

# ELECTRIC RAILWAY JOURNAL



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## ST. LOUIS QUALITY CARS

Public favor is a fickle and intangible thing. It springs primarily from public interest. Those electric railways which have seriously undertaken to modernize their equip-

ment and service have found that the public is quick to respond—and that the new equipment more than pays its way! St. Louis Car Co., St. Louis, Mo.

# St. Louis Car Co.







# Modern Cars

Put Youngstown and Suburban  
on a Paying Basis

Passenger Service  
Increased  
4%

Operating Costs  
Decreased  
17%

Net Revenue  
Increased  
85%

FOR many years before the advent of Fitkin Management, the Youngstown and Suburban Railway operating results were in red. "With the use of new and modern cars" writes Mr. E. O. Shryock, General Manager, in the Electric Railway Journal "railway operating expenses have been reduced, and we believe passenger riding will increase due to the better facilities offered".

During the first five months of 1926, an average of 4,000 more revenue passengers per month used the trolleys than during the same period of 1925. Net operating revenue increased 85%, despite lower freight earnings.

"It takes money to make money" says Mr. Shryock. The Youngstown and Suburban has made large investments in new equipment, to put its line on a paying basis.

Westinghouse Electric & Manufacturing Company  
East Pittsburgh Pennsylvania

Sales Offices in all Principal Cities of  
the United States and Foreign Countries



1927

*Youngstown & Suburban's New Cars, too, are*

# Westinghouse Equipped

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# ELECTRIC RAILWAY JOURNAL

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## Pictures Speak

SINCE the Paleolithic Age man has realized the value of pictures as a medium of communicating thought. They antedate the printed word by thousands of years. They were text matter to the Egyptians. No prose has ever equaled their power to attract and hold attention. They are indelibly registered on the sensitive film of the subconscious mind years after prose has become a jumbled mass of impressions. For example: What would Dickens' subtle characterization of Mr. Pickwick be without seeing the benevolent gentleman through the eyes of Boz? The phrase "cold type" had its origin in the days when books were a dreary succession of closely printed pages. Imagination was overworked instead of being stimulated.

Since that time giant strides in photography have made pictures a major factor in the science of publication. From the modern publisher's standpoint they are dress clothes for the book. There can never be too many of them. The contributor doubles the effectiveness of his message when it is accompanied by pictures. They are the most inexpensive means of transmitting thought. One glance and the reader is on your property. He looks at the situation through your eyes.

Employ, then, their power to advance our business. They Speak!

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## **“One-Wear”—No Repair**

You never hear from Davis  
“One-Wear” Steel Wheels once  
they are under your cars.

They never clamour for con-  
ditioning. They serve  
well and thus avoid attracting  
attention.

The help they give in mainte-  
nance reduction makes Davis  
“One-Wear” Steel Wheels  
worth more.

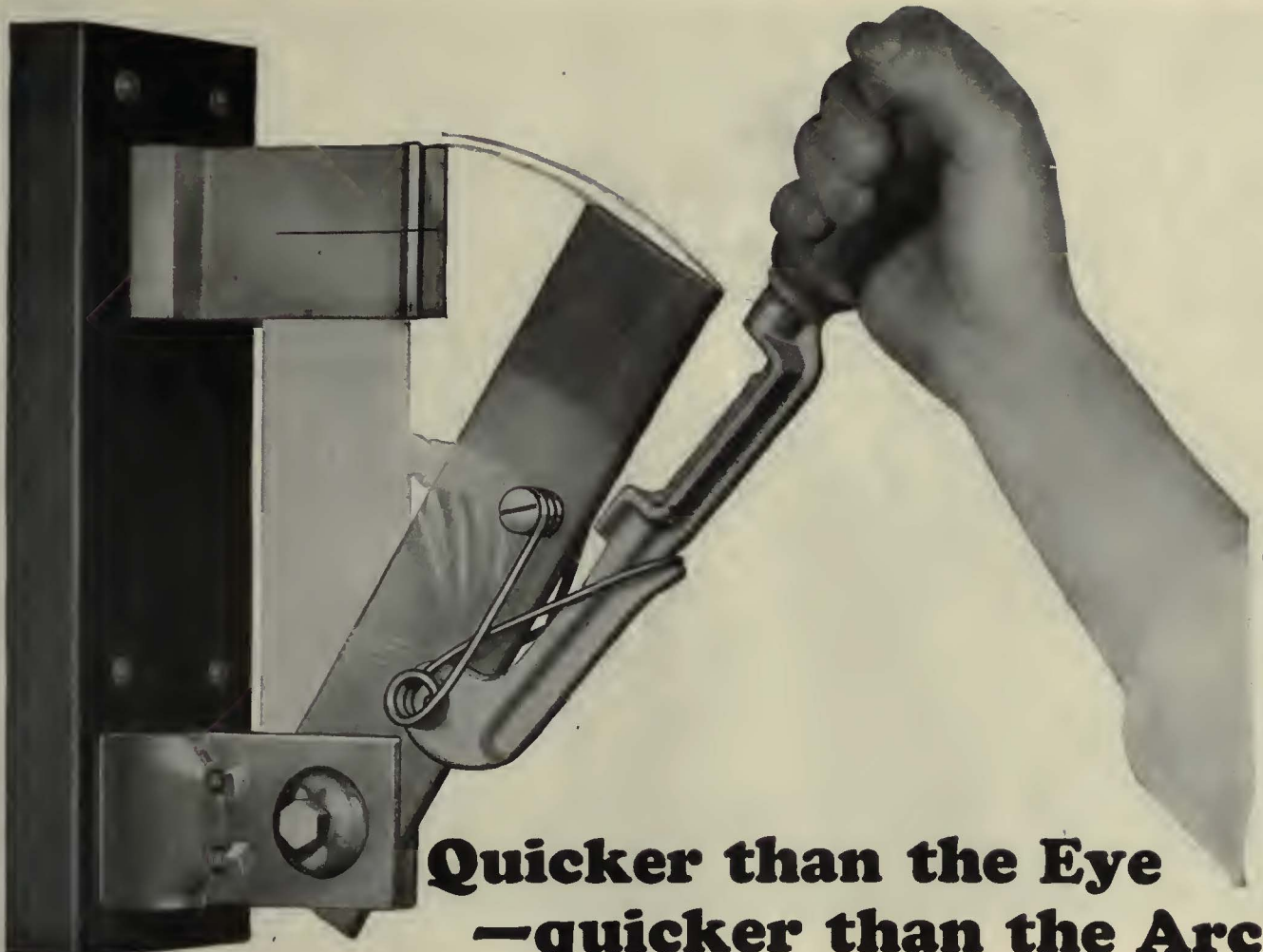
**AMERICAN STEEL FOUNDRIES**

NEW YORK

CHICAGO

ST. LOUIS





## Quicker than the Eye —quicker than the Arc

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

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.

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

1808



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 Co.



PORCELAIN  
INSULATORS  
LINE MATERIALS  
RAIL BONDS  
CAR EQUIPMENT  
MINING  
MATERIALS  
VALVES



# Safe Transportation

*then and now*



## Westinghouse Air Brakes

—develop a retarding force sufficiently powerful for stopping even the heaviest bus quickly to increase safety and permit faster schedules.

—provide automatic equalization to minimize skidding and lengthen life of brake linings.

—relieve the driver of braking fatigue to increase safety and utility.

OLD fashioned conveyances were safe, but slow.

Today we demand that every means of transportation at our disposal be rapid, as well as safe.

The automotive industry is producing motor coaches that are commodious, comfortable, "get there quickly," and are SAFE, because—

Westinghouse Air Brakes are now recognized by leading bus builders as the most satisfactory means of safeguarding highway transportation.

*"Pioneers and specialists in air brake development and manufacture since 1869."*

WESTINGHOUSE TRACTION BRAKE CO.

Automotive Division, Wilmerding, Pa.

