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ELECTRIC RAILWAY JOURNAL

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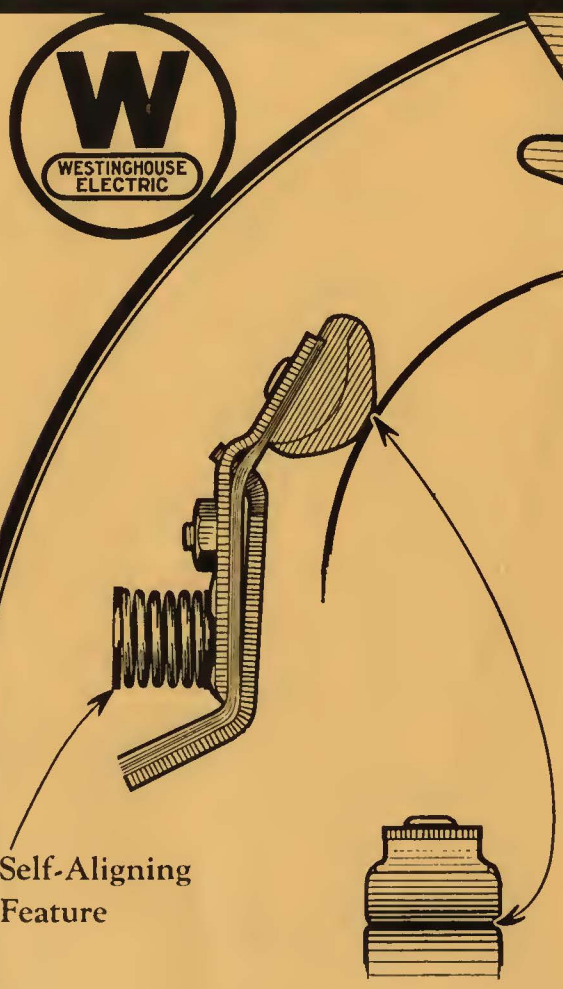

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are self-aligning. Regardless of the contour of the controller drum surface, Westinghouse compensating fingers automatically adjust themselves to the position of maximum contact; they automatically provide an adequate contact area, within the capacity of the controller, to prevent heating or burning.

Study the illustration at the left; under the constant pressure of a long-lived *coil* spring the finger finds its own position. There can be no one-spot contact to heat or burn, even on badly worn controllers.

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Vol. 68
No. 12

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SEPTEMBER 18, 1926

Experience Speaks

WHAT is ahead for the industry? That is the subject which occupies first place in the minds of transportation executives and bankers. Can local transportation be made to pay a reasonable profit? Can new money be attracted for rehabilitation and development with reasonable assurance that it will earn a fair return?

Experience is convincing. Actual results accomplished by one property under given conditions are the best indications of what may be expected by others that apply the same methods. When the record of experience that is presented covers many properties of varying size and wide geographical distribution, it changes conjecture and opinion to firm conviction.

Methods by which they have succeeded in "Making Transportation Pay" will be described by executives of many electric railways in next week's Annual Convention Number of the JOURNAL. These men have given liberally of their valuable time to tell the industry what they have done and how they have done it. They speak from experience.

With the vision to discern clearly the needs of the hour, and the courage to take the necessary steps to modernize their properties, these executives have been pathfinders of the industry. They have found the way to put transportation on a paying basis. Don't miss the Annual Convention Issue next week.

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1926

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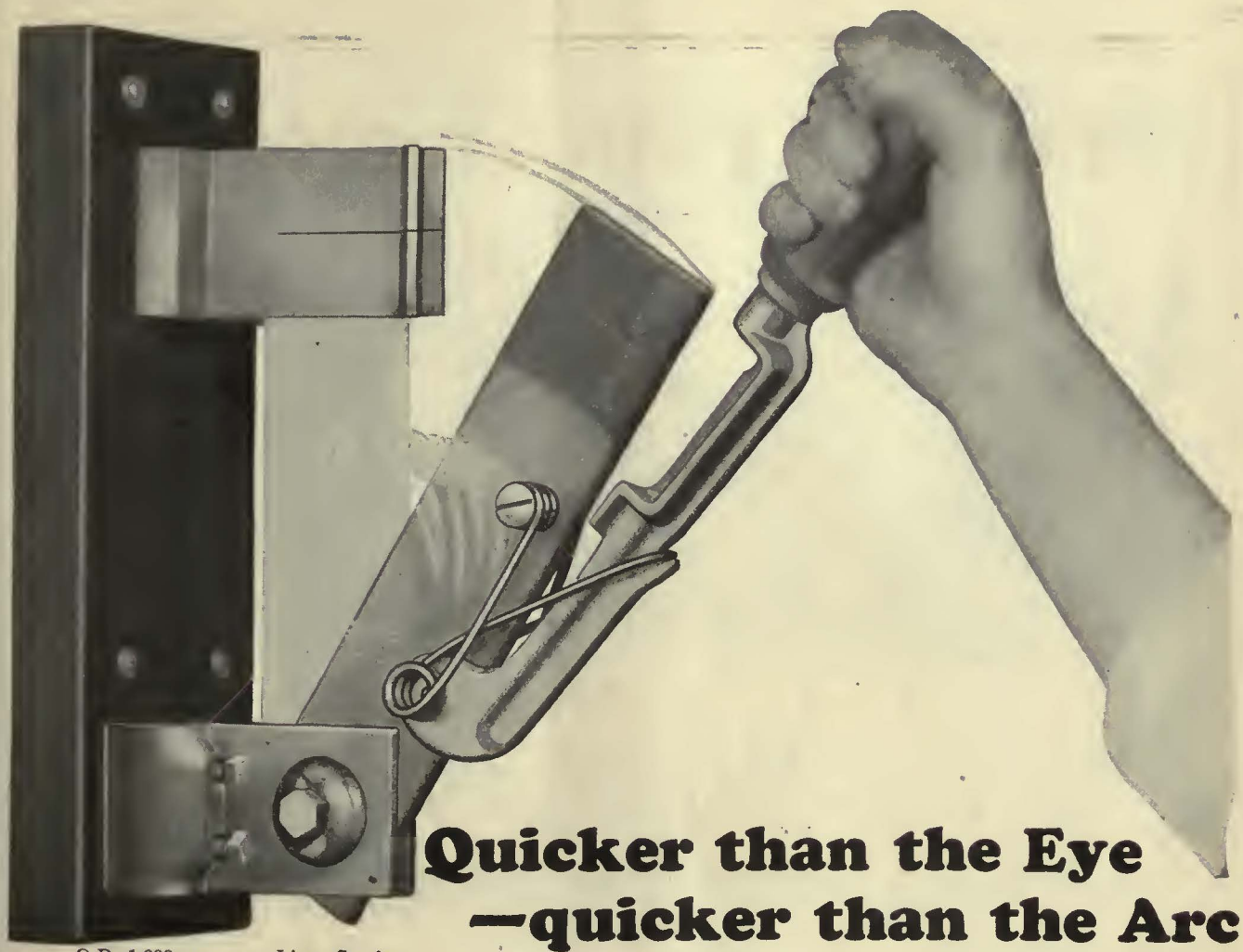


O-B 1,000 ampere Line Section Switch, single pole, without separable terminals. Cat. No. 11365

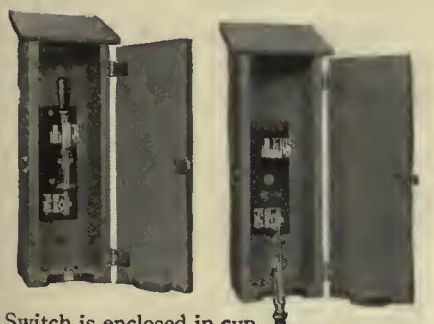
Quicker than the Eye —quicker than the Arc

THE entire break is made with the big, current-carrying blade itself—there is no secondary blade nor auxiliary device to work loose. No springs nor small parts are called upon to carry the current, even momentarily.

Pulling the handle brings into play a powerful phosphor bronze spring, which snaps the blade out of the contacts. A wide gap is formed so quickly that the arc cannot carry over.

Latest improvements include heavier slate bases, more contact surfaces, ground-in contacts all around, and a big soft rubber grip on the handle. The handle itself is of Flecto Iron, the O-B brittle-free hot-dipped galvanized malleable.

Furnished with, or without switch boxes, in capacities from 100 to 1000 amperes—750 volt rating. Shipped from stock.

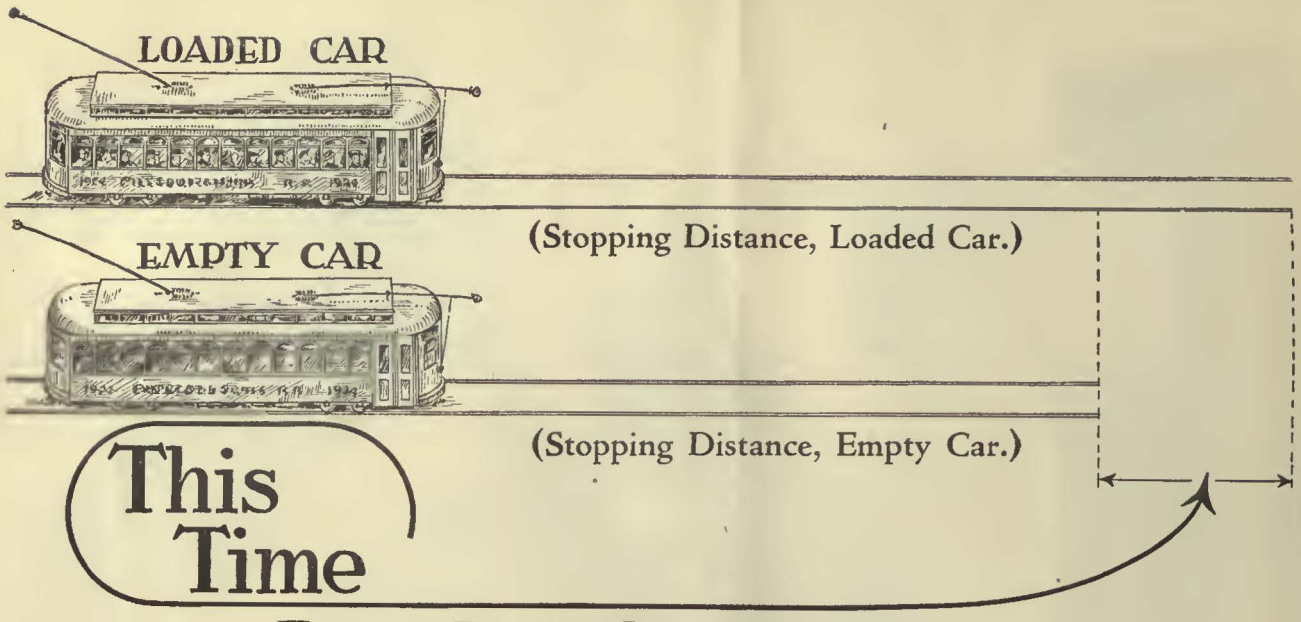


Switch is enclosed in cypress wood box. Door may be fastened with switch open or shut. When switch is open insulated handle only, projects through slot in bottom of box. When switch is shut this slot is covered by a spring-closed slide. All hardware fittings are of bronze.

Ohio Brass Company, Mansfield, Ohio
Dominion Insulator & Mfg. Co., Limited
Niagara Falls, Canada
1808

Ohio Brass Co.

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES



Can be Saved

WITH the ordinary form of air brake equipment the maximum retarding force is limited to that which is ample and permissible for an empty car, but which is inadequate to effect the proper degree of control on a loaded car—particularly if it has a high ratio of loaded to light weight—with the result that the stop is lengthened and more time is consumed.

But this time can be saved!

The Westinghouse Variable Load Brake, adapted specifically for modern light weight surface cars, eliminates the difference in retarding effect on empty and loaded cars—by an automatic adjustment of brake cylinder pressure with the changing load—and insures that stops will be as short under all conditions as would normally be possible only with an empty car.

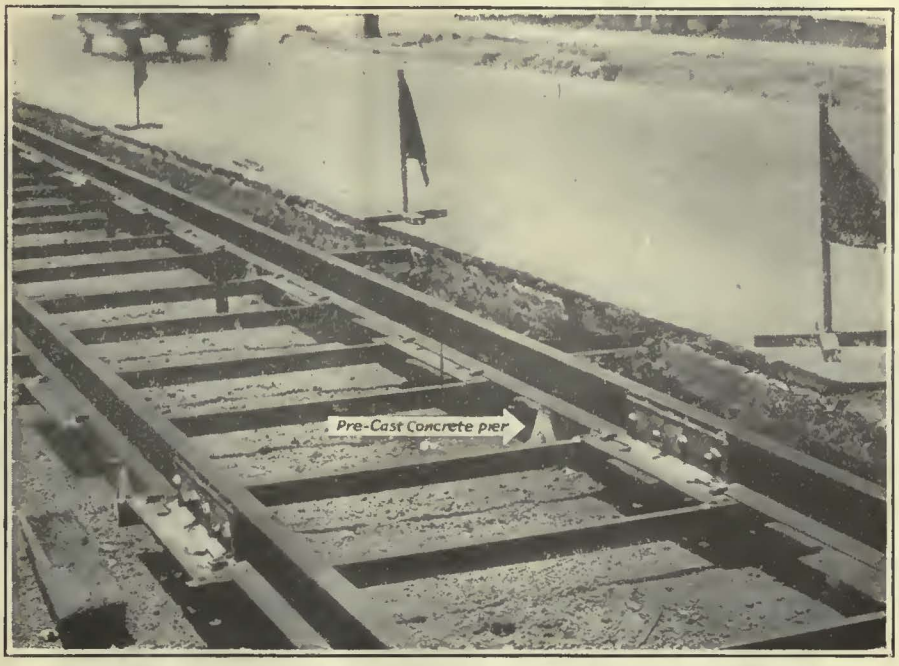
The saving in time, effected by the uniformly shorter stops, is translated into faster schedule speeds just when time is most valuable—during those periods when there is a demand for quick transportation of large volumes of revenue-producing traffic.

Mass transportation can be accelerated to increase the profit and popularity of your service by the use of this modern brake on your modern cars.

Information regarding Westinghouse Variable Load Brakes may be obtained upon application to our nearest district office — *Ask for Descriptive Catalogue T-2045.*

WESTINGHOUSE TRACTION BRAKE CO.
General Office and Works, WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES



"Perishable materials are sometimes utilized in the construction of track, in the effort to secure flexibility, and *the life of the track is shortened* to that of the perishable material"*

THIS simple idea is one of the fundamentals of Twin Tie construction. The combination of steel and concrete provides a uniform structure in which no part limits, by its shorter life, the life of the whole.

When steel, well proportioned, provides large bearing surfaces, tie members, and reinforcement for the concrete foundation of such construction, the life of the rail becomes the limiting factor in the life of your track.

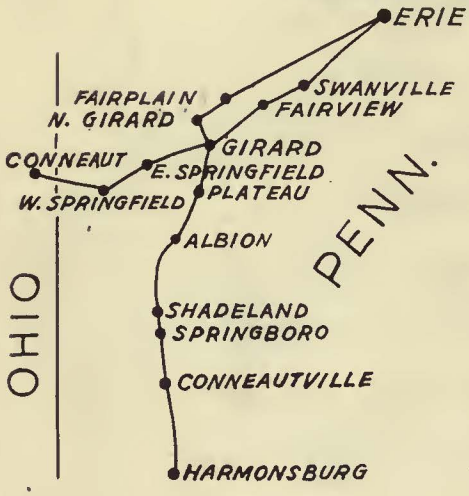
Initial costs of twin tie construction are very low. Detailed figures from many jobs are available for comparison with your estimate and costs.—Write for them today.

*Quotation from a paper, "Modern City Track," read by Nelson R. Love, Chief Engineer of The Denver Tramway Corporation, at the Mid-West Electric Railway Association Meeting at Denver, July, 1926. We will be pleased to mail a copy of the complete article to those interested.

The International Steel Tie Co.
Cleveland, Ohio

Steel Twin Tie Track

Renewable Track—Permanent Foundation



CLOSE TO CLEVELAND

There are nine fleet Greyhound Parlor Cars operated by West Ridge Transportation Company of Girard, Pennsylvania, daily making economy records that help to enhance the net profit for the operators.

The first of these Greyhounds, placed in service during May, 1925, operated its first seven months period, brought the following comment from the owners—"We have 57,080 miles on the first Greyhound purchased from you and have changed one tire—the left rear." This is only one instance of the many operating economies that are obtainable from Garford Greyhound Buses when put to test in actual service. Greyhound owners in increasing numbers testify that Garford Economy is helping them make a greater net profit from their bus operations. Write for details.

IN CLEVELAND

The Greyhounds will again be on display at the A.E.R.A. Exhibit, October 4th to 8th inclusive. Duplicates of the Greyhound Bus here illustrated will be shown in Spaces 302A and 303A.

GARFORD PIONEERED 4-WHEEL BRAKES ON MOTOR BUSES

GARFORD TRUCK COMPANY

651-681 Wapak Road Lima, Ohio

Use ESSCO CATALOG No. 7

Here you will find listed, illustrated and described, thousands of devices, parts and supplies. The tiniest screw in a Faraday Buzzer can be identified and ordered by its Catalog number. The lens or reflector for a Golden Glow Headlight is likewise cataloged. Whether it's a gear case or a match box holder you're looking for—ESSCO Catalog No. 7 should be your first reference.

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KEYSTONE CAR EQUIPMENT

Some Items Selected from ESSCO Catalog No. 7

Golden Glow Headlights
Faraday Signal Systems
Hunter-Keystone Signs
Steel Gear Cases
Motormen's Seats
Lighting Fixtures
Headlight Resistances
Air Sanders
Trolley Catchers
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Rotary Gongs
International Fare Registers
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Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
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Standard Trolley Harps
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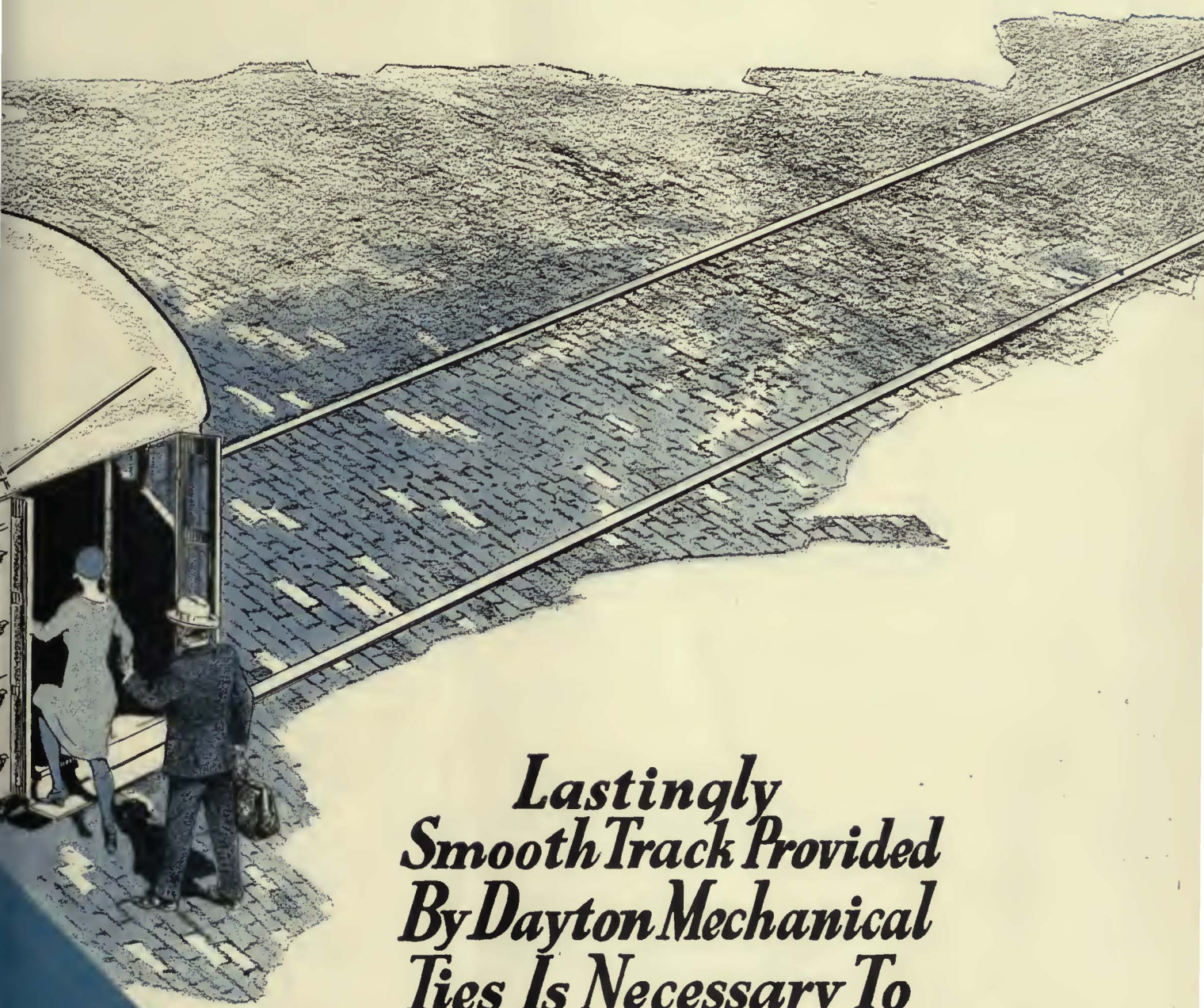
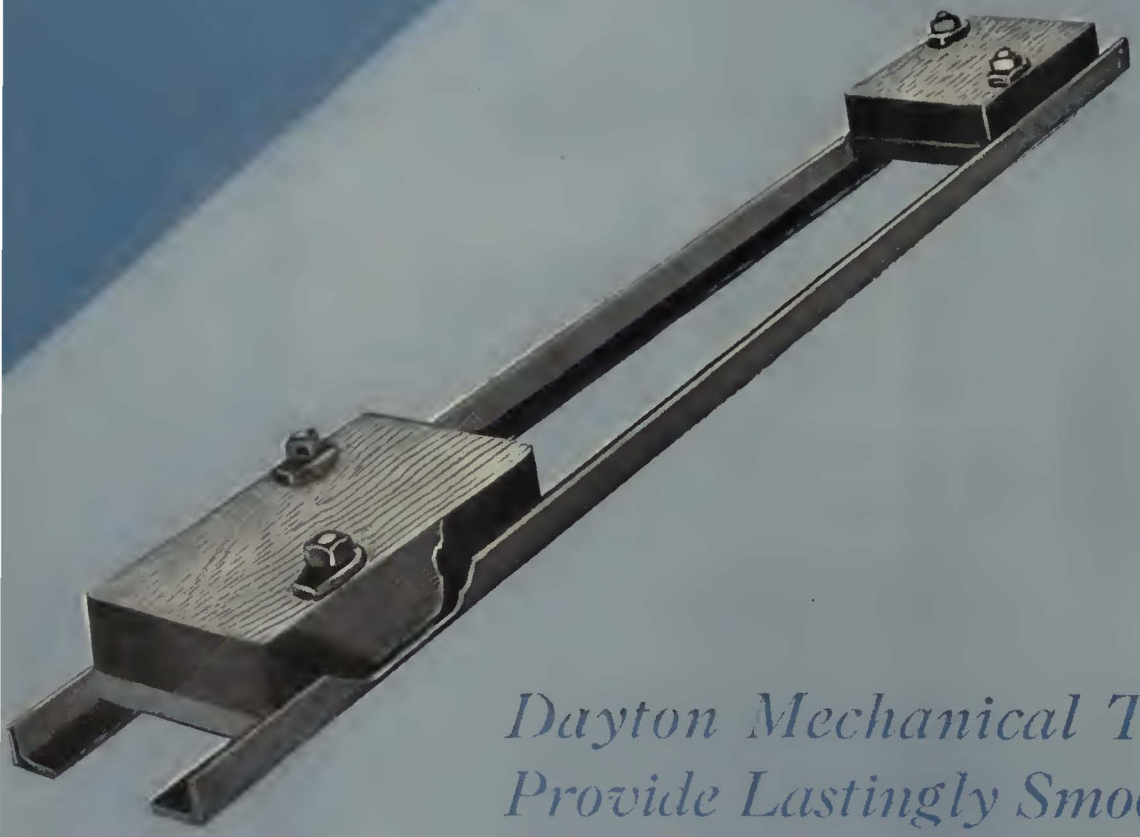
Comfort Wins Patronage



Lastingly Smooth Track Provided By Dayton Mechanical Ties Is Necessary To Comfort



Dayton Mechanical Ties Provide Lastingly Smooth Track With Virtually No Maintenance

Comfort provided by attractive cars, and permanently smooth track increases the number of revenue passengers. Electric street railways are realizing this more and more.

Dayton Mechanical Ties are contributing to this profitable riding comfort all over the nation by providing permanently smooth track.

Inbuilt resilience of Dayton Ties absorbs the shocks that would otherwise destroy ballast and break down the track. Track laid on them remains in perfect condition 10-12 years—even longer—with no maintenance beyond inspection. Smoothness and resiliency also keep down rolling stock repairs.

There is a real story of profit and saving in Dayton Ties. Write for complete information.

The Dayton Mechanical Tie Co.,
Dayton, Ohio.

Balanced

The principle of car buildin

THERE are now available cars so accurately planned to meet the requirements of any given service that the balance between costs and revenue can be definitely set in favor of a healthy profit.

design

hat makes transportation pay—and pay well

These cars— Cincinnati NEW Lightweight Cars,— raise the standard of car appearance, passenger comfort and mechanical efficiency to a point hitherto discussed only as an ideal. For city service they are mounted on a truck of exceptionally easy riding qualities,— designed to stand severe wear and tear. For Interurban service there is a unique high-speed truck which makes 60 miles an hour possible, with comfort and safety, on cars of distinctly lightweight construction.

Such features of the Cincinnati design as "Quartered Equalization" (employed in the new high speed truck mentioned above); Curved Side Construction, permitting wide aisles with maximum roof and wagon clearance; and the exclusive Cincinnati Body Construction have resulted in a series of cars equally unique in appearance and performance.

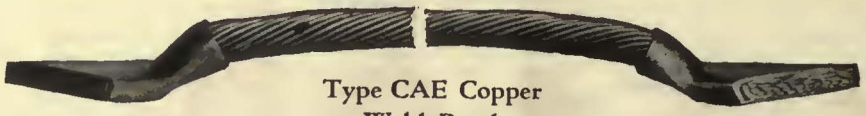
Logically it follows that the actual results obtained on Cincinnati Balanced Lightweight New Car installations made to date have invariably been satisfactory to both operator and riding public.

We have plenty of FACTS to back up every statement made in these advertisements. Cincinnati new cars pay— *and pay well!* The figures are immediately available to any interested electric railway executive.

THE CINCINNATI CAR COMPANY
Cincinnati, Ohio

CINCINNATI NEW CARS

A step ahead of the modern trend



Type CAE Copper
Weld Bond

Type CAE Bond Applied

Bonded stock - - -

even inexperienced welders get good results

Type CAE bonds represent the highest development of the direct copper weld type of rail bond and possess the following exclusive points of superiority.

1. Large area of copper strands.
2. Positive uniting in the weld of every strand of copper conductor.
3. Large area of weld easily obtained.
4. No molds or cups are required.
5. The heavy copper sheath eliminates all strains where the copper strands unite with the weld.
6. The specially coated Erico Copper Welding Rod makes a solid, tough weld.
7. Low installation costs.

ERICO

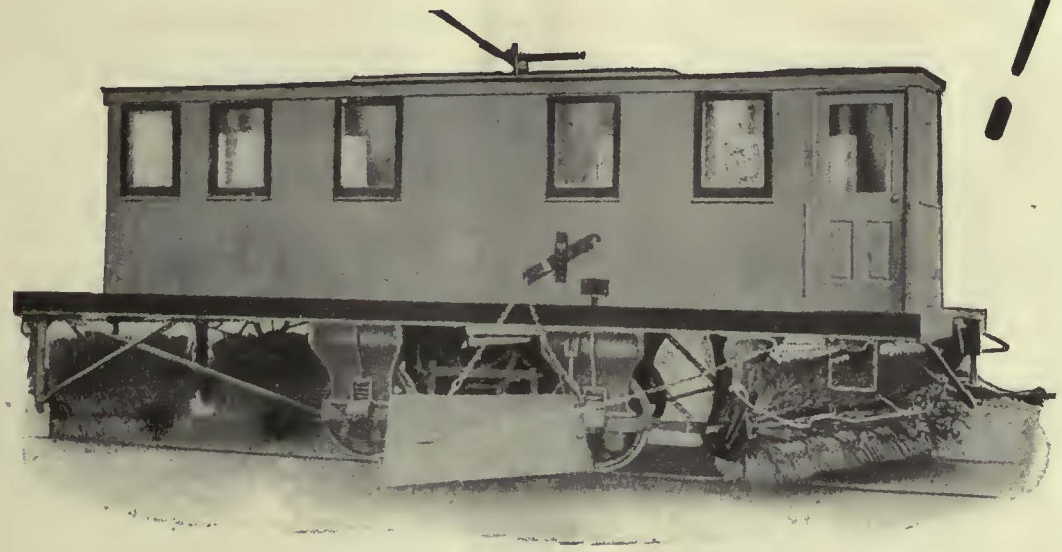
ERICO

Send for Circular No. 15.

The Electric Railway Improvement Company

2070 East 61st Place, Cleveland, Ohio

Maintain your Schedules!



Remove Snow with this efficient Cummings sweeper

The standard single truck, steel underframe, long broom sweeper illustrated is exceptionally strong and rigidly built, handling deep snow rapidly without stalling. The long broom clears both rails and fifteen inches additional on either side. The case hardened roller bar attachable steel chains have tensile strength of 28,000 lbs. This is the standard sweeper on the majority of electric railways.

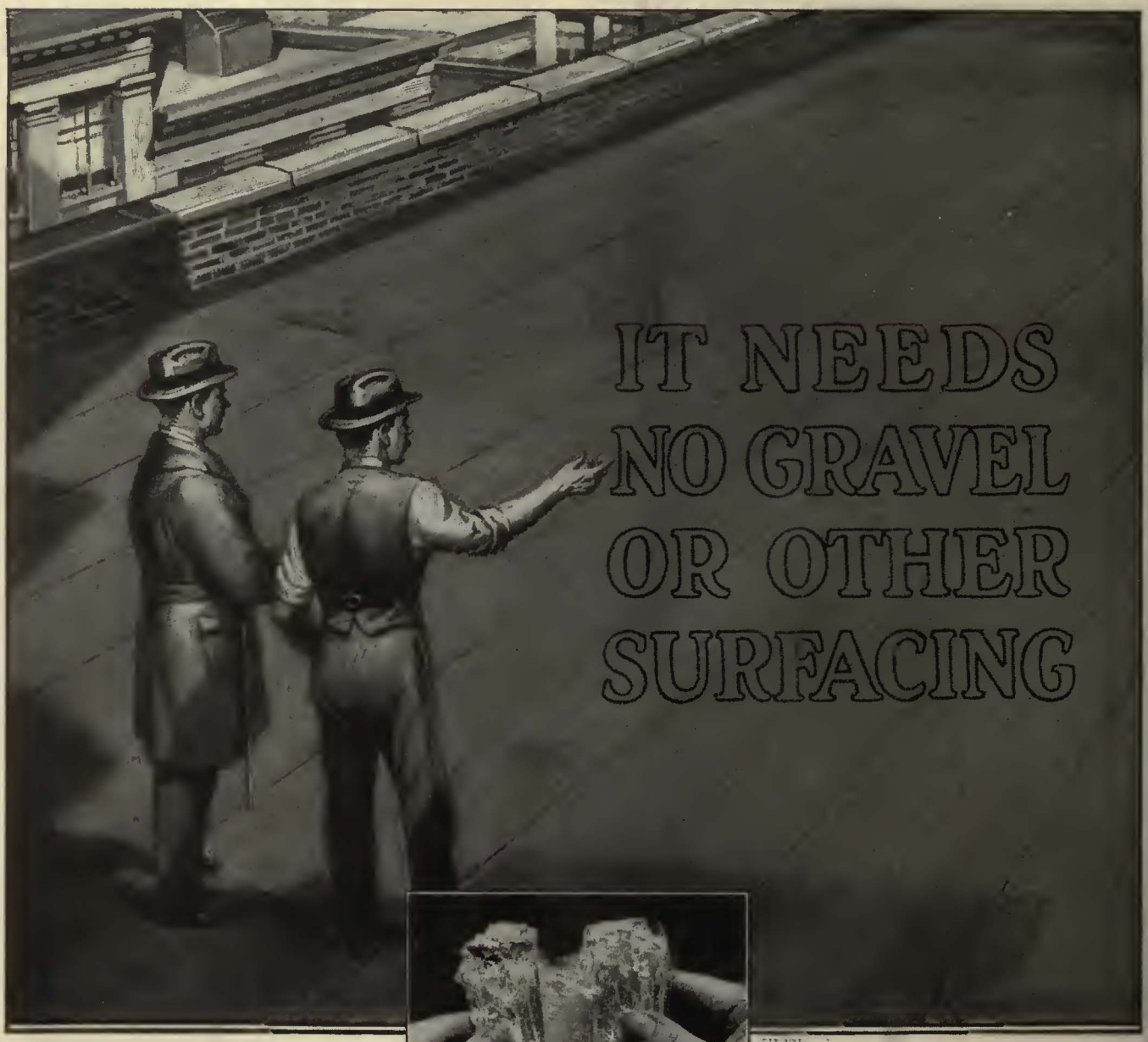
Double truck sweepers and plows are built to meet any snow-fighting condition.

Cummings Car and Coach Co.

Successors to McGUIRE CUMMINGS MFG. CO.

111 W. Monroe Street
Chicago, Ill.

Builders of Modern
Lightweight Street Cars
Single and Double Trucks
Snow plows, Snow sweepers
Gas-Electric Motor Coaches



Crude Asbestos as it comes from the mine.

JOHNS-MANVILLE Built-up Asbestos Roofings are all-mineral so they never need the protection of surfacing. Made of asbestos and mineral asphalts they give positive and everlasting protection against all weather without the excessive weight and cost that gravel adds.

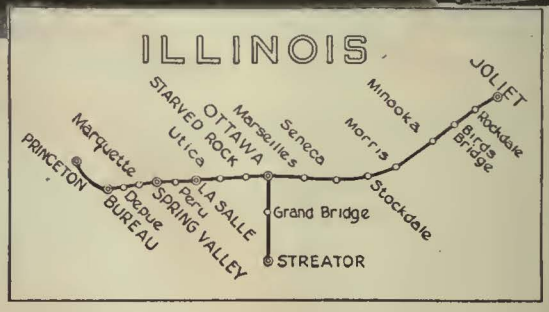
Painting or coating of any sort are never necessary. Roof maintenance expense common to most buildings practically never occurs with a Johns-Manville Built-up Asbestos Roof. And asbestos gives that permanence which eliminates extensive repairs or future replacement.

JOHNS-MANVILLE INC.
292 Madison Avenue at 41st Street, New York City
Branches in all large cities: For Canada: Canadian Johns-Manville Co., Ltd., Toronto

JOHNS-MANVILLE
Asbestos Roofings

Through Asbestos and its allied products
INSULATION
BRAKE LININGS
ROOFINGS
PACKINGS
CEMENTS
FIRE PREVENTION PRODUCTS

Through specific figures, facts are revealed. Experience of a few years with modern light-weight cars, both city and interurban, has furnished convincing proof that new revenues can be developed and substantial savings effected.



A significant page from recent Illinois Traction history

In 1924 this company replaced its 94,000-lb. interurban cars, operated on the Illinois Valley Division, with new 37,000-lb. one-man cars and decreased its headway from 2 hours to 1 hour. The financial gain realized in 1925 from operating these modern cars, which are all equipped with G-E Motors and Control, is indicated by the following facts:

Although two more city cars were operated on the system than in 1923, there was a reduction of 33% in the shop force.

Even with an increase of 70% in interurban passenger car mileage, operating expenses were less by $39,000.

On account of the more attractive cars and reduction in headway, passenger revenue increased $33,000—the total savings, therefore, being about $72,000 or a gross return of about 39% on the investment.

Of 22,239 trains operated in 1923, 92% were on time; in 1925 the number of trains increased to 32,858, of which 97% were on time.

This achievement in improving service and lowering costs of operation is another instance of the success of modern G-E Car Equipment. For these new Illinois Traction cars, G-E-265 Motors with K-35 Control were selected.

The comparative operating costs per car-mile for accounts affected by the new cars are:

	1923	1925	Saving per C. M.	% reduction
Equipment	3.60	0.95	2.65	73
*Power Purchased	5.80	3.35	2.45	42
Platform expense	5.17	3.75	1.42	27

**All service*

330-23

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Publishing Company, Inc.

CHARLES GORDON, *Editor*

Volume 68 New York, Saturday, September 18, 1926 *Number* 12

Chicago Gets a Transportation Proposal

THE mysterious proposal on the part of a group of New York bankers for financing Chicago's local transportation facilities on the basis of a twenty-year franchise has finally come into the light. Advertisements carried in Chicago newspapers publish in full the terms of the proposal for "Solving Chicago's transportation problem, immediately and permanently without new state legislation." The terms of the plan offered carry some unique and interesting features.

