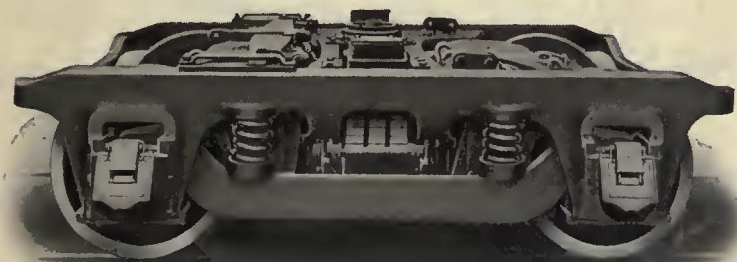
Commonwealth "SWING MOTION" Trucks

Rugged Construction—

Long Life—

Freedom from Costly Maintenance—

Economical for Any Service



Investigate thoroughly the merit of Commonwealth Trucks. See how these trucks fully meet your service requirements. See why their past performance records make them the logical trucks for you to standardize on. The cast steel frame, including cross transoms and pedestals, is one strong unit. Commonwealth Trucks are designed for both street car and interurban service. We will be glad to cooperate with you in the satisfactory solution of your present truck problems.

GENERAL STEEL CASTINGS CORPORATION

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ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS

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231 S. La Salle Street, Chicago
New York Pittsburgh San Francisco

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for the

FINANCING—REORGANIZATION
—DESIGN—CONSTRUCTION

of

INDUSTRIALS and
PUBLIC UTILITIES

Chicago New York San Francisco

The P. Edward Wish Service

50 Church St., NEW YORK

*Street Railway Inspection
DETECTIVES*

131 State St., BOSTON

SEPTEMBER ISSUE

Closes August 21st

Early receipt of copy and
plates will enable us to serve
you best—to furnish proofs
in ample time so changes or
corrections may be made if
desired.

ELECTRIC RAILWAY JOURNAL

STANDARDIZE ON

Glass

up to 15,000 volts



Complete stocks of standard types always on hand.

Because it is **TRANSPARENT**
—Internal defects easily seen.

NON POROUS.
—will not absorb moisture—sustains dielectric strength and will not age or deteriorate.

COSTS LESS
—in the first place—lasts longer with fewer replacements.

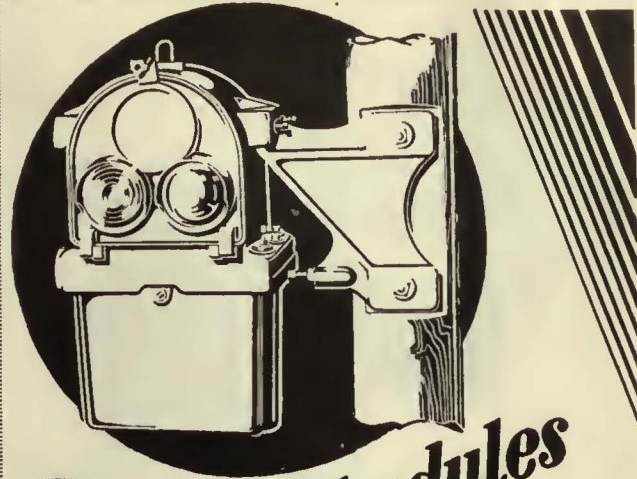
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HEMINGRAY GLASS COMPANY

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Muncie, Indiana



Faster Schedules

Nachod Automatic Block Signals, operating independently of the train crew, insure safe, fast operation and eliminate vexatious delays at switches. They take chance and memory out of the picture . . . provide maximum safety under all conditions of operation. Block and Highway Crossing Signals, Headway Recorders. Nachod & U. S. Signal Co., Inc., Louisville, Ky.

"Nachod Spells Safety"

NACHOD SIGNALS

Utility

Car Heaters fitted with

ENCLOSED HEATING elements carry the Underwriters' Laboratories Label. They give 100% energy output for what you put in.



CHROMALOX STRIP



UTILITY HEAT REGULATORS economize in current consumption.

UTILITY HONEY-COMB VENTILATORS keep the air pure and wholesome.