# WESTINGHOUSE AUTOMOTIVE AIR BRAKES



Any type of concrete track  
can be

Saved . . .  
Salvaged . . . Used over



## The accepted first step toward lowering track costs

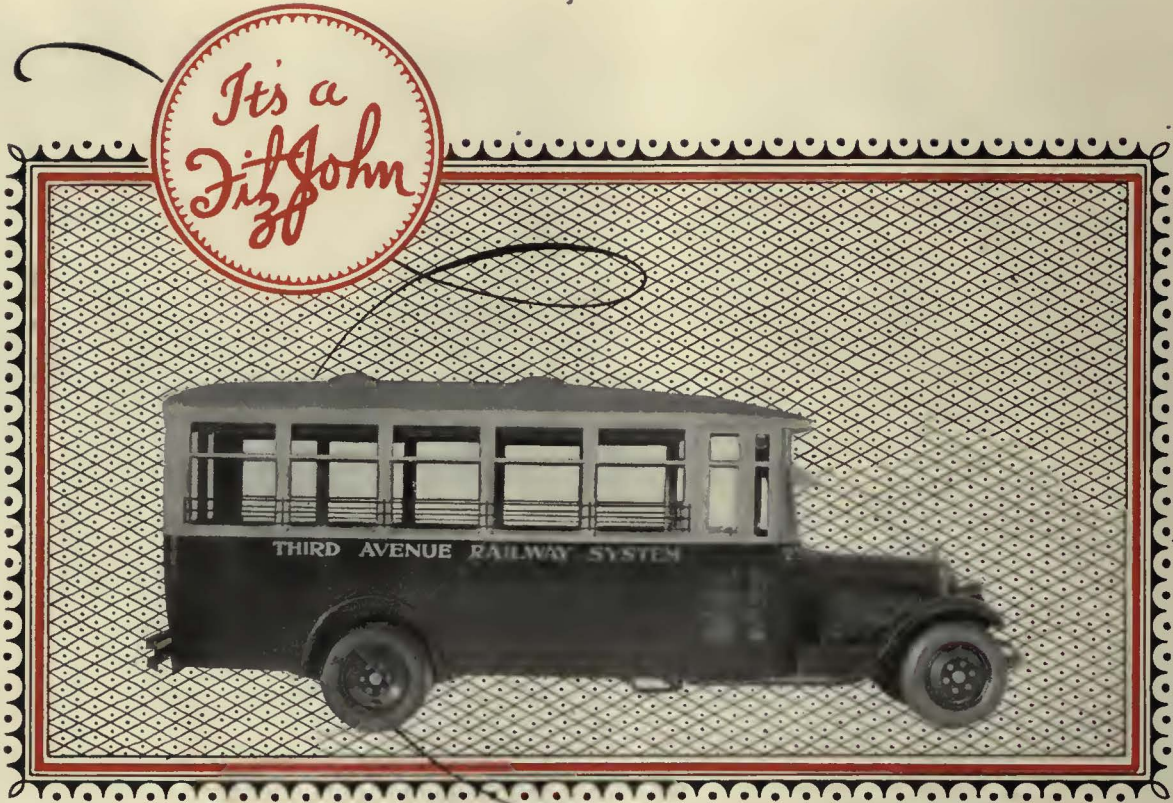
In the first place, the Twin Tie design reduces the construction material 40%. And realizing that concrete and excavation usually make up 82% of the total track cost—you can readily appreciate just how much this 40% savings would mean to you.

Secondly, the experience of the many users of Twin Ties show that track may be laid on Twin Ties with a 50% savings in labor costs.

Actual data on installations and other interesting details are in a booklet that is yours for the asking—Write to The International Steel Tie Co., Cleveland, Ohio.

20% more bearing surface  
steel **Twin Tie** track





*chosen by*  
**The THIRD AVENUE Railway**

Beyond the bustle of New York City the Third Avenue Railway stretches its arteries of service out into the highly restricted residential areas of Westchester County

In full appreciation of the class of service their bus operations are called upon to render, the Third Avenue Railway gave careful thought to their choice of bus bodies.

Not only for the value of Fitzjohn expressed as an investment in durability, comfort and long service life, but as a revenue-building, passenger-attracting asset, the Third Avenue railway chose wisely when they chose Fitzjohn bus bodies to serve a discriminating riding public.

You, too, can select a Fitzjohn for your bus requirements. They are built for any chassis, for city service or de luxe transportation.

*Fitzjohn*

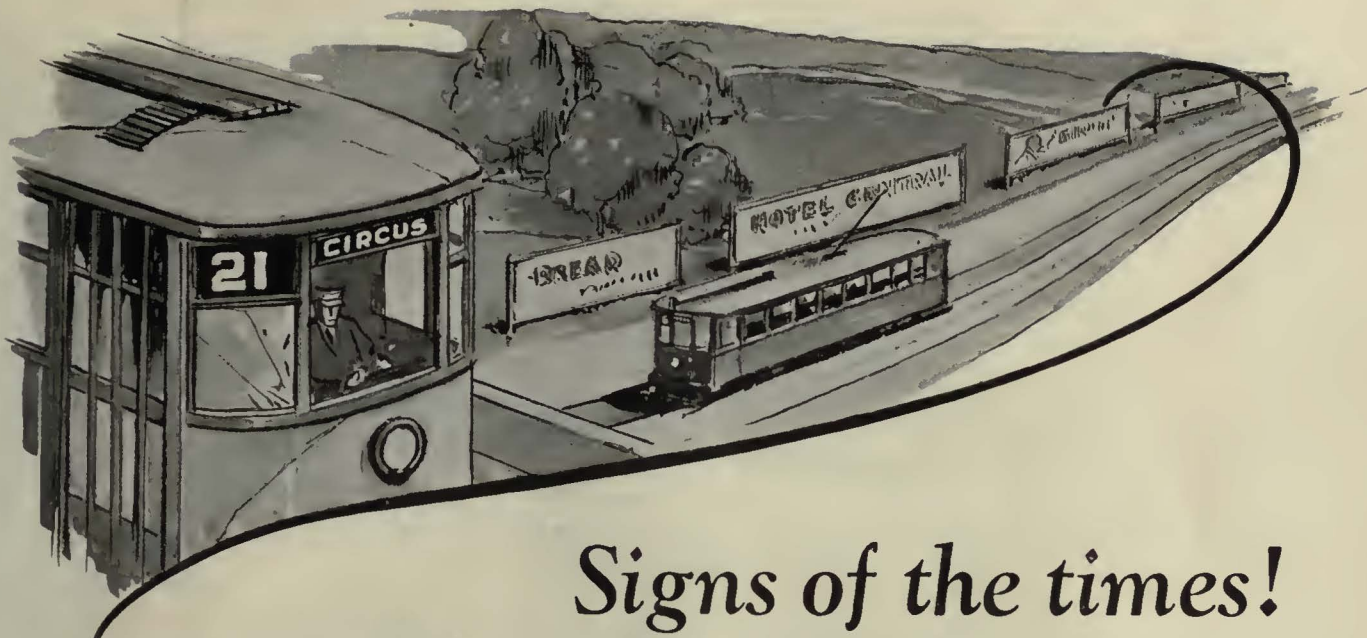
**FITZJOHN Manufacturing Company**

*Exclusive Bus Body Builders*

Muskegon

Michigan





## Signs of the times!



All along the roadway are long lines of billboards. Manufacturers spend millions of dollars to advertise their products by this means.

Advertise your service by this same means in an inexpensive way. Use clear, clean readable signs to mark the destinations and routes of cars and buses.

Hunter-Keystone Signs for cars and Hunter Signs for buses have bold white letters on black roller curtains that "Tell the public where you're going" by day and by night.