There is little beating around the bush in the proposal. The intent seems quite evident and the "teeth" of the plan are in the first paragraph:

The new ordinance to grant a permit, good for twenty years, not only to acquire and operate street railways and to establish motor bus lines in all streets now being used for street railway purposes, but also to establish and operate motor bus lines in all other streets, in which it may be deemed advisable that motor bus lines be operated in connection with the new company's lines in streets now being used for street railway purposes; such permit to become operative Feb. 1, 1927, or as soon thereafter as such new ordinance shall be duly accepted by the new company, the time allowed for such acceptance to be fixed in the new ordinance.

It is needless to go at length here into the forms of security which it is proposed to issue. The high spots of the financial plan proposed are outlined in a news story elsewhere in this issue. The rate of fare is to be enough to pay the cost of maintaining and operating all the new company's lines efficiently and adequately; to meet the requirements of the sinking funds, renewals and depreciation fund and other funds, and deductions from gross earnings to pay the annual interest of all outstanding bonds of the new company.

To quote again:

If on Feb. 1, 1927, the existing companies shall not have vacated the streets now occupied by their tracks and yielded possession thereof to the new company, upon the terms laid down in the new ordinance or mutually agreed upon between them and the new company, then the city shall promptly give to the existing companies notice to remove within six months all their tracks and other property from the city streets and restore the parts thereof so occupied by their tracks and other property to the same condition as the contiguous portions of such streets.

And again:

Whenever the new company shall have acquired lawful possession of or the right to use and operate the street railway properties of the existing companies, then promptly following such acquisition the new company shall begin to operate and thereafter, so long as the new ordinance shall be in force, shall continue to operate said street railway properties and *may, if it shall so elect, discontinue the operation of motor buses in those streets in which street railways are being operated by the new company.*

Here, in brief, is the plan in some of its essential features offered Chicago. The right to operate buses on any and all streets—with the people paying the cost of this duplication of service—forms an excellent club to force existing security holders to accept terms such as the new company might elect to dictate.

It is probably a practical method of financing on a twenty-year franchise—from the bankers' viewpoint. But is it a sound basis for developing a transportation system? Is it fair to those who invested in existing street railway securities in good faith? Chicago may well afford to consider in this light some of the conditions contained in this unique proposal.

Purchasing for Actual Needs

"HAND-TO-MOUTH buying," so called, has been characterized by Eugene G. Grace, president of the Bethlehem Steel Company, as one of the greatest contributing factors toward stabilized national prosperity which has made itself felt to date. In an article which appeared in the *Saturday Evening Post* for Sept. 4 entitled "Distributed Prosperity" Mr. Grace indicates the manner in which the practice of hand-to-mouth buying has come upon us. He traces the beneficial effects which it has already exerted upon industry since it first became noticeable in 1923 as a characteristic in the national economic structure. Decried at the outset, and in many quarters even today, as a radical departure in fundamental industrial policies and as a sure indication of coming economic depression, the practice has continued to develop and gain in favor. Today, according to Mr. Grace's analysis of the situation, we may thank this one practice more than anything else for the decrease in seasonal activity in such industries as that of steel, which had always been subject to wide fluctuations throughout each year.

The whole industrial fabric of the nation is so closely knit that factors which affect one part must inevitably be felt by all. Hence the railways, electric as well as steam, should have much to gain from this same manner of buying. Too fully stocked storerooms and top-heavy inventories have come to be looked on as economic wastes. They require a large amount of tied-up capital which might better be in active use. Further, more uniform buying throughout the year tends to stabilize the industries which supply the railways with their raw materials and improves conditions of employment. At the other extreme, electric railways have in some instances been guilty of buying replacement parts in ridiculously small quantities.

Somewhat unfortunate is the term "hand-to-mouth buying." It implies lack of thrift and foresight. "Producing for consumption" was suggested by Mr. Grace as a more satisfactory term. To this might be added "buying for actual needs." These phrases cover the two sides of the question, producing and consuming.

It would, of course, be foolhardy to permit inventories

to fall below a safe minimum. When a part is needed in repairing a car it is needed badly and must be immediately available. But all Mr. Grace would urge in this or in any other case is the striking of a common-sense medium. Much buying has been done in the past on the "fundamental principles of the old-fashioned crossroads store," whereas a little of the psychology of the chain store would now be very much in order.

Consider for a moment why it was that the crossroads store purchased, as it did, in yearly lots. Execrable transportation and slow means of communication made it necessary for the country merchant to safeguard against running short of merchandise by stocking in unduly large quantities. Today, however, he can dispatch a wire for a bill of goods and in a day or two will receive his order from a conveniently located distributing point. The wholesaler, on the other hand, watched the markets and endeavored to purchase when materials were cheapest. These factors were largely responsible for the wide fluctuations in prices which formerly marked the industrial scheme of things. There is no logic in continuing to base present-day marketing procedure on conditions no longer existent.

A Living Wage Depends on the Liver

RECENT labor discussions in Chicago, Cincinnati, Birmingham, New Orleans, Boston and Newark raise anew the question of the living wage. It is an intriguing issue, this. In some of these cities the matter of wages was settled by conciliation rather than arbitration, but the assumption seems reasonable that much the same conditions govern the economic status of the employees in the other cities mentioned as surround the Eastern Massachusetts men at Boston. If that case may be taken as typical, then things are not so bad with the employees. Mr. Wadleigh for the company made this quite plain. In fact, he appears to have made it plain beyond peradventure, but the members of the board may decide differently. Even in that event it would still remain true that the plight of the Massachusetts men is not a distressing one. Their average wage is $1,825 a year. Their average age is 46 years. Their average length of service with the company is nineteen years. Since October, 1913, wages on the Eastern Massachusetts have increased 117.9 per cent. The cost of living during the same period has increased 60.9 per cent. These and other facts make it appear that these men are well off compared with all other workers in the vicinity no more skilled than are they.

Mr. Wadleigh's comparison of their lot with that of others was not intended to be invidious, to create ill will, but the contrasts he drew were striking. This suggests again the soundness of the contention of the company that "we are paying a decent living wage." It is, of course, commendable to want to live better, but if one cannot manage well what he already has, be the amount large or small, how can he profit by having more? The workman seldom knows how to live judiciously. Often he is proportionately a bigger wastrel than is the so-called man of money. The notion is a mistaken one that ability to spend wisely goes with large earning power or the possession of means. Many men are poor on $10,000 a year. A living wage depends entirely on knowing how to live. And in the present day of inordinate prosperity the art of living seems to be languishing.

On the basis of the remarks of Mr. Vahey, acting for them, one might expect to find the Eastern Massachusetts men constantly upbraiding themselves with the question "Is Life Worth Living" and forgetting that the famous answer of *Punch* to this question was that it all depends on the liver. In the light of many of the recent wage discussions the tear glands of at least one commentator are not stimulated to the extent that there is any semblance of the saline secretions symbolic of sympathy. In other words, despite the able presentation of the cases of the men, there appears to be no need to cry one's eyes out over the plight of labor —particularly platform labor.

Fare and Assessment Fallacies Pricked in New York Bus Report

SEVERAL points made by the Board of Transportation of New York in its report on the pending bus applications are to be commended, but on the whole the report is disappointing. These points relate to the recognition by the board of the need for limiting the length of a bus ride for any given fare and to the recognition—even though stated negatively—of the fallacy of exacting a franchise rental or fee for the privilege of rendering service. The disappointment is that the existing carriers which bid for rights are given such short shrift. City-wide operation is fundamentally sound. But since there is a need for zoning, the borough as a fare unit seems logical. In fact, examination of the routes proposed indicates a probable intention to divide the system into seven physical groups, even though one company receives a city-wide franchise.

There were 106 petitions from 72 applicants. The bound volume in which the matter is reviewed weighs seven pounds and contains 1,088 pages. These figures testify to the complexity of the undertaking before the board. The finding appears to favor the Equitable Coach Company, not now a local operator, but presumably prepared to meet its obligations if the award is finally made to it. The next step to be taken is consideration of the report by the Board of Estimate to determine which, if any, of the proposals is acceptable. After that a form of contract or franchise must be adopted and advertised for fifteen days prior to a final vote by the Board of Estimate on the granting of the franchise. Even after that none of the companies can assemble any tangible assets until a franchise grant is obtained and favorable action upon it is secured by the State Transit Commission. That is the *modus operandi* that must be followed. Understanding of it is essential lest erroneous conclusions be drawn. In other words, the suggestions made are not tantamount to the letting of the grant nor the conferring of operating rights. Far from it.

It was a colossal undertaking, the passing of judgment in this instance. It is, of course, easy to damn a thing of this kind with faint praise. But as said before it is to be regretted that the existing carriers were shown such short shrift. In the best interest of the city they do not deserve it. Condemnation of them for alleged sins of the past does not come with good grace. The criticism does not hold water that the past history of the predecessors of some of the railways which sought operating rights does not inspire confidence in their financial methods. With all due respect to the presumed favorable applicant, does its guar-

antee really mean anything? Chicanery and manipulation are things of the past—at least the presumption is reasonable that public regulation has made them so, no matter what the desire of the owners may be. If that is not so and the Transit Commission, acting in its regulatory capacity in the interest of the public, is impotent, what is the assurance that there will be no further manipulation, no matter to whom the grant is made?

It is not fair, however, hastily to weigh a matter of this kind. Even though ELECTRIC RAILWAY JOURNAL does not find itself at one with the board, it would be unfair not to acknowledge the magnitude of the task before the board or to give it credit for discerning the two important points previously mentioned. So far as the 5-cent fare is concerned, that unit appears to have been retained for its psychological effect in a city which has been educated over many years to believe that there is a relation between transportation and the 5-cent coin. The recommendations of the board do, however, recognize unquestionably the need of abandoning a 5-cent unlimited ride for buses. Five miles is indicated as the maximum length of haul for 5 cents. The wisdom of this figure itself is dependent on many factors. On some parts of Manhattan Island the density of traffic combined with short riding is sufficient to warrant it. Such a 5-mile limit may not be justified on other sections of a city-wide system where traffic density is less and the riding habit not so great.

Another significant thing, mentioned previously, is recognition of the fallacy of exacting a franchise rental or fee. The city's primary objective is and should be to insure maximum service of the best possible character at a given fare. Any assessment against a transportation agency in the form of a franchise tax limits by that amount the resources available for extension and improvement of service. In short, in this recognition and the recognition of the relation between length of haul and cost of transportation, New York is beginning to show evidence of enlightenment when dealing with a new vehicle even though in the past it has been very much in the dark when dealing with existing forms of local transportation.

Better Tax Laws to Be Sought Through Nation-Wide Effort

SURVEYS of the tax situation as it affects the electric railway industry indicate that there has been little co-ordination of thought in the formation of tax laws. Much work has been done, but generally of a local nature. One company, or at best a local group, often through a state association, has been active at different times. There is little general knowledge of tax matters and no nation-wide attempt to establish state and local taxes on a basis that would be equitable to properties with large and small net earnings alike.

In this issue the announcement appears of a practically completed adjunct to the committee on special taxes of the American Electric Railway Association, in the appointment of advisory members. One outstanding authority from each state has been selected. The list reveals the names of many prominent electric railway officials. It is the purpose of the association and the committee to create through these advisory members a nation-wide organization to promote better tax laws. It is the hope that progress may be made toward establishing not only uniformity of laws, but in eliminating such laws that cause almost a crushing burden on some properties.

As much expense as possible must be curtailed to transportation agencies because the advent of the automobile has created a competitive condition that makes impossible the collection of increased revenue beyond certain limits. Other utilities can pass increased costs on to the user much more readily than transportation companies due to the lack of competition.

There must be no tendency to dodge fair taxes, but an electric railway, faced as it is by today's conditions, can only hope to improve its net through superior service and reduced costs. If the augmented committee is successful in establishing a tax basis that will bring reduction to companies now earning little or no net, the savings will revert to the public manyfold in improved equipment and service.

Attendance at Conventions Will Bear Analysis

LAST October, at the American Electric Railway Association convention at Atlantic City, there were 3½ manufacturer representatives to every operating man. At the recent Central Electric Railway Association assemblage the proportion was three to one. Other gatherings have brought similar figures to light. Obviously the manufacturers are giving far better support to the conventions than the men who are primarily supposed to be benefited by these meetings.

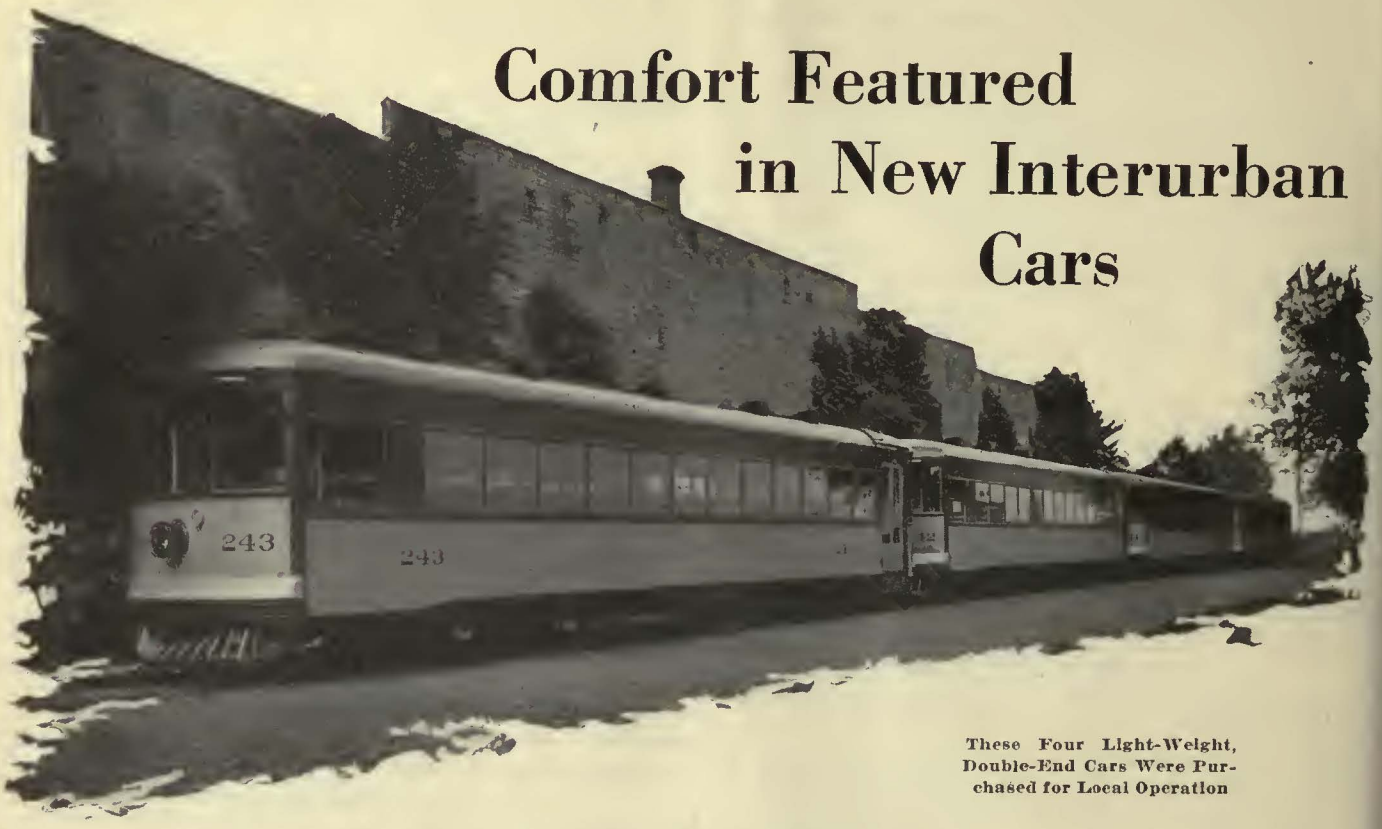
Grant that the producers are actuated by self-interest in attending in such numbers, that they expect to be repaid in the opportunities which will be presented to meet prospective customers. Even so, such a preponderance of manufacturers is an economic fallacy. The cost of sending a large quota of representatives to a convention weighs as heavily upon a manufacturer as upon a railway. The manufacturers are actuated by motives of co-operation as well as profit in this regular attendance at sectional and national gatherings. They have much to give as well as much to receive.

If the railways do not give whole-hearted support to such conventions as are now held, then perhaps there are too many conventions. Better to have 100 per cent attendance at a few gatherings than 50 per cent attendance at a greater number scattered throughout the year. In a house organ of one equipment firm recently appeared this statement:

"Convention expense to the average manufacturer is a formidable item. It can only be justified by affording opportunity to the manufacturer to make contact with a large number of prospective customers. Thus one of three things must inevitably take place: There must be substantially better attendance of operating men or there must be fewer conventions, which presumably would bring larger attendance. If neither of these remedies prevails, then a diminishing support on the part of manufacturers must be expected."

Plain words. Yet they are justified. Constant pressure is brought to bear on the manufacturers to support the local and national meetings to the limit of their ability. After all, they are business institutions, just as are the railways, and convention activity must be mutually profitable to be justified. The forthcoming convention in Cleveland gives every promise of being a noteworthy success in every respect. Attendance of railway men there should help indicate to the industry the value of such meetings.

Comfort Featured in New Interurban Cars



These Four Light-Weight, Double-End Cars Were Purchased for Local Operation

Six New Cars for Chicago & Joliet Electric Railway Embody Many Unusual Elements of Design to Encourage Pleasure Riding—General Dimensions and Appearance of the Interurban Cars Are Similar to Those of Four Double-End Cars Just Received for Local Service Out of Joliet

REPLACEMENT of cars too old for economical operation was the chief reason for the purchase of ten new cars by the Chicago & Joliet Electric Railway. Of this order, six cars of the single-end type are for through interurban service between Joliet and Chicago, while four are double-ended for local service out of Chicago. The ten cars scrapped when the new ones were delivered were all over twenty-five years old. This fact, more than any other, was used by the management in advocating the purchase. Other factors given consideration were the economy of operating a car weighing 24,000 lb. less than the original equipment, or 38,000 lb.; the practicability of one-man operation with new equipment, and the possible increase in riding because of attractive appearance.

Several years ago the city lines were changed over to one-man operation. Two years ago a like change was made on the local interurban runs. The equipment used on the through service between Chicago and Joliet did not lend itself readily to one-man operation and the cost of changing over such old equipment seemed prohibitive.

With the new cars recently delivered, the entire system is now equipped for one-man operation. This is one of the factors in an anticipated operating saving of approximately $30,000 per year. The remainder will come from reduced power bills, because of lighter and more efficient equipment and lower maintenance costs. The latter item is already reflected in the reduction of shop department personnel. One-man operators are paid 5 cents per hour above the scale for conductors and motormen. The estimated saving in energy is about 40 per cent.

All regular service is now given with new cars. However, the company has retained two cars approximately fifteen years old and four cars twelve years old for tripper and extra service. Six still older cars are being retained for special service and for emergency purposes. This gives the company 22 cars of the interurban type, all equipped for one-man service.

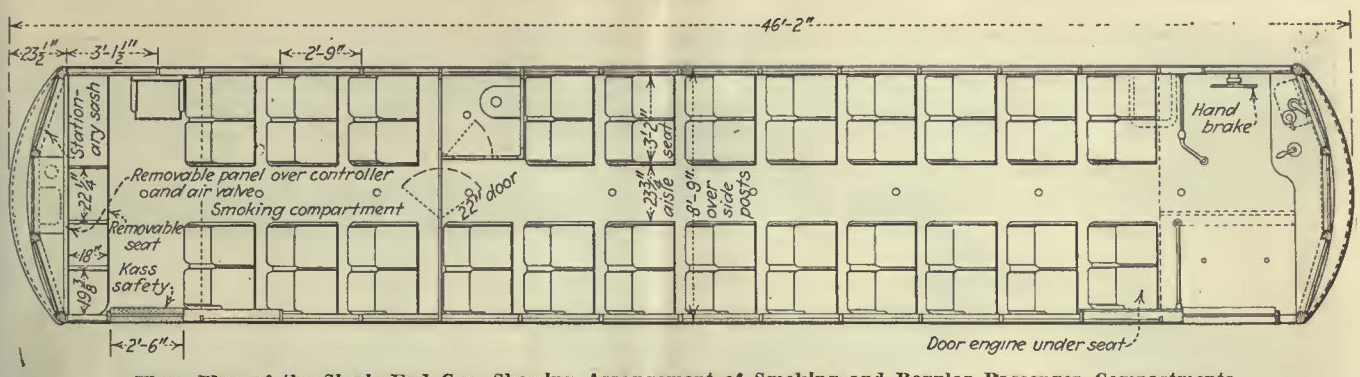
Besides saving approximately $30,000 per year in operating costs, the company expects to attract additional patronage. It is figured that if each of the six new interurban cars will attract one round-trip fare for each trip, the increase in gross revenue for a year will amount to $10,183. This is based on an average of $1.55 for a round trip over the line. Eighteen round trips are run per day between Chicago and Joliet. It is believed that the attractiveness of the car will succeed in building up this new business.

Each of the six single-end cars cost approximately $17,000, or $102,000 for the group. The $10,000 increase in revenue anticipated will more than pay interest on the investment.

On the group of ten cars, including the four double-end cars for local service out of Chicago, the saving in operating expenses is estimated at $30,000. Therefore the return on an investment of approximately $170,000 is well worth $40,000 per year even should the four double-end cars fail to attract any additional riders in local service.

Features Which Distinguish the New Equipment

Streamline effect combined with artistic painting give the cars an attractive appearance. A wide letterboard above the single sash windows is carried from the front to the rear. Sliding doors and folding steps blend with the streamline of the panel below the windows. The



Floor Plan of the Single-End Car, Showing Arrangement of Smoking and Regular Passenger Compartments

arch roof carries ventilators on each side and trolley poles both front and rear. On the front end of the single-end cars and on both ends of the double-end cars are anti-climber bumpers and fenders. The entire appearance of the car is of extreme lowness, accentuating the length and giving the effect of Pullman car design and construction. Both local and through interurban cars were built by the Cummings Car & Coach Company of Chicago.

Bucket-Type Seats in Interurban Cars

In the single-end, one-man type interurban cars seats are provided for 52 passengers on double bucket-type chairs. These are the feature of the car. They are 38 in. wide, upholstered in green plush, both on the face of the back and seat, while the trimming, back and arms are in genuine green leather. At the rear of the car is a smoking compartment with accommodations for thirteen passengers on the same type of seats, upholstered entirely in leather. Five of these seats are placed across the rear, just in front of the emergency control and air brake cabinet. A cream colored headlining gives a light, clean appearance to the interior of the car, which is finished in mahogany and has green battleship linoleum on the floor. Directly over the center aisle are mounted Pullman type lighting fixtures, while the registers of the Railway Utility ventilators are arranged in staggered formation over the seats. In this car a toilet is located just ahead of the partition separating the smoking compartment from the main part of the car. Advertising racks are located above the panel over the windows. Large hat and coat hooks are placed over each window on this panel.

Control equipment and apparatus are inclosed in a cabinet in the forward end of the car. The motorman's position is at the extreme left, thus furnishing an unobstructed view forward for the passengers. A small bulkhead separates the Agasote headlining of the car proper from the aluminum headlining of the vestibule. Suitable aluminum stanchions are placed at the entrance door and just to the rear of the front vestibule to serve as a dividing partition between the vestibule and the passenger compartment. A curtain may be slid along a rod to protect the motorman from the glare of the interior light. A 38-in. air-operated sliding door is used at the forward end of the car. An emergency door at the rear on the same side of the car may be opened by an air valve in the emergency cabinet to the rear of the rear seat, or by a conductor's valve on the outside of the car.

Single-sash windows with brass sash are arranged to raise. Attached to the bottom sill of the sash are large mesh screens which raise when the windows raise. These serve as protecting guards when the windows are open, but are dropped out of view when the windows are closed. This feature allows for a clear vision through the windows and also facilitates cleaning.

Design of the double-end car is similar to that of the

One of the Single-End Interurban Cars Which Will Run Between Chicago and Joliet

Plush-Upholstered, Twin Bucket-Type Seats Are Used in the Single-End Interurban Cars

The Operators Compartment Shown Here Is Practically Identical on Both the Single and Double End Cars

single-end, with the exception that reversible seats upholstered in green plush replace the bucket-type seats. Both sets of seats were manufactured by the Hale-Kilburn Company. No toilet or smoking compartment is provided in the double-end car. Both types of car are mounted on low-height trucks having 26-in. diameter wheels.

There are two 35-hp. No. 510 Westinghouse motors per truck. A free running speed of 40 m.p.h. and an average operating speed of 22 m.p.h. are obtained with the new units.

Before the new equipment was placed in service on Sept. 7, exhibition runs were made over the line. In addition to this, one of the new interurban cars was allowed to stand for some time in front of the company's offices in Joliet. More than a quarter of the population of that community availed itself of this opportunity to inspect the car.

In the accompanying table are given the principal specifications of the cars, both the double-end and single-end cars following the same general specifications, with the exception of the seats.

SPECIFICATIONS FOR THE CHICAGO & JOLIET CARS

Date order was placed	April, 1926
Date of delivery	August, 1926
Seating capacity	Single-end 52, double-end 48
Weight:	
Car body	19,000 lb.
Trucks	11,000 lb.
Equipment	8,100 lb.
Total	38,100 lb.
Bolster centers, length	22 ft. 6¾ in.
Length over all	46 ft. 2 in.
Truck wheelbase	5 ft. 6 in.
Width over sideposts	8 ft. 9 in.
Height, rail to top of roof	10 ft. 9½ in.
Body	All steel
Interior trim	Haskelite, mahogany
Headlining	Agasote
Roof	Haskelite, arch
Air brakes	Westinghouse Traction Brake
Armature bearings	Sleeve
Bumpers	Hedley anti-climbers
Car signal system	Faraday high-voltage
Car trimmings	Statuary bronze
Center and side bearings	Cummings Car & Coach
Control	Double end, K-35-KK
Curtain fixtures	Curtain Supply Co.
Curtain material	Pantasote, doubled-faced
Destination signs	Hunter
Door-operating mechanism	National Pneumatic
Gears and pinions	Westinghouse
Hand brakes	Peacock staffless
Heater equipment	Peter Smith
Headlights	Crouse-Hinds, type D.C.F.
Lightning arresters	Westinghouse
Motors	Four Westinghouse 510-A, 35 hp., inside hung
Paint	Sherwin-Williams
Registers	Ohmer
Safety devices	Safety Car Devices Co.
Sanders	Ohio Brass
Sash fixtures	O M Edwards
Seats	Hale & Kilburn
Seating material	Single-end cars, combination plush and leather; double-end cars, plush and all leather
Slack adjuster	Anderson
Springs	Coil and elliptic
Step treads	Kass
Trolley catchers and retrievers	Knutson
Trolley base	Ohio Brass
Trolley wheels	Westinghouse
Trucks	Cummings No. 62
Ventilators	Railway Utility
Wheels	Davis Steel Co., 26 in.
Energy-saving device	Sangamo economy meter

Two University Courses Offered in Public Utilities

AT LEAST two universities are offering this year new or expanded courses in public utilities. One, a four-year course at the University of Illinois, is under the direct charge of a professor who occupies a chair in the economics of public utilities, recently endowed by the Hon. William B. McKinley. The course is open to graduates as well as to advanced undergraduates. There is also a course for graduate students only. Both lead to degrees. Credit scholarships and fellowships are available to students who give evidence of ability and promise.

In addition a series of afternoon and evening courses in public utilities is being offered this year by the Northwestern University of Chicago, emphasizing the economic, financial, legal and administrative principles in utility operation. They are given in the afternoon and evening to permit the attendance of individuals who are engaged in work during a part of the day, and it is believed that the courses will therefore appeal to many connected with the financial and executive departments of utilities. Several of these courses are given by members of the Institute for Research in Land Economics and Public Utilities, which moved to Chicago on July 1, 1925, and became affiliated with Northwestern University.

The courses in both universities are indorsed by the Joint Committee on Co-operation with Educational Institutions of the Gas Association, State Electric Association, Electric Railway Association, Telephone Association and Committee on Public Utility Information, all of Illinois. The chairman of this joint committee is Britton I. Budd.

Many Variables Affect Energy Consumption by Electric Railways

Checks of Energy Consumption per Car Unit a Valuable Aid to Management—Only by Careful Analysis and Evaluation of the Many Variables Encountered Can the Operating Efficiency Be Adequately Checked

By J. T. Lake
Economy Electric Devices Company, Chicago

PROPER analysis of the variations in energy consumption which follow changes in operating practice on an electric railway is essential to an accurate determination of the value of any supposedly more economical method of operation. So many variable and interwoven factors enter into electric railway performance that it is difficult to set off exactly the effect produced by a change in any one of them. Schedules may be speeded up, thus making a saving in platform hours at a worth-while increase in energy and maintenance cost. When additional copper is strung to decrease line losses, the management may be disagreeably surprised to find an increase in energy used for the same car-miles operated, due to better schedule adherence.

Substantial savings in energy consumption and power demand have been made on a great many properties by increasing the motorman's operating efficiency. If conditions remain the same over a period of years, these savings are evidenced by a continued decrease in the monthly power bills. On any given property, however, conditions very rarely remain the same for any length of time, and hence it is necessary to make proper allowance for the changes that occur. When facilities are available for measuring the energy consumption at the car, it is a comparatively simple process to evaluate readily the effect of the variables encountered.

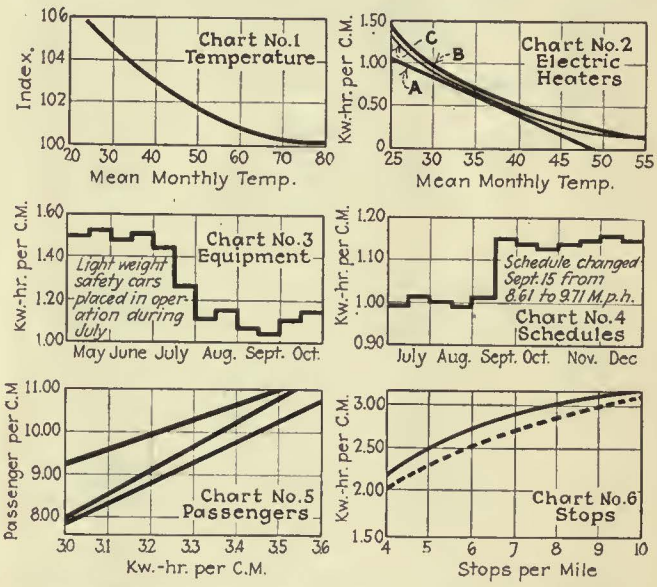
The more important of the variables which affect energy consumption are as follows: Temperature, electric heaters, equipment, schedules, distribution system, miscellaneous use of power, number of passengers, number of stops, street traffic, loading of system and efficiency of operation by trainmen. The effect of most of these variables can be determined by an analysis of past traffic statistics and by applying the corrections obtained to the current figures. These corrections, together with the actual energy consumption at the cars, will supply all the data necessary to compensate properly for changes as they occur.

Temperature Affects Energy Consumption

With decreasing temperature, as in the winter months, the energy consumption per car increases. This increase is the resultant of many factors, such as changing resistivity of the electrical circuit, increased friction, bad rail conditions due to leaves, mud, ice and scum, increased length of stops caused by slower loading of passengers, etc. By plotting a curve between kilowatt-hours per car-mile and average monthly temperature, this relation can be shown graphically. Of course care must be taken that other variables, such as electric heat, schedules, passengers, etc., are eliminated.

Chart No. 1 gives a typical temperature-kilowatt-hours per car-mile curve. This curve is based on five years operation on a property which has no electric heaters on its cars. Analysis of the statistics for only the non-heat months on other properties using electric heat substantiate these figures.

Chart No. 2 shows the amounts of energy consumed per car-mile for electric heat at various mean monthly temperatures. Two of these curves represent actual data, and one (C) is calculated from power statistics, corrected for the other variables which entered into the figures.



Effect of Variables on Energy Consumption by Electric Cars

In Chart No. 1 is shown the increase in energy for propulsion as the temperature decreases. In Chart No. 2 the energy used by electric heaters is plotted against outside temperature. Curves "A" and "B" are based on actual tests. Curve "C" is calculated.

Equipment and schedules have important bearing on amount of energy used. Chart No. 3 shows the result of changing from rebuilt single-truck cars to modern safety cars on one small line. Chart No. 4 illustrates effect of increasing schedule speed.

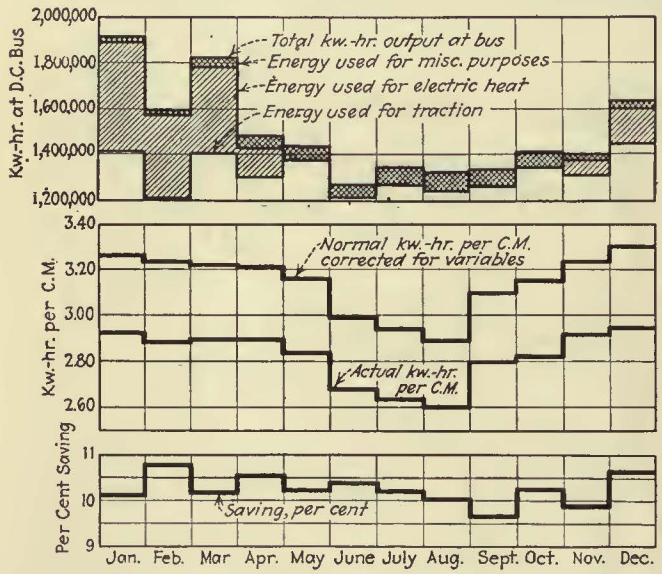
Average number of passengers per car-mile and number of stops are closely related in their effect on energy consumption. Chart No. 5 is platted between passengers per car-mile and kilowatt-hours per car-mile. Chart No. 6 shows the relation between stops and energy. The solid line was derived from speed time diagrams and the dotted line represents actual tests on approximately the same equipment.

Changes in equipment usually involve the adoption of more efficient motors and cars and the retirement of obsolete rolling stock. A theoretical figure showing the change in energy requirements can be obtained from speed-time curves, but as this method assumes a certain condition of the rolling stock, it is more or less inaccurate, particularly when used for older equipment. Where meters are available on the cars it is of course

simple to obtain these figures from the actual readings of the meters taken just before and just after the change. If an entire division or line is changed over at one time, and the energy supplied to that section is metered at a substation, the change is readily noted on the substation meters. However, it is seldom that a property is fortunate enough to change over the equipment on any one division completely. An example is shown in Chart No. 3 of the effect on energy consumption of changing the equipment on one small line from single-truck rebuilt cars to modern one-man cars.

Schedules Have Important Effect on Energy

When schedules are changed the energy requirements for the line under consideration also change. Most of the schedule changes of recent years have been made to speed up the service, which naturally increases the energy required. Chart No. 4 gives an example of the effect of a change in schedule speed from 8.61 to 9.71 m.p.h.



Analysis of Energy Consumption for a Year on a Typical Electric Railway Property

Above is the monthly fluctuation in various divisions of the power bill. In the center, the importance of correcting for variables in checking energy consumption figures is illustrated. Below is the saving made by use of car meters to check trainmen.

The effect of any changes in the distribution system can be determined by a comparison of the unit energy consumption at the busbar and at the car. The ratio between the two does not necessarily indicate the true efficiency of distribution, as there may be some miscellaneous use of energy for other than car operation. However, if this does not change materially for any given period, a change in the distribution system can be checked by the ratio between the unit energy consumption at the busbar and at the car.

Most properties use a very appreciable amount of d.c. power in their shops and carhouses. Considerable amounts of power are used also for track grinders, arc welders, and other track and maintenance tools. In a great many cases all of this power is properly metered, or is accounted for by estimates based on tests and prorated according to time of operation. On some properties the amount used for these purposes is quite heavy and during the season of track construction varies considerably. It is advisable, therefore, to make proper allowance for this, both for accounting purposes on miscellaneous work and in analyzing the energy used for passenger car operation.

An increase in the density of passenger traffic, i.e., in passengers per car-mile, is usually accompanied by an increase in the unit energy consumption. This is particularly true where the traffic density is comparatively light, as additional passengers mean additional stops. Even where the traffic density is very heavy, an increase in passengers per car-mile will result in some increase in unit energy consumption, not so much in this case because of an increase in the number of stops as of increased length of stops and, to some very slight extent, the weight of passengers. This latter factor is much more noticeable where modern light-weight cars are in use because the passenger load is a greater proportion of the total weight. On Chart No. 5 are given curves from three large cities which show very clearly the effect of increased passengers per car-mile upon the kilowatt-hour per car-mile consumption. This relation, of course, will vary with local conditions.

Number of Stops Also Important

The number of stops has a very important effect on unit power consumption. This factor is influenced largely by the passenger density and is usually considered with this figure. However, knowledge of the effect of eliminating stops is often desired by managements in order to justify such reduction. These data can be obtained either through speed time curves or by actual test. Chart No. 6 shows the relation between number of stops and energy consumption for a particular class of equipment. The solid line was derived from speed time diagrams. The dotted line is based upon test on approximately the same equipment.

With the speedily increasing density of traffic on the streets, operators have found it more and more difficult to maintain their schedules, which of course means a greatly increased unit energy consumption. There seems to be a fairly uniform relation between automobile registration and energy consumption, and this is shown most clearly over a period of years by the gradual increase in energy used, even after all possible allowances have been made for other factors.