RAILWAY UTILITY COMPANY

2241-47 Indiana Ave., Chicago

J. H. DENTON, Eastern Mgr.
1328 Broadway, New York

Car Comfort with Utility Heaters Regulators Ventilators

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TROLLEY wheels are never chosen for looks, never selected because one kind costs a little more or less than another. They're chosen for performance. That's why

KALAMAZOO



trolley wheels and harps are the standard of comparison today. That's why many properties use them exclusively. There's a difference in trolley wheels. May we tell you about it?

THE STAR BRASS WORKS
KALAMAZOO, MICHIGAN



Don't throw away waste and wiping cloths!

NO MATTER how grimy and oil-soaked waste and wiping cloths may be, you can reclaim them at a fraction of the cost of replacing them. And in addition, these washed cloths will be softer and more absorbent than new.

As, for example, a Pacific Coast road finds reclaiming cloths the Oakite way so economical that they now wash out printed and painted advertising banners which have been displayed on the sides of their cars. The rags obtained are re-used for window washing and similar purposes.

It will pay you to investigate this and other Oakite money-saving methods. Write and ask to have our nearest Service Man give you more information. No obligation.

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U. S. and Canada

Manufactured only by
OAKITE PRODUCTS, INC., 28B Thames Street, NEW YORK, N. Y.

OAKITE

TRADE MARK REG. U. S. PAT. OFF.

Industrial Cleaning Materials and Methods

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SEARCHLIGHT SECTION

EMPLOYMENT : BUSINESS : OPPORTUNITIES : EQUIPMENT—USED or SPECIAL

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 5 cents a word, minimum \$1.00 an insertion, payable in advance.
Positions Vacant and all other classifications, excepting Equipment, 10 cents a word, minimum charge \$2.00.
Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.
 Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 inch \$6.00
 2 to 3 inches..... 5.75 an inch
 4 to 7 inches..... 5.50 an inch
Other spaces and contract rates on request.
An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page. R.J.

COPY FOR NEW ADVERTISEMENTS ACCEPTED UNTIL 3 P. M. ON THE 20TH FOR THE ISSUE OUT THE FIRST OF THE FOLLOWING MONTH

POSITION WANTED

ASSISTANT superintendent equipment, 17 years' experience. Maintenance of equipment and electrical engineering, air brake. Location, anywhere. PW-253 Electric Railway Journal, Tenth Ave. at 36th St., New York.

ARMATURE winder, electrician, 15 years' experience; references furnished; go anywhere on short notice. PW-248, Electric Railway Journal, 883 Mission St., San Francisco, Cal.

MASTER Mechanic, 20 years' service street and interurban cars and busses overhauling, and maintenance of equipment. Salary and location secondary. PW-247, Electric Railway Journal, 520 No. Michigan Ave., Chicago, Ill.

POSITION wanted by graduate electrical engineer with twenty years' experience in street railway operation as superintendent of transportation and transportation engineer. PW-252, Electric Railway Journal, 520 No. Michigan Ave., Chicago, Ill.

SECRET service operator available. Fully experienced in inspection work on cars and busses. Capable of organizing secret service inspection department. Free to locate any place. PW-251, Electric Railway Journal, Tenth Ave. at 36th St., New York.

DISMANTLING?

Let us handle this for you. We specialize in buying and dismantling entire railroads, street railways, industrial and public service properties which have ceased operation. We furnish expert appraisals on all such properties.

Consult us also about New and Relaying Rails—all weights and sections. You will like our service.

The Perry, Buxton, Doane Company

(Capital \$1,000,000.00)

Boston Office, P. O. Box 5253, Boston, Mass.
 Pacific Sales Office—Failing Building, Portland, Oregon

Saving is a good habit, BUT—

Why Save Things You'll Never Use?

WHY let Mother Nature grow grass between the wheels of replaced cars? Why pile up rails, shop equipment, power plant equipment, line equipment, car appliances, road building material, etc., etc., you will never use again?

TODAY you can turn them over at a fair price. Is it not the better part of good horse-sense to dispose of them NOW?

6000 other electric railway men will see your advertisements of used or surplus equipment and materials here—in the Searchlight Section of their business paper.

Some of these men—officials or executives of other lines in other parts of the country and operating under different conditions—can use what you no longer need. For an insignificant investment you

can tell these others what you have. And they will buy.

One "Searchlight" advertiser wrote, "We can cheerfully recommend the Searchlight Section as a wonderful medium for reaching buyers of rails and equipment." Another—"The strongest proof that your 'Searchlight' finds its way to many readers is shown by the numerous letters we have received in answer to our recent ad."