*Ask for a copy of Catalog No. 7, illustrating and describing the complete line of Keystone Car Equipment—Catalog No. 9 for Bus Equipment.*

### ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA 17th and Cambria Sts.    NEW YORK 50 Church St.    CHICAGO Illinois Merchants' Bank Bldg.  
 PITTSBURGH 1123 Bessemer Bldg.    BOSTON 88 Broad St.    SCRANTON 316 N. Washington Ave.    DETROIT General Motors Building  
 Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver







Many types  
but all Safety Cars

Modern types of cars are as varied as the communities they serve. Single truck, double-truck—single end, double end—all have their place in handling the peculiar problems within their zones of operation. High cars, low cars—long cars, short cars—but all Safety Cars where the best interests of a community and a will to serve vividly and economically are given thought.



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

*Postal and Telegraphic Address:*

**WILMERDING, PA.**

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

(3106)

*It is a Safety Car if equipped with  
our standard Safety Car Control Devices*



# Such Quiet Gears


**Transmission gear silence is imperative for a bus. Heavy loads on steep grades and frequent stops draw heavily on 2nd and 3rd speeds.**

**Mack Transmission gears are quiet. Pleasing quiet draws patronage.**









**Private automobiles use their transmission gears but little. With trucks, noise doesn't bother the freight.**

**With a bus, it's different.**

**Mack secures quiet transmission gears by correctly guiding them on their shafts by generator ground surfaces; by making the shafts stiff and supporting them rigidly by large and thoroughly lubricated bearings; by designing them with wide faces and low tooth speeds; by insisting that the gears are metallurgically and mechanically right.**

**The price of correctly-meshed, true-running gears with truly-formed, smooth-surfaced teeth is pains-taking care in the manufacture of every part; costly processes not usually employed; special materials formed in special ways and heat-treated with scientific precision.**

**Gear teeth finished by generator grinding to mirror smoothness and perfection of form are typical of the Mack. They roll quietly. They are frictionless. They continue to hold these advantages indefinitely in the severest service.**





In Toledo, Ohio The Community Traction Company—  
A Doherty Property—Use Macks in City Service

## **Not soft cushions alone—**

**Revenue is influenced by comfort. Long springs, properly balanced, their ends embedded in rubber; seats properly designed with double cushions—spring and air; ample leg room—all these are Mack's contributions in helping to "sell the service". But Mack goes further. For comfort, the ear must not be offended. So, in addition, after designing a quiet, balanced, vibrationless engine, Mack took the noise out of the transmission case.**

**The Community Traction Company will tell you that the luxury of their Macks have developed their riding habit and that quiet transmission gears have been a factor in creating the impression of luxurious, comfortable riding.**

**Mack Trucks, Inc.**  
International Motor Company  
25 Broadway, New York City



## “GETTING OUT”



Exit at  
the Rear

Car ready to start when from the rear comes a cry of—

### “Getting out”

One lone passenger struggles through the crowded aisles to the front exit door.

Delays — Inconvenience — “Aisle Friction.”

The one answer to these difficulties is the *Circulating Load*.

The National Pneumatic Company has evolved the *Automatic Treadle Exit Door* which makes it possible for you to circulate your load in one man service with as much comfort, speed and safety as on two man cars.



Enter at  
the Front

# National Pneumatic Company

Executive Office, 50 Church Street, New York

General Works, Rahway, New Jersey

CHICAGO  
518 McCormick Building

PHILADELPHIA  
1010 Colonial Trust Building

MANUFACTURED IN TORONTO, CANADA, BY  
Railway & Power Engineering Corp., Ltd.

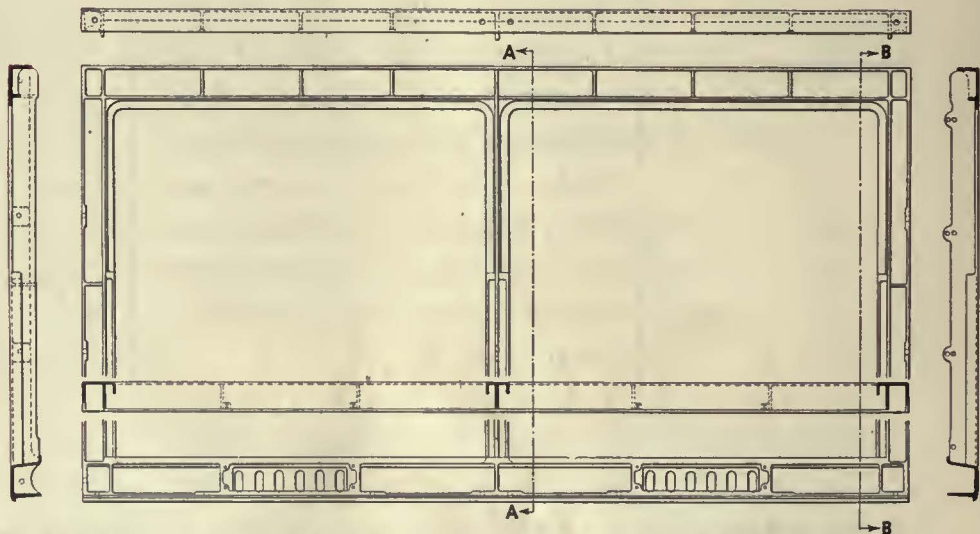


# True lightweight—

**A**N EXTERIOR view of the Cincinnati All Steel Car Frame, above which is suspended the jig-built poplar roof. Note particularly the highly simplified design, and rigid construction with continuous steel channels extending clear across the roof from side sill to side sill at each end.



**D**ETAIL of construction of side sill angle girder plate showing "U" steel stiffeners and the cast aluminum side window frame bolted to the same. This picture shows also the entirely novel "individual" ventilator provided for each passenger, and the method of fastening the skirt to the side sill angle.



**T**HE Cast Aluminum Side frame as used on Cincinnati NEW Cars is made in two-window sections, except where an odd number of windows is necessary. This detail shows clearly the rigid yet simple design of such a section. Greatly simplified construction, interchangeability, great rigidity and easy-to-open windows are outstanding features of this important innovation.

# is the direct result of BALANCED DESIGN

[
]
 A statement by the **PIONEER**  
 builders and advocates of the  
 lightweight Car

Twelve years ago Cincinnati began advocating the use of lightweight cars on electric railways. Since that time the swing to lighter rolling stock has steadily gained impetus. And Cincinnati, as a pioneer in this movement, has consistently worked to establish a workable and efficient standard of lightweight car construction.

Such a standard has been found in the principle of BALANCED DESIGN. For here lightweight is achieved through accurate coordination of every unit in the completed car, with application of modern lightweight engineering principles in the fabrication of these units. This might be

called building *up* to light weight as opposed to the usual "shaving down" process. Hence nothing has been sacrificed and everything gained.

Where conventional design would not give the desired results, radical changes have been made. Some of these unusual features are illustrated and described on the opposite page. They illustrate very clearly how by building Cincinnati NEW Cars as complete BALANCED units it has been possible to achieve light weight in its most modern and efficient form.

We will be glad to discuss this subject in greater detail with interested electric railway executives.

THE CINCINNATI CAR COMPANY  
CINCINNATI, OHIO

CINCINNATI  
*New*  
 CARS

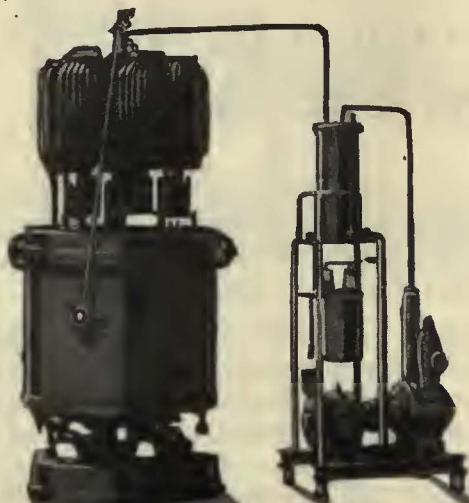
*A step ahead of the modern trend*





# American BROWN BOVERI

Changed from



## CHIEF ADVANTAGES

- (1) Efficiency high over the whole working range.
- (2) Simple operation and minimum attention.
- (3) No synchronizing.
- (4) Very high momentary overload capacity and insensibility to short circuits.
- (5) Negligible maintenance.
- (6) Low weight. No special foundations.
- (7) Noiseless and vibrationless operation, consequently rectifier substations can be erected in densely populated localities.
- (8) New substations need only be of light construction. In many cases old houses can be converted, while the plant can often be erected in places that could not be considered for rotating machinery.