Considering the entire system of an electric railway as an electrical unit, it is obvious that load factor will play an important part in the over-all efficiency. For instance, if it is assumed that the entire feeder system is energized, but that no cars are being run, the energy used is the total standby consumption with zero car-miles as a divisor. This gives the highest (infinite) kilowatt-hours per car-mile. On the other hand, if we assume 100 per cent loading of the electrical system, with its various units, such as generators, motors, copper, etc., working at maximum efficiency, the lowest figure of kilowatt-hour per car-mile is obtained. On most properties the fluctuations from month to month, or year to year are not severe enough to cause the variations in this factor to be seriously reflected in the energy use per car-mile. But instances have arisen where, due to changing conditions, the traffic load has been considerably reduced on a property which was originally laid out for a certain density of traffic. The effect of the load factor is then quite noticeable. If the energy is metered at the cars, it is not necessary to take this factor into consideration in checking the effect of operating improvements, as the results are obtained directly at the car meters. But where it is necessary to determine the effect of changes in oper-

ating conditions by measurement at the busbars, it is important to give this factor its due weight.

The manner in which the trainmen operate their equipment is the factor which has the greatest effect upon energy consumption of an electric railway. Reductions as high as 25 per cent have been obtained and maintained through the proper checking of their performance. The average reduction is usually well over 10 per cent, and where the conditions have remained constant, are easily discernible over a long period of years. Unfortunately, most properties have undergone more or less change in their operating conditions, and it then becomes necessary properly to interpret the effects of these changes when endeavoring properly to determine just how much energy saving has been made.

The usual practice in an Economy meter installation is to obtain an "As was" or normal figure, prior to the actual placing of the meters in service, to determine just what the entry consumption normally would be. This is most conveniently done by blindfolding the meters and taking midnight readings covering a period of a week, together with the corresponding mileage. This gives a figure for the blind or normal energy consumption for each type of equipment and each line. Then these results can be compared with the corresponding power house readings, and from these two figures a base can be derived from which to determine the future performance of trainmen. This base figure may be corrected for any changes which occur in operating conditions, as indicated in the preceding paragraphs. The difference between the actual energy used and this corrected base or blind figure gives the amount of energy which has been saved through the checking of car operators.

Rigid Frames Feature Electric Locomotives for Virginian Railway

Layout of Apparatus on These 11,000-Volt, Single-Phase Units Dictated by Adoption of Solid Framing Instead of Articulated Type—Several Extremely Heavy Pieces Had to Be Anchored to Prevent Shifting Under Severe Strains Incident to Buffing Shocks

By C. C. Whittaker
Railway Equipment Engineer Westinghouse Electric & Manufacturing Company

WHEN an electric locomotive is to have a maximum power output for minimum weight, the designer is at once confronted by a number of problems which must be solved by compromise. Heavy pieces of equipment must be located near the center of the locomotive and equally disposed about the center lines in order to minimize undesirable oscillations, either rolling or swinging, commonly called "dumbbell" effect. Current collectors must be located so as to minimize the effect of side displacement on curves. Equipment must be arranged so that minimum length of cab results and hence minimum length of cable runs and pipe. High-tension apparatus, where possible, should be inclosed in a grounded compartment as a safety measure. A minimum amount of inflammable material should be used and cable should be protected either by a flameproof braid, conduit or ducts. All equipment must be installed so as to offer the maximum facility for inspection, maintenance and removal for heavy repairs without greatly disturbing adjacent parts.

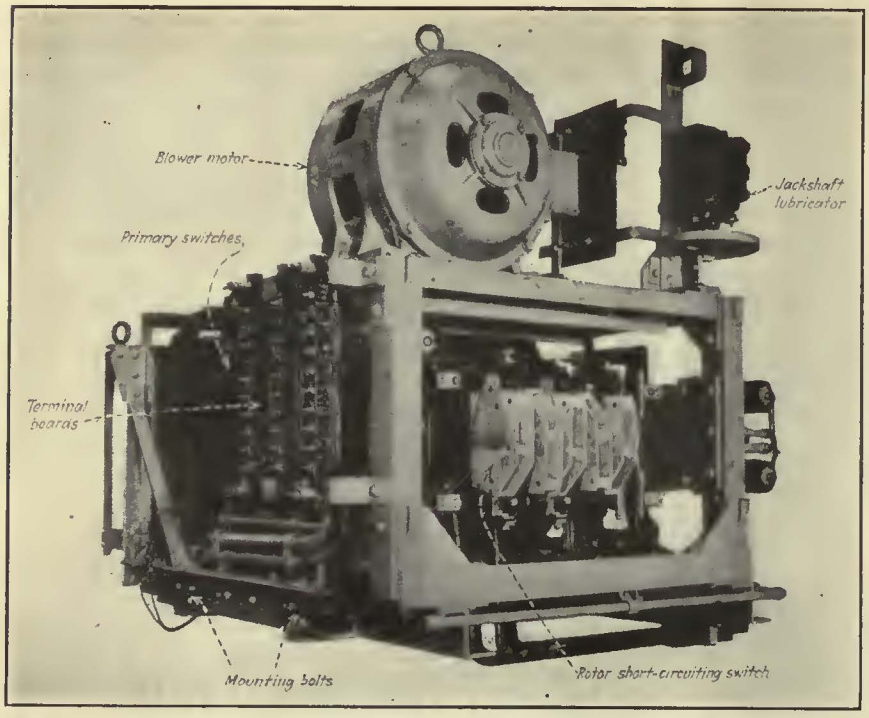
The Virginian Railway locomotives, which are used on the electrified section of that railroad between Mullens, W. Va., and Roanoke, Va., for haulage of heavy coal trains, were designed with a rigid frame or backbone steel casting which transmits all of the buffing strains, contains the bearings for the traction motor rotors, and for the jack-shafts. The supports for the electrical equipment and the cab housing this equipment are built directly upon this casting. The action in this design on the electric control apparatus had not been proved out previously by service, as former designs had the electrical apparatus mounted in a cab which was in effect spring-borne.

The arrangement in this present design is to give a massive bedplate on which the electrical equipment is supported. This large mass is not so subject to vibrations, due to inequalities of the roadbed, etc., as were the less heavy structures used previously. It does, however, take a greater share of the buffing impact, inasmuch as any bump is transmitted directly to the backbone frame or apparatus support. Earlier designs in which there are separate trucks and a cab mounted thereon by center pins have the buffing strains transmitted to the equipment in a less direct and more resilient path.

In the new design the liability of failure is transferred from a more or less continuous source of vibration to one infrequent but more severe. Realizing this, special care was taken in the manner of fastening the heavy pieces of apparatus to the locomotive frame to resist both the shear of their support and the tendency to overturn when maximum buffing strains are encountered.

The heaviest single piece of apparatus, the phase converter, weighing 30,832 lb., is held down by twelve 1½-in. bolts and in addition is keyed against a longitudinal displacement by being wedged within a depressed portion of the locomotive frame casting.

The second largest piece, the main transformer, weighing 25,000 lb., offered a new problem, inasmuch as it is of an oil-insulated, forced-cooled type. As hot oil is extremely difficult to hold by any ordinary form or riveted or calked joint, it was decided to build the



The Apparatus for the Control of One Traction Motor Is All Assembled in a Complete Unit

transformer tank as a cylinder with one triple-welded, vertical seam, and with the bottom flanged, riveted and welded to the sides. These are shown in accompanying drawings. In addition, the bottom is reinforced by I-beams, on which the weight of the transformer itself is carried. This cylindrical structure, when fastened securely at the base, has sufficient rigidity to withstand shocks met in service notwithstanding the high center of gravity of the complete transformer. It is held down by eight 1¼-in. bolts and is further wedged between fitted lugs to guard against longitudinal displacement.

The transformer projects through the roof and has its top removable for inspection. All leads, both high and low tension, are taken through special insulating bushings in the side of the tank which are properly shielded from the weather. Where the low-tension copper strap leads that are cleated to the cab structure join to the transformer terminals, flexible copper braid leads are interposed to accommodate any slight motion that may exist between cab shell and transformer tank.

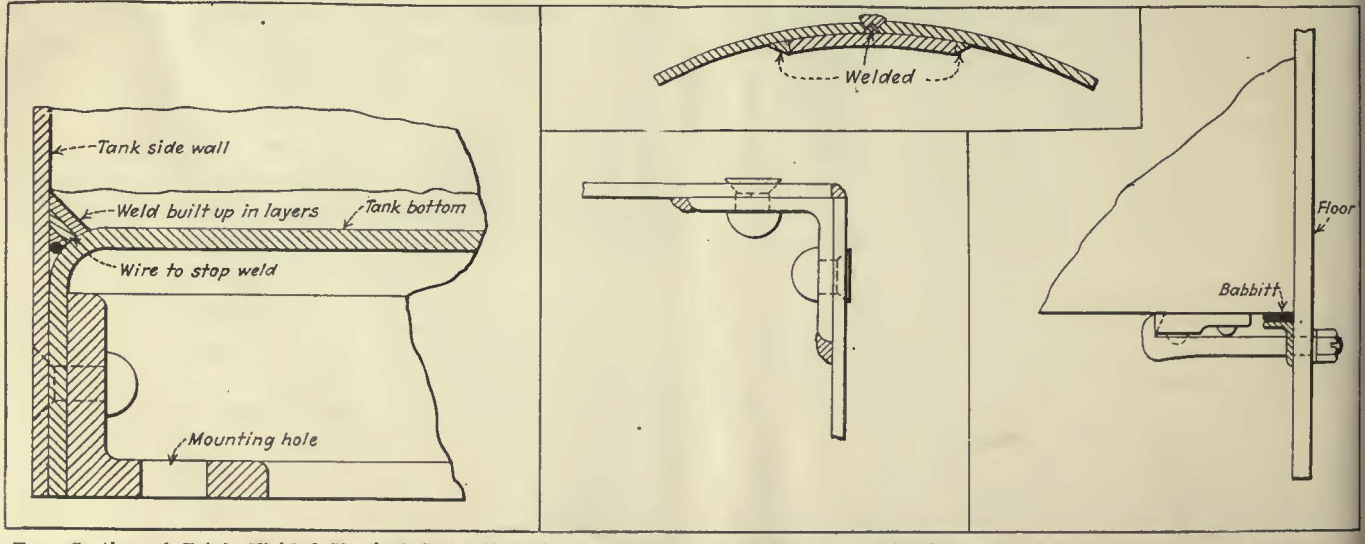
The third heaviest piece of apparatus, the liquid rheostat, weighing 21,900 lb. complete, has a relatively large base and a low center of gravity. Its tank is rectangular, with corners reinforced by inside angles riveted and triple welded. The whole tank rests on the floor of the cab and is surrounded by an angle frame riveted to the floor. The space between this angle frame and the rheostat tank is filled with babbitt. The tank is held down by "J" bolts at each end, as shown in one of the diagrams. Flexible cable is employed for leads to the rheostat.

On account of the rigidity of the rheostat and transformer tanks and the relatively flexible cab superstructure, both of these tanks, where they project through the roof, have an opening of ½ in. all around, properly shielded from rain. This allows for possible sway so that undue strains will not be imposed on the tanks by movement of the cab.

Three-inch flexible steel pipe is used to conduct the oil from the transformer to the circulating pump and radiator. The use of this type of pipe obviated the necessity of bending stiff pipe to exact shape so that when its ends were drawn tight in final position no strains would be set up. It also decreased the liability of leaks at pipe joints due to vibrational strains.

An assembly of apparatus for the control of one of the traction motors, shown in one of the illustrations, is mounted directly on the frame of one of the traction motors. It is held in place by four bolts and is interchangeable with any other similar assembly. It includes all the control items common to each traction motor, such as the blower outfit, motor primary switches, pole changeover, short-circuiting switch, terminal boards, and jackshaft lubricator.

Since these motive power units may be run singly,



Top—Section of Triple-Welded Vertical Seam Transformer Tank. Left—Method of Riveting and Welding Bottom of Transformer Tank to Sides. Center—Riveted and Triple-Welded Angles Reinforce Inside Corners of Liquid Rheostat Tank. Right—Method of Fastening Liquid Rheostat Tank to Floor of Motive Power Unit

or in groups of three or four, special attention was given to the operation of the pantographs from the standpoint of safety. When two or three cabs are used in multiple, a bus line extends the full length of the locomotive. This bus line is energized whenever any one pantograph is against the trolley wire. Consequently, if it becomes necessary for a man to go onto the locomotive roof, his first act before ascending is to lower all pantographs and then to throw in the bus line grounding switch. This feature protects the attendant while on the roof from the accidental release of any pantograph. If for any reason a pantograph should become disabled it can be conveniently disconnected from the bus line and locked down by means of the same plug and flexible cable that is used to connect the pantograph to the bus line. When in case of an emergency condition a pantograph must be unlatched or pulled down from a position on the ground, a 15-ft. impregnated wood hook stick is provided. This stick is normally carried in a length of conduit on the side of the locomotive and is thus always dry.

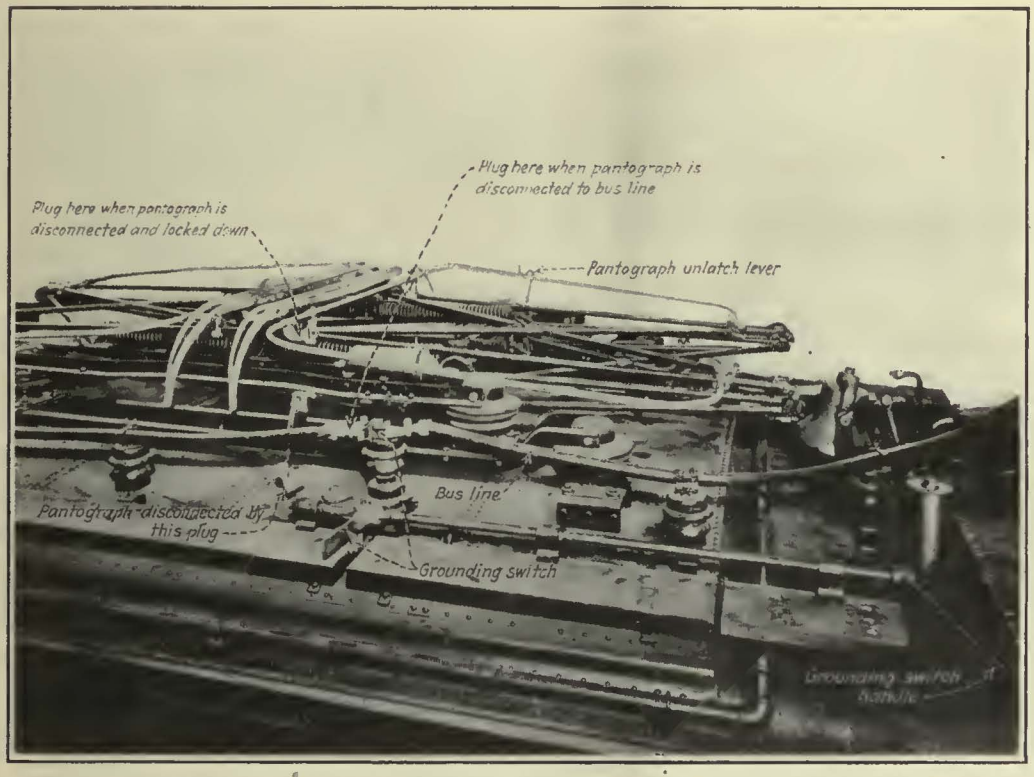
These locomotives are at present operating under an 11,000-volt trolley wire. All wiring and insulation in connection with the pantographs, however, has been laid out suitably for subsequent operation on a 22,000-volt line. Provision is also made so that a second pantograph may easily be added to those cabs operating as single units.

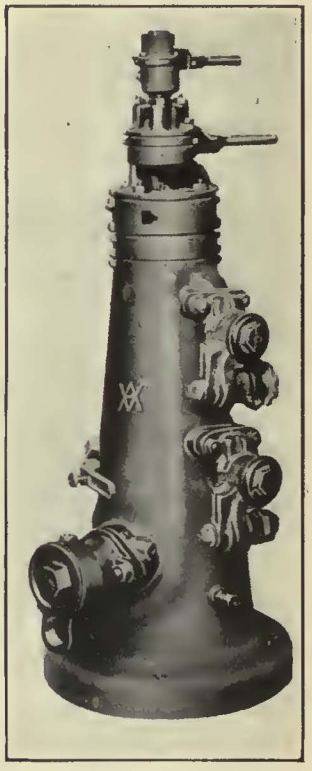
Sand boxes are filled from the outside. By this means much of the undesirable sand dust is prevented from coming in contact with the electrical equipment.

Eight ammeters are required in front of the engineer to indicate the performance of the complete locomotive when four cabs are operating in multiple. Usually, however, three units comprise a complete locomotive. These meters are of the edgewise type and are arranged in two rows of four each, one above the other. By means of these meters the engineman can tell the load on each unit, and therefore regulate the proportion of the total that each is taking. The meters also indicate when any of the units slips its drivers.

All auxiliary motors are controlled by a pneumatically operated remote-controlled cam switch group. Each individual motor is provided with a quick-break knife switch which is used merely for disconnecting. In order to guard against the improper manipulation of these switches when alive, a set of guards is provided which completely incloses each switch and its fuses, with the exception of the handle.

The air-brake piping at the engineer's stand was greatly simplified by the development of the K-14-A brake valve pedestal bracket. Ducts were cast in the walls of the pedestal to take the place of pipes which on other equipments connected to the brake valve to feed and reducing valves, brake pipe cutout cock, equalizing reservoir and other details. The space within the pedestal became the equalizing reservoir. By means of this pedestal construction a large amount of difficult and unsightly pipe fitting was made unnecessary, eliminating in all approximately 40 threaded connections and resulting in a more reliable system of air brake piping.





At Left—The Virginian Locomotive Pantograph Includes a Number of Special Features. At Right—The Air Brake Valve Pedestal Contains All Air Control Equipment

Red Coats to Protect Track Greasers

THE Wisconsin Public Service Corporation, Green Bay, Wis., has outfitted its track greasers with red coats. These coats serve to make the workmen more conspicuous and also to distinguish them from ordinary pedestrians. During dark days the track greasers also attach red lanterns to their grease pails for further protection. During several months use the coats and lanterns have proved to add largely to the track greasers' safety.

New Buses for London Feeder Service

TO ENCOURAGE traffic for the extension of the City & South London Electric Railway from Clapham to Morden, Surrey, the London General Omnibus Company has arranged to run new and luxurious single-deck buses on pneumatic tires to six districts beyond the Morden terminus. The forecourt of the station has been planned for the accommodation of buses.

The new type of bus, which is described at length in the *Tramway and Railway World* for Aug. 19, seats 22 persons, sixteen in cross seats and six in longitudinal seats at the rear end. All seats are of a new armchair pattern, assuring each passenger ample room and comfortable riding. The cushions are spring-filled, padded and upholstered in antique green leather. The center of the back has a spring squab which is separately fixed. Surrounding this is a spring roller which fits the passenger's back and prevents any tendency to side roll when the vehicle is in motion.

A semi-elliptic roof is used. All windows are of the half-sliding type and three center pivot ventilators also

Single-Deck Two-Man Bus Recently Developed by the London General Omnibus Company for Feeder Service

are provided. The interior paint work is white, the exterior being in French gray with wine color lining. A standard "K" type chassis with pneumatic tires carries the body.

Until the railway extension opens for traffic at the end of the summer eleven of the buses are working from Wimbledon station to Worcester Park station, Cheam and Burgh Heath as Routes 155, 156 and 164. Nine more of the machines are in course of construction.

The new extension will be a boon to South London and the outer suburbs, as it will serve a population of about 300,000 persons and give through service to other routes on the Underground system. The journey from Morden to Charing Cross, now occupying 50 minutes, will be made in 29 minutes, a saving of 21 minutes.

Accident Prevention Plan in Effect in Oklahoma City

A PLAN intended to reduce the number of accidents to employees and the public has been put into effect by the receivers of the Oklahoma Railway, Oklahoma City, Okla. Trainmen and bus drivers have been divided into eleven teams of eighteen men each and the team having the best safety record at the end of each month will receive $100. The trainmen decide whether the entire prize will go to the team making the best score or whether a part of the money shall be awarded to the second place team. Receivers of the Oklahoma Railway report that the employees have entered into the spirit of the contest and that the riders are showing a desire to co-operate in the accident prevention work.

Popularity Cycle of Street Car

Baltimore People Are Finding that It Pays to Ride the Cars—New Equipment, Greater Comfort and Speed Contributing Factors

REASONS why street car riding in Baltimore is increasing are set forth in an interesting statement made public by the United Railways & Electric Company, Baltimore, Md. The company says that people are finding out that it pays to "Ride the Cars." During the first six months of this year there has been an increase of nearly 4 per cent and the company has been able to furnish 9,145,832 more seat-miles from Jan. 1 to May 31 than it was able to furnish in the corresponding period of last year. Since September of last year, the company says, it has been able to drop nearly 100 more or less obsolete cars from its equipment and, as a result of an intensive car construction program, coupled with a scientific study of each of the company's 35 lines, in which running time, layovers, traffic and peak loads were thoroughly checked up, there have been many improvements. These include the adoption of a system of interline operation whereby cars assigned to one line may be put to work on another line on short notice to meet rush-hour emergencies, resulting in ability to make double use of many cars when most needed; greater frequency and less wasted car-miles, substitution on one line of cars seating 47 passengers for cars seating 36, substitution of two lines of cars seating 36 passengers for cars seating 30, doubling the number of 60-passenger trail cars on one line; completion of 26 articulated two-car trains, with six more probably ready in September, and completion of eleven permanently coupled two-car trains.

In answer to the question "Why is street car riding increasing," the company makes some pertinent comments on periods of popularity through which the various transportation agencies pass. The trolley car, having lived down the stigma of "nobody rode the street cars unless they had to," is approaching a new cycle of popularity, but from a different angle. In the good old days the electric cars were used for pleasure only and the favorite seat was right up behind the motormen, "with the breeze booming full in your face and the track through the summer countryside slipping away right in front of you beneath the rolling car." Then shortly after the automobile was heralded as the invention of the hour and was rushed into service on the slightest pretext. But now another cycle has swung around.

The statement of the company concedes the greatness of the automobile—"for benefits to mankind neither the airplane nor the radio compare with it. But people in big cities are now coming to the conclusion that they are more comfortable downtown at business if they leave the automobile at home. And so the cycle of popularity comes around again for the street car."

Cleveland Railway Extends the Use of Automatic Substations

THIRD ARTICLE

The Remote and Supervisory Control Systems Were Developed for Economy of Operation and Ease of Load Transfer—Entire Control Centers in Company's Main Office, Where the Load Dispatcher Is at All Times in Touch with the Whole Power Conversion System

By L. D. Bale
Superintendent of Power the Cleveland Railway

The Heart of the Supervisory Control System
At this desk the load dispatcher is in communication with all the substations and has before him complete knowledge of what is taking place

MOST important among considerations leading up to the development of the remote control and supervisory system as used on the Cleveland Railway were (1) the necessity for correlating the operation of automatic substations one with another and with those manually operated so that the most economical operation of individual stations would result; (2) to insure the ability to shift or transfer load at will in the event of station or system trouble; (3) control the direct-current feeders in the automatic substations and facilitate the clearing of grounds wherever possible by the "burning-off" process. It is only by the use of such a scheme that the demand of the management for maximum insurance against service interruptions involving either individual feeder sections, local areas or the system as a whole could be met.

As a rule the dispatching of load on a system depends on the dispatcher being in immediate touch with the operatives of the various substations under his control. In this manner he is in a position to issue instructions to them, based upon knowledge of the condition of the system, and is able to handle emergencies fairly well.

With the advent of the automatically controlled substation the dispatcher would have neither the necessary information relative to the operating conditions of the stations or system nor means at his command for changing them. The scheme of remote and supervisory control places the dispatcher in a position where he is at all times fully informed as to the condition of the system and the occurrence of any trouble, such as with a.c. and d.c. feeders and converters. He has at his command facilities whereby, at a moment's

Remote Control Key Plate
Through this device the load dispatcher can operate the mechanism in the various controlled substations

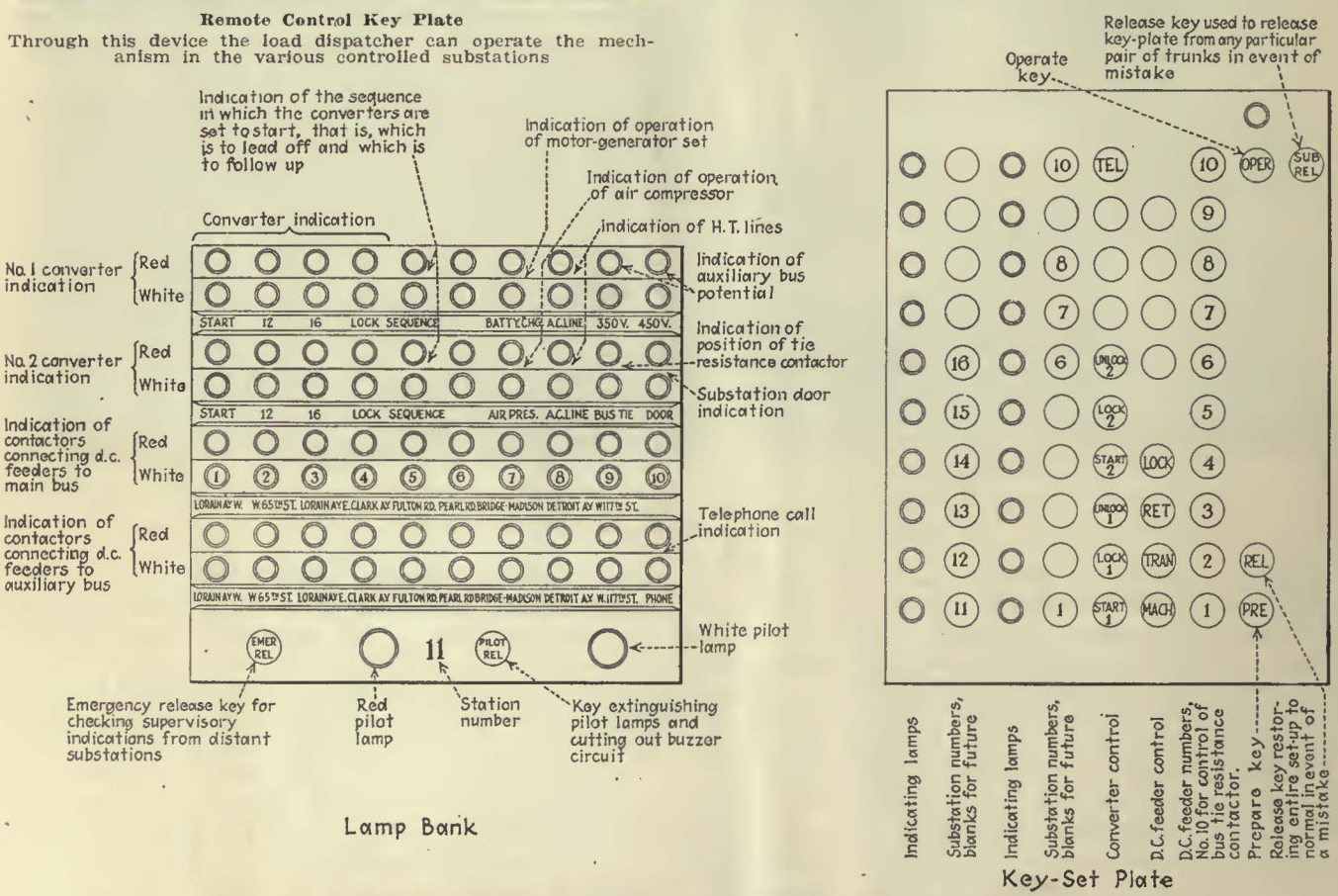
notice, he can bring about changes in the operation of any station, stations or equipment necessary to rectify conditions which may exist.

Control Centered in Executive Offices

The dispatching center is located in the executive offices of the company, which are situated at the approximate geographical center of the system. The dispatcher's desk as now installed provides facilities for the control and supervision of fifteen automatic substations. Its compactness may be seen from the illustration. A duplicate of the present desk will be installed for proposed stations.

The cordless telephone board, seen at the left of the control board, enables the dispatcher to communicate directly with the operators of the manual stations. Connection from the dispatching center to each automatic substation is obtained through two leased pairs of underground telephone conductors. One pair of these wires is used for remote metering and also acts as a common side for the control and supervisory system, the other for the opposite sides of the signal and control circuits. Telephone communication is had through condensers and repeating coils over the two wires of the latter pair. The single-line diagram illustrates the relays and the principal elements comprising this system.

The turret or vertical portion of the desk is sectionalized so that each substation is represented by a group of red and white lamps and a graphic ammeter. A



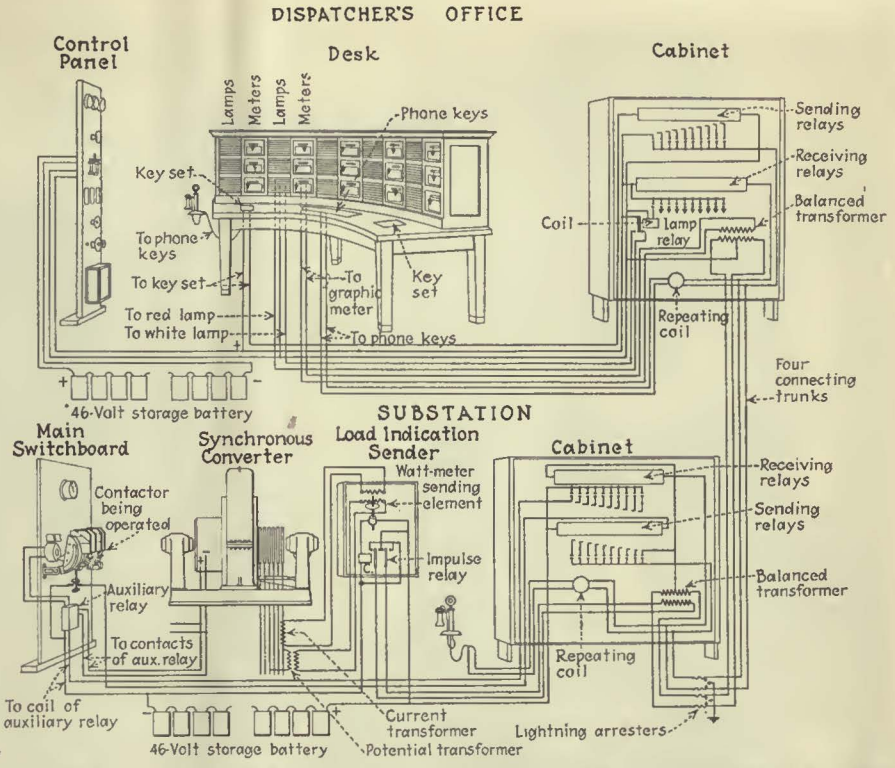
Schematic Diagram of the Remote Control Key Plate and Lamp Bank

By depressing the proper key a code is automatically set up at the relays in the load dispatcher's office, which is in turn automatically forwarded over two of the four control wires to the proper substation. This view indicates the diagrammatic plan of the lamp bank on which the various functions are indicated in the load dispatcher's office. One of these lamp banks is used for each substation automatically controlled from the load dispatcher's office. At present in the Cleveland Railway load dispatcher's office there are ten of these lamp banks on the vertical portion of the board. When a converter is started the operator may observe from the flashing of the lamps the sequence of the operations as they are performed. Adjoining each of these light panels is an indicating and recording ammeter which shows the total load on each automatic substation.

sender, consisting of automatic telephone-type relays located in the control cabinet at the substation, automatically sends impulses or code over the trunks to the office on the operation of power control or conversion apparatus in the distant substation. A corresponding chain of relays at the office receives this code, setting up a selection which operates a relay controlling the lamp circuits of certain red or white lights indicating the operation which has taken place at the substation.

As the code is received at the office and preceding the change in the lamps which indicate the functioning of equipment a buzzer sounds and a red or white pilot lamp, connected with the substation group of lamps, lights. The red pilot lamp indicates that the closing of a contactor or a starting operation is taking place, while the white lamp denotes the reverse. The object of these pilot lamps is to call the dispatcher's attention to the substation in which a change is to take place.

The supervisory mechanism is so arranged that after one code set up by the operation of power equipment is completely sent to the office it is ready to respond to the operation of any other power equipment which has operated in the meantime. In other words, if several pieces of substation equipment operate simultaneously, the corresponding codes are stored up in the substation cabinet and are sent to the office, one after the other, with the highest code number having preference.

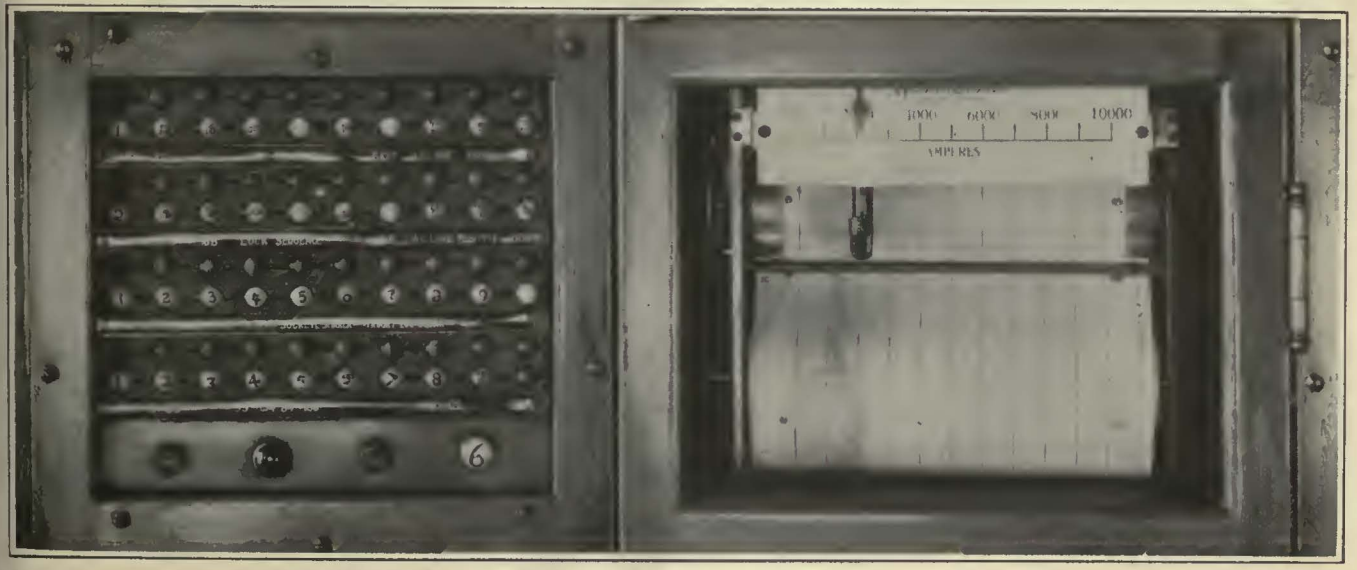


Simplified Single-Line Diagram Showing Connections between the Load Dispatcher's Desk in the Hanna Building of the Cleveland Railway and a Typical Substation Several Miles Away

The load dispatcher's office equipment is indicated at the top of the diagram and shows the load dispatcher's desk, as at present erected for fifteen substations. When more than fifteen automatic substations are in service a second unit, completing a semicircle, will be added. In the cabinet at the right are the banks of relays that automatically send the code to the corresponding cabinet in the substation. If two signals are by chance given simultaneously, the cabinet stores one of them while the other one goes through, when the second will automatically follow as soon as the circuit is clear. The cabinets at both the sending and receiving ends are either for sending or receiving codes. Only four wires connect any one substation with the load dispatcher's office, two being used for the operating code and two for the recording meter connection.