Let us tell you the cost of advertising your used or surplus equipment and materials in the Searchlight Section. Just address a list of what you have to dispose of to the

Searchlight Department

ELECTRIC RAILWAY JOURNAL

Tenth Ave. at 36th St., New York, N. Y.




TO BEAUTIFY AND TO BE LASTING!

The graceful, tapering form which makes NATIONAL Tubular Poles an adornment to a city street, results also in a proportioning of weight and strength where both are needed most. Refinement of design has not led to weakness, but incorporates both beauty and durability.

The material used in NATIONAL Poles is a steel specially adapted for the conditions of line-pole service and proved by many years of use. The effect of strains and shocks of traffic, the fury of the elements and attacks of corrosion is reduced to a minimum by installing these strong, durable poles. Available in varying designs and dimensions. Beauty, safety, and economy are served by specifying them. Write for Bulletin 14, on poles made from—

America's Standard Wrought Pipe

· NATIONAL TUBE COMPANY · PITTSBURGH, PA.

Subsidiary of United  States Steel Corporation

NATIONAL POLES

FUNDAMENTALLY RIGHT



A new era in urban transportation

The success of the modern trolley bus in Chicago and Rockford is convincing proof that it is here to stay. Particularly outstanding in public appeal and economy of operation it appeals to riders and operators alike. An increasing interest also is evidence that railway operators recognize the fact that the electric trolley bus principle is fundamentally right.

THE J. G. BRILL COMPANY
PHILADELPHIA

CHICAGO OFFICE - HARRIS TRUST BUILDING
SAN FRANCISCO OFFICE - RIALTO BUILDING



THE J. G. BRILL COMPANY OF OHIO - CLEVELAND
THE J. G. BRILL COMPANY OF MASSACHUSETTS -
SPRINGFIELD

Brill Trolley Buses

Summer Comfort

for your Bus riders
in cold weather

Tropic-Aire Heaters supply sufficient warmth in the coldest weather even with frequent opening of bus doors. Tropic-Aire hot water heat is clean and free from odors. Tropic-Aire Hot Water Bus Heaters prove most dependable in city bus service.

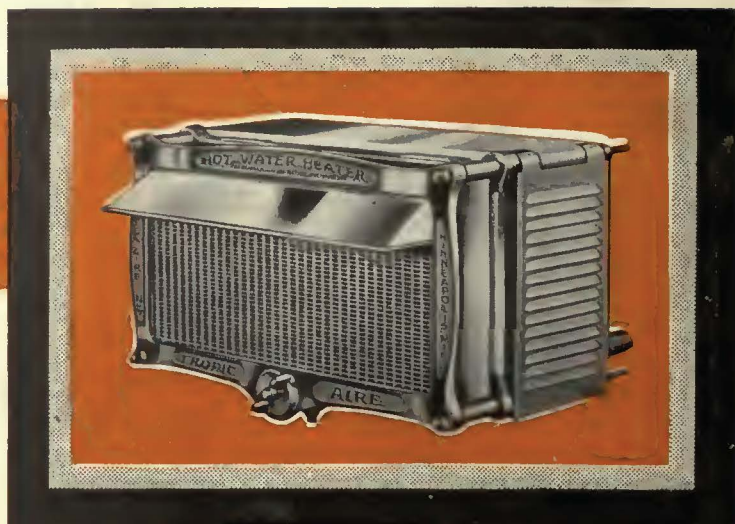
Tropic-Aire Heaters are standard equipment for Public Service Coordinated Transport of Newark, N. J.—Greyhound Lines—Chicago Motor Coach Co., and many other of America's prominent bus companies.

Tropic-Aire Heating Systems are easily installed. They don't require excessive exhaust piping and valves. There is practically no maintenance expense. Tropic-Aire Heaters are designed for all types of buses. They are directly connected to and are a part of the water circulating system. We invite your investigation. Specify and install Tropic-Aire Heaters.

TROPIC-AIRE, Inc.

60 Eleventh Ave., N. E., at Sibley St.
MINNEAPOLIS MINNESOTA

Patent Numbers 1,581,761 — 1,668,491 — RE 17,131 —
Others Pending



FANS CIRCULATE
HOT WATER HEAT

BOTH FRONT AND
REAR HEATERS—
ASK FOR DETAILS



TROPIC-AIRE

HOT
WATER

Bus Heaters