## Principal Products

Mercury-Aro Power Rectifiers (steel enclosed)  
Electric Locomotives—for any system of current, high or low tensions.  
Complete equipment for railway electrification  
Rotary Converters  
Motor Generators  
Complete equipment for outdoor and indoor substations

Diesel-Electric Locomotives

Automatic Regulators

Steam Turbo-Generators for normal or high pressures and super-heats

Oil Switches and Circuit Breakers

Transformers

Turbo-Compressors and Blowers

Ships

Diesel Driven  
Turbine Driven  
Electrical Driven

Dredges and Harbor Equipment



## Mercury-Arc Power Rectifiers

Change frequency to another with  
very little effort

You know the difficulty of changing Rotary Converters or Motor Generators from one A. C. frequency to another. It means almost complete replacement.

Unlike any other type of converting equipment, American Brown Boveri Mercury-Arc Power Rectifiers can be transferred from frequency to frequency with very little trouble. This saves you time, effort and expense. It is only one of the many reasons why ABB equipment is worth-while.....why the industry is buying ABB Mercury-Arc Power Rectifiers. Other reasons, especially the higher efficiencies, are indicated on the opposite page.

*Bulletin No. 301, describing ABB Mercury-Arc Power Rectifiers is ready. We will be glad to send you a copy.*

American Brown Boveri Electric Corporation

165 Broadway, New York, N. Y.

Camden, New Jersey

922 Witherspoon Bldg., Philadelphia.

842 Summer St., Boston

230 South Clark St., Chicago

# AMERICAN BROWN BOVERI





# Coffee

## by Long Distance

\$10,963.20  
worth



WHENEVER ACTION is important, we suggest long distance calls. Compare the charges with what it would cost to send representatives in person. Compare the number and size of the orders and compare the time required.

Hundreds of businesses are now using the telephone over states and over trade territories as they formerly used it locally. There are no county or state lines to the telephone, in buying and selling goods;

A COLORADO COFFEE COMPANY devised a new container for its product. On one side appeared the name of the brand, on the other the word "sugar," "corn-meal," "salt" or some other commodity for which the can could later be used. Here was an idea likely to appeal to housewives. What was needed was quick distribution. They got it—by Long Distance. Telephone calls to 19 dealers in 9 states got 18 orders for 27,128 pounds of coffee. Later, the 19th dealer bought as a result of the call.

in making appointments; in closing transactions. In saving time and money.

What concern would it pay to call now, in the next state or across the continent? The cost is usually less than you'd think. . . . *Number, please?*

## BELL LONG DISTANCE SERVICE





# More Mileage More Profits

**T**HERE is a black-ink story in Royal Cord Motorcoach Tires. It is written in the cost accounts of ledgers all over the country.

It is a story of interest to all motorcoach operators, for it tells of greater profits through lowered costs of operation—more mileage per tire.

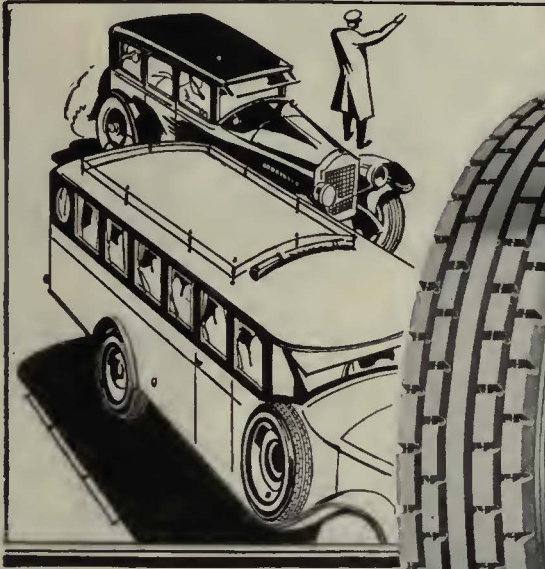
\* \* \*

Back in the days when the motorbus was little more than a converted truck, United States Tire engineers, having already produced the first pneumatic bus tire, set themselves a new objective for a still better tire. They went to work to give the growing industry "the lowest possible cost per tire mile."

Then—because they wanted to know the exact conditions their tire would meet—they studied motorcoach operation, not only in the laboratory but in the field.

From every section of the country, they gathered every bit of data that might aid them. Then, and not till then, they built. And the result was the Royal Cord Motorcoach Tire—a new type of tire, different in every way, fully fitted to meet the new requirements.

Today, the Royal Cord Motorcoach Tire is widely recognized as "The Modern Tire for the Modern Motorcoach."



The motorcoach which keeps its schedules is the motorcoach that gets the traffic. The motorcoach that gets off schedule because of tire trouble, loses it. The United States Royal Cord Motorcoach Tire gives a motorcoach a chance to live up to its time table. It emphasizes comfort and provides an extra measure of safety under all conditions.

United States  Rubber Company  
Trade Mark

**U** The Royal Cord Motorcoach embodies the newest principles in tire construction: *Latex-treated Web Cord, Sprayed Rubber, Self-Cooling Bead, Multi-ply Carcass, Scientific Tread Design.*

## UNITED STATES ROYAL CORD Motorcoach



UNITED STATES TIRES ARE GOOD TIRES





## When Dependability is All-important G-E Headlights are Specified

The Chicago, North Shore and Milwaukee Railroad Company won renown by its safe and speedy transportation of the immense crowd which attended the Eucharistic Congress at Mundelein.

In anticipation of this abnormal service demand, the North Shore Line purchased twenty-four new cars. For such an emergency, headlight equipment had to be dependable. There would be no time for substitution or repairs. That is why G-E Headlights were specified.

Year-in and year-out dependability is the basis for such confidence in G-E Headlights.



*For*  
Modern Equipment Standards

# 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 69

New York, Saturday, February 26, 1927

Number 9

## The Legislative Reformer Is Hard at Work

LEGISLATURES are in session in 41 states. Thousands of bills of all descriptions are pouring into the hoppers. Many of them will never see the light of day. It is just as well. Of all the sins to which humanity—particularly humanity in the United States—is heir, the sin of legislation is one of the worst. It is an ever-recurring but strange sight this, but there seems nothing to do but grin and bear it. That, however, is not so easy to do in some cases. There is no need to go into the details, but the efforts being made in some states to legislate against one-man cars, to return to home rule and to attempt to cure this or that supposed ill by legislation would be funny if they were not quite so serious in their possible consequences.

This does not mean that one should not give serious heed to the recommendations in the Governors' messages abstracted elsewhere in this issue. Some of the things sought to be accomplished are laudable in their purpose. It is to be hoped that the bills intended to put these recommendations into effect may be enacted into law. To assume a negative attitude on the whole matter of legislation will not do just because many of the bills are ill-conceived. It is advisable to work assiduously against bills that are likely to impose hardship on the industry, but while doing so it is also well to try to preserve a philosophical attitude toward the measures of the zealot imbued with the insane idea of reformation at one fell swoop. Nothing helps the reformer more than to underestimate him or to hold him too cheaply. The zealot, enamored of his own estimation of his own importance and charmed by the sound of his own voice, is not dangerous so long as he is content, Narcissus-like, to be satisfied with his own reflection and his own echo, but no one knows how long he will remain thus content. It is when he attempts to translate his zeal into action that he becomes a menace to society. Evidence of the bitter consequences of such endeavor beset the world at every turn. If legislation could make us good, we would be good indeed.