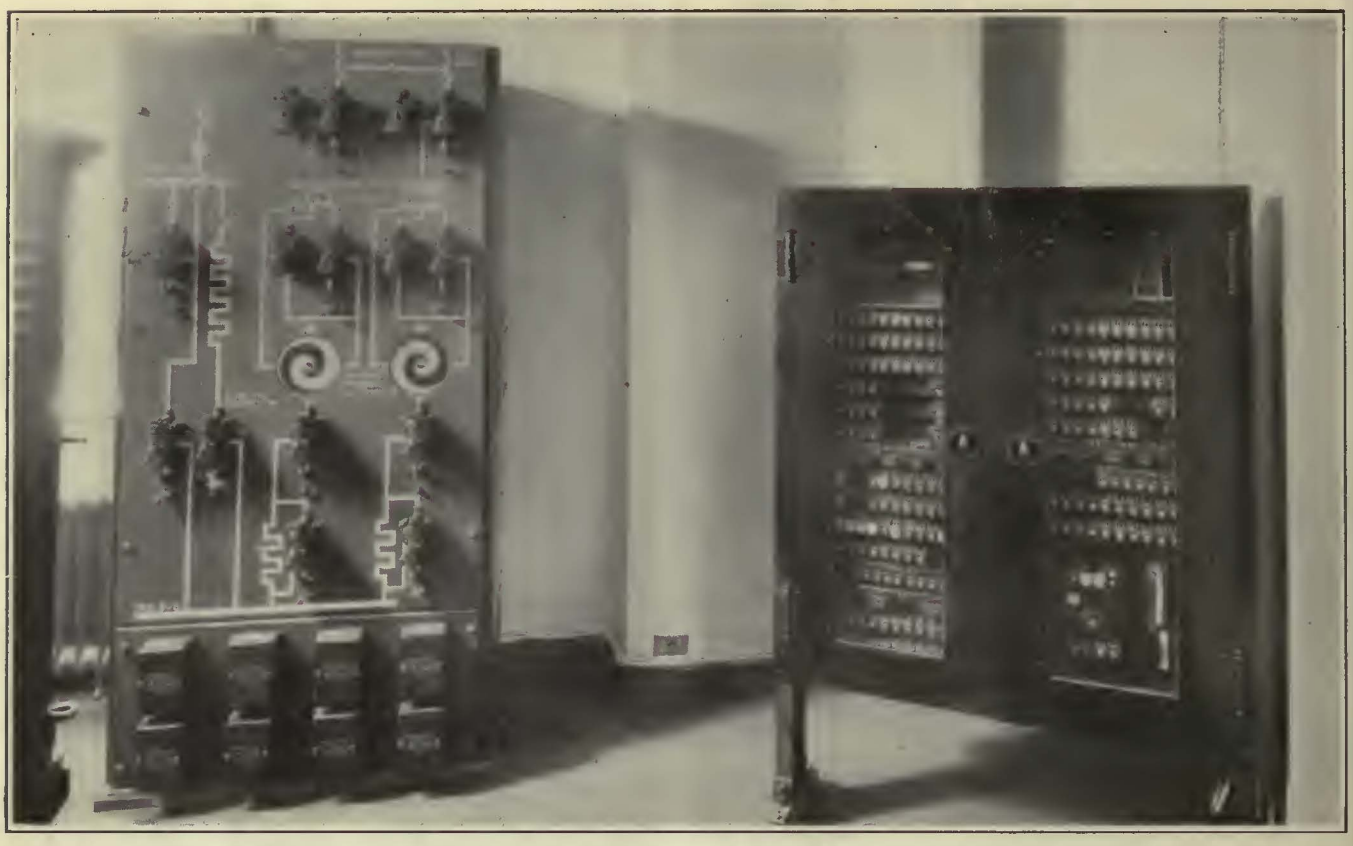
Method of Actuating Control from Office

A set of 36 keys of adding machine type is located on the dispatcher's desk. Each of these keys is inscribed with the insignia denoting its function. It will be noted in the drawing that each automatic station is represented by a key in the first or second rows on the left side of the key plate; the next row is for converter operations; the fourth row for d.c. feeder operations, and the fifth, d.c. feeder numbers. If the dispatcher wishes an operation in a certain station to take place he depresses the key corresponding to the number of that station. By so doing one relay-type sender of the key set is connected to the trunks of the



Supervisory Lamp Bank and Remote Load Indicator for One Substation

This is the upper left hand section of the vertical control board, showing the appearance of the equipment whose connections are given in the line drawing. Space is provided for fifteen of these sections



A Model Automatic Substation and Its Remote and Supervisory Control Cabinet Are Set Up in the Dispatcher's Office for Demonstration Purposes

automatic station in which he desires to bring about a change. He next depresses the key or keys bearing the designation of the operation he wishes to perform. Then the key marked "prepare" is depressed, after which the relay sends impulses corresponding to the code set up by the depressed keys. The code is received at the substation by a chain of receiving relays and energizes the selection relays, which lock in a closed position. The selection automatically imposes potential on the auxiliary switch of the power apparatus which the dispatcher wishes to operate. A code is sent back to the office, changing individual lamps so as to indicate to the dispatcher whether the circuit which has been set up will, when energized, operate the particular piece of equipment as contemplated. If the check-back is satisfactory the dispatcher depresses the "operate" key, which momentarily changes the lamps to the former condition and then operates the equipment. The code is again sent to the office, changing the lamps so that they indicate the operated or final condition of the power apparatus.

If the check-back is not satisfactory the dispatcher depresses the "release" key which restores the supervisory relay equipment at office and substation to normal without operating any power equipment. This phase of the control is an exceedingly valuable adjunct as it enables the dispatcher to check the correctness of his operation and that of the equipment, thereby insuring freedom from false operations.

Telephone communication is had between the dispatching center and the automatic substations over the connecting trunks. No interference is experienced between the control and supervisory codes and telephone communication.

The equipment of each automatic substation includes a device known as a load indication sender. This consists of a watt-hour meter, the elements of which are energized from transformers in the converter circuits. A relay energized through the commutator of this meter imposes impulses on one pair of the trunks connected to the office. The frequency of these impulses varies with the speed of the meter; that is, with the load of the station.

The impulses received at the office are translated through a polarized relay in conjunction with a special meter, so as to cause the movement of a pen, producing an indication of current values on the continuous strip chart. The meter is also provided with a scale and pointer from which the dispatcher can read the load at all times.

A summation of the operations controlled in the distant substations from the dispatcher's desk are as follows:

Either or both converters can be started, stopped or locked out; outgoing d.c. feeders may be transferred from main bus to auxiliary bus, retransferred or locked out; i.e., disconnected from both buses; the contactor controlling the current-limiting resistance between the main and auxiliary buses may be opened or closed.

The dispatcher may observe from the lamps on the substation panels of his desk:

(1) The initial starting operation of converters.

(2) The closing of the first d.c. contactor which connects the converter to the load through the entire bank of current-limiting resistance, and the operation of the final converter contactor shunting out the last step of resistance.

(3) Indication of the positions of all the outgoing d.c. feeder contactors, whether connected to main or auxiliary bus or locked out.

(4) The position of the contactor controlling the current-limiting resistance between buses.

(5) Whether or not the alternating-current supply lines are energized.

(6) A voltage indication, in two steps, of the auxiliary bus, thus acquainting the dispatcher with the progress being made during the burning off of grounds.

(7) An indication (in the case of the seven new stations) as to the operation of the motor-generator set used in connection with the control battery.

(8) A similar indication of the operation of the main air compressor.

(9) The opening and closing of the substation entrance door is called to the dispatcher's attention.

This last feature, in conjunction with the telephone, enables the dispatcher to keep in close touch with the maintenance men as they move about the system from station to station.

The system of remote control and supervision, as installed, does not supersede the functioning of the automatically controlled substation, but is merely superimposed or added to the automatic equipment. In the event of open or short-circuited cable pairs or trunks the control equipment is automatically disconnected from the substation through a system of trunk guard relays. The station then reverts to full automatic operation without the supervision of the dispatcher.

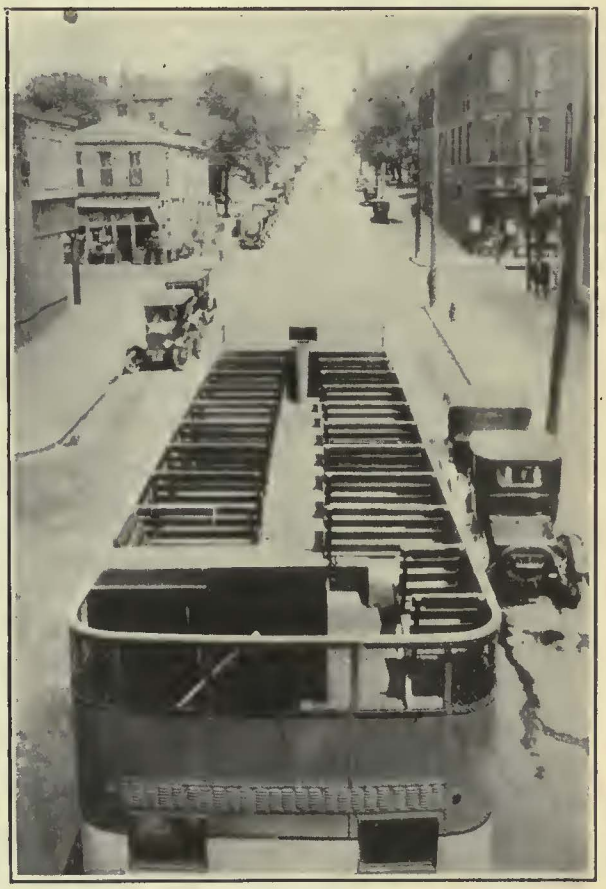
The "lock-out" feature mentioned in conjunction with the control and supervision of converters has been found desirable on this system. This is because the resistance between stations over the distribution system is low, which results in all converters on the system attempting to share a proportional part of the total system load at any given time. It can be realized that with this condition existing the converters in automatic substations would start automatically before they were required and likewise operate for too long a period, with the accompanying detrimental effect to the over-all substation efficiency. The dispatcher, to overcome this phase, holds off or locks out equipment which is not necessary for the available load.

The "lock-out" position in connection with the d.c. feeders is provided to enable disconnecting of the feeders from both main and auxiliary buses in the event of a condition existing, such as a conflagration, on thoroughfares over which the feeders may extend.

Periscopes and Loud Speakers for Double-Deck Buses

Desiring to Operate Double-Deck Buses Under One-Man Control the Kansas City Railways Developed Special Equipment to Facilitate This

ONE-MAN operation of double-deck buses by the Kansas City Railways, Kansas City, Mo., has been made possible through the development of special periscopes and loud speakers with which to observe and direct passengers on the upper decks. When the buses were built in 1925 the plans called for both of these items of equipment, but apparently no periscope suit-



This Special Equipment for Viewing the Upper Deck Was Developed by the Kansas City Railways

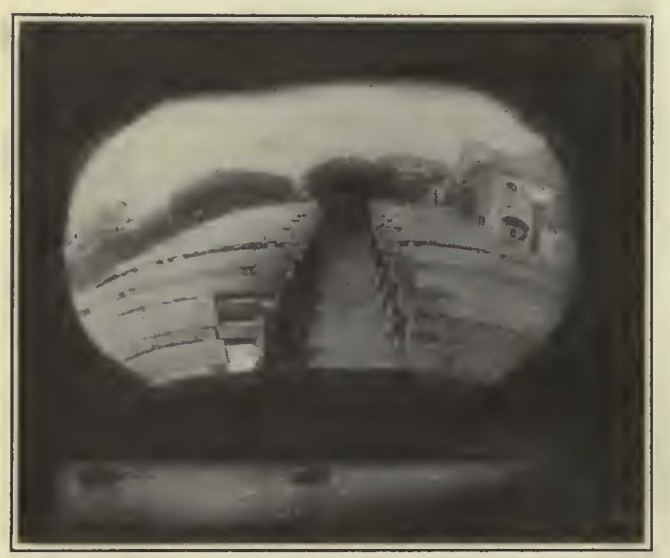
At top, left—The top of the periscope is inconspicuous and does not interfere with the view of the passengers sitting on the upper deck.

Bottom, left—Arrow indicates the location of the periscope mirror into which the operator looks. At the left may be seen the loud speaker transmitter in the "on" position.

At right—Top view of a bus showing the periscope on the front railing.

able for this type of service was available at that time. Those on the market were so designed that the view given to the operator was too small and required his entire attention in order to obtain even a distorted view of the upper deck.

It was desired to obtain a periscope which would make it possible for the operator to observe the upper deck without having to move his body or distract his



What the Operator Sees When He Looks in the Periscope Mirror. The Picture Is Somewhat Blurred Because of Difficulties Encountered in Photographing a Triple-Reflected Image

attention from the road for more than a second. Under the supervision of R. W. Bailey, superintendent of power and equipment, a periscope was designed and perfected in the shops of the railway, and just recently the finished product has been installed on all of the eighteen double-deck buses operated.

No unusual features mark the loud speakers, which have been installed simultaneously with the periscopes. They are of the conventional radio amplifier type, with the horn located under the left front seat. From this point the operator's voice is plainly audible over the entire upper deck. The transmitter is located on a swinging arm attached to the left front corner post. This arm is held in two positions: "On," as is shown in an accompanying illustration, ready for the operator's use, and "Off," when swung out of the way next to the operator's door.

When in the "Off" position the switch controlling the loud speaker circuit is open in order to prevent needless consumption of energy. Moved over to the steering wheel in the "On" position the switch contact is made and the loud speaker is ready for use of the operator in calling the streets and making any other announcements necessary to passengers on the upper deck.

One energetic bus operator of the company recently saw in this new equipment an opportunity to render to his patrons a modicum of extra service not prescribed in the rule book. Fresh air fans crowded the upper deck of a Linwood-Benton bus as it rolled along Linwood Boulevard one hot night not long ago. Not a passenger sat below and a glance at the periscope convinced Vayne E. Lumpkin, the driver, that all was quiet and peaceful above him.

Suddenly, and apparently from out of the stillness of the night, came the announcement in a pleasant tenor voice, "Station BUS broadcasting."

Conversation halted. "Here," thought the passengers, "is something new in the way of bus service."

"When did they equip the buses with radios?" one asked of his neighbor.

Then came a few bars of a song familiar to all listeners-in—

> "I'm sitting on top of the world,
> Just rolling along, just rolling along."

With this song and others were the passengers entertained. Soon most of them were convinced that there actually was a radio receiving set on the bus and that the periscope, staring vacantly at them from the front of the upper deck, was serving to carry the sound up to them.

Down on the driver's seat Vayne Lumpkin, with his eyes and mind on the road ahead, was singing softly into the mouthpiece of the announcing device, as much to himself as to his bewildered passengers.

The program continued, static-like sounds filling in between numbers and announcements being made in real radio fashion. One by one the passengers left the bus, few of them ever realizing that they had not been listening to a real radio program.

All of this was of course somewhat of a departure from usual procedure in bus operation and Mr. Lumpkin's example could scarcely be followed universally by bus operators with the same gratifying results. Of course a new school of training for embryonic singers might be established, making one's vocal attributes a factor in considering him for a driver's position.

The lower extremity of the periscope is practically unnoticeable from the viewpoint of the passengers on the lower deck, located as it is right at the ceiling line at the front of the bus. Yet its location is such that the operator in his seat need but glance upward at about a 45-deg. angle until his eyes focus on the lower mirror, the dimensions of which are 4 in. x 6 in.

Close-Up of the Loud Speaker Transmitter in the "On" Position, Ready for the Operator's Use

No more movement of the body is required to look into this plain flat mirror of the periscope than to glance into the rear vision mirror above the windshield. Neither does the height of the operator have to be taken into account in locating the periscope.

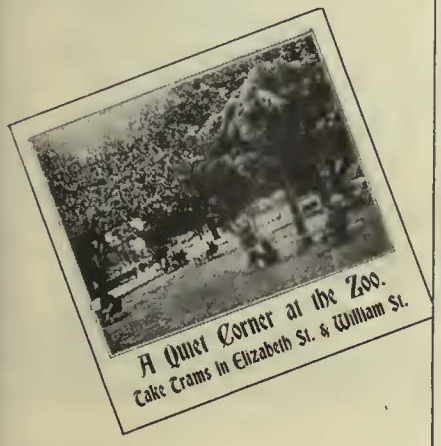
The periscope housing, or tube, extends up through the ceiling and front upper deck floor and is anchored to the upper arm rail, as shown in an accompanying illustration. It will be noted that the periscope is located in the center of the aisle (facing the rear), commands a clear view of the entire upper deck and yet does not obstruct the view of the passengers.

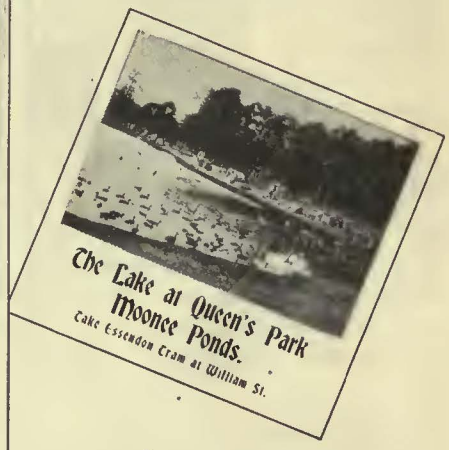
Selling Rides in Melbourne Through Car-Window Posters

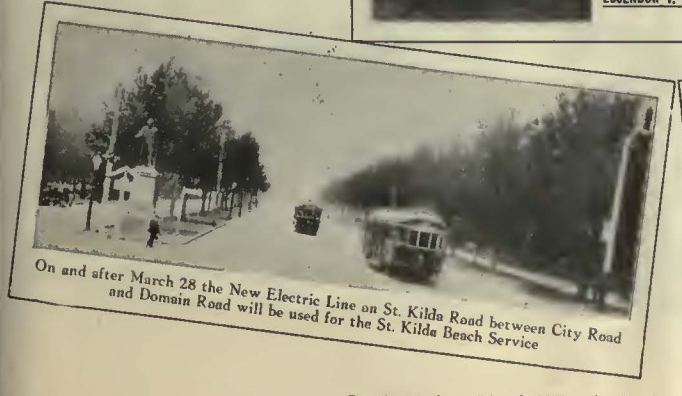
REFERENCE was made editorially in the Aug. 14 issue of ELECTRIC RAILWAY JOURNAL to the use of radio broadcasting every Friday night by the Melbourne & Metropolitan Tramways Board, Melbourne, Australia, to secure publicity for week-end pleasure objectives via car or bus. Aside from this, the management has made excellent use of car-window dodgers which manage to combine an alluring picture with necessary text within areas from 8½ in. square to 12 in. x 18 in. The cost of an edition of 2,000 varies from £5 to £10, according to size and quality of the placard.

Like the New Yorker who has never climbed the Statue of Liberty or the San Franciscan who has never seen the Golden Gate at sunset, many a Melbourne resident needs to be reminded occasionally that he is living in and near scenes of great beauty. Such a reminder, for example, is furnished by the placard on Wattle Park. This park is a 137-acre reserve, the property of the Tramway Board, in which have been preserved many trees typical of the Australian "bush," such as the gum, blackwood, wattle and acacia. Its attractiveness has been enhanced by its establishment as a bird and game sanctuary. This park is within 7 miles of Melbourne and is reached for a trolley fare of 5½d. (11 cents) on weekdays and 6d. (12 cents) on Sundays. Two other recent dodgers show "A Quiet Corner at the Zoo" and the lake at Queen's Park.

The Australian's love for outdoor sports is catered to by one dodger showing a stirring football scene to accompany a schedule of six games on one day, while another advertises the "Melbourne Cup" in connection with "the sport of kings." Another dodger, announcing the opening of the electrified St. Kilda Road, gives a good idea of the side-door car now standard on the tramway lines in Melbourne.





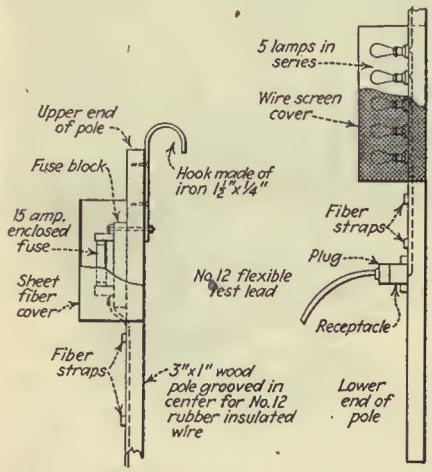


Posters Are Used Effectively in the Cars at Melbourne, Australia

Maintenance Notes

Handy Testing Pole

WHEN testing out railway motors for short circuits and grounds and also for testing the car wiring in case of trouble it is quite common practice for the electric railway repairmen to use line potential with either a resistance or bank of lamps in series with the test lead. In many cases this test circuit can be attached directly to the car lighting circuit, but sometimes it happens that the ground or short circuit necessitates keeping the trolley from the wire. In that case it is convenient to have a pole-testing outfit which can be hooked over the trolley wire or attached to some other terminal with line potential.



Car Equipment Test Pole

The upper end of the pole shown at the left has a metal hook for making contact with the trolley wire and a fuse with sheet fiber cover. The lower end of the pole shown at the right contains a bank of five lamps and a receptacle for plugging in the test lead.

The accompanying illustration shows the details of a pole-testing outfit which has been found of particular convenience on a large Eastern railway system. The pole itself is 12 ft. long and is made of 1½-in. by ¼-in. stock. A flat iron hook 1½ in. wide by ¼ in. thick is attached to one end and a bolt at the lower end of this hook passes through the pole and makes connection with one of the terminals of a 15-amp. fuse block. An inclosed fuse of 15-amp. capacity is used in the circuit. The fuse block and fuse are covered with sheet fiber, the cover being open at both top and bottom. From the lower terminal of the fuse block a lead of No. 12 rubber-covered wire runs down the pole, which is grooved so that the wire is imbedded in the pole. Fiber straps 1 in. wide hold the wire in position. These are spaced 15 in. apart.

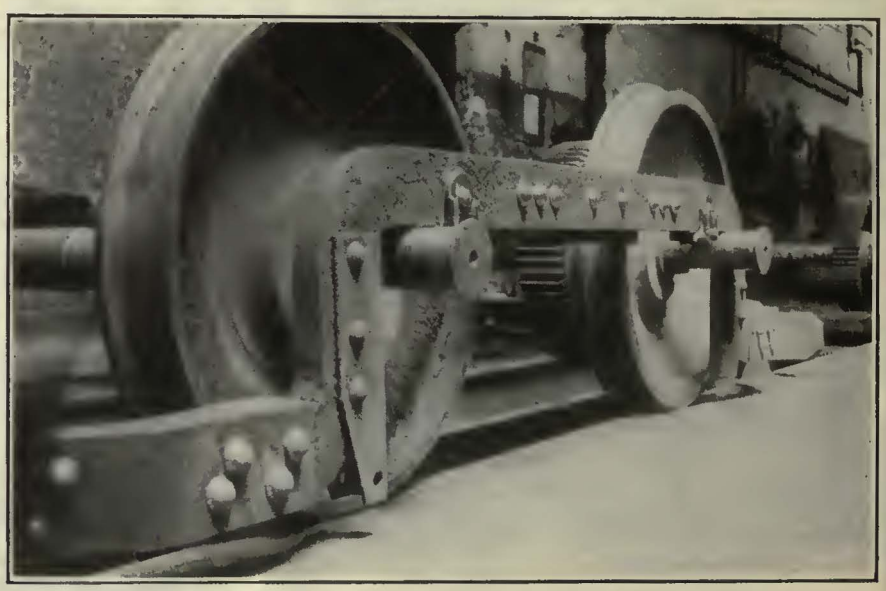
The lower end of the pole has rounded corners for convenience in handling and a bank of five lamps is installed along the pole, and just below this a standard receptacle so that the test lead can be plugged in. A wire screen hinged cover is installed over the lamps. This protects the lamps from injury and the hinged construction allows removal and replacement of lamps quickly. The plug and receptacle with a separate test lead has been found particularly convenient, since if the lead is attached permanently to the pole it is usually left loose and so is dragged along the floor, or if looped up it becomes injured quickly. This construction also makes it much easier for storage of test poles, since they can be placed in a rack without any loose dangling wires.

A test of car equipment frequently requires a current greater than will pass through five lamps in series. In such cases metal washers are placed in some of the lamp receptacles so as to short circuit them, and where equipment is being tested on the line side frequently all of the lamps are short circuited. This is the reason for using a fuse of such large capacity, as a smaller fuse would be sufficient if the lamps were always in the test circuit.

Rebuilding Trucks with Rivets Rather than Bolts

WITH the present-day development of cutting torches it is far more economical to cut off the heads of bolts rather than laboriously to unscrew nuts which have become rusted tight. Therefore, when the Berkshire Street Railway, Pittsfield, Mass., wishes to rebuild the trucks of its cars it has adopted the policy of cutting the old bolts out with torches and replacing them with rivets, which later may be removed in similar fashion. The rivets cannot become loosened and thus are not subjected to the battering which a loosened bolt must suffer from weaving structural parts.

The accompanying illustration shows a typical job of riveting which has been done on one of the company's trucks. It was stated that the time required for removing the old bolts by the cutting process is practically negligible, it being possible to remove a group of five bolts or rivets in from three to five min-



A Truck Frame Which Has Been Completely Riveted in Rebuilding
(Note—The wheels and axles shown are being used simply to support the truck frame.)

utes. Incidentally it is much easier to rivet structural parts which are difficult of access than to insert bolts and tighten nuts to the necessary degree.

Rubber-Covered Steps Prevent Accidents

RUBBER covering for steps is in quite common use in the industrial field, but for street cars it is somewhat of a novelty. It is being tried on one of the cars of the Levis

Rubber Covering Is Being Tried on the Steps of This Levis Tramways Car to Prevent Slipping

Tramways by H. E. Weyman, general manager, as a means to prevent step accidents due to slipping. Corrugated rubber of the type used for floor mats has been attached to the folding steps of the car. It is inconspicuous and does not interfere with the action of the mechanism. It does, however, provide a much surer footing, particularly in wet weather. While it has not seen service in the winter, it is felt that snow and ice will not cling to the rubber so tightly as they do to wood, and that there will be considerable cleaning action when the steps are opened and closed.

Preventing Leaks Around Car Sash

ONE of the questions discussed at the semi-annual meeting of the Electric Railway Association of Equipment Men, Southern Properties, was practical methods which have been used to prevent leaks around the sash of high-speed cars. The discussion showed that several companies have used channel rubber, others commercial putty or felt. One company is using a stationary vestibule sash. It was the consensus of opinion that felt or rubber used had not proved entirely satisfactory and that railways which had tried it were again using putty. The Texas Electric Railway, Dallas, Tex., has overcome leakage by putting a flanged piece of metal onto the sash and arranging it so that it comes up high enough to clear the sash, leaving a projection of ½ in. to ⅝ in., and by cutting off the beads usually found on the sash, a piece of metal being substituted for this. The steel used is No. 24 gage.

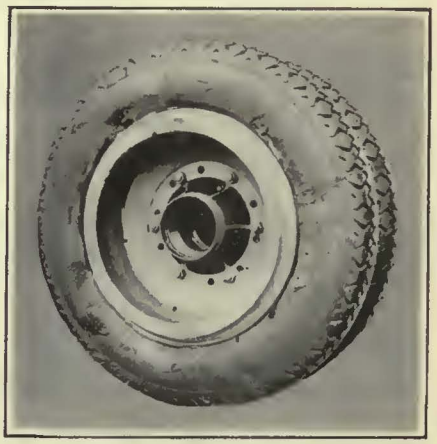
New Equipment Available

Cool Tires Feature New Wheel Design

AMONG the causes contributing to tire trouble and expense are unsprung weight and heating of the tires from the action of the brakes. To offset these difficulties, the Steel Wheels, Incorporated, of Newark, N. J., has just placed upon the market a new type of light-weight self-cooled automotive wheel suitable for buses and pneumatic-tired trucks. These wheels have been designed by Charles G. Keller, an experienced automotive engineer, and they embody patented features which render them unique in several respects. There is a system of ventilation or circulation of air, and as tests have shown the temperature of tires on the wheels so ventilated is considerably lower than on any standard type of wheel which had been formerly employed.

Outside View of Rear Dual Wheel

The Vulcan steel wheel, as this new wheel is known, consists of a cast-steel spider, integral with the hub and possessing a U-shaped hollow spoke with beveled spoke ends. It has no felloe, but is arranged



Inside View of Wheel Showing Intake for Cooling Air

so that the rims on which the tires are mounted are directly applied and locked upon the spoke ends. Any of several standard rims may be employed as well as a special rim manufactured by this company. The special rim contains the locking bolts that are integral with the rim and that are expanded or contracted in order to secure the rim or to loosen it from the spoke ends. When the fastening lugs are loose the rim with tire is turned until the fastening lugs are disengaged from the spoke ends. This allows the rim with tire to be removed easily in a bayonet lock action. The unsprung weight of this wheel is from 25 to 30 per cent less than that of a corresponding disk wheel of the same size, while the manufacturers say the price will not be appreciably more.

When standard rims, such as Firestone or Goodyear types, are used, the locking screw is applied to the end of the spoke instead of the rim. The expansion of the locking screw against the bevel surfaces of the spoke ends, however, holds the rim in place against stops which are integral with the spoke ends.

This method of securing and loosening the rim has no loose parts. The locking bolts are a permanent part of the wheel construction. Another feature of this locking device, when applied to dual tires, is that either the inside or the outside tire may be independently loosened or tightened with the wrench.

The spoke and the hub form a cast-steel spider provided with ribs which cause air to circulate through

the hollow spokes from the hub to the rim. The circulating air then passes out over the outer circumference of the brake drum. A continuous flow is thus provided which has a cooling effect and prevents the tire from exceeding a temperature which might prove injurious to the fabric or rubber.

A recent scientific test has been made with a standard bus, on a long mountain road, in Pennsylvania.

Rear Dual Wheel Showing Hub Spider with Brake Drum but Without Rims

Vulcan wheels were applied to a bus weighing approximately 17,000 lb. and operated down a 2½-mile grade averaging about 10 per cent with air brakes applied. The tire temperature was then taken and compared with the temperature of tires run, under exactly the same conditions, upon standard makes of wheels. The temperature of tires upon the Vulcan wheels proved appreciably lower in each instance.

In addition to the test on the hill, a traffic test was made which consisted in subjecting the bus to 100 stops per hour for four hours continuously. At the end of each hour the temperatures of the tires and various parts of the wheel were read. In this case the Vulcan wheels showed appreciably less heat transmitted to the tires than in the case of standard wheels.

Large Capacity Oil Circuit Breakers

DESIGNED for either indoor or outdoor service, the General Electric Company announces a line of oil circuit breakers available in sizes of 400, 600, 800 and 1,200 amp. and voltages of from 15,000 to 88,000 inclusive. They bear the General Electric designations FK-236 and FHK-236.

The breakers rated at 73 kv. or less may be used up to altitudes of 10,000 ft. The 88-kv. breakers are equipped with "high altitude" bushings when used above 4,000 ft. The range of interrupting capacities for the FK-236 breakers is from 2,000 to 7,000 amp., and from 3,300 to 14,000 amp. for the FHK-236 type of breakers.

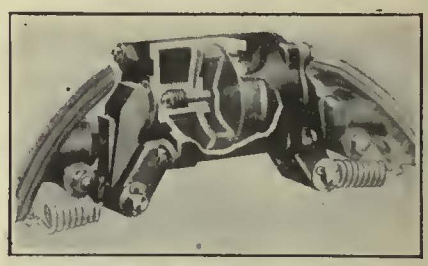
Each triple-pole breaker is made up of three single-pole, single-throw units operated by a single mechanism. This mechanism may be manually operated or electrically operated by either a solenoid or a motor.

Unit mechanisms are totally inclosed within the breaker frame and are, therefore, freed of any tendency to reclose under the action of unbalanced internal pressures which may be set up when opening under abnormal conditions. A larger air space is thus also provided, with consequent increase of interrupting capacity.

Of the two forms, the type FK-236 uses finger and blade contacts, while the type FHK-236 is equipped with plunger or rod type contacts and explosion chambers. With explosion chambers higher interrupting capacities are obtained, although both types are adequate for the service for which they are rated.

Brake Cylinder Leaks Overcome

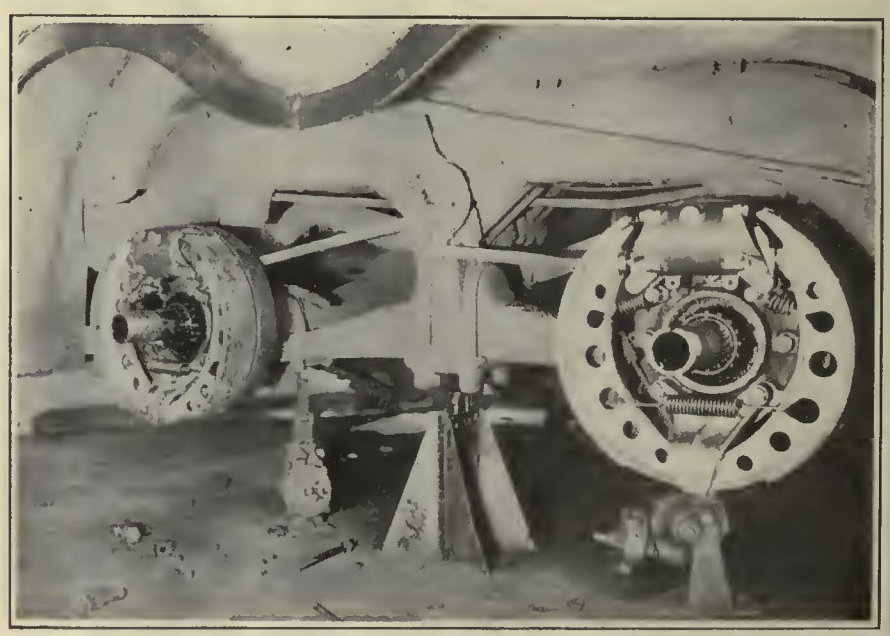
COMPARATIVELY short life of piston packing as compared with other parts of the air brake system for buses led the Christensen Air



Brake Cylinder Cut Away, Showing Sealtite All-Metal Piston Installed

14,000 amp. for the FHK-236 type. devote particular attention to the perfecting of a wearproof and leakproof piston. The result has been the adoption of the Sealtite design. This piston is all metal and gives a perfect seal. It is practically wearproof and is unaffected by oil vapor which comes over from the compressor in the air line.

The Sealtite piston consists essentially of a thin, flexible alloy cup. Inside the cup is an expander ring having on its inner circumference a ball seat. The face of the piston is a valve plate which seats on the expander ring. It is held in position by a coil spring and nut. The coil spring exerts a sufficient pressure to keep the face plate firmly seated and the metal cup expanded against the cylinder wall. When air is admitted to the cylinder the pressure exerted on the face plate of the piston causes it to seat more firmly against the cylinder wall. Thus, the seal is tightened as the air pressure increases. To give rigidity to the complete piston assembly, a strong steel follower plate is fastened behind the cup.



Rigid Shoe Construction and All-Metal Sealtite Piston on New Cleveland Six-Wheeler

Association News & Discussions

C.E.R.A. Master Mechanics Discuss Ways of Modernizing Equipment

REVIEW of the work accomplished toward improved car construction, efficient shop methods and high-class maintenance was the principal business of the experience meeting of the Central Electric Railway Master Mechanics Association, held at Sandusky, Ohio, Sept. 9. Thirty-five master mechanics and their guests attended the meeting.

In opening the discussion, Pierre V. C. See, president of the association, described briefly some of the work which the Northern Ohio Power & Light Company has been doing in Akron, Ohio. A new bus has been designed and built in the railway shops, the body being built by the G. C. Kuhlman Car Company, Cleveland, Ohio. The bus seats 29 passengers, has a 234-in. wheelbase, an over-all length of chassis of 320 in. and a frame height at the driver's position of 27 in. The bus, bearing the nameplate "Northern Ohio," will be exhibited at the October convention of the American Electric Railway Association. Its axle has the extremely high road clearance of 9 in. and is geared 6 to 1 so as to give extra power for hill climbing without undue engine speed. There are many severe hills around Akron. The railway has experienced considerable trouble from broken frames in the fleet of buses which it now operates, and in the new design considerable care has been devoted to this portion of the chassis. A 9¾-in. pressed channel frame was selected, which is tied together with members partly tubular and partly channel. Exceptionally large gussets were installed so as to prevent the possibility of any loosening at the joints.

The front springs have a novel method of mounting. Instead of the spring being dead-ended at the front of the chassis, it is anchored at the rear with the flexible shackle connecting with the shock absorber in the front.

In addition to building this new bus, the Northern Ohio Power & Light Company has remodeled 41 steel cars of old design for one-man operation. One car used in city service, which originally had end doors and platforms, has had a center door added and 3 ft. has been cut off the back end. This is a single-end car. Particular attention has been given to the method of painting to make this car attractive and also to seat upholstering, so as to provide an easy ride for passengers. In addition the company has also remodeled one interurban car. Among other improvements in maintenance methods which have proved of particular value Mr. See mentioned the silk screen and squeegee method of painting roller destination signs and the oil reclaiming methods used by the company.

Several improvements in supporting and connecting foundation brake rigging on the cars of the Lake Shore Electric Railway were described by A. Brownworts of that company. Heat-treated bushings are used at all connections and fulcrums of brake levers and improved methods of connecting have reduced maintenance troubles. A J. Challeen, superintendent of equipment and shops, Detroit United Railway, described the lubrication schedule which he is using for the oiling and packing of bearings. An inspection card index system is used with this work.

J. B. Corderman, master mechanic Lima-Toledo Railroad, told of rebuilding some cars and the improvements made. Methods of applying oil and preparing waste for packing have also been improved, so that the lubrication cost is but 20 cents per thousand car-miles, including all waste, car oil, compressor oil and gear grease. The method used for saturating waste is to cook it in hot oil. Mr. Corderman also referred to wear caused by the end thrust of helical gearing. In order to take up this wear he uses the Westinghouse method of inserting ⅛-in. shims between the armature and thrust collars.

Use of solid bronze bearings has produced gratifying results for the Cleveland - Southwestern Railway & Light Company. The methods used were described by J. W. Osborn, superintendent of rolling stock. All bearings are fitted to the axles or shafts on which they are used. Axle bearings are marked with their position in the car, so that in overhauling they are returned to the original location. A clearance of 0.012 in. over the shaft diameter is used for armature bearings after they are pressed in to housings. Mr. Osborn also referred to economies in painting. His company uses the enamel system and applies one coat of clear enamel over the colored enamel, instead of using a clear varnish. This lasts longer and produces a pleasing appearance.