## Many Failures in Service Are Due to Carelessness

NOT long ago a certain large department store made a careful investigation to determine the reason for every road breakdown of its motor truck delivery equipment. It was found that about 40 per cent of the breakdowns were due to carelessness, either in operation or maintenance, and that 60 per cent could be properly attributed to causes such as failure of material or general wear and tear. Analyzing further the matter of carelessness, it was found that only 10 per cent of the total breakdowns resulted from faulty maintenance, while 30 per cent were caused by improper operation of the vehicle. These conclusions are particularly significant because the investigation was conducted

by a neutral member of the store's executive staff.

To some extent a similar condition exists in connection with electric railway operation of cars and buses. Because of careful inspection methods on most railways incipient failures of material usually are detected before breakdown occurs on the road. For that reason the proportion of breakdowns due to abuse of equipment probably exceeds the 30 per cent found in the cases of the delivery trucks, and the proportion due to material failure is smaller. While the construction of the average railway car is more rugged than that of an automotive delivery vehicle and it will stand more abuse by its operators, the number of road failures resulting from such causes as carelessness and improper operation undoubtedly is large. Careful analysis of this situation would be well worth while on any railway property. Not only would repair bills be reduced but fewer interruptions to service would occur.

## Ready-to-Wear vs. Custom Built

MUCH theory has been aired concerning the ultimate rôle which the bus will play in the drama of co-ordinated transportation. There have been some to claim that it might properly be expected to replace the street car, or at least to share honors with it, as an instrument of mass transportation. Enthusiasts all for the bus, the exponents of this theory have shown a singular lack of foresightedness in sensing the real field in which the vehicle might best develop its manifold possibilities. In their eagerness to see its widespread adoption in transportation work they have, in various local instances, come perilously close to convincing the people that the bus is nothing more nor less than a street car on rubber tires.

Much more constructive is the stand taken by an ever-increasing number of transportation executives, that the bus will best serve them as an entering wedge among the class of people who have a decided aversion to rubbing shoulders with the hoi polloi in a crowded car—who prefer the comfort and individuality of their own automobiles, be the attendant evils of traffic congestion and lack of parking facilities what they may. This is no small element in any community of size. It is constituted of people who know what they want and who have the money to pay to secure it. The prosperous business man as a rule does not drive to his office in his own car because he enjoys the task of threading the choked downtown streets and paying an exorbitant parking charge for space in some centrally located garage. But he will do this if he must in order to obtain the privileges which he has been led to believe epitomize social prestige and which certainly guarantee a degree of comfort not obtainable in a mass transportation vehicle.

There is no fundamental reason why buses should not be operated in de luxe suburban service, providing for the better residential districts of a given area a



transportation medium quite comparable to the private automobile. Direct express service to the central business and shopping districts; even reserved club car service for the men in a certain residential section who might wish to subscribe to such an institution—these are but suggestions of the possibilities which might be developed by a railway company whose executives have a sense for latent values. Of course the fares charged for these services must of necessity be on a plane to justify the luxurious equipment and attention to individual needs which are provided.

Two Pennsylvania systems, the Philadelphia Rapid Transit Company and the Pittsburgh Railways, are among the most recent to embark upon such a program. The former has established a de luxe bus service connecting Doylestown, Willow Grove and the center of Philadelphia. From Willow Grove to Philadelphia no service stops are made. The usual electric car service between the several points on the route has been retained, but a well-planned selling campaign was adopted for the bus service, this being directed at the well-to-do elements of the citizenry of Willow Grove and the other communities along the route. Luxurious 27-passenger gas-electric buses have been provided and the fare charged is considerably higher than the street car fare for the same trip. Similar services offered by the Pittsburgh Railways were explained in detail by T. W. Noonan before the C.E.R.A. at its recent meeting.

These are but examples of the broadening vistas for the bus. It is "custom-built" to fit individual needs of varying groups, while the street car must always be ready on the shelves of the transportation merchant.

### Something Different in Fares and Public Relations

UNUSUAL circumstances attended the settlement of the recent fare case in Fort Worth, Tex., an account of which appears elsewhere in this issue. The railway concerned is the Northern Texas Traction Company, 1924 Coffin prize winner. Its approach to the matter differed in detail from the general procedure. In this respect and in respect to the system of rates suggested the case is of interest to the entire industry. The negotiations culminated in the City Council authorizing the rate readjustment by unanimous vote. It was a remarkable demonstration of public good will. The whole proceeding occupied a period of only two months. This in itself is remarkable, but, more remarkable still, not a single letter or protest appeared in any of the newspapers during all this time. At no time in any of the conferences did the company's lawyers participate in the discussion. The company took the position that this was not a legal but a business matter and that it should be handled in a business-like way with technicalities avoided. For taking this attitude the company was complimented by the members of the Council.

So much for the spirit of good will that pervaded the negotiations. Now for the increase and its significance. The new rates contemplate a 10-cent cash fare, three tokens for 25 cents and a pass costing 40 cents a week which entitles the holder to a wholesale rate of 5 cents per ride. This type of pass is somewhat of a departure in charging for railway service. On twelve rides a week the average fare on the ticket is 8½ cents, the same as the token rate. All rides that the passholder takes in addition to twelve a week are likely to be in off-peak periods. The company, it is

understood, feels that the nickel pass has many advantages over the weekly pass. A supposititious case is that if the company had adopted the weekly pass at \$1.25 the passenger would have to use the pass more than fifteen times a week to save any money under the token rate, whereas the feeling of the Fort Worth management is understood to be that the rider is entitled to begin saving as soon as he has exceeded the twelve-ride-per-week mark. Moreover, the buyer of the nickel pass puts up only 40 cents, and if he should be unable to use the ticket for a part of the week, he has less to lose than on the \$1.25 or \$1.50 weekly pass. The company estimates that 25 to 30 per cent of the passengers will ride on the nickel pass.

As for the actual change in the system, it appears to have been put into effect with unusual celerity. The whole proceeding carries a lesson to the industry, a lesson showing the influence exerted in behalf of a company that has the public good will, and a lesson of the resourcefulness that is constantly seeking to make the electric railways of greater value to the communities they serve while at the same time they strive by wholly legitimate means to turn to their own advantage every resource that may increase earnings.

### Two Worth-While Educational Activities

PROVISION for the training of foreman-conference leaders and a study of the methods of training car and trainmen are two aspects of the work of the American Association committee on education on which it has decided to concentrate its attention this year. The decision was reached at the meeting held at Toledo this month in connection with the C.E.R.A. meeting.

Both of these subjects are of vital importance. One relates to the supervisory force, where training in the duties and opportunities of foremanship is both needed and desired; the other is in a field where vast sums of money are spent annually and where a small improvement will net a large return.

The committee on education has through its studies, recommendations and demonstrations awakened a real interest in foreman conferences and other forms of supervisor training. Assent to the need for such training is freely given by all managers who have familiarized themselves with the information now available regarding its possibilities. This assent is based on the conviction, first, that foremen as a class have not realized the full potentiality of their position as intermediary between the men and the management, and, second, that foremen welcome an opportunity to study their jobs as foremen and to appropriate the fruits of modern development in the art of foremanship.

When the problem of the foreman conference is considered, the first question that arises is, Who will lead it? The success of a series of conferences obviously lies largely in the leadership. A high official cannot be leader of a conference of the type that brings out informal and profitable discussion on foremanship. Except in rare cases, men hesitate to disclose their thoughts about their own jobs before an official on whom they wish to make a good impression. The leader must be a man whose position with the company or outside its ranks is such that the standing of the foremen cannot possibly be affected by anything they may say in his presence. And he must have their confidence in his ability to keep to himself what he hears.

Whoever undertakes the leadership of a foreman



group will benefit by study of the experience of other leaders. Much material is available through books and pamphlets, particularly those prepared by the Federal Board for Vocational Education. State educational boards, also, stand ready to assist in practical ways. They should be consulted freely. If in addition to these sources of information and leader training the committee on education can directly and indirectly provide further opportunities, countrywide as well as local, for special training of electric railway foreman-conference leaders, the path of the manager who wishes to furnish foreman training on his own property will be made smoother.