In addition to purchasing eight new cars, several others have been remodeled in the shops of the Steubenville, East Liverpool & Beaver Valley Traction Company. This work was described by R. E. Twiggs. In the remodeling, vestibule partitions were removed, the trucks were remodeled and top brake-hanger castings were standardized. Brake levers have also been standardized on city cars. The motors used under these remodeled cars have been completely revamped, and as a result of decreased maintenance, four less men are used on inspection and other work has been cut down nearly one-half. Improvements in lighting have been incorporated through the use of twenty low-voltage lamps in series. Trials have also been made of internally frosted bulbs.

George R. Green, superintendent of equipment Southern Michigan Railway, South Bend, Ind., described the vehicle collision light which his company has installed on the corners of cars in addition to headlights. This has an amber colored lens and its use has

Master Mechanics of the Central Electric Railway Association on the Court House Steps in Sandusky, Ohio

reduced accidents considerably. These corner lights are being added to cars as fast as they go to the shops for overhauling. His company has also remodeled some cars into a parlor car type. These are particularly attractive to car riders, and the receipts have increased considerably. Mr. Green also spoke of the value of the work being done by the Central Electric Railway Master Mechanics Association and the benefit derived from such meetings as the present one.

Through the purchase of new cars the Union Traction Company of Indiana has been able to retire some of its old cars. The best of the old motors have been overhauled and are used under freight cars in place of some still older equipment. This work was described by Thomas H. Nicholl, superintendent of motive power.

A. A. Crawford, superintendent of motive power Youngstown & Ohio River Railroad, said that he had now had one year's experience with the thirty-in-series type of lamp. He had found it particularly easy to change over from the five-circuit arrangement in cars to the single-circuit arrangement, and during the year had lost but twelve lamps due to failure, while there had been no loss by theft whatever. At the time these new type lamps were installed a bulletin was issued to the motormen and conductors which stated that these lamps could not be used for house lighting. Mr. Crawford also told of a method used to increase the speed of his cars. Funds were not available for changing the gear ratio, and so $\frac{1}{8}$ in. was taken off of the pole faces of the motors. This increased air gap increased the speed approximately 10 per cent. No commutator or brush trouble has been experienced.

Six-Motor Freight Car Developed

The new six-motor freight car of the Western Ohio Railway was described by E. B. Gunn, superintendent of transportation and equipment for that railway. This has three motors per truck, and the car is now used in a six-car train hauling five trailers, where previously but three trailers were hauled. The energy consumption is but slightly greater than the four-motor equipment, even when hauling the increased load. Tests showed an energy consumption of 5.3 kw.-hr. per car-mile as compared with 4.9 for the four-motor equipment. Mr. Gunn also brought up the subject of breakage of triple valve stems and slide valves. This is to be investigated by experts from the Westinghouse Traction Brake Company and a report will be made at the next meeting.

H. G. Arthur, G. C. Kuhlman Car Company, described what has been accomplished through the standard design of freight car as adopted by the Central Electric Railway Master Mechanics Association. His company has now built 70 and has fifteen more on order. The American Car & Foundry Company has also built quite a number of cars of this type.

Improved results from acetylene welding were described by W. J. Fox of the Interstate Public Service Company. This work has included the welding of body castings, the building up of the faces of coupler knuckles and repairs to axle housings. Body castings with cracks about one-half way through have been repaired at an average cost of $11.48 for labor and material. This cost includes 15 per cent added for overhead. Building up of the faces of knuckles averages $6.01, and welding of axle housings is done for $17.83. A considerable saving has been accomplished through the standardization of steps on various types of cars, so that there are no rights and lefts.

Terence Scullen, master mechanic the Cleveland Railway, told of the aluminum car which his company is building. A weight reduction to about half that of an ordinary car of similar size has been accomplished. The car, however, is only in the construction stage now. Mr. Scullen also suggested that it would be desirable for an association to take up the distribution of labor and material in the various classification of accounts. He said his company is now operating 50 trucks, whose maintenance was charged to equipment. Also, such track equipment as welders, grinders, etc., are charged to maintenance. This, of course, makes comparison of maintenance costs with other railways out of the question.

Standardization to Meet I.C.C. Rules

At the afternoon session Thomas H. Nicholl reported for the standardization committee. He took up the Interstate Commerce Commission's rules for the testing and inspection of locomotives other than steam. The committee has drafted a new set of rules embodying features of the I.C.C. rules which are suitable, and adding its own rules to this. This was gone over and discussed in considerable detail by the members present, and it was decided that this should be submitted to the executive committee of the Central Electric Railway Association for use in connection with any recommendations to be made. Reports were made by the committees on subjects, uniform charges and arbitration.

The next meeting of the association will be held in Toledo next February. After the meeting adjourned an inspection tour was made to the shop of the Lake Shore Electric Railway in Sandusky.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Oct. 1*—American Electric Railway Association, Metropolitan Section, Engineering Societies Building, New York City, 8 p. m.**

***Oct. 4-8*—American Electric Railway Association, annual convention and exhibits, Public Auditorium, Cleveland, Ohio.**

***Oct. 10-15*—Congress International Tramway, Local Railway and Motorbus Association, Barcelona, Spain.**

***Oct. 25-29*—Annual Congress and Exhibit, National Safety Council, Book-Cadillac Hotel, Detroit, Mich.**

***Nov. 16-18*—Society of Automotive Engineers, National Transportation and Service Meeting, Boston, Mass.**

***November 16-19*—American Welding Society, fall meeting and International Welding and Cutting Exposition, Buffalo, New York.**

Electric Railways at National Safety Congress

MORE than 200 speakers will address the fifteenth annual congress of the National Safety Council, which will be held in Detroit Oct. 25-29. There will be 100 separate meetings covering a wide range of industries.

Arrangements for the sessions of the Electric Railway Section are being rapidly completed. Among the speakers scheduled are:

James P. Barnes, president Louisville Railway, "Accident Prevention—Why and How, from the Standpoint of the Executive."

R. W. Emerson, general manager Cleveland Railway, leader of round-table discussion on "No-Report Claims and What Is Being Done to Reduce Them and the Standing of the Safety Department in the Organization."

M. J. Feron, general superintendent of transportation Chicago Rapid Transit Company, appearing as chairman of "Board of Inquiry."

T. G. Hamilton, general superintendent Gary Street Railway, "Harmonious Relations Between Employees and Management and Their Effect on Accident Prevention."

R. H. Horton, president Philadelphia Rural Transit Company, "Bus Operation."

G. B. Powell, superintendent of transportation Louisville Railway, "Accident Classifications and Statistics."

American Association News

Red Special—Blue Special

DE LUXE trains to the 45th annual convention of the A.E.R.A. have been arranged for by the transportation committee. Both trains will leave from New York on the evening of Saturday, Oct. 2, arriving in Cleveland Sunday morning.

The Red Special via the Pennsylvania Railroad, for delegates from New York, Newark, Trenton, Philadelphia, Baltimore, Washington, York, Harrisburg and connecting points, will leave the Pennsylvania Station, New York City, Oct. 2 at 6:50 p.m., Eastern standard time. It is due to arrive in Cleveland at 8:50 Sunday morning.

The Blue Special, via the New York Central Railroad, for delegates from New York, New England, Albany, Utica and Syracuse, will leave Grand Central Terminal, New York City, Oct. 2 at 6.30 p.m. Eastern standard time. It is due to arrive in Cleveland at 8:30 Sunday morning.

Applications for reservations on these trains should be made with the following members of the committee:

New York, Newark and vicinity, C. H. Beck, Room 2300, 150 Broadway, New York City.

Trenton and Philadelphia, Thomas Cooper, Westinghouse Electric & Manufacturing Company, Philadelphia, Pa.

Baltimore and Washington, J. H. Hanna, president the Capitol Traction Company, Washington, D. C.

York and Harrisburg, C. F. Crane, Harrisburg Railways, Harrisburg, Pa.

Boston, Providence and down Maine, Edward Dana, general manager Boston Elevated Railway, Boston, Mass.

Springfield, Worcester, Pittsfield, Chatham and New Haven, C. V. Wood, president Springfield Street Railway, Springfield, Mass.

Albany, Utica and Syracuse, E. H. Murphy, general manager United Traction Company, Albany, N. Y.

Reservations for those who cannot leave until Sunday may be made on similar trains on each railroad leaving on the same schedule. All requests for reservations should be accompanied by remittances to cover cost of accommodations desired.

Added Entertainment at Cleveland

SPECIAL late supper will be provided in the Rainbow Room of the Hotel Winton during the Cleveland convention week, following the regular convention entertainment program. Arrangements for this have been made by the entertainment committee. A cover charge will be made by the management and service will be à la carte.

Wednesday, Oct. 6, will be special A.E.R.A. night and admission will be limited to wearers of the official badge. The program on that night will start at 11 p.m., for which the regular cover charge will be made. As a heavy attendance is expected for the feature program, the entertainment committee suggests that those wishing to be sure of having tables make reservations in advance with W. S. Koones, manager Hotel Winton, Cleveland.

Progress on Convention Building

SINCE the new building which was put up as an annex to the public auditorium in Cleveland was turned over to the convention committee on Sept. 4, the work of preparation has continued with unabated speed. After the finishing touches were put on by the Cleveland Railway forces it was necessary to clean up the débris which had accumulated during construction and to prepare the interior for receiving the exhibit. This has been done and the wiring, piping, etc., within the building have been installed.

The space between the two buildings which formerly was used for automobile parking has been cleared and tracks for outdoor exhibits have been laid. Between the new building and the auditorium there will be a walkway 50 ft. wide covered by a canopy. In this space will be placed working exhibits of track appliances such as grinders, tampers, etc.

Figures are not available for comparison of the total space which this exhibit will occupy with exhibits of other associations, since the track space is figured on a linear basis rather than a square foot basis. Were the entire exhibit figured on a square foot basis it would undoubtedly prove the largest exhibition of the kind ever held in this country.

Special Tax Committee Expanded

SOME time ago it was decided to appoint advisory members to the committee on special taxes of the American Electric Railway Association. One outstanding authority has been selected from each state to act in this capacity. Acceptances have been received from all but thirteen states. Those remaining have very limited electric railway operations. The first duty of these advisers was to furnish the association with a digest of the tax laws of each state that relate to electric railways. The association will analyze these digests and prepare a report to be read before the meeting of the special tax committee at the Cleveland convention on Oct. 7.

At this meeting it is expected that a program will be decided upon to promote this work during the year. While the work will be included in the activities of the special tax committee much of the detail will be handled by the association direct. Lucius S. Storrs, acting in co-operation with Alfred T. Davidson, chairman of the committee on special taxes, issued the invitations and will be sponsor for the work done by the advisory members. The details will be handled by Leslie Vickers, economist of the A.E.R.A.

The list of appointees who have accepted follows:

California—W. V. Hill, manager California Electric Railway Association, San Francisco.

Colorado—Ernest Stenger, president the Denver Tramway Corporation, Denver.

Connecticut—W. J. Flickinger, vice-president the Connecticut Company, New Haven.

Delaware—T. W. Wilson, vice-president and general manager Wilmington & Philadelphia Traction Company, Wilmington.

Florida—J. P. Ingle, manager Jacksonville Traction Company, Jacksonville.

Georgia — P. S. Arkwright, president Georgia Railway & Power Company, Atlanta.

Illinois—D. W. Synder, Jr., vice-president Illinois Traction System, Springfield.

Indiana—A. W. Brady, receiver Union Traction Company of Indiana, Anderson.

Kentucky—J. P. Pope, vice-president and general manager Kentucky Traction & Terminal Company, Lexington.

Louisiana—H. B. Hearn, president Shreveport Railways, Shreveport.

Maine—Alfred Sweeney, general manager Androscoggin & Kennebec Railway, Lewiston.

Maryland — C. D. Emmons, president United Railways & Electric Company, Baltimore.

Massachusetts—L. D. Pellissier, president Holyoke Street Railway, Holyoke.

Michigan—Alfred Fischer, director Michigan Committee on Public Utility Information, Ann Arbor.

Minnesota—A. M. Robertson, president the Duluth Street Railway, Minneapolis.

Mississippi—C. P. Couch, vice-president Mississippi Power & Light Company, Jackson.

Missouri—A. T. Perkins, manager for receiver United Railways of St. Louis, St. Louis.

Nebraska—R. A. Leussler, vice-president Omaha & Council Bluffs Street Railway, Omaha.

New Hampshire—J. Brodie Smith, general manager Manchester Street Railway, Manchester.

New Jersey—E. W. Wakelee, vice-president Public Service Railway, Newark.

New York — E. M. Walker, president Schenectady Railway, Schenectady.

North Carolina—W. L. Currie, claims attorney Carolina Power & Light Company, Raleigh.

Ohio—W. A. Draper, president Cincinnati Street Railway, Cincinnati.

Oregon — W. H. Lines, vice-president Portland Electric Power Company, Portland.

Pensylvania—A W. Robertson, president Philadelphia Company, Pittsburgh.

Rhode Island — E. J. Dickson, vice-president United Electric Railways, Providence.

South Carolina — Stuart Cooper, vice-president and manager Charleston Consolidated Railway & Lighting Company, Charleston.

Tennessee — T. H. Tutwiler, president Memphis Power & Light Company, Memphis.

Texas — Richard Meriwether, vice-president and general manager Dallas Railway, Dallas.

Utah—E. A. West, general manager Utah Light & Traction Company, Salt Lake City.

Virginia—T. Justin Moore, general counsel Virginia Electric & Power Company, Richmond.

Washington—Hance H. Cleland, attorney, Cleland & Clifford, Olympia.

West Virginia—J. D. Whittemore, vice-president Monongahela-West Penn Public Service Company, Fairmont.

Wisconsin—H. L. Geisse, general manager Wisconsin Valley Electric Company, Wausau.

District of Columbia—William F. Ham, president Washington Railway & Electric Company, Washington.

Metropolitan Section Meets Oct. 1

OPENING the 1926-27 season, the Metropolitan Section of the A.E.R.A. will meet Oct. 1 at the Engineering Societies Building, 33 West 39th Street, New York City, beginning at 8 p.m. The subjects committee has prepared a full program. There will be an address by President F. R. Coates on "Recent Developments in the Electric Railway Industry." W. R. Webster, vice-president Bridgeport Brass Company, will give an illustrated talk on the "Copper and Brass Industry and Its Relation to Transportation." Entertainment will be provided through the courtesy of Eddie Wager and his troupe.

There will be a Dutch treat dinner at Friedlander's restaurant, 56 West 39th Street, beginning at 6 o'clock the evening of the meeting.

Engineering Standards

VARIOUS recommendations of the committees of the Engineering Association were passed on by the committee on standards at a meeting held at association headquarters, New York City, on Sept. 14. In general these recommendations were concurred in subject to final approval on the floor of the convention. In a few instances action was deferred awaiting further explanation from the committees presenting the proposed standards.

Members present were Charles Rufus Harte, chairman; H. A. Johnson, C. G. Keen, John Lindall, N. W. Storer, F. W. Peters representing H. L. Andrews, J. A. Brooks, J. M. Waldron, C. C. Beck, J. J. Sinclair and M. B. Rosevear.

The News of the Industry

Ten-Cent Fare Asked in Buffalo

President of International Railway Says Service Cannot Continue to Be Rendered at Less than Cost

The International Railway, Buffalo, has applied to the New York Public Service Commission for permission to increase its fare in Buffalo from 7½ to 10 cents and proportionate increases on all its interurban divisions. It is proposed to put the new fares into effect on Oct. 16. Inability of the company to provide funds for repaving and track improvements and create a replacement fund of $1,016,000 annually as authorized by the state commission in 1920 are given by Bernard J. Yungbluth, president of the International, as reasons for the higher fare.

In the city of Buffalo the International Railway asks for a 10-cent fare with free transfers in place of the present 8-cent fare or two tokens for 15 cents. The local fares in Niagara Falls, Lockport, Lancaster and LaSalle would be increased to 8 cents or two tokens for 15 cents in place of the present 5 and 6-cent fares. Children under five years would ride free and children between the ages of five and twelve years would be required to pay a 5-cent fare in place of the present 3-cent charge.

Interurban rates will be on the 3-cents-a-mile basis, with a minimum cash fare of 10 cents. The Buffalo to Niagara Falls fare would be 70 cents; Buffalo to Lockport, 75 cents; Buffalo to Olcott, $1.15; Buffalo to Depew or Lancaster, 25 cents; Buffalo-Englewood commutation, $5 a month; Buffalo to Depew or Lancaster commutation, $7.50 a month. Tolls across the upper steel arch bridge at Niagara Falls and the Niagara River Bridge at Lewiston will be 10 cents one way or 15 cents round trip for pedestrians, instead of the 10-cent round-trip charge as at present: automobile with driver 25 cents and additional passengers 10 cents each.

Mr. Yungbluth said:

Buffalo's transportation system must be financially sound and its credit good before it can extend and improve. The International has been losing money since 1918. Its stockholders have received no dividends since 1918 but have contributed $4,140,445 to the company. Based on a formula adopted by the Public Service Commission in 1920, the company should have set aside $1,016,000 annually to pay for renewals, replacements, etc., but the International has not earned this money.

There is an increasing demand in each of the municipalities served by the International for street repaving and track reconstruction. This cost in Buffalo alone would exceed $2,000,000. The Public Service Commission has ordered this work done in Grant Street and Walden Avenue, but the commission did not provide for this cost in the present fares, which makes an increased fare now necessary.

Street car riders in New York State are required to build roads for automobiles, motor trucks and other traffic. This paving is not used by the street cars. The paving charge, relic of horse-car days, is a far greater load on the car rider today than originally. The car rider is still required to pay the cost.

No business can long continue if its product is sold at a loss. The product of the International is transportation, which has a cost just as definite as that of any manufactured article. The cost is higher than the selling price represented by the fare. Transportation cannot be given unless its cost is met.

In 1920 the International Railway was authorized to abandon the 5-cent fare in Buffalo and to charge 7 cents with four tokens for 25 cents. In February, 1925, the fare again was increased to the present rate of 8 cents with two tokens for 15 cents. Last year the company applied for a rehearing and a higher fare. The rehearing was held by the state utilities board but the higher fare was denied. On that occasion the commission by a divided vote set the company's valuation in Buffalo at $22,000,000 for fare basis, and the company's claim of a valuation of $96,000,000 was rejected.

New Proposal Presented in Chicago

Lisman & Company Behind Syndicate Which Would Take Over Surface Lines on Twenty-Year Franchise—Special Committee Will Work Out Tentative Grant

STATEMENTS recently attributed to Charles E. Mitchell, president of the National City Bank, New York, that "New York bankers will not mix in Chicago politics to straighten Chicago's traction tangle" to the contrary notwithstanding, Frederick J. Lisman, president of Lisman & Company, and Judge John M. Harlan, New York, representing a group of New York and Chicago bankers, personally appeared before the local transportation committee of the Chicago City Council on Sept. 13 to present a plan for the solution of the city's transportation problems. Still silent as to the identity of their clients, both men declared the plan to be "the finest traction offer ever made to this or any other city."

Briefly, the representatives of the syndicate proposed, first, that they shall receive a twenty-year franchise. Then they will form a new company to take over the properties of the Chicago Surface Lines at the present capitalization of $163,000,000. To pay for these they will issue new bonds running for 50 years in two series. First mortgage bonds will be awarded to present holders of first mortgage bonds of more than $90,000,000 and general mortgage bonds to present holders of junior securities of about $60,000,000. The syndicate obligates itself to supply an aggregate of $50,000,000 for extensions, new equipment and other improvements. These obligations will be an equal lien with the first mortgage bonds, but will run for only twenty years. All the securities would bear 5 per cent interest.

The plan provides that this $50,000,000 shall be amortized in twenty years and a sinking fund will be created to amortize the present capitalization in 50 years. Fares would be based on cost of service, but the present 7-cent rate would prevail at the outset. Whenever the franchise expires and is not renewed the 50-year bonds become due and payable, but if the company continues to get franchises for a total of 50 years the entire system becomes the property of the city without charge. The city would also be given the right to purchase the system at any time at a price agreed upon in the proposed franchise.

In addition to operating the Surface Lines, the bankers ask the right to operate buses, agree to operate the subways when built and agree to operate the elevated lines when they are made a part of the new company. They also offer to build the subway at cost, plus a reasonable construction profit, or build them for a sum fixed in advance. Mr. Lisman announced that the syndicate had already retained the firm of Parsons, Klapp, Brinckerhoff & Douglas as engineers to have charge of subway construction.

Local bankers and traction officials, invited by the City Council to attend the conference, discussed the new proposal freely. John E. Blunt, vice-president of the Illinois Merchants' Bank, pointed out that the proposal gives priority in payment to the proposed $50,000,000 to be invested in the next twenty years over the $100,000,000 invested in extensions, improvements and rehabilitation in the last twenty years. "That is unfair to the present bondholders," he declared.

Mr. Lisman and Judge Harlan, however, insisted that they would give present security holders a better bond than they now hold, because there would be a sinking fund to amortize part of the bonds under the new plan. "Under present conditions," Mr. Lisman said, "when the franchise expires next February, the security holders have no assurance of being paid. We offer a plan which insures them payment and a better market value than ever."

Leonard A. Busby, president of the Chicago City Railway, told the committee that he believed such a scheme could be financed in Chicago or any other large city within 30 days on the same terms proposed by the syndicate.

"Instead of $50,000,000 being needed for extensions, etc., however, something like $275,000,000 will be required in the next twenty years." he explained.

At the conclusion of the presentation, the Aldermen decided to create a special committee to confer with the Eastern bankers to work out a tentative ordinance along the lines suggested.

So favorably impressed with the new proposal were a number of the Aldermen that they succeeded in temporarily postponing negotiations with Chicago bankers and traction executives.

At the last conference between the City Council and the local traction interests on Sept. 10, Melvin A. Traylor, president of the First National Bank of Chicago, warned the city that unless the companies are given a franchise that will permit them to make money, they cannot extend their lines or improve service.

"The people of Chicago are getting good telephone, light and gas service," he asserted, "because those companies are making good money. Don't think you are going to get traction service below cost; it can't be done."

Declaring that street car riders in Chicago had paid $5,061,372 in the year ended Jan. 31 last and $52,805,573—or three-fifths of 1 cent on every fare collected—in the last twelve years for expenses other than the cost of transportation, Leonard A. Busby, president of the Chicago City Railway, vigorously denounced the practice of burdening the Surface Lines with paving and street cleaning costs. The figures he submitted showed that car riders have paid in the last twelve years $7,052,158 for cleaning and sprinkling of streets and removal of snow and ice, $4,265,077 for the maintenance of pavements, $7,066,492 for new pavements and renewals, $427,656 for moving of tracks because of sewers, $1,280,491 for moving of tracks because of street widenings, $1,635,000 for the board of supervising engineers, $23,441,379 as compensation to the city, and another item of $7,637,320 as interest on paving costs placed in the railway capital account.

The net result of Mr. Busby's eloquence in behalf of the unduly burdened car rider was the adoption of a motion by the committee declaring it the future policy to prevent any charges against operation not transportation costs.

The Aldermen did not immediately decide, however, just what items should be eliminated from the carfare or what part of each item. When they do, it is probable they will specify that the capital account shall be decreasd by the amount of the additional net revenue rather than permit this estimated $5,000,000 to be used for the payment of dividends.

New Toledo Grant Introduced

Toledo's new street railway and bus franchise ordinance amending and extending the Milner service-at-cost plan has been completed and turned over to the City Council. It was drawn up through co-operation of Frank M. Dotson, city law director, and Dewey C. Bailey, counsel for Henry L. Doherty & Company, with the advice and aid of Prof. Henry E. Riggs for engineering counsel and Newton D. Baker, Cleveland, for legal opinion. In Council the grant was immediately referred to the rules, by-laws and ordinances committee, which has called the first hearing for Sept. 22.

The ordinance is the outgrowth of a survey made by Professor Riggs a year ago following an open meeting of citizens at which remedies which would secure lower fares, extensions of lines and better service were demanded.

Wages Unchanged in New Jersey

The new three-year agreement covering the wages of the operating forces of Public Service Railway, Public Service Railroad and Public Service Transportation Company was signed on Sept. 13 by President Thomas N. McCarter on behalf of the companies and by the presidents of the nine locals of the Amalgamated Association on behalf of the men.

The agreement provides a wage scale of 65 cents an hour for all operators in service a year or more, the rate now prevailing, for classification and uniform wage scale for employees other than trainmen and makes several modifications in working conditions asked for by the men.

The terms of the agreement were reached after long negotiations which culminated during the week ended Sept. 11 in a two days conference between the officers of the companies and the state conference board of the Amalgamated Association, assisted by Vice-President William B. Fitzgerald and John H. Reardon, member general executive board. The conditions that were fixed were ratified by a two to one vote in a referendum of the employees, members of the association, held on Sept. 11.

$700,000 for Service Improvements in Milwaukee

Following closely on the heels of the Railroad Commission's order permitting the installation of one-man cars on the Wells-Downer line by the Milwaukee Electric Railway & Light Company commencing Oct. 1, came the application of the company for permission to use one-man cars on its Oakland-Delaware line. Like the Wells-Downer line, only partial use will be made of the one-man car on the Oakland-Delaware line in order to provide the additional service ordered by the commission. In the case of all lines where the service is not up to commission standards, it is expected that the company will ask that such additional service be provided by the installation of one-man cars. The number of cars the company will add to the present Oakland-Delaware schedule was not made known. This line is one of a number of lines in Milwaukee for which the commission recommended increased service in its survey. Should the commission approve the installation of one-man cars on the Oakland-Delaware line, there will be seven one-man car lines in Milwaukee, with four of them passing through the downtown section.

Another important development is the order of the commission directing the company to purchase 40 new cars. Arrangements have already been made by the company for cars identical with those now in service on the recently installed one-man lines, except that there will be some improvements in equipment as well as four additional upholstered seats. The cost of these new cars approximates $700,000, including increased power capacity and car station facilities. In its general survey the commission recommended the addition of 70 new cars, but the company complained that with this and certain rail extensions believed by it to be unnecessary the cost would be $1,971,000, which would reduce the company's net income to 3.6 per cent.

The commission's order provides that these additional 40 cars shall be in service by Dec. 1, 1927, but President S. B. Way has promised delivery and installation of fifteen cars by Dec. 1, the second lot by Dec. 20 and the remaining ten the first week of the new year, fully a year in advance of the time set by the commission. Mr. Way believes that as the result of improving scheduling and methods of operation he has ample cars to comply with commission standards.

$40,000,000 Subway Planned for Cleveland

Don Rennels, in a copyright article in the Cleveland *Press*, says that incorporation papers will soon be issued to the Cleveland Subway Company. Some of the facts given by the *Press* are:

That a subway for the west and southwest sections of the city is contemplated as well as for the east and southeast.

That the plans call for a subway that will cost considerably less than $4,000,000 a mile.

That a New York bank has agreed to finance the proposition to the extent of $30,000,000, even $40,000,000 if necessary.

That the Rockefellers, Sr. and Jr., are interested in the proposed new plan.

That the Cleveland Railway looks with favor on the plan and has indicated it would lease and operate the subway after it has been built.

That the franchise and charter ordinances now are being prepared and will be presented to City Council at the earliest possible moment.

Mr. Rennels said that it was understood that the bank behind the project was the Equitable Trust Company. Officials of the Equitable Trust Company at New York stated that they have been negotiating with Cleveland interests for financing the construction of a subway system in that city, but that there is nothing definite to announce at this time and no financing is in sight just now.

Theater in Portland Carries People Free

The management of the Broadway Theater, Portland, Ore., celebrated the opening of its $1,000,000 theater recently by giving free rides for one hour one evening on street cars and buses. For this purpose the theater company took over all the street cars and buses of the Portland Electric Power Company between 6:30 and 7:30 p.m., no fares on any line being collected during that time. A 50 per cent addition to the regular equipment of the P. E. P. company was necessary, this being practically equal to rush hour facilities. The service applied to incoming cars and buses only. A street carnival and general festival activities were participated in by the public as guests of the theater company.

How Madison Determined the Proportion of Multi-Riders

Reference was made in the ELECTRIC RAILWAY JOURNAL for Aug. 14 to what was termed a "weekly pass" trial at Madison, Wis., on the system of the Madison Railways. Additional facts show that this was not a pass installation of the usual type, but was a four weeks trial to determine how many persons could be classified as multi-riders, viz., agents, solicitors, delivery boys, etc. This test was made by charging an unusually high price for the pass and by limiting its use to the person whose name was signed thereon.

With regard to price, it should be stated that while the cash fare at Madison is 8 cents, about 60 per cent of the patrons ride on tokens, sold seventeen for $1. At $1.25 the pass cost 21¼ fares of the type that would be paid by a fairly regular user of the cars. A further limitation was that the pass was not valid on the company's buses, while tokens (without transfer privilege) are.

During the four weeks in August that the plan was effective the management gave ample publicity thereto and stimulated its platform men to sell the pass by offering a week's vacation with pay to the top man. Despite this wholehearted effort, the largest number of passes sold in any one week did not exceed 250. The average sale was 210. On the whole, the pass with the test limitations imposed appealed to only 2 per cent of the company's patrons.

Surface Lines Seek Insurance Benefits

Indication that the trainmen and shopmen of the Chicago Surface Lines would ask their employers for a weekly sick benefit, the maintenance of a substantial death benefit fund and other concessions similar to those recently awarded employees of the Chicago Rapid Transit Company after prolonged arbitration was made during the week ended Sept. 11, by William Quinlan, president of the Chicago local of electric railway conductors and motormen. Since a board of mediation rejected on Sept. 4 the elevated men's demands for a wage increase of 5 cents an hour representatives of the surface lines employees have shown no disposition to press their demand for a similar increase in pay.

Joplin Returns to Five-Cent Fare

Almost a 6 to 1 majority in favor of the proposal of the Southwest Missouri Railroad for exclusive handling of Joplin's public ransportation by street car with a return to the 5-cent fare was given by the voters of that city in a special election recently. A counter proposal to return to buses was defeated by equally as substantial vote.

The street car proposal received 3,174 favorable votes and 636 unfavorable. On the jitney proposal, 577 voted yes and 3,009 voted no.

The return to the 5-cent fare was made effective at once.

While a return to the 5-cent fare is made in Joplin the railroad has not considered a reduction of the intercity rate. The intercity rate increase was obtained solely because of the 8-cent fare in the Joplin city zone.

Michigan Monorail Plan Revived

Thirteen men, appointed by the City Commission at Port Huron, Mich., will investigate in conjunction with the commission and report on the proposed construction through Port Huron of a monorail railway system. F. J. Potter, consulting engineer of the Rapid Transit Corporation of America, a Delaware concern, addressed the commission recently in an effort to obtain the sanction of the city for a right-of-way through the city. The company has ambitious plans to construct a belt line monorail system connecting Port Huron with Detroit, Lansing, Saginaw, Bay City, Grand Rapids and other Michigan cities with Chicago and Toledo.

Ancient Franchise Clause Stirs Up Trouble in Sedalia

The future of the railway in Sedalia, Mo., is very uncertain. There is talk of abandonment and bus substitution, but no definite plan of procedure has been announced by the City Light & Traction Company. The present state of affairs is in the nature of a controversy between the company and the city over paving obligations and franchise requirements.

Recently the company was called upon to comply with the terms of its franchise when the city took the preliminary steps to pave West Sixteenth Street for a distance of seven blocks, the street being one traversed by the company's Sixteenth Street car line. This franchise provision states that when the City Council declares it essential to pave a street occupied by car tracks the company must at the same time pave with like material the space between its rails and 1 ft. on the outside of each rail. If the company should fail to comply with such paving ordinance the city reserves the right to remove the car tracks and proceed with the paving of such street as though no tracks existed therein.

The company did not feel justified in making the expenditure for the west Sixteenth Street work and invited the city to avail itself of the provision of the franchise to remove the tracks. This opened the subject for constructive public discussion and investigation, with the result that the Mayor, Council and many people reached the conclusion that the removal of the railway and the substitution of bus service therefor in a town the size of Sedalia (25,000 people) would be a step forward and in keeping with the present trend. A semblance of an agreement was reached between the city and the company and later seven blocks of track on Sixteenth Street were removed by the city.

The company, however, has not obligated itself to supply bus service when the railway lines are removed, and as yet no other responsible interest has come forth with a proposal to do so. The entire issue is proceeding constructively as between the company and the city authorities, but it is not clear what will be the future action with respect to other lines.

Salt Lake Road Not Entitled to Share Freight Agreement

The Salt Lake & Utah Railroad, Salt Lake City, Utah, was denied the privilege of sharing in a freight agreement, or being an intermediate participating carrier in the routing of westbound traffic, by a decision of the Interstate Commerce Commission. The commission's decision terminated an arrangement begun in July, 1919, when the Salt Lake & Utah became a participating carrier in transcontinental traffic, under freight rate authority of the director-general of railroads. Transcontinental rail carriers having lines which traverse the same territory told the commission that delays had been encountered constantly in moving traffic over the line of the Salt Lake & Utah. Where the line acted as an intermediate carrier of westbound transcontinental freight, steam roads accorded it 10 per cent of the proportion of the through rate, applicable west of the Missouri River, on business originating west of that line. The Sale Lake & Utah sought the same divisions on eastbound through traffic.

New Rates on South Shore Line

Through commutation rates between downtown Chicago and points on the Chicago, South Shore & South Bend Railroad were put into effect on Sept. 16. Included in the new fares are ten and 25-ride bearer tickets, 54-ride individual monthly tickets and 500 and 1,000-mile mileage books. The mileage books and the ten and 25 ride bearer tickets are good for use within one year from date of purchase.

The new passenger tariffs, which will provide greater convenience in commuting from Hammond, East Chicago, Gary, Michigan City and South Bend to Chicago, are made possible through an operating agreement with the Illinois Central Railroad, over the tracks of which company South Shore line trains now operate electrically from Kensington to Randolph Street, Chicago, a distance of 15 miles.

Attitude of Employees Studied on Chicago "L"

With the information obtained from its house-to-house survey and analysis of the public reaction toward the company, the second step by the Chicago Rapid Transit Company was to obtain definite information on how the employees handled customers. To accomplish this a force of investigators rode around on trains and asked them many questions. The correctness of the information given was noted, the manner in which it was given, the appearance of the employee and other points. When all the data were compiled and analyzed, groups of employees were called together and the results of the investigation shown them. The response was immediate and gratifying. They entered into the spirit of the "Service Improvement Program" and offered many valuable suggestions. They showed a willingness to co-operate with the management in giving customers the best service possible. The result of this work, still being carried on, is reflected in better service to "L" riders.

Weekly Pass in Des Moines

Institution of a weekly pass to sell at $1.25 and good for any number of rides during the seven-day period following its purchase was announced by F. C. Chambers, president of the Des Moines City Railway, Des Moines, Iowa, effective Sept. 20. The passes will be sold by conductors on the cars. They can be used by any number of persons for successive trips. In other words, as President Chambers pointed out, a pass will take its bearer anywhere on any line on the system as long as he presents it within the prescribed time limit.

The weekly pass will be quite similar to the Sunday pass, which was instituted several weeks ago, and was recently extended to include holidays. Mr. Chambers stated that the company's favorable experience with the 25-cent Sunday pass prompted the proposed trial of the weekly pass.

Announcement of the pass has met with wide favor among regular street car patrons and from occasional riders. It was emphasized that persons who ride the cars twice daily six days a week at 10 cents a trip can for 5 cents additional secure unlimited transportation all over the city.

Mr. Chambers hopes that use of the weekly pass will stimulate passenger traffic in the "lean" hours and result in more continuous use of the company's facilities. The moving picture houses are already showing slides urging patrons to use the passes to visit the film shows.

New Proposition Made to Chautauqua Residents

The Chautauqua Traction Company, Jamestown, N. Y., and allied railway lines have submitted a proposal to Dr. Arthur E. Bestor, president of Chautauqua Institution, and Alfred C. Davis of the West Lake Association offering to sell the Chautauqua station for $25,000 and to lease all stations, tracks and overhead structures of the abandoned Chautauqua Traction line for the nominal sum of $1 a year to any corporation which the institution and the residents of the west side of the lake may organize.

The plan suggested by the traction company is that the organization formed by the institution and the west side residents construct a link between the old Chautauqua line and the company's Jamestown and Westfield lines. The cost of this link is estimated at $15,000. Also that either that organization should operate the cars or the Jamestown, Westfield & Northwestern Railway, one of the allied companies, would undertake to operate them for it.

Dr. Bestor said it seemed to him that the offer was no different from the one submitted last winter which was rejected by Chautauqua and property owners along the west side of the lake. He said that the institution was not interested in any proposition that involved a revival of the Chautauqua Traction line as a separate corporation, and that a line on the west side of the lake could not be operated without a loss unless tied up with the management of the Jamestown, Westfield & Northwestern Railway.

Early this year the Public Service Commission approved the petition of the Chautauqua Traction Company for permission to abandon its trackage between Mayville and Ashville.

Fares Reduced for Trial Period

A trial reduction of fare from 7 cents to 5 cents in local zones was put into effect on Sept. 1 by the Webster, Monessen, Belle Vernon & Fayette City Street Railway operating between Charleroi and Ellsworth and Charleroi, Monessen and Belle Vernon. Books of 100 tickets were sold for $5 and may be used by any member of the holder's family. The special rate will be tried during a period of 60 days, and will be made permanent if increased revenues justify the reduction.