The second proposed activity of the committee, training of platform men, is an entirely different matter. There is a real need here also. That present practice is not altogether satisfactory is indicated by the spirit of investigation everywhere apparent. Railways are sending out representatives to study training methods elsewhere so that their own may be improved.

Campaigns such as those for accident reduction, merchandising transportation and energy saving emphasize the qualities needed in the present-day motorman, conductor or operator. The present liberal wage scales warrant high-grade service on the platform. This means training of a new order. The committee on education can help here by formulating, for discussion and adoption by the industry, those fundamental training principles which must be followed in developing the 100 per cent 1927 trainmen.

### Courtesy Declares Dividends of Good Will

FROM far off Buenos Aires comes a problem in courtesy some form of which is met with every day by the American motorman and conductor. According to the Buenos Aires *Standard*, a tram guard's problem is difficult in that city. If he invites a passenger to take a seat instead of standing on the platform he is abused for his pains. On the other hand, if he does not invite the passenger to be seated when there is room, he runs the risk of being accused of neglecting his duty. This is the old case of being between the upper and the nether millstones. Undoubtedly there are many people who travel today who have no consideration or discretion, much less courtesy. Dealing with such people presents one of the most important phases of public relations work, in which the platform men should be made to realize that they can be of enormous assistance to the railway companies.

In the last analysis, the motorman or conductor is the company. Upon his ability to analyze human nature rests the success of the company in winning public favor. While it is difficult to keep one's temper when placed between the upper and the nether millstones, it will be a comforting fact if the motorman or conductor is reminded that the only solution of the problem lies in continual courtesy, which, like water washing on a stone, eventually will penetrate surface resistance. The trouble about so-called courtesy is that it is often manufactured politely and is as different from the real article as education is from culture. A real exponent of courtesy is a person upon whom no amount of rudeness can have any effect. Courtesy, the aristocrat of social relations, is found on every step of the social ladder.

We cannot, however, expect the courteous employee to anticipate all of the public relations problems encountered during a ten-hour tour of duty on the plat-

form. Hence it seems the practical thing to assign a specialist to this question with the idea of preparing a skeleton course in platform etiquette. It will be well worth the expense when we bear in mind that a courteous platform man declares daily dividends of good will for his company.

### A Reorganization That Saved the Original Investment

FRANK, indeed, in what it told was the paper presented by Robert M. Feustel before the Toledo meeting of the Central Electric Railway Association. The very title of the paper, "Financial Reorganization Saved the Original Investment," was provocative in the disclosures which the title implied. And Mr. Feustel did not disappoint his audience. It is impossible here to recapitulate what Mr. Feustel said. The facts set down by him do not lend themselves to such treatment, but the author was on firm ground when he made the suggestion that some years ago it would have been rank heresy for a utility operator to have admitted that outstanding securities were greater in face value than the actual money invested in physical property. Indeed it would. More's the pity. He was on thoroughly sound ground, too, when he said it had always seemed to him that the utility operators had failed to make the most before utility commissions of the very natural and logical history of the growth of their financial structures. What is most important, he backed up this statement with the reasons for making it.

The problem in the case of Mr. Feustel's property was no different from that presented in many others. Within a period of fifteen years poor guesses as to the choice of territory in some cases and the development of the automobile in all changed what was a perfectly legitimate business enterprise into a task for salvaging. And the salvaging was intelligently done. Money had to be found to better the service and so increase revenues. And that money was found. First mortgage bonds were cut in amount from \$9,000,000 to \$4,700,000. It wasn't easy to do this. The new securities equaled in face value all of the cash which had been put into the property, including the foregone interest for the three years of default. As things stand now the first mortgage represents only 35 or 40 per cent of the investment, a very different financial set-up from that with which the company started.

Mr. Feustel is over-modest when he says that there is nothing at all remarkable about the plan outlined except that "the new securities did represent all the cash in the properties at face value and were so arranged that future financing would be accomplished, and if earnings would have been low the sheriff was not so near." Particularly was he not condemnatory of the *entrepreneur*. It seemed to him that the original financial structure was a perfectly logical outcome of the highly competitive condition under which the early electric railways were built and that the promoters were well entitled to any profits they could make in gathering so much money into the development of the new and still speculative utility field. With that point of view ELECTRIC RAILWAY JOURNAL is in thorough accord. All in all, Mr. Feustel told a story that the industry needs to have on the records, a story that substantiates the position taken by the committee on finance. On this occasion the need is not to scoff at what was originally attempted, but to proclaim what was eventually accomplished.



# Three Classes of Service,

Says T. E. Mitten

Must Be Recognized by Local Transportation Men

Some of us are trying to sell cotton goods in a silk age. The quality of local transportation service has not kept pace with the changing demand of the times. A constantly increasing standard of service at a fair price should be the objective of the industry

AN INTERVIEW BY  
*Charles Gordon*



T. E. Mitten

**T**HERE has been considerable interest—and some skepticism—throughout the transportation world in the steps taken during recent years under the direction of T. E. Mitten to develop all branches of local transportation in and around Philadelphia. Co-ordination to his organization has meant not only cars and buses, but taxicabs as well.

Because of the bold steps which have been taken in putting together various transportation agencies in Philadelphia, I sought an interview with Mr. Mitten to get his ideas regarding the future of the industry. And it didn't take very many minutes to find that taxicabs and buses notwithstanding, Mr. Mitten continues to look on the electric railway car as the backbone of a co-ordinated system of city transport. But more on that subject later.

Mr. Mitten received me in his office in the new Mitten bank—another example of the man's daring ideas. This latest enterprise, like most of his other ventures during recent years, is an outgrowth of his hobby—mutual ownership by employees and management. Whether or not his ideas are generally applicable only experience will tell. But that they are audacious and interesting is apparent beyond question. He did not talk much about the bank and I did not press him on this feature of his plans, as my purpose was to get his views on more direct transportation subjects. However, the bank is a sidelight on the man, and illustrates how far out of the beaten track he has the courage to go in the development of his ideas. Employee-management co-operation had much to do with its inception. One of its features is understood to be a trust department operated at cost, to administer the estates of stockholders and depositors—and of course the employees of the transportation company may be expected to represent a major element in both groups. The average estate of P.R.T. employees amounts to about \$3,000. This is a tidy sum. Though Mr. Mitten did not say so himself, I am told that one of the motives that led to the bank was the effort to help in conserving these estates and

to protect both employees and their families from the ravages of the shyster lawyer and the fake stock salesman.

I let my imagination run a little as a former street car conductor resplendent in gray uniform and shining hardware ushered me into the bank elevator. When the company needed capital recently it sold preferred stock from car platforms—\$10,000,000 worth of it in ten days! Deferred payments are made to the conductors by a transaction little more complicated than the issuance of a transfer. Bankers long ago discovered that people save more if you put a branch bank near at hand. From the making of stock installment payments to the conductor to making savings deposits on car platforms doesn't seem like a long step. No wonder that Philadelphia bankers are watching Mitten with great interest.

Although the bank is beside the real subject, it forms a background for the study of the characteristics of the man interviewed. He is generally considered a radical in the electric railway industry—and he probably is. But since the industry as a whole suffers from over-conservatism, his views on the industry's future and the objectives he has in mind as the goal of his daring moves during the past few years rank him as a distinct optimist on electric railways. Not only is that true, but he is also an optimist on the future of the street car as an agency of public transportation, once it has been developed and applied in combination with other forms of transportation, in a way to take advantage of its inherent service characteristics. Mr. Mitten made all this evident quickly at the beginning of our talk.

Since his acquisition of the Yellow Cab Company of Philadelphia is one of his most recent steps toward complete co-ordination of all facilities, that was a good place to start the questions, to find out just what had led the P.R.T. to acquire the cab company.

"It is the local transportation company's job," he said,



**I**N DEMOCRATIC America we don't like to admit class difference in anything—but we have it nevertheless. . . . We have three classes of service at three different rates. Once we recognize that condition fully we'll begin to make real progress in development. The bus is the middle class vehicle. It fits between the street car and the individual automobile or taxi. When combined, these three agencies form a complete local transportation system, but we still have considerable to learn about how to utilize each form of vehicle in such a co-ordinated system, and how to build a proper rate structure for the various classes of service given.