Course in Accident Prevention at New York University

The first collegiate course in accident prevention will be offered this month at New York University, according to an announcement by Arthur Williams, president of the American Museum of Safety, which will also co-operate with the university. Because of the increase in the number of industrial and public accidents, and in response to the demand from all parts of the country for trained leaders in safety work, this university is planning to train many women for leadership in accident prevention. Mr. Williams said that the need now was for men and women with the qualities of leaders and organizers and with the training of safety engineers and public safety directors, such as would be offered by the New York University.

The course will be given under the direction of C. W. Price, vice-president of the Elliott Service Company, formerly general manager of the National Safety Council and director of safety International Harvester Company.

The subject matter is divided broadly into industrial safety and public safety.

Reconstruction Activities Continue at San Diego

The San Diego Electric Railway, San Diego, Cal., continues to express its faith in the future of electric railway transportation in San Diego by continuing reconstruction and rehabilitation of existing rail facilities and providing for extensions.

The Woolman Avenue extension has just been completed at a cost of nearly $70,000, adding about 1 mile of new track in paved streets. The company's standard type of construction in pavement, consisting of steel ties, concrete ballast, drain tile and heavy steel, was used on this work.

The company is now undertaking the reconstruction of the Imperial Avenue line, comprising 2,446 ft. of double track and totaling approximately 5,234 ft. of equivalent single track, including 146 ft. of crossovers and 196 ft. of branchoffs. Steel tie construction is also planned for this work, which is made particularly intricate on account of necessity of providing for considerable special work leading from the main line to the carhouse. This work is estimated to cost $75,000.

Report Against $2,000,000 Subway for Cincinnati

A report from Colonel Sherill, City Manager, recommending the city not to undertake construction of a subway for street cars under Broadway and East Fifth Street, as proposed last spring, has been referred by the City Council to its finance committee.

Colonel Sherill said in his report that the building of the subway from the Gilbert Avenue viaduct to Government Square had been investigated from three angles, an estimate of cost made by the Foundation Company, New York, a survey of its value as a traffic time saver by the railway and city street and traffic officials, and a research into the legal phases of the scheme.

The report on the cost placed it at $1,968,000. Colonel Sherill said that this amount showed that the subway would cost far more than its actual value to the city warranted. He said that the experts of the Cincinnati Street Railway estimated that the subway would save only four minutes in running time for street cars traveling from the Gilbert Avenue Viaduct to Government Square. It also was pointed out that the four lanes of traffic on the Gilbert Avenue Viaduct, even now a "bottle neck," would be reduced to two through the building of the street car entrances to the subway.

The running time for street cars over the route is from nine to thirteen minutes.

News Notes

Service Resumed in Walla Walla.— Following closely upon the discontinuation of the bus service by the Walla Walla Transit Company, Walla Walla, Wash., comes the announcement that the company will resume operation with small vehicles to replace the large buses which were put on the run last January. Lack of patronage was given as the reason for discontinuance of service. The Walla Walla Transit Company succeeded the Walla Walla Valley Railway early this year. The railway company was served with official notice on Sept. 3 that it would he held responsible for carrying out the terms of its franchise to the extent of removing or paving over the rails, which it has recently abandoned. The railway's franchise was not canceled by the city, officials stated; the city permitted it to be transferred to the Walla Walla Transit Company, which operated buses in the city. The situation in Walla Walla has been the subject of review previously in the ELECTRIC RAILWAY JOURNAL.

Rerouting Speeds Service.— Faster service was put in operation on Sept. 13 by the Minneapolis & St. Paul Suburban Railroad, Twin Cities, Minn., between St. Paul and Stillwater. This general speeding up was accomplished by rerouting in the St. Paul loop and installation of a siding in North St. Paul. Except from 4 to 6 p.m. the time will be shortened six minutes. This is a single-track line with passing tracks from the St. Paul limits eastward.

More One-Man Cars in Service.—The Western Avenue line at Toledo, Ohio, has been equipped with one-man cars remodeled in the shops of the Community Traction Company. Operation started on Sept. 15. It is estimated there will be an operating saving of about $12,000 a year under the new plan. This is the fifth Toledo line to be put on the one-man plan.

Subway Strikers Affiliate with Amalgamated.—Edward P. Lavin, leader of the recent strike of motormen and trackmen on the subway division of the Interborough Rapid Transit Company, New York, has announced that the Consolidated Railway Workers, as the strikers' organization was called, had become a branch of the Amalgamated Association, affiliated with the American Federation of Labor. One charter from the Amalgamated will be held to cover the entire Interborough system.

Fares Reduced in Texarkana.—The Southwestern Gas & Electric Company, Texarkana, Ark., is selling tickets at four for 25 cents for adults and children's tickets at three for 10 cents. This is a substantial reduction in the former rates when tickets for adults were 7 cents and those for children 4 cents.

Public Utility Course Open.—Under the terms of the will of the late George H. Leatherbee the course in public utility management at the Harvard Business School will be open without charge to properly qualified business men. The course, which will meet from 12 to 1 o'clock three times each week, will deal with the complex legal, economic and financial phases of public utility management. A study will be made of court and commission decisions showing the extent and method of public utility regulation, and later cases will be considered illustrating methods of marketing operation, finance and customer relations. Applications should be made in writing to the office of the school, 17 University Hall, Cambridge, Mass.

"Don't Get Hurt" Campaign.—The Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., is now conducting a "don't get hurt" campaign which is distinctly educational. The object is to spur the patrons of the road as well as the conductors and motormen to exercise such care as is necessary to prevent accidents. It is said that no other railway in the state has a more careful group of conductors and motormen than the company which serves the Lower Peninsula. However, the people at large are urged to learn the great lesson of self-reliance as a prerequisite to self-protection, and that is the lesson which the promoters of the "don't get hurt" campaign hope to teach to the patrons and operators.

New Fare in Effect.—The Binghamton Railway, Binghamton, N. Y., put into effect on Sept. 15 a readjustment of its fare zones, which means a reduction in fares between Binghamton and Endicott. The new schedule extends the present westbound zone from Binghamton to the Erie underpass at Westover, on which the fare will be 7 cents. The present western limit of that zone is Riverside Drive, Johnson City. By the change passengers will be able to ride from any point in Binghamton, Port Dickinson or Hillcrest to the Erie underpass for 7 cents. At the present time it costs 14 cents. The Endicott zone will extend from Floral Avenue to West Endicott and a cash fare of 7 cents will be charged. The return trip ticket now costing 15 cents will be abolished. At present it costs 29 cents to ride to Binghamton and return to Endicott. The Public Service Commission will call a hearing on the proposed new schedule.

Foreign News

Brisbane Has Deficit After Fixed Charges

The Municipal Tramways of Brisbane, Queensland, reports a net revenue from operation during 1925 of £142,926. After the amounts required for interest (£80,514), sinking fund (£15,358), depreciation (£59,439), and amortization (£14,000) are deducted from the net revenue, the debit balance for the year is £26,395. Operating revenues and expenses for the last three years are given in Table I.

The property was taken over from the Brisbane Tramways, Ltd., on Dec. 31, 1922, for £1,400,000. Since that time the Court of Industrial Arbitration has increased the wages and holidays and reduced the working hours of the staff to the equivalent of and addition of £40,000 per annum. More service has been installed, but there has been no increase in fare for six years and then only the establishment of a minimum 2d. fare on Sundays and holidays. Table II shows a comparison of capital spent and net earnings in Brisbane and other cities in Australia, as given in the Brisbane report. This report says that after provision for sinking fund, depreciation account, etc., is made, each of the four other cities shown in the table would have reported a larger deficit than Brisbane.

During the year 26 new cars were added. The present standard is center entrance car, somewhat like the "California" type, with a closed compartment at each end and open compartment with six stationary benches in the center. These benches are arranged in groups of two, back to back. This car seats 64 passengers and weighs 507 lb. per seat. Steel tired wheels are now used exclusively. At the end of 1925, the system comprised 85.5 miles of track and 50.3 miles of route. The tramways still have to do a large amount of paving, although they have no income tax to pay.

Considerable space is given in the report just issued to the motor bus situation in Brisbane. During the year 11 buses were purchased. In addition, at the end of the year, 40 private buses were operating in Brisbane. In an appendix to the report G. R. Steer, general manager tramways department, discusses at length the relative merits of buses and trams in city service.

In this statement Mr. Steer quotes various authorities, including articles in the ELECTRIC RAILWAY JOURNAL, on the place of the bus in city transportation service. He also gives figures on the cost of bus operation from Melbourne and Adelaide, the only other cities in Australia where buses are operated by the tramway authorities and operating reports are available. In Melbourne, 44 buses for the year ended June 30, 1925, showed a profit of £3,224 without any charges for interest and depreciation. In Adelaide, with 40 buses, the loss from March 25, 1925, to Jan. 31, 1926, was £8,820, including all charges. The conclusion of Mr. Steer is that for the present at least "neither trackless trams nor motor buses can cope with the growing traffic of Brisbane as well as large electric tramcars of modern design."

TABLE I—OPERATING REVENUES AND EXPENSES 1923-1925

	1923	1924	1925
Operating revenues	£628,841	£663,747	£706,520
Operating expenses	£443,885	£536,989	£563,604
Net revenue	£184,956	£126,758	£142,916
Operating ratio, per cent	70.59	80.90	79.77
Passengers carried	74,721,594	78,367,194	82,514,979
Car-miles run	5,212,971	5,457,800	5,915,844

TABLE II—INVESTMENT, NET REVENUE AND THEIR RATIO, VARIOUS AUSTRALIAN CITIES

	Capital Spent	Revenue Net	Ratio Net Revenue to Capital*, per Cent
Brisbane	£1,690,130	£142,916	8.46
Sydney	7,713,143	506,843	6.57
Melbourne (electric)	3,242,485	106,519	3.29
Adelaide	2,563,568	164,688	6.42
Perth	932,317	45,604	4.89

*Before deduction of interest on investment, sinking fund payments or depreciation.

TABLE III—TRAFFIC STATISTICS, VARIOUS AUSTRALIAN CITIES

	Per Car-Mile				Operating Ratio, Per Cent
	Operating Revenue d.	Operating Expenses d.	Net Revenue d.	Passengers Carried	
Brisbane	27.52	22.86	4.66	13.95	79.77
Sydney	26.45	21.87	4.58	10.40	82.66
Melbourne (electric)	21.36	18.50	2.86	9.54	85.91
Adelaide	20.77	15.12	5.65	8.78	71.71
Perth	22.23	18.63	3.60	9.50	83.81

Recent Bus Developments

Additional Buses Acquired by San Diego Electric Railway

Due to increasing traffic on existing bus lines and contemplated extension of one such line into outlying residential districts, together with recent inauguration of feeder service on another rail line, the San Diego Electric Railway, San Diego, Cal., has found it necessary to add to its bus equipment and has just received three new Fageol Safety Coaches, making a total of thirteen Fageols and two Dodge-Grahams in the city fleet.

The company now operates one route completely by bus, with terminus in the downtown business district, with transfer privileges to the rail lines, and in addition maintains three feeder lines to rail lines and one line serving new territory, but connecting with three converging rail lines about midway to the business district. All of the bus operations are conducted as a part of the rail system, at identical rates of fare, with transfer privileges. The fares, however, are based on the zone system, so that in some instances bus extensions automatically create another fare zone, bringing in more revenue in addition to increasing the business to the existing rail lines.

New Minneapolis Bus Service Starts Oct. 1

Due to delay in getting electric equipment for the gas-electric buses which it is to put into service in Minneapolis, Minn., the Twin City Rapid Transit Company will postpone operation of these buses until Oct. 1. The chassis are being made in Chicago and the bodies in Minneapolis. The new line will cover the territory from Bridge Square to Hennepin Avenue and 36th Street. Supervision of the other proposed routes is a duty of the park board, which has not yet acted upon the application for extension of this line over parkways. Other buses will be put in operation in the fall to Bryn Mawr, on 38th Street and Lowry Avenue, as extensions or connections of existing electric lines.

Further Entanglements in Buffalo Bus War

Municipal bus lines of Buffalo, N. Y., are operating at a daily deficit, according to a report submitted to the City Council. The original appropriation of $10,000 has been exhausted, and while there was $2,315 in the treasury on Sept. 15, bills aggregating more than $4,000 remained unpaid, for which Mayor Frank X. Schwab, sponsor of the municiapl buses, said he would ask the City Council for another appropriation. From July 12, when the first buses were placed in service, until Sept. 13 total receipts aggregated $8,494. On the basis of the 8-cent fare, this indicates that upward of 10,000 persons were carried on the lines.

Other members of the Buffalo City Council, indicating their opposition to Mayor Schwab's plan of municipal buses, said they would refuse to approve another appropriation because they claim the operation of municipal buses is illegal and they feared the expenditure of public funds for an illegal enterprise would result in prosecution and the added probability that they would be called upon personally to repay this money into the city treasury.

The bills submitted to the City Council revealed for the first time that Mayor Schwab has a contract with John C. Montana, who operates interurban and sightseeing buses from Buffalo, to pay him $50 per day per bus. The White Motor Company presented a bill for $4,354. The Ohmer Fare Register Company was paid $380 for fare-recording machines.

When Mayor Schwab found that other members of the City Council opposed continuation of the service, which is in direct competition with that furnished by the International Bus Corporation, a subsidiary of the International Railway, he called a conference in his office in the City Hall of individuals who might be interested in organizing a new bus company to take over the management of the city-operated machines. A few responded and the Mayor said a company is soon to be incorporated to operate single-deck buses over several routes providing the necessary consents can be obtained. The Mayor assured the prospective investors that he would see that they received a franchise from the city.

City-Wide Bus Proposals Favored in New York

Board of Transportation Files Sixth Report on 106 Petitions from 72 Applicants—Only Four Bidders Would Cover Metropolis with Lines—Street Railways Severely Criticised

THE Board of Transportation submitted a 1,088-page report to a special meeting of the Board of Estimate of New York on Sept. 15 on the proposal to award bus operation franchises to private corporations. The report makes only two definite recommendations of prime importance. They are, first, that the franchise be awarded only to a corporation of great financing ability and for city-wide operation only, and, second, that there be strict adherence to the 5-cent fare principle, with a possible charge of 2 cents for transfers.

On the basis of the present bids the Board of Transportation indicated that the offer of the Equitable Coach Company was the most favorable in that it is the only one that comes anywhere near meeting the rigid conditions, but the way is left wide open for further negotiation with other concerns eager to enter the bus transportation field.

The report was presented by Commissioner Ryan. It was referred to the committee of the whole without comment. The next step to be taken in the consideration of the report by the Board of Estimate and Apportionment will be to determine which, if any, of the proposals is acceptable, then adopt a form of contract or franchise and advertise it for fifteen days prior to a date for a final vote by the Board of Estimate on the granting of the franchise.

Concerning the Fare

Regarding the 5-cent fare a summary of the report said:

> After reviewing all the proposals made and analyzing them minutely, the board concludes that bus operation can be maintained on a 5-cent fare. This conclusion is sustained by the fact that the Fifth Avenue Coach Company, the New York Railways and the Third Avenue Railway system, through their subsidiaries, have recently amended their original 10-cent fare proposals and now seek franchises to operate at a 5-cent fare.

Only four concerns applied for franchises to operate in all boroughs except Richmond. They were the Equitable Coach Company, the Union Bus Corporation, the Borough Motorbus Company, Inc., and the Service Bus Corporation. In its comment on the Equitable bid the commission said in part:

> The two essential requisites of financial responsibility and practical experience appear to be combined in support of this application.
>
> The initial rate of fare is universally 5 cents on all routes in the four boroughs. The proposal to divide ten long routes into 5-cent zones, out of 67 routes in the four boroughs, is superior in this respect to the proposals of existing transportation corporations.
>
> The proposal to charge 2 cents for transfers will affect one-tenth of the passengers, if the experience of street railroad operation is duplicated on bus routes.
>
> The possession of a fleet of 895 double-deck and single-deck buses will permit flexibility of operation and the adjustment of service according to necessity in rush hours.
>
> The supervision and regulation of service would be simplified by having only one company to regulate.
>
> Unity of ownership and management at the beginning of extensive bus operation in this city will avoid the baffling problem of ultimate unification which has for several years been the objective of state laws and state regulatory agencies in respect to other forms of city passenger transportation facilities.
>
> The possibility of a repetition of the financial manipulation of city franchises by means of mergers and purchase of stock control of transportation companies, attended in the past by corruption and scandal, and by loss in investors, will be minimized if only one franchise is granted and there are not several bus companies to merge.
>
> The recapture of one city-wide franchise and operating equipment will be much simpler and more satisfactory than the acquisition of a number of enterprises and a dissimilar variety of equipment, if or when the city should find it in the public interest to terminate private operation or to consolidate surface and rapid transit facilities.
>
> With one franchise holder operating in several boroughs the ability to provide interborough operation across the bridges

connecting the boroughs will be increased with resultant possibility, if deemed advisable, to connect traffic centers of different boroughs.

Taking up the various proffers of borough-wide, or less than city-wide operation, the report says of the bid of the Manhattan Surface Coach Company, affiliated with the New York Railways, the corporation operating the greater part of the surface railway lines in Manhattan:

1. The combination of the New York Railways and the Fifth Avenue Coach Company assures adequate financial resources for installation of bus operation.
2. Experienced operators of transportation facilities would be in charge of operation.
3. Two transfer points of limited usefulness would be added to the bus system.
4. Unnecessary and duplicate street car transfer points are included, many of which would be detrimental to service and would promote traffic delay on overcrowded avenues, which would probably result in the discontinuance of such transferring after the franchise is granted.
5. Bus routes are excessively zoned, thus nullifying much of the benefit of an initial 5-cent fare. The zoning plan is less advantageous than proposed by other applicants.
6. The amount of compensation offered to the city is the lowest offered by any applicant.
7. The limitation upon the right of the city to recapture is unacceptable.
8. The complication of the affairs of this bus system with the transportation affairs of Chicago and St. Louis is not desirable.
9. The remoteness of financial responsibility, extending through four intermediate holding companies to a fifth holding company incorporated in Delaware and located in Chicago, suggests a possible recurrence of the financial manipulation that has heretofore resulted in federal receiverships.
10. The history of the New York Railways and its predecessors does not inspire confidence in its financial methods, and the recent acquisition of its capital stock by a subsidiary of the Omnibus Company of Chicago resembles the manner in which the previous combinations of street railroads were organized in this city, all of which have failed with disastrous results to investors and the traveling public.
11. The lesson from past experience indicates that the city should discourage and not sanction a further duplication of transportation holding companies, and should endeavor to secure the cancellation of existing perpetual franchises in return for new limited franchises.
12. This proposal is important, but is not the best of those now pending before the board for the operation of the new bus system. The change from street cars to buses as equipment for Sixth, Seventh, Columbus and Lenox Avenues may be consummated without involving the new bus system with the tangled affairs of the street railways, and as a separate matter deserves its serious consideration.

Fare Raise Again Opposed

Concerning the request of the New York City Omnibus Corporation, which also involves a combination of the Fifth Avenue Coach Company with the New York Railways, the Board of Transportation declares:

Desirable as it is to bring about the cancellation of perpetual franchises and the removal of street car tracks from some of the central avenues of Manhattan, the proposal of the applicant to impose all the debt of outworn and unprofitable street car lines upon the new bus system, and to charge a double rate of fare merely for the purpose of supporting this excess burden is not deemed to be in the public interest.

To the extent that the application proposes the installation of buses, the plan of routes would provide a well-articulated bus service, which could only be instituted with the consent of the street railroad corporation that holds franchises on the avenues included.

Examination of the fare and transfer proposals will demonstrate that passengers on the new bus lines will gain nothing. A substantial financial gain would probably be realized by both the corporate partners, (a) by preserving to the Fifth Avenue Coach Company all of its existing lines operated under temporary permits and thus maintaining the present value and profits of its existing 10-cent fare perpetual bus franchises; (b) by providing for full payment of outstanding indebtedness of street car lines that are not profitable, and enhancing the value of other perpetual street railroad franchises owned by the New York Railways.

This applicant offers to pay the city 2 per cent of its gross revenues from new bus lines.

Right of recapture by the city is to be for municipal operation only.

There are more advantageous proposals pending before the Board of Estimate and Apportionment.

An individual bid made by the Fifth Avenue Coach Company for Manhattan service is condemned in these words:

The rate of fare is higher, the cost of transfers is greater, and the compensation offered to the city is less than other responsible applicants offer, and, therefore, the proposal is deemed to be unacceptable.

Of the Manhattan service bid put forward by the Surface Transportation Company, a subsidiary of the Third Avenue Railway, the board recorded this verdict:

The scheme proposed by this applicant does not conform in any way with the city plan for a co-ordinated system of bus routes that would be a substantially extensive and useful addition to existing transit facilities, for which proposals to operate were invited.

Not being in accord with the city plan, and not being an alternative that would increase transit facilities where and as they should be increased, this proposal is inferior to any other that accepts the city plan.

This company has been particularly active in agitation, and its recent letters stating that the convenience of the people would be best served by its proposal of a 10-cent fare and transfer to street cars are more extensively discussed in the analysis of its application for a franchise in the Borough of the Bronx which it has most strenuously agitated in behalf of the 10-cent fare policy.

Of the Bronx offer filed by the Surface Transportation Corporation, the report says:

1. Excessive and unnecessary zoning of routes No. 3, No. 4, No. 9 and perhaps No. 6 and No. 11 is suggested as an alternative to the original proposal to charge a 10-cent fare on these routes.
2. Curtailment of route No. 11 at the Bronx side of the Harlem River will be detrimental to the service which this route could afford if extended over 181st Street Bridge to the vicinity of 181st Street rapid transit station and business locality.
3. The amendment to the original application, except as to excessive zoning, has made this proposal one of the best as to Bronx operation only.
4. Indefinite and uncertain statements about zoning and transfers are not convincing when offered by experienced street car operators, particularly when all other applicants and investigators can readily determine suitable points of zoning. The evasion of the inquiry on these points does not inspire confidence that applicant will grant any privileges that it can avoid.
5. The argument that a 10-cent fare is more beneficial to the traveling public than a 5-cent fare cannot be sustained.
6. The contention that any benefit will accrue to the general public by the so-called co-ordinated system of street cars and buses is contrary to the fact unless a 5-cent fare is established on buses and free transfers issued to and from buses and street car lines.
7. Two-thirds of all pasengers on street cars in the Bronx do not transfer, but the applicant contends that it is beneficial to the public to charge double fare to two-thirds of passengers so that one-third can get free transfers.
8. The persistent effort to maintain a predominance of its railroad interests does not encourage belief or confidence that it would develop bus service to its full capacity or usefulness, and is an indication that an independent bus service would be more beneficial to the traveling public if adequately financed.

In its survey of proposals for Brooklyn operations the board made some drastic observations upon the application filed by the Coney Island & Gravesend Bus Corporation, the bus subsidiary of the Brooklyn-Manhattan Transit Corporation. It said:

The plan of routes proposed by this applicant is not in accord with the plan adopted by the Board of Estimate and Apportionment for a co-ordinated bus system, but as designed will not only dismember the city system into disconnected parts, but will also effectually prevent the establishment of any future bus system, there being no other available streets that are not covered by street car franchises.

The transfer privileges are so restricted as to be only equivalent to the bus transfers eliminated, and the traveling public gains nothing by a so-called co-ordination of street car lines and bus routes.

The threat of the applicant to legally contest the right of the city to grant bus franchises on streets where there are no car lines, and continue such bus routes to appropriate terminals at points of concentration of traffic, will, if carried into effect, determine whether the railroad corporations own all the public streets, settle many disputable questions about the alleged rights of public utility corporations, and prepare the way for legislation to relieve the city of any disabilities that may be revealed by such litigation. For example, if the law requiring that a certificate of convenience and necessity be obtained from state authorities as a prerequisite to the validity of a franchise grant can be construed as a prohibition against the establishment of additional service to the public on streets not named in existing franchises, the knowledge of such a condition will arouse public sentiment to demand the repeal of such a law.

The history of organization, merger, consolidation, and management of Brooklyn street railroads is a record of financial manipulation, receiverships, reorganizations and more receiverships, possible only by the possession of a multitude of perpetual franchises. It seems essential that the new method of bus transportation should be organized in such a manner that independent operation will be at all times possible, and that by issuance of short-term franchises any attempt to involve the new grants in another manipulation of securities will be discouraged.

Insists on Unified Operation

In presenting in the report arguments favoring comprehensive, city-wide and unified operation over four boroughs, the Board of Transportation declares that:

This latest investigation has strengthened the opinion previously expressed in omnibus reports that segregated operation of single routes is less advantageous to the public than more comprehensive operation, and to grant franchises for detached routes would be to dislocate the plan for co-ordinated service, result in a multitude of franchises and preclude the establishment of a comprehensive service.

A summary of the arguments favoring unified city-wide operation in four of the five boroughs is as follows:

1. One company could more effectively utilize a large number of omnibuses and provide a more comprehensive and adaptable service than a number of small units, because the inclusion of all routes in one franchise would enable the operation of equipment wherever and whenever and in the quantity that traffic necessity requires.
2. The largest amount of traffic moves from the outlying residential districts toward the terminal districts between the hours of 7 and 9 in the morning and in the opposite directions between 5 and 7 in the afternoon. During the intervening hours the heaviest traffic occurs in the terminal districts. On Saturday afternoons, Sundays, holidays, and during evening hours, the business districts are practically deserted, and the greatest amount of traffic moves toward places of recreation.
3. One company could mass the bulk of its equipment of 900 motor buses anywhere, but the limited equipment of each of several units would be restricted to operation within its local territory.
4. The four boroughs of Manhattan, Bronx, Brooklyn and Queens, being linked together by bridges, are in reality homogeneous territory for vehicular traffic and all passenger transportation service.
5. The pooling of the revenue of the most desirable and the less desirable routes will be beneficial to outlying sections of the city by making possible better service

than those sparsely settled localities could otherwise obtain.

6. One company would be under better control by regulatory authority than would several companies, because larger resources in the form of equipment would make the adjustment of service to traffic necessities much less difficult than such adjustment of small units by several owners.

7. The subdivision of the city into several franchise territories would create legal obstacles to future routing of additional service lines over important highways leading to terminal districts, similar to those which the city now encounters by reason of the existence of numerous street car franchises. The future re-location of lines of service so as to best adapt them to traffic needs will be much easier to accomplish under one franchise.

8. By the grant of one franchise the expansion of service according to the development of growing communities could be attained without conflict over franchise routes and at least expenditures for additional equipment.

9. The grant of franchises to several companies will result immediately in the creation of an incentive toward consolidation and the manipulation of stock and bond issues that have attended all previous consolidations and reorganizations of transportation companies in this city.

10. The overhead expense of one company must neccessarily be lower than the combined overhead of several companies each with its officers, directors, attorneys, etc., and quantity purchase of equipment and supply will reduce overhead as well as operating expense.

11. It will be simpler and easier for the city to recapture or terminate one franchise than several franchises, if municipal operation or unification of transit facilities becomes desirable.

In the certificate of incorporation of the Equitable Coach Company, which was filed with the Secretary of State Nov. 19, 1925, the name and residence of each incorporator and the number of shares each had agreed to take were stated as follows:

Percival E. Cowan, 157 West 105th Street, one share; Oswald L. Johnston, 506 West 111th Street, one share; Fifield Workum, 59 East 82d Street, one share; Harrison S. Dimmidd, 229 Waverly Place, one share, and Ralph E. Stone, 538 West 114th Street, one share.

The incorporators were named as the directors for the first year. Percival E. Cowan, as president, signed the certificate of incorporation and Mr. Dimmidd attested the instrument as secretary.

The J. G. White Management Corportion is prepared, it is understood, to finance the Equitable if that corporation should be successful in obtaining a city-wide bus franchise.

A summary of the extent of the bus routes recommended by the Board of Transportation covered in the bids on which the Board of Transportation reported is as follows:

MANHATTAN

Total mileage all routes	52.9
Average mileage all routes	4.4

BRONX

Total mileage all routes	57.4
Average mileage all routes	4.4

BROOKLYN

Total mileage all routes	81.9
Average mileage all routes	4.4

QUEENS

Total mileage all routes	95.4
Average mileage all routes	4.1

Comptroller Charles W. Berry declared on Sept. 16 that he was not committed to a city-wide system. Although he said he had not taken any position in favor of awarding franchises by boroughs, his remarks indicated that he considered this still a possibility, despite the Board of Transportation's report. The report is understood to be satisfactory to Mayor Walker, who has been inclined all along to favor a city-wide system, but there is great doubt that a majority of the other members of the Board of Estimate agree with him. Mr. Berry said:

> I am not going to let the Board of Transportation do my thinking for me. A thousand-page report on applications for bus franchises was laid before the Board of Estimate at its meeting Wednesday, and surely no one can expect me to have read it, much less studied it, by this time. But I see by the newspapers that the report favors the city-wide bus franchise petition of a certain company, but the report says nothing, I understand, of the persons who are behind that particular application. I am not committed to the city-wide proposition, nor have I yet taken a stand as to a separate bus system in each of the five boroughs of the city. No doubt good arguments can be made for both these plans.

Mr. Berry indicated that he believed some of the proposed routes, as laid out by the Board of Transportation, might lead to litigation by surface line companies on the ground that they would compete with existing surface lines. He expressed surprise that the B.-M. T. offer to establish a bus system in Brooklyn had not received more consideration, and said he would stick to his demand for a seat for every passenger, which he expressed several weeks ago.

Another Bus Line for Oakland

Plans for a bus line between downtown Oakland and the Berkeley boundary to supplement the Telegraph and Shattuck Avenue railway service, submitted by the Key System Transit Company, have been accepted by the Oakland City Council.

The Council authorized the company to commence the service immediately for a six months experiment. At the end of this period the bus line may be withdrawn at the option of the company.

By restricting railway stops in a zone between Alcatraz Avenue and Twentieth Street, the company has promised to cut several minutes from the running time between Berkeley and Oakland. The buses will run on a regular stop schedule from Eleventh and Broadway to Alcatraz and Telegraph Avenues.

The plan just approved is identical with one submitted to the City Council several months ago. At that time it was held to be in conflict with the city ordinance permitting bus lines to be operated only as feeder or extensions to car lines.

Decision Rendered in Yonkers

The application of the Yonkers Railroad for an injunction pending trial restraining the city of Yonkers, N. Y., from selling fifteen bus routes at auction was denied on Sept. 13 by Supreme Court Justice George H. Taylor, Jr.

The railway contended that the proposed sale was illegal and prejudicial to its rights in Yonkers. It also alleged that the auction had been so arranged as to prevent the Yonkers Railroad from bidding for the proposed routes, some of which, it was contended, create illegal competition by paralleling the trolley routes.

The court held that all the objections were insufficient to warrant injunctive relief.

On Sept. 15 the court as a further move in the matter denied the application of the Yonkers Railroad for a stay to prevent the Yonkers Aldermen from awarding to the highest bidder franchises to operate fifteen bus routes in that city. Alfred T. Davison, counsel for the corporation, made the application because, he said, the company was going to appeal to the Appellate Division from the decision of Justice Taylor. The company has announced it will fight to the highest court against outsiders getting the bus franchises.

Union Station in Prospect.—Independent bus owners as well as electric railways operating buses have agreed to build a union bus station in Madison, Wis., providing a part of the recently introduced Williams bus ordinance is not enforced until Jan. 1, 1928, as they will be unable to have the station built before that time. If the Common Council will accept this modification and the ordinance becomes a law the bus station controversy will be disposed of. The proposed ordinance provides that buses will not be permitted to stand on any street for a period longer than is required to load or unload passengers. At present the downtown streets are used as stations by the bus lines, which practice has long been unpopular because of the part it plays in adding to the city's growing traffic congestion problem.

Improvements for Sightseers. — The Colorado Springs & Interurban Railway, Colorado Springs, Col., as the parent organization of the Gray Line Motor Tours Company, operating in the Pike's Peak country, is understood to be planning to use glass-topped buses for sightseeing purposes next season. This method will protect passengers from the wind and dust, but will permit unobstructed view of the wonderful canyons.

Bus Service Extended.—The bus operations of the Madison Railways, Madison, Wis., have again been enlarged. With bus lines already operating to the suburbs of Nakoma, Wingra, Tenney Park and Elmside, the company has installed another line to the rapidly growing suburb of Shorewood. Four trips will be made daily to this suburb.

New Service With School Opening.—Special bus service to and from the new Girls' High School in Atlanta, Ga., was instituted on Sept. 7 by the Georgia Railway & Power Company with the opening of school. The new service has been arranged to overcome the difficulty on the part of north side students, who last year were compelled to transfer once and sometimes twice to reach the school from their homes over the regular railway routes. Two trips will be made by the buses, which will form a special "High School" train, one in the morning going to the high school and one in the afternoon, at the close of the session, returning from the high school. It is the plan of the company to continue the system each year during the school term.

Financial and Corporate

Narragansett After Railway Plant

United Railway Company's Power System Included in Plan to Coordinate Utilities in Providence

Utility developments in Rhode Island took a new turn during the week ended Sept. 18 in the shape of an offer by the Narragansett Electric Lighting Company, Providence, to purchase the power plant, transmission lines and substations of the United Electric Railways for cash to be used for the retirement of the latter's bonds, and so to operate this equipment in conjunction with its own plant for twenty years as to realize the economies which could be obtained were the companies merged. As a result of the presentation of the Narragansett plan, the proponents of the Rhode Island Public Service Company merger plan, who are identified with the banking house of Bodell & Company, Providence, agreed to postpone until Oct. 15 the time required for depositing Narragansett stock in connection with their program for consolidation, this action being taken at the request of the directors of the railway.

In a letter to the railway dated Sept. 8, E. A. Barrows of the Narragansett company said that it was felt all of the advantages resulting from such a purchase could be secured without the merger of the two companies or the loss of their separate corporate identities. He said there is a widespread feeling on the part of his shareholders and the public against a merging of the two companies. He then continued in part:

All of the economies possible under a merger can be effected through a more simple and direct method without any of the attendant disadvantages. We are, therefore, prepared to enter into negotiations to purchase your power plant, transmission lines and substations for cash, to be used for the retirement of your bonds, and so to operate same in conjunction with our plant, for a period of twenty years, as to realize the economies which could be obtained if the companies were merged; and will give you, until you are able to share the benefits with us, all the advantages of such operation with respect to the electricity purchased by you that are possible to be obtained without detriment to our customers or shareholders.

We are submitting herewith a tentative plan which we think conforms to the above principle. The effects of this plan, based upon the information now available, are as follows:

1. There would be retired immediately United Electric Railways bonds of the principal amount of from $5,000,000 to $6,000,000.

2. Beginning one year after the plan becomes effective, there would be retired United Electric Railways bonds, increasing from about $225,000 principal amount, the first year, to $4,700,000 by the end of the twentieth year.

3. At the end of the contract period of twenty years there would be outstanding approximately $3,270,000 principal amount of United Electric Railways bonds instead of $14,012,300 principal amount now outstanding.

4. Beginning one year after the plan becomes effective the approximate annual interest savings to the United Electric Railways would be as follows: $11,000 the first year, $23,000 the second year, $57,000 the fifth year, $85,000 the tenth year and $235,000 the twentieth year, with corresponding increases during the intervening years.

5. In addition to the interest saving shown above, there would be an operating saving to the United Electric Railways estimated at from $41,000 to $91,000 a year after providing for the retirement of bonds as set forth in subdivisions 1 and 2 above.

6. The interest and operating savings enumerated in subdivisions 4 and 5 will inure directly to the stockholders of the United Electric Railways and the riding public. These annual savings with the initial and subsequent annual retirement of bonds will, we believe, greatly enhance the value of the stock.

The above figures relative to the retirement of bonds and the saving in interest charges are based upon purchasing bonds initially and during the 20-year period of the contract at prices at which we have assumed they might be purchased.

The services of Day & Zimmermann, Inc., have been engaged to make a thorough investigation of the plan and to report as to its effect upon the United Electric Railways, the Narragansett Electric Lighting Company, the railway company bondholders and the shareholders of both companies and their patrons and customers, and to give their opinion as to whether the plan conforms to the principle set forth in the letter.

The tentative proposal has the approval of the board of directors of the Narragansett company. To make it effective will require the approval of the security holders of both companies and of the Public Utilities Commission, and it is made, of course, contingent upon such approval.

A cash offer of $86 a share for Narragansett stock payable immediately upon presentation of certificates was made on Sept. 16 by Bond & Goodwin, Inc., Boston, with whom arrangements for the stock purchase have been made by the Rhode Island Public Service Company. This offer is not contingent upon the success of the proposed merger of the lighting and railway companies through the medium of the Public Service Company, but is an alternative to the original plan announced. All stock so purchased by Bond & Goodwin will be deposited under the plan and agreement to merge when such deposit is sufficient to make the plan effective both as to the Narragansett and the railway companies. Sept. 25 was fixed as the time limit on the Bond & Goodwin offer.

Receivership Sought for Iowa Property

Application for receivership for the Mississippi Valley Electric Company, demanded by stockholders, was granted on Sept. 11 by Judge Ralph Otto of the Johnson County District Court. Henry Negus, Iowa City Attorney, was named receiver with instructions to continue the operation of the three street railway properties involved. The Mississippi Valley Electric Company is the holding corporation for the Iowa City Electric Railway, the Fort Madison Electric Company, both in Iowa, and the Mankato Electric Railway, Mankato, Minn. Inroads on railway passenger traffic made by automobiles and buses were declared to be mainly responsible for the lack of patronage which brought on the receivership. Both of the companies in Iowa used a limited number of buses.