"to furnish every form of service required by the public. As we lose the short-haul rider and the strangers in our city with the development of the automobile, why let them go to some other agency that can make a profit from carrying them? The demand for transportation all over this country has been growing rapidly in quantity but changing at the same time in character. Why should we sit by and lose a large proportion of riders who are willing to pay the price of a taxi ride when we can haul them that way at a profit?"

That sounded like good business sense, and so without trying to get further into the taxi matter, another question was ventured in the direction in which I was more particularly interested. "What about the buses, Mr. Mitten, are they going to replace street cars?"

"Not by any means!" was his emphatic reply. And then he asked me a question. "Why do that? What good would it do?"

"Substitution of buses for street cars would make no particular improvement in the situation as regards congestion. That would constitute a change without any fundamental advance in transportation facilities, either as to quantity or character. The electrically propelled vehicle has one inherent advantage that we have not talked much about, but which is distinctly in its favor nevertheless. It can be operated under ground and does not produce a gas problem. The great proportion of the people who ride in public vehicles must be taken off the streets in the congested areas and carried in underground streets—for that is all subways really are. In most cities of major size in this country there is no other alternative."

This seemed perfectly sound reasoning, but I did not feel that it covered the whole situation, and so I ventured another question.

#### SURFACE CARS UNDERGROUND ONLY IN CONGESTED DISTRICTS

"Does that mean, then, that you accept the idea that transportation of the future will be furnished entirely by subways underground along main traffic routes, with buses on the surface to act as feeders, so that street cars will ultimately be no longer necessary?"

Here again Mr. Mitten refused to accept the opinion expressed by others and showed the independence of his thinking.

"I don't think that follows at all," he said, "except in New York, where there are special conditions not comparable with the situation in any other city in the country; any system of subways in other American cities extending beyond the central congested business district would be needlessly extravagant and inconvenient. There is no particular reason why a passenger

should have to transfer from rapid transit lines to feeders and vice versa in order to get from his home to his place of work. If you figure time from his door to his office, under such a system it is questionable whether any actual time would be saved in the average city over a system in which the car took him within convenient distance of his home without a transfer after leaving the business district. Certainly there is serious delay in getting through the congested district in most cities. Therefore the thing that is needed is to put the street cars underground when they strike the congestion. On the surface extensions therefrom, they should be operated over routes that would move the greatest possible number of people to their homes with the minimum of inconvenience."

#### DIFFERENT KINDS OF SERVICE NEEDED

Here Mr. Mitten launched into a very significant part of his discussion.

"One of our troubles in city transportation today is that we are trying to force everybody to use one class of service, whether they want it or not, and that service, from the standpoint of comfort and convenience, is the lowest in grade that the public will bear. In Europe they are just beginning to conceive the real meaning of co-ordination in the sense of tying together various transportation agencies to give the greatest possible variety of service at maximum efficiency. If we don't look to our laurels we'll soon be looking to their leadership. In democratic America we don't like to admit class difference in anything—but we have it nevertheless. On the railroads we have it and it is also an established fact in local transportation, whether we admit it or not. We have three classes of service at three different rates. Once we recognize that condition fully we'll begin to make real progress in development. The bus is the middle class vehicle. It fits between the street car and the individual automobile or taxi. When combined, these three agencies form a complete local transportation system, but we still have considerable to learn about how to utilize each form of vehicle in such a co-ordinated system, and how to build a proper rate structure for the various classes of service given."

At this point Mr. Mitten threw precedent to the winds.

"What do you consider the proper measure of service for the basic or lowest rate agency?" I asked.

"A seat for every passenger is the only acceptable standard," he said. "One of the fallacies in present-day thinking on transportation is that we have started with the assumption that such a standard is impossible. I don't agree with that at all. By providing prepayment



facilities in surface car subways under the greater part of the business district in a city like Philadelphia, practically any car when properly equipped with safety devices can be operated with one man. Since platform labor is at least 50 per cent of present operating costs, it is evident that such a saving would enable a much higher service standard than at present can be attained. The increased speeds that would be possible would enormously increase the present capacity of the downtown tracks.

There seems to be no good reason whatever why every passenger cannot be given a seat, and why the rate of fare cannot at the same time be held at a reasonable figure for this popular class of service. Beyond that point the bus plays its part. By putting cars underground and operating buses on the surface, the capacity of the business districts will be increased. At the same time the bus has desirable flexibility for surface operation in the business districts. But its service should be maintained on a distinctly higher level at higher rates. Since it is possible for buses to pass each other going in the same direction on a given street, special express service can be given. This can be developed into a distinctive service at rates of fare which are a proper measure of the value of the service given. And there you have the picture. Beyond that point is the individual vehicle, for those who are willing to pay more for individual service. Each of these agencies, has its own distinct field to serve, and a live transportation company should be in position to furnish any class of

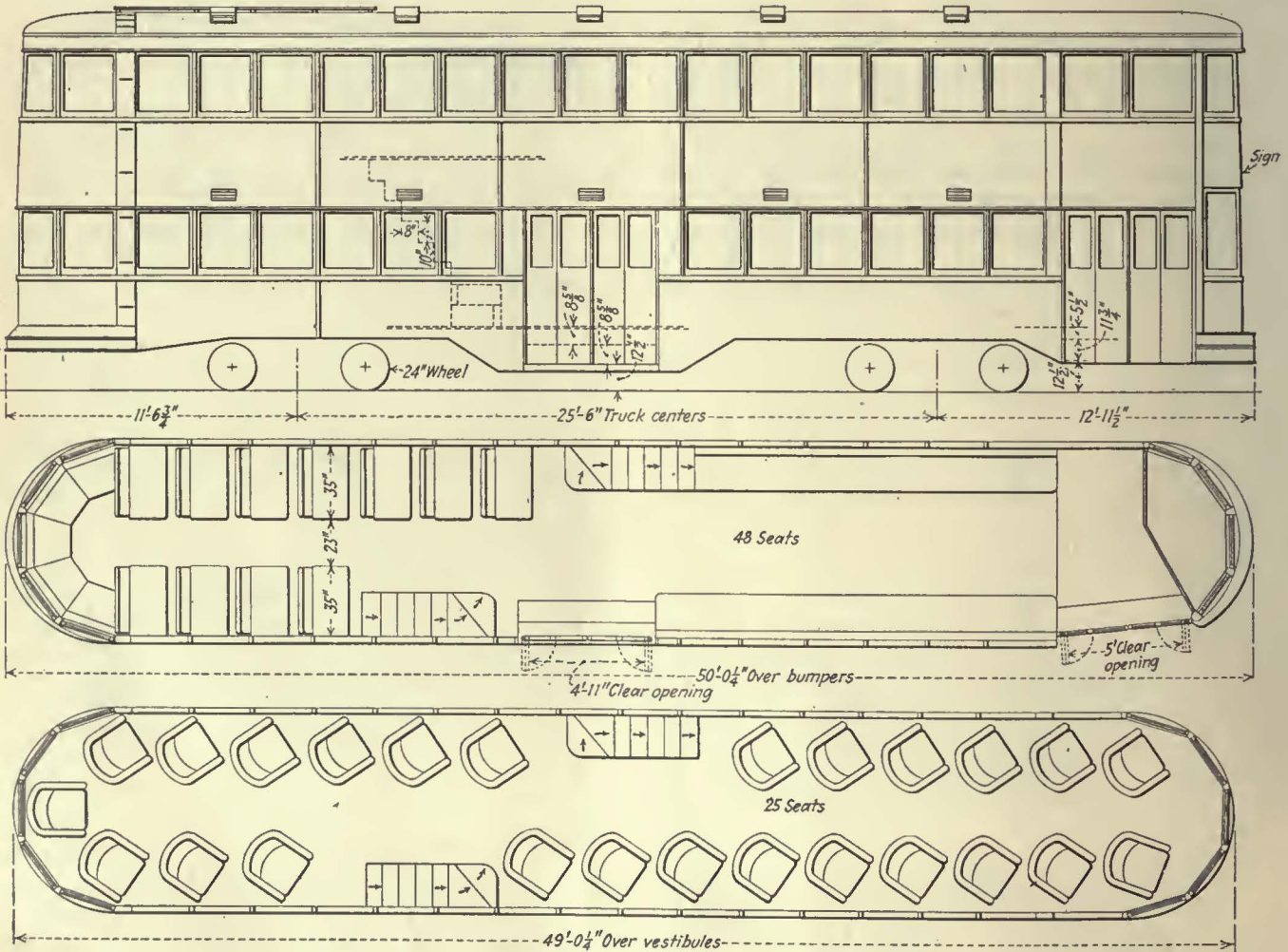
service that is wanted. It is a serious mistake to try to bring all transportation to one class, or to permit other agencies to step into a city and take all of those riders who are no longer content to utilize the popular service at minimum cost."