New Angle to Seattle Tax Case

The Puget Sound Power & Light Company, Seattle, Wash., has moved to collect an additional sum from the city in the street railway tax suit which has been pending in the courts for several years. Its idea for an additional sum is based on a rule of the Circuit Court which permits a respondent an additional 10 per cent where an appellant appeals "to cause delay." If the company is successful, the city would have to pay $500,000 plus 10 per cent, or $550,000. In the street railway case, the company asks that the city pay three-fourths of the 1919 tax on the street railway. Ownership was changed from the company to the city in that year, and as the city had possession of it for nine months, the company declares, it should pay three-fourths of the tax, which the company was required to pay, under protest, to King County. The company recently won a decision in the United States Court and the city appealed to the United States Circuit Court of Appeals. The amount of the 1919 tax was about $650,000.

Short Abandonment in Amsterdam Approved

The Public Service Commission on Sept. 3 approved the application of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., for permission to abandon part of its railway lines in the city of Amsterdam. The part to be abandoned consists of 2.08 miles of the so-called Hagaman line on Forbes Street-Vrooman Avenue and other streets, all within the city.

In the memorandum accompanying the order in this case the commission stated:

As has been said by this commission in other cases, it is the duty of the commission to protect the interests of the public. The desire of the persons residing in the section traversed by this portion of the line to keep it in operation, however, is best evidenced by the patronage given it.

Proposals to abandon portions of railroad lines because of continued financial losses resulting from operation have been passed upon by the courts on many occasions. Where it has been shown that the continued operation of an unprofitable branch or portion of line would tend only to exhaust the resources of the road as a whole, abandonment has been permitted.

Omaha Bondholders Act to Protect Franchise Rights

The City Council of Omaha, Neb., has refused to retain John P. Breen as an assistant to City Attorney Van Dusen in the litigation in the federal court brought by the Guarantee Trust Company, New York, representing the bondholders of the Omaha & Council Bluffs Street Railway, to restrain the city authorities from granting permits to bus companies to operate in competition with the railway. It will be recalled that the state Supreme Court decided that these were not franchises requiring a vote of the people but a

license that the Council might grant or refuse.

The Council now stands enjoined by the federal court from taking the favorable action it indicated it would do with the buses, and the case, in the present crowded condition of the federal court calendar, will not be reached for six months. The petition has been drawn sufficiently broad to cover franchise litigation as well as bus rights, the refusal of the voters to extend the present railway franchise making that important to the bondholders.

Operating Income Lower on Boston & Maine Electrics

Operating income of the electric railways under the Boston & Maine Railroad supervision for the year ended Dec. 31, 1925, was $17,154, against $33,235 for a similar period ended the year previous. This fact was disclosed in the ninety-third annual report of the Boston & Maine. The electric properties included in the steam railroad system were the Portsmouth Electric Railway, operating from Portsmouth to Hampton, N. H., a distance of 14 miles, and the Concord Electric Railways, operating from Concord to Manchester and Penacook, N. H., a distance of 28 miles. The Portsmouth Electric Railway discontinued operation on May 17, 1925. The accompanying table shows the results of operation by these properties.

RESULTS OF OPERATIONS OF ELECTRIC RAILWAYS OF BOSTON & MAINE

	Year Ended Dec. 31, 1925	Year Ended Dec. 31, 1924
Revenues:		
Passenger	$202,535	$263,528
Freight	60	167
Mail	270	428
All other revenue	11,086	11,081
Total revenues	$213,951	$275,204
Operating Expenses:		
Total maintenance of way and structures	$25,635	$32,039
Total maintenance of equipment	$32,775	$47,945
Total power	$26,842	$37,042
Total traffic	$300	$489
Total transportation	$63,894	$83,315
Total general and miscellaneous	$21,994	$16,319
Total operating expenses	$171,443	$217,151
Net revenue	$42,507	$58,052
Tax accruals	25,353	24,817
Operating income	$17,154	$33,235

Doherty Interests Get Lake Shore Power

Ownership of the Lake Shore Power Company, carrying with it the control of the Toledo & Indiana Railroad, an interurban line between Toledo and Bryan, Ohio; the Toledo & Indiana Transportation Company, bus operating unit, and the Toledo & Indiana Building Company, owning the Toledo terminals of the electric line, has been purchased by Henry L. Doherty & Company.

It is anticipated that the power company will be linked up with the Toledo Edison Company, which serves territory both north and south of the Toledo & Indiana territory.

Future status of the railway is not yet determined. For the time being both units will continue to operate as at present.

Officers of the Lake Shore Power Company are Charles T. DeHore, president; Marion M. Miller, Toledo banker, treasurer, and LeRoy E. Eastman, secretary.

Officers of the Toledo & Indiana Railroad are L. G. Van Ness, Cincinnati, president; Charles T. DeHore, vice-president, and H. C. Warren, general manager.

President Van Ness and his associates also operate the Maumee Valley Transportation Company, a bus line which supplanted the former electric belt line operating on both sides of the Maumee River connecting Toledo with Maumee and Perrysburg, up-river suburbs.

Acquisition of the Toledo & Indiana line is the third electric railway purchase made by the Doherty interests here largely for development of the power distribution system in the Toledo territory. The Toledo & Western line and the Northwestern Ohio Railway were the two other railway properties whose power business was segregated and taken over by the Toledo Edison Company.

Change Proposed in Savannah Stock Set-Up

Stockholders of the Savannah Electric & Power Company, Savannah, Ga., which is part of the Engineers' Public Service System, a Stone & Webster, Inc., organization, will vote on Oct. 7 on a proposal to divide common stock on a four-to-one ratio and to place it on a no-par basis, and also to increase the authorized amount of first preferred or debenture stock.

It is proposed to change the present 25,000 shares of $100 par common stock into 100,000 shares of no-par stock and to give four new shares for every one of old held; to increase the number of common shares from 100,000 to 200,000; to increase from $1,800,000 to $2,300,000 the present amount of first preferred or debenture stocks, and to authorize directors to sell all or part of the new common or preferred stock.

Of the new common stock, 33,334 shares would be sold at $18 to Engineers' Public Service. The $600,000 provided by this sale would be used in part to complete an addition to generating equipment to cost about $2,300,000. Recently $1,700,000 of three-year 5 per cent coupon notes were sold to provide part of the amount required for this improvement.

The new preferred stock or debentures would be series C 7 per cent. It would be sold locally in lieu of 7½ per cent prior series debentures, which Savannah Electric has hitherto sold within its area of operations.

State Commission Reduces Illinois Rates $73,965,473 in Five Years

A total of $73,965,473 has been saved to the people of Illinois in reduced street car and elevated railroad fares and gas and electric rates in the five-year period from 1921 to 1926, during which Frank L. Smith has been chairman of the Illinois Commerce Commission. This statement was made by Mr. Smith himself to a committee composed of United States Senators in Chicago recently to investigate campaign fund expenditures.

Of the total saving, Mr. Smith declared, $43,223,473 was taken out of the earnings of Chicago traction properties; $35,281,326 of this was cut from Chicago Surface Lines revenues and the remainder from those of the Chicago Rapid Transit Company.

In answer to questions with regard to Rapid Transit rate reductions put to him by the investigating committee, Mr. Smith said:

> The rates were reduced about $8,000,000 in 1921. My recollection is that the fare was 10 cents at that time. The fare was lowered to three rides for 25 cents and a $1.25 book that reduced the average cost per passenger ride to 8¼ cents.

$160,000 Net Income of Reading Company

The annual report of the Reading Transit Company, Reading, Pa., and its subsidiaries for the year ended July 31, 1926, shows a net income of $159,560, compared with $187,184 for the year previous. After deducting $119,145 for dividend on preferred stock, there was a balance of net income of $40,415 for the year 1926, compared with $68,039 for 1925. The company's complete statement follows:

EARNINGS OF READING TRANSIT AND SUBSIDIARY COMPANIES

	1926	1925
Operating revenue	$2,981,253	$3,018,159
Operating expenses and taxes	$1,715,145	$1,681,811
Maintenance and depreciation	700,990	750,186
Rentals	330,255	335,573
Total operating expenses maintenance, depreciation, taxes and rentals	$2,746,391	$2,767,570
Operating income	$234,861	$250,588
Other income	22,388	25,179
Total income	$257,250	$275,768
Deductions from Income: Interest on funded debt	$86,479	$77,459
Other deductions from income	11,210	11,124
Total deductions from income	$97,689	$88,583
Net income	$159,560	$187,184
Provision for dividend on preferred stock	119,145	119,145
Balance of net income	$40,415	$68,039

Record Travel on Chicago Surface Lines Continues

For the fourteenth consecutive month revenue rides on the Chicago Surface Lines, Chicago, Ill., exceeded the number of rides in the corresponding period of the previous year. The number of passengers carried in the month of July, while showing a slight decrease from the number recorded in June, increased 5,668,999 over a similar month of last year. The fact that the July figure is lower than that for June is attributed to the extraordinarily heavy traffic during the week of June 20, when in the three days of the Eucharistic Congress session in Chicago the system transported the largest number of people ever recorded by any single local transportation agency in the world. During the first seven months of this year there has been a total increase of 34,-

982,866 rides on the Surface Lines, which is approximately 10,000,000 more than the total increase of 1925 over the previous year.

Gross earnings for the month of July totaled $4,978,676, compared with $5,135,966 in June and $4,753,357 in the corresponding month of 1925. Divisible receipts of $310,841 allowed the company $139,878 for its 55 per cent interest in earnings. During the month the company paid $2,755,126 in wages, of which sum trainmen received $1,806,704. The average fare per ride, including free and transfer passengers, was 3.78 cents, as against 3.77 cents in July of 1925.

Annapolis Interurban Earnings Off

A net loss of $62,478 is reported by the Washington, Baltimore & Annapolis Electric Railway, Baltimore, Md., for the six months ended June 30, compared with a net loss of $14,488 in the corresponding period of 1925. In June the net loss was $4,598, against $9,104 last year.

Gross railway operating revenue during the half year was $984,068, against $1,109,108 in the comparative 1925 period. Gross revenue for June was $168,757, compared with $182,485.

While the percentage of railway operating expenses to railway operating revenue in the six months was somewhat higher than in 1925, substantial reduction was shown in June in favor of the company. Operating ratio for the first half of the year was 82.13, against 80.17 per cent, in the 1925 period, but in June this was lowered to 79.50, against 83.40 per cent in June, 1925.

STATEMENT OF EARNINGS OF THE WASHINGTON, BALTIMORE & ANNAPOLIS RAILROAD

	Six Months 1926	Six Months 1925
Railway operating revenues	$984,068	$1,109,108
Railway operating expenses	808,255	889,082
Net revenue railway operations	$175,812	$220,026
Net revenue auxiliary operations	45,314	44,539
Net operating revenue	$221,127	$264,566
Taxes assignable to railway operations	47,710	50,727
Operating income	$173,417	$213,839
Non-operating income	17,490	20,127
Gross income	$190,907	$233,966
Deductions from gross income	253,385	248,455
Net loss	$62,478	$14,488
Percentage railway operating expenses to railway operating revenues	82.13%	80.17%

The earnings are exclusive of the income of such subsidiaries as the Annapolis & Chesapeake Bay Power Company, the Terminal Real Estate Company, and the Maryland Development & Realty Company of Anne Arundel County.

New Customer-Ownership Campaign in Portland

To meet heavy capital requirements for the next year or two, the Portland Electric Power Company, Portland, Ore., has decided to offer to the public a new issue of first preferred stock. The dividend rate is $6 per share per annum. This issue is cumulative as to dividends and is non-assessable. It is to be sold for $90 a share, cash or on easy terms. It will yield 6.67 per cent return, with the dividend payable quarterly, on the first day of March, June, September and December.

The primary purpose in making the offering is to obtain the personal, friendly interest of the people of Portland as shareholders and their help and advice toward making the public service institution a better and more efficient public servant in every way.

The company is withdrawing from the market its present 7.2 per cent first preferred stock, of which nearly $4,000,000, par value, has been purchased by employees, customers and the public in a little over two years.

In order to carry on its vast program, the company says it will need more than $3,000,000 of new capital each year for a number of years.

Dividend on Louisville Railway Common

At a meeting on Sept. 10, directors of the Louisville Railway, Louisville, Ky., ordered a disbursement of $2 a share on the common stock, payable on Oct. 1, to stockholders of record Sept. 15. This is the first common stock dividend since July, 1918. The directors also ordered payment of the regular semi-annual dividend of $2.50 a share on preferred stock, payable also on Oct. 1.

It was announced that the directors hoped to be able to put the common on a 4 per cent annual dividend basis, but before anything can be decided upon, results of the present new operating agreement will have to be determined.

Gross Income Increases.—The St. Paul City Railway, St. Paul, Minn., reports to the Department of Public Utilities an increase of $16,000 gross income for July, 1926, over July, 1925. For the first seven months, under the new rate of fare of 8 cents and six tokens for 40 cents, the gross for the first seven months of 1926 was $85,639 more than in 1925. The income to July 31 is equivalent to a net return of 4.25 per cent on a valuation of $16,200,000. Revenue passengers carried in July, 1926, totaled 4,866,087, against 5,378,570 in July, 1925, and 5,053,970 in June, 1926. Revenue passengers for the first seven months totaled 39,287,931, compared with 42,878,437 in 1925.

Railway Service Plea Approved.—The Public Service Commission has authorized the issuance of 13,685 shares of no par value stock by the Cumberland & Westernport Transit Company, successor to the Cumberland & Westernport Electric Railway, Cumberland, Md. The authorized capital stock is 3,930 shares of preferred of no par value and 9,755 shares of common of no par value. As soon as the recent sale under foreclosure is ratified by the court and the receivership terminated the new company will take hold. Authority to furnish electric railway service between Frostburg and Cumberland and between Frostburg and Westernport has been granted to the company following a hearing by the Public Service Commission.

One Through Line Discontinued.—Operation of through cars on the Westfield-Holyoke line of the Springfield Street Railway, Springfield, Mass., ceased on Sept. 7. The company is still giving local service on this line as far as St. Mary's Cemetery.

Decreased Earnings Due to Strike.—The effects of the strike of employees of the Indianapolis Street Railway, Indianapolis, Ind., are reflected in decreased earnings and increased operating expenses totaling $111,037, according to a report just filed with the Indiana Public Service Commission for the month of July. The strike continued from July 5 to July 31. The report shows the gross earnings of the month were $371,002, compared with $420,155 for a similar month of last year; operating expenses were $384,839, compared with $322,954 for July a year ago. This, the company said, was due to the additional expenses in operation and protection of the company's property during the strike period.

F. C. Marston Named for Brooklyn Board.—At a meeting of holders of the voting trust certificates of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., Fred C. Marston, secretary and treasurer, was nominated a director to succeed the late Charles Boody. The other eleven directors representing the voting trust certificate holders were renominated.

Bonds Refunded.—The $160,000 of 7 per cent bonds of the Marlborough & Westbury Street Railway due July 1, 1926, were paid off at maturity at the office of the American Trust Company, Boston, Mass. In connection with this payment the Worcester Consolidated Street Railway, Worcester, Mass., sold $160,000 of 6½ per cent refunding mortgage bonds dated Aug. 1, 1910, and due Aug. 1, 1930. The new securities were offered to the investing public through Harris, Forbes & Company, Boston, Mass.

Net Operating Revenues Fall Off.—During the calendar year 1925 the electric railways of the State of California had an operating revenue of $58,611,045, against $59,923,333 in 1924. This fact was disclosed in the annual report of the department of finance and accounts of the Railroad Commission. The operating expenses for 1925 were $47,062,373, against $46,181,326 in 1924. The net operating revenue in 1925 was $11,548,671, against $13,742,007 in 1924.

Revenue in Madison Increases.—While the total number of street car passengers carried by the Madison Railways, Madison, Wis., during August, 1926, showed a decrease compared with the 1920-24 four-year average for August the company's gross revenue from street car and bus operation increased $1,538 over that of August, 1925. Street car and bus passengers for August, 1926, totaled 441,703, compared with 407,744 for last year; street car passengers in August, 1926, 411,307, compared with 499,349 for the four-year average in August; gross street car and bus revenue in August, 1926, $30,251, compared with $28,713 for August, 1925; gross street car revenue August, 1926, $27,860, compared with $27,250 recorded for the corresponding month last year.

Wishes to Abandon Line.—The New York & Stamford Railway on Sept. 10 filed a petition with the Public Service Commission for permission to abandon "that portion of its route which is located on Palmer Avenue between Fenimore Road and Mamaroneck Avenue in the village of Mamaroneck, Westchester County." It was claimed that the route was no longer necessary for the successful operation of the road and the convenience of the public. A public hearing will be held on the application.

Increase in Net Earnings.—For the year ended Dec. 31, 1925, the gross earnings of the operating subsidiaries of the Electric Light & Power Corporation amounted to $44,614,878, against $41,452,378 in 1924. The net earnings were $18,417,861, against $16,425,549 in 1924. The Electric Light & Power Corporation owns considerable stock in many railway properties, including the New Orleans Public Service, Inc., New Orleans, La., and the Texas Interurban Railway, operating a high-speed service between Dallas and Terrell and Dallas and Denton.

Discontinuance of Line Approved.—Abandonment of the Northern States Power Company's unprofitable interurban line between Chippewa Falls and Eau Claire, Wis., which was postponed during Fair Week, was made permanent on Sept. 1, in accordance with an order of approval by the commission. Tracks will be removed in Chippewa Falls and out of Chippewa Falls as far as the city limits of Eau Claire. Electric railway service, however, will be provided by the company in Eau Claire.

Rental Dividend Declared by Interborough. — Directors of the Interborough Rapid Transit Company, New York, N. Y., on Sept. 14 authorized payment of the regular quarterly dividend rental of $1.25 per share on the stock of the Manhattan Railway subject to the plan of readjustment. The dividend rental is payable Oct. 1 to stockholders subject to the plan of readjustment of record Sept. 20.

Would Abandon Freight Stations.—Permission has been granted by the California Railroad Commission to the Pacific Electric Railway to discontinue and abandon its freight stations at Surf Street in the city of Santa Monica and at Mildred Avenue in Venice. The company has been authorized to establish in lieu thereof a consolidated freight station at Sunset Avenue, Venice.

Approves Removal of Trolley Route.—The Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., recently received formal approval from the Public Service Commission to substitute buses in place of street cars in Grand Avenue and South East Avenue in the city and town of Poughkeepsie. The city of Poughkeepsie through Mayor Frank B. Lovelace approved the application of the railway company so that the city could carry out a new paving program.

Apply to Abandon Lines.—The International Railway, Buffalo, N. Y., has petitioned the Public Service Commission for approval of a declaration of abandonment of certain lines in the village of Kenmore and the town and city of Tonawanda, Erie County. At the same time the International Bus Corporation, a subsidiary of the International Railway, filed a petition for a certificate of convenience and necessity for the operation of a bus route over substantially the route to be abandoned. Public hearing on these two applications will be held before the Public Service Commission.

New Grouping of Mississippi Properties.—Incorporation of the Mississippi Central Power Corporation in Maryland is said to presage the consolidation into a new group of several Southern public utilities supervised by the Electric Bond & Share Company. The properties said to be involved in the transaction are controlled by the Electric Power & Light Corporation, an Electric Bond & Share affiliation. The Electric Power & Light properties which it is expected will be re-grouped are the Arkansas Light & Power Company, Pine Bluff Company, Louisiana Power & Light Company, Central Louisiana Power Company, Louisiana Power Company and Mississippi Power & Light Company. These properties are already for the most part interconnected. They serve a population exceeding 300,000 persons.

Issues of Bonds, Notes and Stock Authorized.—The Minneapolis, Northfield & Southern Railway, Minneapolis, Minn., has been authorized by the Interstate Commerce Commission to issue $750,000 of first mortgage gold bonds, $250,000 of five-year convertible 6 per cent gold notes and $250,000 of common capital stock. Bonds are to be sold at not less than 55 per cent of par and the notes at not less than par.

Will Abandon Railway Service.—The New Bedford & Onset Street Railway, New Bedford, Mass., plans to discontinue service on all its electric lines after Oct. 16. Elton S. Wilde, president of the company, has sent notices to that effect to the Board of Selectmen in the several towns through which the road operates, namely Middleboro, Wareham, Rochester, Marion, Mattapoiset and Bourne. This action follows a recent vote of the board of directors, which was authorized by the stockholders some time ago to take whatever action it saw fit with the best interests of the company in mind. The line is 33 miles long. Just what will be done with the equipment, property and franchises of the railway has not been decided. The Union Street Railway is operating a bus line to take care of service in that section.

Petitions for Discontinuance. — The abandonment of 9 miles of track and right-of-way between Salamanca and Little Valley, N. Y., has been proposed to the Interstate Commerce Commission by the Olean, Bradford & Salamanca Railway, Olean, N. Y. In its petition for authority to discontinue service and take up the tracks on its Little Valley branch the railway states that the line was built in 1906 with the expectation of doing a large business between the two communities. Since then a concrete highway has been constructed between the two towns, paralleling the railway much of the way and private automobiles and buses now carry a large part of the traffic which the railway had expected. For some time the line has been a losing proposition and last year the loss equaled 50 per cent of the gross income, it is declared.

Personal Items

S. E. Mason Made General Manager at San Diego

The recent promotion of S. E. Mason as general manager of the San Diego Electric Railway and of the San Diego & Coronado Ferry Company, San Diego, Cal., marks another step in his rather meteoric career with these properties, owned and operated by the Spreckels interests. Mr. Mason entered the service of the San Diego companies as superintendent of equipment in July, 1923, coming from the San Antonio Gas & Electric Company, with which he was connected for eleven years, the last six as superintendent of equipment, traction department.

In January, 1924, he was promoted to the position of general superintendent, and in June, 1925, upon the resignation of Claus Spreckels, vice-president and general manager, who at that time gave up active management of the electric railway in order to devote more time to the general direction of the large diversified Spreckels activities in San Diego, Mr. Mason was appointed assistant general manager directly responsible to the president of the road. Reorganization and division responsibilities brought about by the death of John D. Spreckels led to his promotion to the position of general manager in August of this year. Mr. Mason was born in Texas in 1889.

Dean J. Locke Joins Baltimore Company

Dean J. Locke will join the staff of the United Railways & Electric Company, Baltimore, Md., on Oct. 1, as assistant superintendent of traffic. He will go from the Public Service group of transportation companies of New Jersey, where he has been staff engineer and personal assistant to the vice-president in charge of operation during the past four years.

Following his graduation from Worcester Polytechnic Institute in 1912, Mr. Locke entered the employ of Albert S. Richey, electric railway engineer of Worcester, Mass., as electrical engineer, and during a period of eleven years was actively engaged in the solution of a wide range of transportation problems for railway properties throughout the East. Included in his activities were traffic surveys, appraisals of railway and lighting properties, car and equipment tests, and statistical work. In

New Jersey Mr. Locke's work has been even broader, having to do with many of the activities of a large company operating city, suburban and interurban cars, city and suburban buses, and ferries, although the greater part of his time was devoted to the analysis and solution of problems arising from the active competition betwen motor vehicles and trolleys.

M. H. Aylesworth with New Broadcasting Company

M. H. Aylesworth, for many years managing director of the National Electric Light Association, has been elected president of the new National Broadcasting Company. He will perform the executive and administrative duties of the corporation.

Mr. Aylesworth, while not hitherto identified with the radio industry or broadcasting, has had public experience as chairman of the Colorado Public Utilities Commission, and, through his work with the association which represents the electrical industry, has a broad understanding of the technical problems which measure the pace of broadcasting.

One of his major responsibilities will be to see that the operations of the National Broadcasting Company reflect enlightened public opinion, which expresses itself so promptly the morning after any error of taste or judgment or departure from fair play.

The new company is really the outgrowth of the purchase of station W.E.A.F., by the Radio Corporation of America, which decided to incorporate that station, under the name of the National Broadcasting Company, Inc., to provide the best program available for broadcasting in the United States. It is hoped that arrangements may be made so that every event of national importance may be broadcast widely throughout the United States.

Obituary

C. A. Elliott

Clifford A. Elliott, cost engineer of the engineering department of the Pacific Electric Railway, Los Angeles, Cal., died on Sept. 6 at the Pacific Hospital. Mr. Elliott was one of the most widely known and highly regarded of veteran employees. Never of robust health, during the past two years he had been ill intermittently which caused him to give up his work from time to time.

Mr. Elliott became connected with the Pacific Electric in February, 1911, as a clerk. As cost engineer he had charge of computing expenditures and of preparing work orders. His familiarity with details of historical construction was one of his outstanding attributes. He was a regular contributor to the *Pacific Electric Magazine*, published by the railway, and for many years had been a contributor to the ELECTRIC RAILWAY JOURNAL.

Mr. Elliott was born in Missouri, in 1883.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

400,000 Tons of Steel Needed

New York City Will Want This Amount in Two Years, but Is Against Bids from Abroad

New York City within the next two years will require 400,000 tons of steel for its subway building program. To date, about 7,500 tons of steel has been contracted for on the subway construction sections now under way. On one of the subway contracts now under construction the Board of Transportation, in the hope of reducing costs, segregated the steel items from all the other items and asked for independent bids from steel manufacturers in this country. Despite this, only three bids were received from steel fabricators, and one of the leading steel mills that supplies most of the steel to subway builders did not bid at all.

The most recent subway construction contract awarded by the Board of Transportation contained an item for 3,000 tons of steel at $115 a ton. The average price, however, varies between $120 and $125 a ton.

Despite the urgings of contractors, the board has declined to approve of the use of foreign fabricated steel for the subways now under construction. Contractors have asked that German and Belgian made steel be utilized in the construction of the new rapid transit system, but the board is determined to adhere to its policy of using only American made steel, unless unit item prices for home-made articles are increased to a point where foreign competition must have to be considered as a matter of self-protection against unwarrantably high bids for domestic products.

The board does not wish unnecessarily to invite the foreign made steel here. Moreover, expert inspection of the foreign made material would necessitate the employment and maintenance of steel inspectors in the foreign mills. This objection is not so serious, however, for contractors have offered to defray the added expenses of foreign inspection and maintenance of American inspectors at the mills abroad.

Handbook of Pneumatic Tools for Railways

A convenient little pocket handbook of pneumatic tools for railways has just been published by the Ingersoll-Rand Company, New York, N. Y. While many of the tools listed therein are particularly designed for steam railroad uses, there are also many which are equally applicable for use in electric railway shops. The major portion of the handbook is given over to pictures of Ingersoll-Rand tools in actual use in various applications, and in each case the recommended size and type of tool for that particular task is given. Electric railway men will be particularly interested in the tools specified for repair work on steel cars, wood work on composite cars and wooden cars, and tools for passenger car work. Descriptions of Ingersoll-Rand pneumatic tools of all types suitable for railway work are also included in this compact handbook.

Sales of Yellow Coaches to Electric Railways Are Active

During the month of August a large number of buses manufactured by the Yellow Truck & Coach Manufacturing Company, of Chicago, Ill., were sold to electric railway companies and their bus-operating subsidiaries throughout the country. Three 21-passenger, pay-enter coaches were also ordered by the London Street Railway Company, London, Ont.

The purchasers and the types and numbers of units ordered by each are reported as follows:

Operator	Model	No. Units
Houston Electric Company, Houston, Tex.	"X" 21-passenger, pay-enter	1
	"Z" 230-wheelbase 33-passenger coach	1
London Street Railway, London, Ont., Canada	"X" 21-passenger, pay-enter	3
Potomac Edison Company, Hagerstown, Md.	"X" 21-passenger, pay-enter	2
Fort Dodge, Des Moines & Southern Transportation Company, Boone, Iowa	"Y" Parlor Coach, 29-passenger	2
Blue Goose Motor Coach Company, East St. Louis, Ill.	"Y" Parlor Coach 29-passenger	1
Tennessee Electric Power Company, Nashville, Tenn.	"Z" 29-passenger, City service	10
New Orleans Public Service Company, New Orleans, La.	Gas-electric chassis (St. Louis bodies)	9
Boston Elevated Railway, Boston, Mass.	"Z" 29-passenger, City service	5
Tri-City Railway, Davenport, Iowa	"X" 21-passenger pay-enter	6
West Pennsylvania Railway, Pittsburgh, Pa.	"X" 21-passenger pay-enter	2
International Bus Corporation, Buffalo, N. Y.	Gas-electric 33-passenger, City service	5
Wyoming Valley Autobus Company, Wilkes-Barre, Pa.	"X" 21-passenger, pay-enter	2
	"Z" 29-passenger, City service	10

Important Notice to Exhibitors at Cleveland Convention

EXHIBITS at the American Electric Railway Association convention in Cleveland will be thrown open to the general public on Wednesday evening, Oct. 6, from 7 to 10:30 o'clock. It is expected, therefore, that each exhibitor will have some one in attendance at his booth between these hours. This will not only safeguard exhibits from molestation or possible theft, but will further pleasant relations with the public through having competent representatives on hand to answer questions. Exhibitors owe it to themselves to have their booths properly manned on Wednesday evening.

Looking Forward from the Smoking Compartment in One of the New Alliance Cars

Another Snag in Purchase of Seattle's 80 New Cars

Discussion over the purchase of extensive new rolling stock by the Municipal Railway waxes quite warm at times in official circles of Seattle, Wash. The City Council has attempted to justify the proposed purchase of 80 street cars with the statement that they are needed to accommodate the steady increase in patronage on the city's lines. Official reports have been forthcoming, however, to show that the number of car riders has done anything but increase of late. A legal obstacle to the issuance of bonds to finance the purchase has thus suggested itself to Corporation Counsel T. J. L. Kennedy.

He had been asked by City Comptroller Harry W. Carroll to pass on the ordinance providing for the purchase, the Comptroller meanwhile withholding the sale of $1,875,000 bonds. While leaving the finding of fact up to the Council, Mr. Kennedy held that it is without authority to issue bonds for the purchase of any new utility equipment intended as replacement. Such an act would be in violation of a section of the state law designed to safeguard the public from mismanagement of a municipally owned utility, Mr. Kenney pointed out.

Whether the present contemplated purchase was for the purpose of extension or for replacement, the Corporation Counsel indicated, was for the Council itself to determine. This point has already been discussed at length among Council members. At the time the ordinance was being framed Councilman Oliver T. Erickson pointed out the "deceit" in the bill, which declares that the present rolling stock is "entirely inadequate to provide properly for transportation of the passengers now using the said system, and the increase in the number of patrons of said system has accentuated the already urgent demand for seats for all passengers." In view of all railway department reports showing a steady decrease in patronage, the falsity of such a statement is evident, according to Mr. Erickson. He points out, therefore, that any new equipment must be considered replacement.

Commenting on the opinion of the Corporation Counsel, City Comptroller Carroll said that he will continue to hold up the issuance of the bonds until he can determine whether there is any concealed discount in the purchase contract and also whether the new cars are in the nature of extension or replacement.

Passenger Comfort Is Greatest Factor in New Alliance Cars

Many special features have been incorporated into the design of the new cars delivered to the Stark Electric Railroad, Alliance, Ohio, to render them attractive to the riding public. Intended for interurban service, the eight new units combine both passenger and smoking compartments and each is further equipped with a toilet room, located at the partition between the passenger and smoking compartments. It is planned to operate the cars under one-man operation, full use being made of safety devices which will render that control absolutely safe.

Specifications on the cars were published in the issue of ELECTRIC RAILWAY JOURNAL for April 17, 1926. The new rolling stock was built by the Cincinnati Car Company, Cincinnati, Ohio, and is to be used in service between Alliance and Salem. Such un-

Eight of These Cars Have Been Placed in Service Between Alliance and Salem, Ohio

usual features as hat check boxes and telephones are included in the equipment.

Westinghouse Engineering Department Reorganized

A reorganization of the general engineering department of the Westinghouse Electric & Manufacturing Company has been announced by H. W. Cope, assistant director of engineering. The reorganization has necessitated the reallocation of several engineers, four being elevated to managers of engineering. These are S. B. Cooper, manager of railway engineering; F. C. Hanker, manager of central station engineering; G. E. Stoltz, manager of industrial engineering, and W. E. Thau, manager of marine engineering.

Other appointments announced by Mr. Cope are:

Railway Engineering—H. K. Smith, engineer heavy traction engineering; G. M. Woods, engineer light traction engineering, and A. H. Candee, engineer gas-electric traction engineering.

Central Station Engineering—C. A. Powel, engineer generating station engineering; R. D. Evans, engineer transmission engineering, and C. A. Butcher, engineer substation engineering.

Industrial Engineering—C. W. Drake, engineer general industrial engineering; J. W. Speer, engineer material handling engineering, and E. B. Dawson, engineer electrochemical and electrometallurgical engineering.

The appointment of N. W. Storer as consulting railway engineer in charge of the group handling of Diesel-electric locomotives and rail cars, has been announced by R. S. Feicht, director of engineering.

Track and Line

Community Traction Company, Toledo, Ohio, has ordered 750 tons of 100-lb. rail to be used in the reconstruction of the Cherry Street line and a section of Nebraska Avenue. Track construction will be of the steel-tie type. The actual work will await the plans of the city of Toledo for its repaving of the two streets.

Seattle Municipal Railway, Seattle, Wash., has awarded contracts totaling $9,625 for cable on the Yesler Way, James Street and Madison Street lines.

Los Angeles Railway, Los Angeles, Cal., has filed an application for permission to extend the street car tracks from Fifth and Flower Streets west to the intersection with Beaudry Avenue, thence across Beaudry Avenue and Boylston Street to connect with the present Sixth Street line; also to extend the car line on Figueroa Street from Fifth Street to Sixth Street. A more direct connection with the downtown district will be made by the extensions requested and will be of great benefit to patrons using these car lines.

Winnipeg Electric Company, Winnipeg, Man., is building an extension of line on St. Ann's Road, from St. Mary's Road, 8,000 ft. of single track open construction to be laid with 60-lb. rails and provided with bracket arm trolleys. The company contemplates building a double-track line on the new Memorial Boulevard, connecting Portage Avenue and Broadway; 2,200 ft. of track to be laid on Main Street with 85-lb. C.P.R. rails with elastic fillers provided with span wire trolley on ornamental lighting posts. It will also relay 1,200 ft. of double track line on Osborne Street from Broadway to Osborne Bridge, construction to be similar to that on Memorial Boulevard. This relaying has been rendered necessary owing to the realignment of Osborne Street.

South Carolina Gas & Electric Company, Spartanburg, S. C., has received much of the material to be used in relaying its rails on West Main Street. The company is reported ready to start installation just as soon as the Southern Paving & Construction Company, holder of the local paving contract, is ready to pave the thoroughfare. This company will lay the rails as well as do the paving.

San Diego Railway, San Diego, Cal., has started the reconstruction of track on the Imperial Avenue line. The standard steel tie and concrete ballast type of construction will be used. Additional crossovers are being installed to permit through line traffic. The work will cost about $75,000.

Power Houses, Shops and and Buildings

Indianapolis Street Railway, Indianapolis, Ind., plans the construction of five substations, bids on which are being received. Each station will cost about $20,000 and will be 32 ft. x 50 ft. Each will be of brick with steel sash, and equipped with fire doors. Construction will start this fall in an effort to have the substations in operation before midwinter.

Trade Notes

E. H. Johnson has been appointed engineer of the service department for the Timken Roller Bearing Company, Canton, Ohio. He will have direct charge of the installation of Timken bearings in automotive and industrial applications. Mr. Johnson's experience in this field with the Timken company qualifies him particularly well to direct this work.

Ingot Iron Railway Products Company, Middletown, Ohio, announces the removal of its general office from 122 South Michigan Avenue, Chicago, Ill., to Middletown, Ohio. District offices are maintained at Chicago, St. Louis, Minneapolis and Philadelphia.

New Advertising Literature

General Electric Company, Schenectady, N. Y., has issued bulletin GEA-452 describing its welding head and accessories for automatic arc welding.

Lincoln Electric Company, Cleveland, Ohio, has started the publication of a house organ known as "The Operator's Stabilizer," published "for operators who take pride in their jobs." A. F. Davis, the editor, wants to make the stabilizer a regular and frequent "convention" of the boys doing the real work in welding. The first issue devoted generous space to "How Can I Do It?" as well as "How I Did It." Suggestions are invited.

ELECTRIC RAILWAY MATERIAL PRICES—Sept. 14, 1926

Metals—New York

Copper, electrolytic, cents per lb.	14.35
Lead, cents per lb.	8.75
Nickel, cents per lb.	35.00
Zinc, cents per lb.	7.45
Tin, Straits, cents per lb.	68.875
Aluminum, 98 to 99 per cent, cents per lb.	27.00
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	56.00
General service	31.50

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$5.375
Somerset mine run, Boston	1.95
Pittsburgh mine run, Pittsburgh	2.00
Franklin, Ill., screenings, Chicago	1.575
Central, Ill., screenings, Chicago	1.40
Kansas screenings, Kansas City	2.35

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	2.90
Tie plates (flat type), cents per lb.	2.30
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.20
Steel bars, cents per lb.	2.00
Ties, white oak, Chicago, 6 in.x8 in.x8 ft.	$1.45

Hardware—Pittsburgh

Wire nails, base per keg	2.65
Sheet iron (24 gage), cents per lb.	3.00
Sheet iron, galvanized (24 gage), cents per lb.	3.85
Galvanized barbed wire, cents per lb.	3.35
Galvanized wire, ordinary, cents per lb.	2.50

Waste—New York

Waste, wool, cents per lb.	12–18
Waste, cotton (100 lb. bale), cents per lb.:	
White	13–17.50
Colored	10–14

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	11.6
White lead in oil (100 lb. keg), cents per lb.	15.25
Turpentine (bbl. lots), per gal.	$0.95
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	5.25–5.50

* Prices f.o.b. works, boxing charges extra.

Wire—New York

Copper wire, cents per lb.	16.25
Rubber-covered wire, No. 14, per 1,000 ft.	$6.00
Weatherproof wire base, cents per lb.	18.00

Paving Materials

Paving stone, granite, 5 in. New York—Grade 1, per thousand	$147
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd.	$2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	51.00
Paving brick 3x8½x4 N.Y., per 1,000 in carload lots	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.85
Cement, Chicago consumers' net prices, without bags	2.10
Gravel, ¾-in., cu.yd., f.o.b. N. Y.	1.75
Sand, cu.yd., f.o.b. N. Y.	1.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	11.75
Light copper, cents per lb.	10.00
Heavy brass, cents per lb.	7.125
Zinc, old scrap, cents per lb.	4.25
Lead, cents per lb. (heavy)	7.25
Steel car axles, Chicago, net ton	$17.75
Cast iron car wheels, Chicago, gross ton	15.50
Rails (short), Chicago, gross ton	17.75
Rails, (relaying), Chicago, gross ton	26.00
Machine turnings, Chicago, gross ton	8.25

Net Revenue Can Be Increased!

—by reducing accident claims and reserves due to and necessitated by failures of inferior handbrakes in emergencies or during power interruptions. In modernizing equipment safety should be considered as an all important factor.

Peacock Staffless Brakes

are like an insurance policy protecting against inroads upon net revenue and accident reserves due to failure of hand brakes.

Low installation and maintenance costs; simplicity of operation; minimum platform space; thoroughly modern in every particular; developing three times the braking capacity of ordinary handbrakes; 144-in. chain winding capacity insuring adequate braking power even though brake shoes are worn and brake rigging is loose. There are other factors that adapt Peacock Staffless Brakes to the most modern cars.

The Peacock Staffless

Further facts, figures and estimates upon request.

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Canadian Representative: Lyman Tube & Supply Co., Limited, Montreal, Canada

PEACOCK

Staffles Brakes

30,000 miles and still going strong

BLACK DIAMOND STAGE CO.

Black Diamond Wash. January 22nd, 1926

P. E. Myers, Branch Manager,
Kelly-Springfield Tire Company,
Seattle, Washington.

Dear Mr. Myers:

We operate eight Motor Coaches varying in size from eleven to twenty-two passenger capacity We now have twenty of your Heavy Duty Cords in service and will soon have all our Motor Coaches fully equipped with them.

They are giving us remarkable service and they have reduced our operating expense to a considerable degree Two of the 36 x 6 Heavy Duty Cords have now delivered thirty thousand miles on the rear of our twenty-two passenger White, and are still going strong

Yours very truly,

BLACK DIAMOND STAGE CO.

Oral G. Grove

KELLY HEAVY DUTY CORD

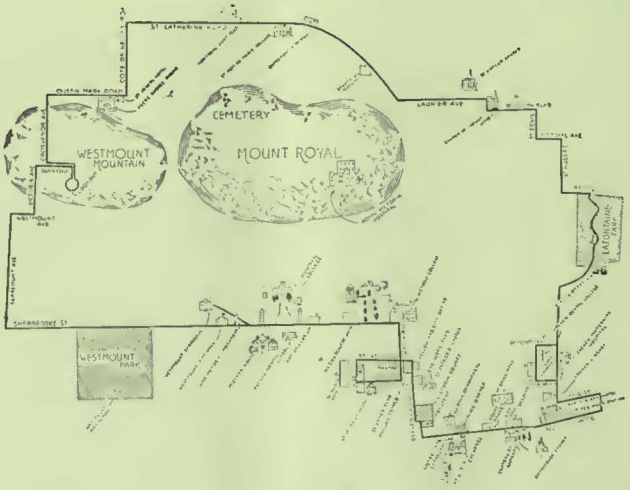
Seeing Montreal in

YELLOW COACHES

YELLOW KNIGHT

50


8
YELLOW SIGHTSEEING TOURS


CEMETERY
MOUNT ROYAL
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CENTS

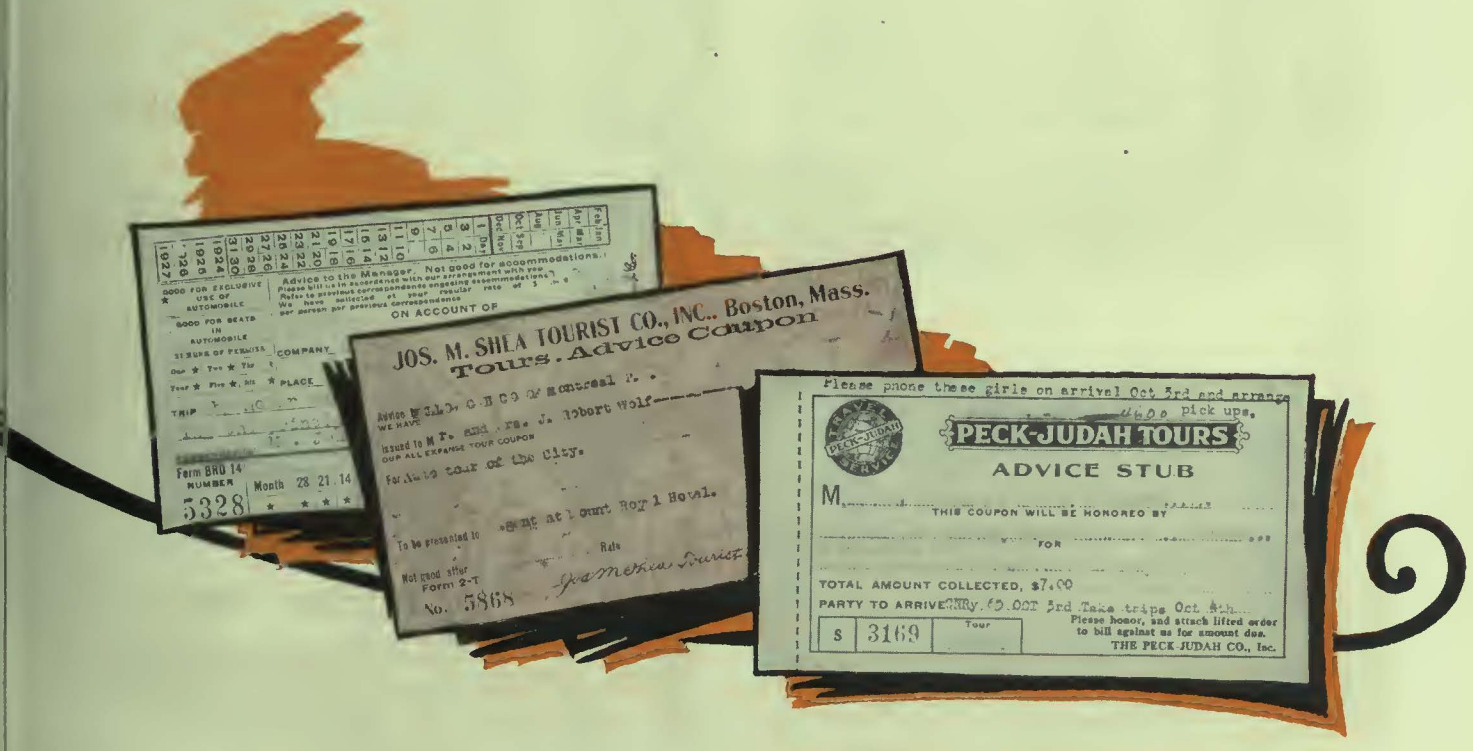
net profit per mile

Yellow Coaches are making money for the Yellow Cab Company in Montreal, Canada—making it at the rate of 50 cents net profit per mile.

Cost of operation is spread over the entire year with revenues accruing only during a short operating season. This makes more remarkable the showing in net earnings per mile.

Historic Montreal is the furthest point north on this continent where motor coach sightseeing operations are conducted, and from May until October ten Yellow Sightseeing Coaches are kept busy—*Yellow Coaches exclusively*—carrying tourists over the city sightseeing route of 16 miles. Each coach averages four trips daily in clear weather, and on week ends special extended tours are conducted which circle the western part of the island of Montreal, a distance of 56 miles.

Last year, Yellow Coaches carried 43,373 passengers and piled up a total of 28,465 miles—a good record for a short season.



IT IS a matter of record that never once, since the first coach was placed in service in March, 1924, has a Yellow Coach suffered an involuntary stop. To quote the words of the Company—

"Once the season starts, Yellow Coaches keep going."

And the "going" is by no means easy, for road conditions are far from ideal. Steep grades are encountered and the severity of the stiff Canadian winters leaves its marks on the highways.

This season, so great is the operating company's confidence in their equipment that the plan will be tried of keeping six Yellow Parlor Coaches on the road for sightseeing during the winter. That stamina of performance will carry them through the heavy snows is a prediction which influences this extension of service so as to yield profitable revenue *every month in the year.*

Whatever type of operation *you* contemplate, Yellow Coach plus General Motors stands ready to guide you in the selection of your routes, the establishment of fixed profits and to protect your investment with financial stability that eliminates all danger of orphan equipment.

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Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

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Box Numbers, in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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ERJ

POSITIONS VACANT

EXPERIENCED track foreman: Energetic man wanted on city work. Give references and experience in detail. P-930, Electric Railway Journal, Tenth Ave. at 36th Street, New York.

POSITIONS WANTED

ACTIVE young man, single, age 22, over three and one half years special training with large builder of street railway cars and trucks, desires change to mechanical department of operating company with opportunities for advancing. Can arrange for an interview with any interested party at Cleveland convention and solicit correspondence of others not attending. PW-927, Electric Railway Journal, 1600 Arch Street, Philadelphia, Pa.

ACTIVE young man, age 27, over five years' experience in street railway operation, trained in traffic, transportation, commercial and research work, desires for personal reasons to make change. PW-933, Electric Railway Journal, Guardian Bldg., Cleveland, O.

SUPERINTENDENT with twenty years' experience in operation and maintenance of railway rolling stock and track; an outstanding success as a railway operator and as operator of co-ordinated railway and bus services desires for personal reason to make change. Fully capable of taking complete charge as manager or superintendent. PW-925, Electric Railway Journal, 7 South Dearborn St., Chicago, Ill.

SUPERINTENDENT of transportation: Qualified by a former successful record of twenty years on large city and interstate properties also co-ordination of rail and bus service recognized as an official of exceptional ability, successful in rehabilitation of properties, public relations, accident prevention, one man operation and handling of labor. Fully competent to take over any property and get results. High-grade references, correspondence invited. Will make appointments for interview at Cleveland convention or at convenience of interested parties. PW-926, Electric Railway Journal, Guardian Building, Cleveland, Ohio.

SUPERINTENDENT of transportation: With unquestionable qualifications, wide experience, fine record of achievements on city and interurban properties, credited with having built up one of the best groups of trainmen in the Middle West and placing property on paying basis, at present engaged, wishes to make connection with a property that is in need of a clean cut, progressive, capable transportation official. High-grade references. Correspondence invited. Can arrange for interview at Cleveland convention. PW-934, Electric Railway Journal, Guardian Bldg., Cleveland, O.

YOUNG man wants position providing an opportunity of learning electric railway practice. Graduate of a co-operative coarse in electrical engineering. PW-932, Electric Railway Journal, 7 So. Dearborn St., Chicago, Ill.

Wanted—

60 to 85 ton Electric Locomotive—railway voltage.
2—1000 kw. Railway Rotary Converters, 60 cy., 3 or 6 ph.

For Sale—Special Bargains

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6—Standard Single Truck Double End.

MOTORS

32—Westinghouse 306 SV Motors.

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10—General Electric CP-27 Air Compressors.
8—Westinghouse DH-16 Air Compressors.

CONTROLLERS

12—K-35-G-2 Controllers.

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FOR SALE

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Brill Built
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Cars Complete—Low Price—Fine Condition
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

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McCardell three section tower. Less than 3 years old and in excellent condition. Electric starter and lights.

Prompt reply advisable as this equipment must be moved quickly.

FS-931, Electric Railway Journal
Tenth Ave. at 36th St., New York City

ELECTRIC SHOVEL

1½-yd. Vulcan, standard gage, 600 v., d.c. shovel. In first class condition. Must be moved at once so only $1,700.00 will buy it.

ZELNICKER IN ST. LOUIS
Rails Equipment Steel Piling, etc.

ROTARY CONVERTERS

2—Converter and Transformer units new in 1924.
Can be seen in operation at Warehouse Point, Conn.
Synchronous Converters
No. 4006698—4006699 G.E.
Type H.C.C. 6—500—1200.
Form P. Speed 1200 Direct Current.
Amperes 834 Nominal Volts 600 3 Phase, 1250 Amp. 2 hrs. 55 degrees C Rise.

TRANSFORMERS

Type H.J.T.H.
Form D.D. Volts 13200 Y 445 Cycle 60
Capacity 500 K.V.A. Nominal.
750 K.V.A 2 hrs. 60 Degrees C Rise.
Reactance 12% approx.
G.E. Regular Coil H. Design.
Immediate delivery can be made.

THE PERRY BUXTON DOANE CO.
Boston, Mass.

FOR SALE

Standard Birney Safety Cars

2—Double end, 34 capacity, G. E. motors and lightning arresters, West. air brakes, Safety car devices, Economy meters, International registers, 42-in. gage.

The Denver & So. Platte Ry. Co.
210 Tramway Bldg., Denver, Colo.

SAVE 30% TO 50% ON
RAILS-LOCOMOTIVES-CARS
Economy—Service
Quality—Reliability
HYMAN-MICHAELS COMPANY
Peoples Gas Bldg., Chicago
ST. LOUIS — DALLAS — LOS ANGELES
SAN FRANCISCO — PORTLAND — SEATTLE

"Opportunity" Advertising:

Think *"SEARCHLIGHT"* First!

G-02

WHAT AND WHERE TO BUY

Advertising, Street Car
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Air Brakes
Christensen Air Brake Co.
Westinghouse Air Brake Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.
Columbia Machine Works

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Johnson & Co., J. R.
National Railway Appliance Co.
Westinghouse E. & M. Co.

Axles, Carbon Vanadium
Johnson & Co., J. R.

Axles, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Johnson & Co., J. R.
Ludlum Steel Co.

Babbitt Metal
Johnson & Co., J. R.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.

Barges, Steel
American Bridge Co.

Bearings and Bearing Metals
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Columbia Machine Works
Stucki Co., A.

Bearings, Roller and Ball
Timken Roller-Bearing Co.

Bells & Buzzers
Consolidated Car Heating Co.

Bells and Gongs
Brill Co., The J. G.
Elec. Service Supplies Co.

Benders, Rail
Railway Trackwork Co.

Bodies, Bus
Cummings Car & Coach Co.

Body Material—Haskelite & Plymetl
Haskelite Mfg. Corp.

Boilers
Babcock & Wilcox Co.

Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
American Bridge Co.
Columbia Machine Works
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Lining, Asbestos
Johns-Manville, Inc.

Brake Shoes
American Brake Shoe & Foundry Co.
Brill Co., The J. G.

Brakes, Brake Systems and Brake Parts
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Westinghouse Traction Brake Co.

Bridges, Steel
American Bridge Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

Brush Holders
Columbia Machine Works

Building Materials, Fireproof
Johns-Manville, Inc.

Buildings, Steel
American Bridge Co.

Bulkheads
Haskelite Mfg. Corp.

Bunkers, Coal
American Bridge Co.

Bus Seats
Hale-Kilburn Co.

Buses, Motor
Brill Co., The J. G.
Cummings Car & Coach Co.
Garford Motor Truck Co.
Mack Truck Co.
Yellow Truck & Coach Mfg. Co.

Bushings, Case Hardened and Manganese
Brill Co., The J. G.
Columbia Machine Works

Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnished
Irvington Varnish & Ins. Co.
Mica Insulator Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co.

Cars, Gas, Rail
Brill Co., The J. G.

Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Brill Co., The J. G.
General Electric Co.

Castings, Brass, Composition or Copper
A. & J. M. Anderson Mfg. Co.

Castings, Gray Iron and Steel
American Steel Foundries.
American Bridge Co.
Bemis Car Truck Co.
Wm. Wharton, Jr. & Co., Inc.

Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceiling Car
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Ceilings, Plywood Panels
Haskelite Mfg. Corp.

Cements, High Temperature
Johns-Manville, Inc.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.

Circuit-Breakers
A. & J. M. Anderson Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Columbia Machine Works
Dossert & Co.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Coils, Armature and Field
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
International Register Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Columbia Machine Works
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

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Johns-Manville, Inc.

Compressors, Air
General Electric Co.
Westinghouse Tr. Br. Co.

Condensers
General Electric Co.
Westinghouse E. & M. Co.

Condenser Papers
Irvington Varnish & Ins. Co.

Conduits, Fibre
Johns-Manville, Inc.

Conduit Duct Underfloor
Johns-Manville, Inc.

Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.

Connectors, Trailer Car
Columbia Machine Wks.
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
General Electric Co.
Westinghouse E. & M. Co.

Conveying and Hoisting Machinery
American Bridge Co.

Copper Wire
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Mining Co.

Copper Wire Instruments Measuring Testing and Recording
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
American Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
International Register Co.
Roebling's Sons Co., J. A.
Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cranes, Hoist & Lift
Electric Service Supplies Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings
Ramapo Ajax Corp.
Wm. Wharton Jr. & Co., Inc.

Crossing, Frog and Switch
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Crossing Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton Jr. & Co., Inc.

Crossings, Track (See Track Special Work)

Crossings, Trolley
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Morton Mfg. Co.
Pantasote Co., Inc.

Dealer's Machinery & Second Hand Equipment
Denver & So. Platte Ry. Co.
Elec. Equipment Co.
Hyman Michaels Co.
Irving S. Van Loan Corp.
Perry Buxton Doane Co.
Salzberg Co., Inc., H. E.
Zelnicker, in St. Louis

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Electric Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heating Co.
National Pneumatic Co., Inc.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale-Kilburn Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Ears
Columbia Machine Works
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electric Grinders
Railway Trackwork Co.

Electric Transmission Towers
American Bridge Co.

Electrical Wires and Cables
Amer. Electrical Works
American Steel & Wire Co.
Roebling's Sons Co., John A.

Electrodes, Carbon
Railway Trackwork Co.
Una Welding & Bonding Co.

Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layng Corp.
Byllesby & Co., H. M.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClellan & Junkersfeld
Richey, Albert, S.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.

Engines, Gas, Oil or Steam
Westinghouse E. & M. Co.

Exterior Side Panels
Haskelite Mfg. Corp.

Fare Boxes
Cleveland Fare Box Co.
Nat'l Ry. Appliance Co.
Perey Mfg. Co., Inc.

Fare Registers
Electric Service Sup. Co.

Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co.
Star Brass Works
Wood Co., Chas. N.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
W. S. Godwin Co., Inc.

Flaxlinum Insulators
Nat'l Ry. Appliance Co.

Floodlights
Elec. Service Supplies Co.

Floor, Sub.
Haskelite Mfg. Corp.

Flooring, Monolithic
Johns-Manville, Inc.

Floors
Haskelite Mfg. Corp.

Forgings
Brill Co., The J. G.
Carnegie Steel Co.

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton Jr. & Co., Inc.

Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Funnell Castings
Wm. Wharton, Jr. & Co., Inc.

Furnaces, Electric Steel, Melting
American Bridge Co.
American Brown Boveri Elec. Corp.

Fuses and Fuse Boxes
Consolidated Car Heating Co.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
General Electric Co.

Gaskets, Asbestos
Johns-Manville, Inc.
Westinghouse Tr. Br. Co.

Gas-Electric Cars
General Electric Co.
Westinghouse E. & M. Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car
Brill Co., The J. G.
Cincinnati Car Co.

Gauges, Oil & Water
Ohio Brass Co.

Gear Blanks
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.

Gear Cases
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bethlehem Steel Co.
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.

(Continued on page 42)

Generating Sets, Gas-Electric
General Electric Co.

Generators
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs)

Greases (See Lubricants)

Grinders and Grinding Supplies
Metal & Thermit Corp.
Railway Trackwork Co.

Grinders, Portable
Railway Trackwork Co.

Grinders, Portable Electric
Railway Trackwork Co.

Grinding Bricks and Wheels
Railway Trackwork Co.

Guard Rail Clamps
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Guard Rails, Tee Rail and Manganese
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Guards, Trolley
Elec. Service Sup. Co.
Ohio Brass Co.

Harps, Trolley
Bayonet Trolley Harp Co.
Columbia Machine Works
Elec. Service Supplies Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining
Columbia Machine Works
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heat. & Light. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

Heaters, Car, Stove
Smith Heater Co., Peter

Helmets—Welding
Railway Trackwork Co.
Una Welding & Bonding Co.

Horns, Car
American Stromberg Co.

Hose, Bridges
Ohio Brass Co.

Hose, Pneumatic
Westinghouse Traction Brake Co.

Instruments, Measuring, Testing and Recording
American Steel & Wire Co.
General Electric Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.

Irvington Varnish & Ins. Co.
Johns-Manville, Inc.
Mica Insulator Co.
Okonite Co.
Okonite-Callender Cable Co. Inc.
U. S. Rubber Co.
Westinghouse E. & M. Co.

Insulating Silk
Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Okonite-Callender Cable Co. Inc.
U. S. Rubber Co.
Westinghouse E. & M. Co.

Insulation, Pipe, Boiler
Johns-Manville, Inc.

Insulation Slot
Irvington Varnish & Ins. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Insulators (See also Line Material)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Irvington Varnish & Ins. Co
Ohio Brass Co.
Westinghouse E. & M. Co.

Interior Side Linings
Haskelite Mfg. Corp.

Interurban Cars (See Cars Passenger, Freight Express etc.)

Jacks (See also Cranes, Hoists and Lifts)
Buda Co.
Elec. Service Supplies Co.
National Railway Appliance Co.

Joints, Rail (See Rail Joints)

Journal Boxes
Brill Co., The J. G.

Lamps, Guards and Fixtures
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc and Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Letter Boards
Haskelite Mfg. Corp.

Lightning Protection
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Dossert & Co.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Johns-Manville, Inc.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Wm. Wharton, Jr. & Co., Inc.

Locomotives, Electric
Cummings Car & Coach Co.
General Electric Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Universal Lubricating Co.

Lubricants, Oil and Grease
Universal Lubricating Co.

Machinery, Insulating
Amer. Insulating Mach. Co.

Manganese Steel Castings
Wm. Wharton, Jr. & Co., Inc.

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Manganese Steel, Special Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton Jr. & Co., Inc.

Manganese Steel Switches, Frogs and Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Mica
Mica Insulator Co.

Motor Buses (See Buses, Motor)

Motor and Generator Sets
General Electric Co.

Motor Leads
Dossert & Co.

Motors, Electric
General Electric Co.
Westinghouse E. & M. Co.

Motorman's Seats
Brill Co., The J. G.
Electric Service Sup. Co.
Hale-Kilburn Co.
Wood Co., Chas. N.

Nuts and Bolts
Bethlehem Steel Co.
Hubbard & Co.

Oils (See Lubricants)

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus Oxy-Acetylene)

Packing, Asbestos
Johns-Manville, Inc.

Packing
U. S. Rubber Co.
Westinghouse Traction Brake Co.

Paints and Iron Preservatives
Johns-Manville, Inc.

Paints and Varnishes (Insulating)
Electric Service Sup. Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
National Ry. Appliance Co.

Paints & Varnishes, Preservative
Joseph Dixon Crucible Co.

Panels, Outside, Inside
Haskelite Mfg. Corp.

Paving Guards, Steel
W. S. Godwin Co., Inc.

Pickups, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pins, Wood & Iron
Sharp, Edw. P.

Pipe Fittings
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Electric Service Sup. Co.
National Railway Appliance Co.

Plywood, Roofs, Headlining Floors, Interior Panels, Bulkheads, Truss Planks
Haskelite Mfg. Corp.

Pole Clamps
Clark-Williams Eng. Co.

Pole Line Hardware
Bethlehem Steel Co.
Electric Service Sup. Co.
Ohio Brass Co.

Poles, Metal Street
Elec. Ry. Equipment Co.
Hubbard & Co.

Pole Mountings
Clark-Williams Eng. Co.

Pole Reinforcing
Hubbard & Co.

Poles and Ties Treated
Bell Lumber Co.

Poles, Ties, Posts, Piling and Lumber
Bell Lumber Co.
Naugle Pole & Tie Co.

Poles, Trolley
Bayonet Trolley Harp Co.
Bell Lumber Co.
Electric Service Sup. Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Electric Service Sup. Co.

Portable Grinders
Buda Co.

Potheads
Okonite Co.
Okonite-Callender Cable Co. Inc.

Power Houses
American Bridge Co.

Power Saving Devices
National Ry. Appliance Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Westinghouse Traction Brake Co.

Punches, Ticket
International Register Co.
Wood Co., Chas. N.

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Ludlum Steel Co.

Rail Joints—Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rails, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Ludlum Steel Co.

Rail Welding
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co.
Electric Service Sup. Co.
Hale-Kilburn Co.

Registers and Fittings
Brill Co., The J. G.
Cincinnati Car Co.
Electric Service Sup. Co.
International Register Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Coils)
General Electric Co.
Westinghouse E. & M. Co.

Replacers, Car
Electric Service Sup. Co.

Resistances
Consolidated Car Heating Co.

Resistance, Wire and Tube
American Steel & Wire Co.
General Electric Co.
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.

Roofing, Asbestos, Corrugated and Flat
Johns-Manville, Inc.

Roofing, Car
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Roofing and Shingles
Johns-Manville, Inc.

Roofs, Car & Bus
Haskelite Mfg. Corp.

Rubber Specialties of All Kinds
U. S. Rubber Co.

Sanders, Track
Brill Co., The J. G.
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car
Brill Co., The J. G.

Sash, Metal, Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Electric Service Sup. Co.

Seating Materials
Brill Co., J. G.
Hale-Kilburn Co.
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Hale-Kilburn Co.

Second Hand Equipment
Denver & So. Platte Ry. Co.
Electric Equipment Co.
Hyman Michael Co.
Irving S. Van Loan Corp.
Perry Buxton Doan Co.
Salzberg Co., Inc., H. E.
Zelnicker in St. Louis

Shades, Vestibule
Brill Co., The J. G.

Shovels
Brill Co., The J. G.
Hubbard & Co.

Shovels, Power
Brill Co., The J. G.

Side Bearings (See Bearings Center and Side

Signals, Car Starting
Consolidated Car Heating Co.
Electric Service Sup. Co.
National Pneumatic Co., Inc.

Signal Systems, Block
Electric Service Sup. Co.
Nachod & U. S. Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod & U. S. Signal Co.

Signals, Indicating
Nichols-Lintern Co.

Slack Adjusters (See Brake Adjusters)

Slag
Carnegie Steel Co.

Sleet Wheels and Cutters
A. & J. M. Anderson Mfg. Co.
Bayonet Trolley Harp Co.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Electric Service Sup. Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Consolidated Car Fender Co.
Cummings Car & Coach Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.
Wm. Wharton, Jr. & Co., Inc.

Spikes
Amer. Steel & Wire Co.

Splicing Compounds
U. S. Rubber Co.
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
American Steel Foundries
Amer. Steel & Wire Co.
Brill Co., The J. G.

Sprinklers, Track and Road
Brill Co., The J. G.
Cummings Car & Coach Co.

Steel and Steel Products
Carnegie Steel Co.
Morton Mfg. Co.

Steel Car Doors
Morton Mfg. Co.

Steel Flooring
Morton Mfg. Co.

Steps, Car
Brill Co., The J. G.
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
A. & J. M. Anderson Mfg. Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Street Cars (See Cars, Passenger, Freight, Express, etc.)

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switchboards, Asbestos
Johns-Manville, Inc.

Switch Stands and Fixtures
Ramapo Ajax Corp.

Switches and Switchboards
Consolidated Car Heating Co.
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Tampers, Tie
Railway Trackwork Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

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Telephones and Parts
Electric Service Sup. Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers & Destroyers
Electric Service Sup. Co.

Tickets and Transfers
Globe Ticket Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel
American Bridge Co.
Carnegie Steel Co.
W. S. Godwin Co., Inc.
Ludlum Steel Co.
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires
Kelly-Springfield Tire Co.
U. S. Rubber Co

Tongue Switches
Wm. Wharton, Jr. & Co., Inc.

Tool Steel
Bethlehem Steel Co.
Carnegie Steel Co.

Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Electric Service Sup. Co.
Hubbard & Co.
Railway Trackwork Co.

Torches, Acetylene (See Cutting Apparatus)

Towers and Transmission Structures
Archbold-Brady Co.
Westinghouse E. & M. Co.

Track Expansion Joints
Wm. Wharton, Jr. & Co., Inc.

Track Grinders
Metal & Thermit Corp.
Railway Trackwork Co.
Ramapo Ajax Corp.
Una Welding & Bonding Co.

Track, Special Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Trackless Trolley Cars
Brill Co., The J. G.

Transfer Tables
American Bridge Co.

Transfers (See Tickets)

Transformers
General Electric Co.
Westinghouse E. & M. Co.

Transmission Towers and Structures
American Bridge Co.

Treads, Safety, Stair Car Step
Morton Mfg. Co.

Trolley Bases
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Material (Overhead)
A. & J. M. Anderson Mfg. Co.
Electric Service Sup. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Shoe
Miller Trolley Shoe Co.

Trolley Wheel Bushings
Star Brass Works

Trolley Wheels (See Wheels, Trolley)

Trolley Wheels and Harps
Electric Service Supplies Co.
Star Brass Works
Thornton Trolley Wheel Co.

Trolley Wire
American Brass Co.
Amer. Electrical Works
American Steel Foundries
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
Roebling's Sons Co., J. A.

Trucks, Car
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.

Trucks, Motor
International Motor Co.
Mack Truck, Inc.
Yellow Truck & Coach Mfg. Co.

Truss Planks
Haskelite Mfg. Corp.

Tubing, Yellow and Black, Flexible Varnish
Irvington Varnish & Ins. Co.

Turbines, Steam
General Electric Co.
Westinghouse E. & M. Co.

Turnstiles
Electric Service Sup. Co.
Perey Mfg. Co., Inc.

Turntables
American Bridge Co.
Electric Service Supplies Co.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers and Silks
Irvington Varnish & Ins. Co.

Ventilators, Car
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
Nat'l Ry. Appliance Co.
Railway Utility Co.

Vestibule Linings
Haskelite Mfg. Corp.

Waterproofing
Johns-Manville, Inc.

Weatherproofing
Morton Mfg. Co.

Welded Rail Joints
Electric Railway Improvement Co.
Lorain Steel Co., The
Metal & Thermit Corp.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Welders, Portable Electric
Electric Railway Improvement Co.
Metal & Thermit Corp.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welders, Rail Joint
Ohio Brass Co.
Railway Trackwork Co.

Welding Processes and Apparatus
Electric Railway Improvement Co.
General Electric Co.
Metal & Thermit Corp.
National Railway Appliance Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welding Steel
Electric Railway Improvement Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Welding Wire
American Steel & Wire Co.
General Electric Co.
Railway Trackwork Co.
Roebling's Sons Co., J. A.

Welding Wire and Rods
Railway Trackwork Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron

Wheels, Car Steel & Steel Tire
American Steel Foundries
Carnegie Steel Co.

Wheels, Trolley
Bayonet Trolley Harp Co.
Elec. Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
Sharp, Edw. P.
Star Brass Works

Wheels, Wrought Steel
Carnegie Steel Co.
Ludlum Steel Co.

Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Westinghouse Traction Brake Co.

Window Sash Locks & Racks
Morton Mfg. Co.

Wire Rope
Amer. Steel & Wire Co.
Roebling's Sons Co., J. A.

Wires and Cables
American Brass Co.
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
General Electric Co.
Okonite Co.
Okonite-Callender Cable Co.
Roebling's Sons Co., J. A.
Westinghouse E. & M. Co.

41%

Gross return on investment proves that—

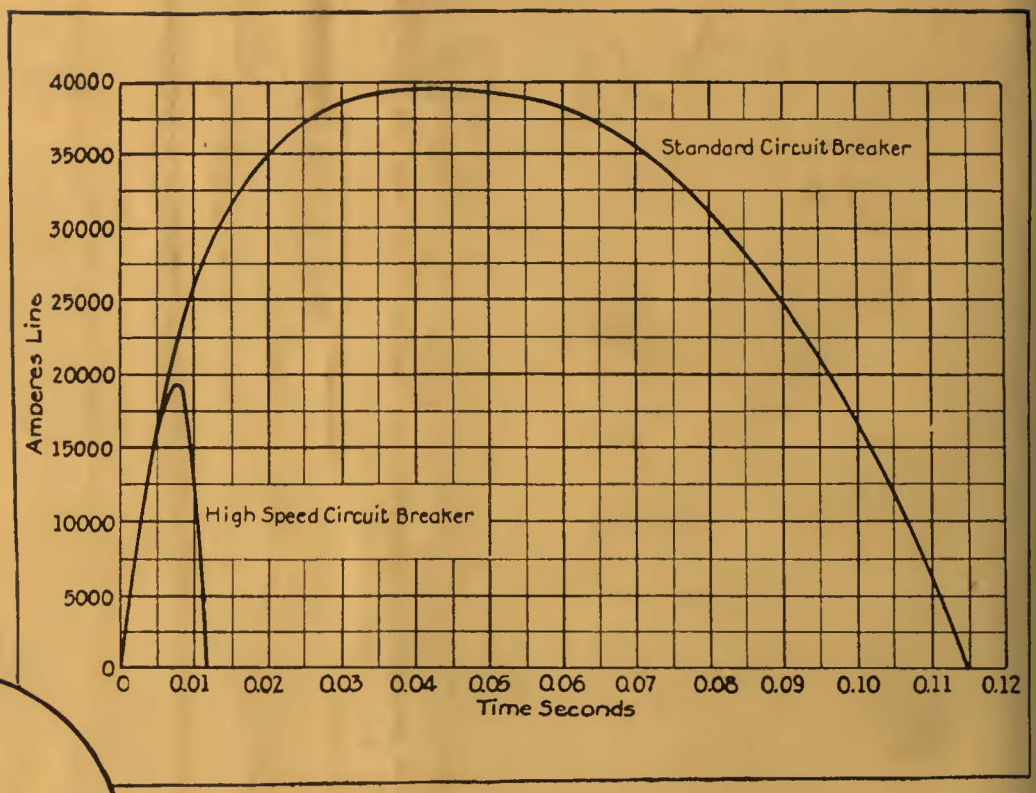
New Cars Pay

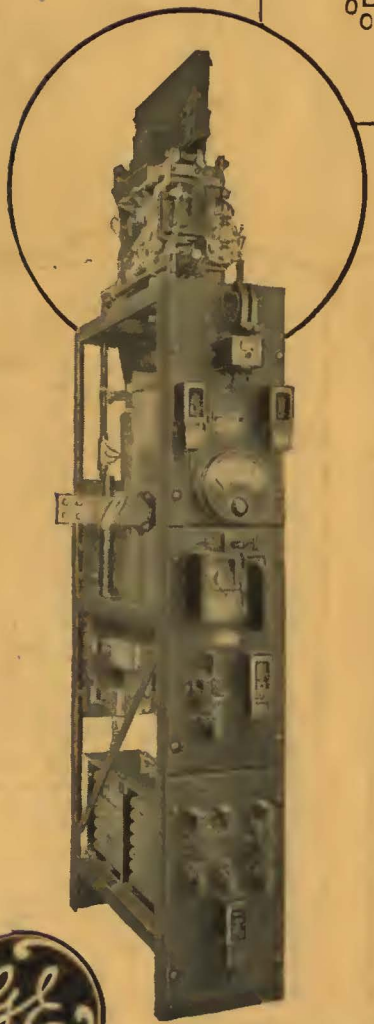
Actual Operating Costs OLD CARS 1922	Per Car Mile
Way and Structures	7.07c.
Equipment	6.19
Power	8.52
Conducting Transp.	13.94
General and Misc.	11.68
Total	47.40c.

Actual Operating Costs NEW CARS 1925	Per Car Mile
Way and Structures	7.43c.
Equipment	2.66
Power	5.46
Conducting Transp.	12.67
General and Misc.	11.30
Total	39.52c.
Saving	$30,065
Approx. Invest.	72,500
Gross return on investment	41%

In 1923 the Pennsylvania-Ohio Electric Co. placed in service on its Youngstown-New Castle Division four (4) new 37,000 lb. cars equipped with 35 h.p. motors, displacing an equal number of 54,000 lb. cars equipped with 90 h.p. motors. From resultant economies obtained thus far indications are that these new cars will pay for themselves in less than three years time.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — ST. LOUIS MO. — G.C. KUHLMAN CAR CO. — CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.





High-Speed Breaker installed on Automatic Reclosing Feeder Panel.

The measure of the added protection

The decision to install high-speed air circuit breakers puts the finishing touches to the layout of a modern, well-protected railway substation.

The G-E High-Speed Breaker has the following important characteristics:

Very effective rupturing of arc due to magnetic blowout and narrow slots in the arc chute.

Electro-magnetic tripping without mechanical latches.

Electro-magnetic, pneumatic, or manual closing.

Trip-free feature for closing under load.

Selective feature permitting discrimination between over-loads and short-circuits.

Self-contained for installation in any convenient location.

Ask for Bulletin 44742-1, which describes this equipment.

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GENERAL ELECTRIC