### Peter Witt Designs New De Luxe Car

PETER WITT, Cleveland consulting railway expert and car specialist, has just designed a new double-deck de luxe car with which he hopes to increase revenue without a corresponding advance in the cost of operation. To accomplish this Mr. Witt has planned to fit the upper deck with revolving chairs, for which there will be an extra charge. Twenty-five passengers are to be accommodated on the upper level, which is reached by two sets of stairs within the car.

By skillful planning, the main deck is arranged to seat 48 passengers and still leave ample room for standees and for free passage to the upper level. General dimensions of the car are as shown in the accompanying table.

|                                     |                            |
|-------------------------------------|----------------------------|
| Length over bumpers                 | 50 ft. 1/2 in.             |
| Length over vestibules              | 49 ft. 1/2 in.             |
| Height over all                     | 15 ft. 0 in.               |
| Truck centers, two trucks           | 25 ft. 6 in.               |
| Maximum headroom, upper level       | 5 ft. 6 in.                |
| Maximum headroom, lower level       | 6 ft. 6 in.                |
| Side-front entrance, clear opening  | 5 ft. 5 in.                |
| Side-center entrance, clear opening | 4 ft. 11 in.               |
| Height rail to first step           | 12 1/2 in.                 |
| Height, first step to platform      | 8 in.                      |
| Steps to upper level                | 8-in. tread, 10-in. risers |



Side View and Seating Arrangement of Proposed Double-Deck Car

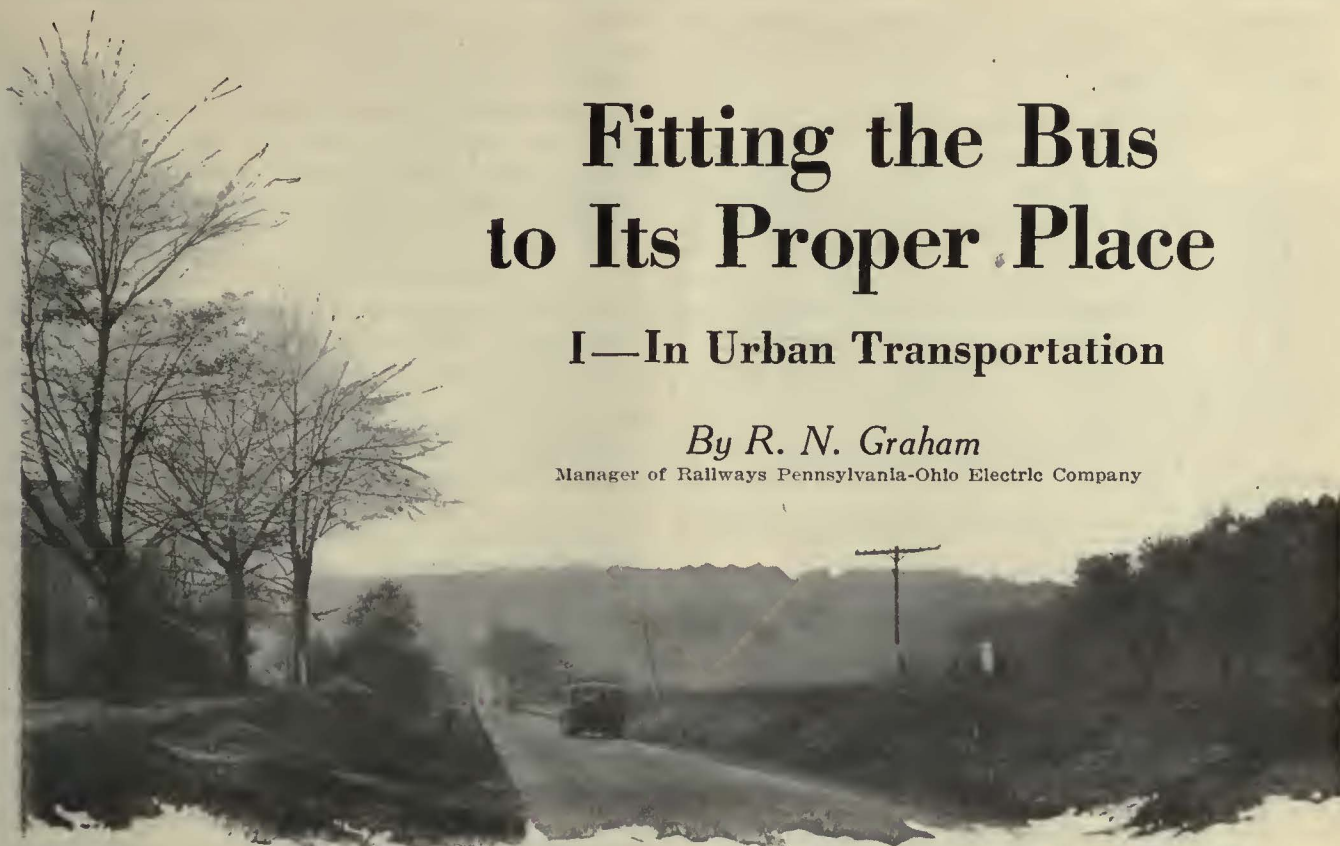


# Fitting the Bus to Its Proper Place

## I—In Urban Transportation

By R. N. Graham

Manager of Railways Pennsylvania-Ohio Electric Company



THE company with which I am connected has been operating motor buses for about five years. We have operated a total of 13,609,365 miles. Of this operation, about one-half has been city bus operation and about one-half suburban and interurban operation. The greater part of our city bus operation is in the city of Youngstown, Ohio, which probably has about 160,000 inhabitants. We have some city bus operation in New Castle, Pa.; Sharon, Pa., and Warren, Ohio, which are towns having from 20,000 to 50,000 inhabitants. We have a number of local suburban coach lines connecting Youngstown with surrounding communities and three real interurban operations, a line connecting Cleveland with Youngstown, a distance of about 70 miles; a line connecting Akron and Youngstown, a distance of about 50 miles, and a line connecting Youngstown with Meadville, Pa., a distance of about 70 miles.

The gross revenue of our entire bus and coach operation for the year 1926 was \$1,344,072.40. In the city of Youngstown during that year we operated 2,027,964 bus-miles. Gross revenue was \$638,145.11 in buses. The gross revenue of both street railway and bus operation was \$2,101,877.56. The number of passengers carried in Youngstown by street railway was 23,269,544, and by bus 10,380,431.

The first use of the bus in urban transportation by the Youngstown Municipal Railway

was in September, 1922. An accompanying statement shows the gross revenue, passengers carried and bus-miles operated in the city of Youngstown for that year and each year since then.

You will note that we operate in the city of Youngstown about 80 street cars. This is about the same number that we operated in 1921. We now operate in the city 57 motor buses, but in 1921 we had none.

In our conception of our job in furnishing transportation to our communities, we differentiate in no respect between a street car and a motor bus. We view them

both as proved agencies of transportation, as the tools of our trade. We do not intend to operate a street car where a bus can be more effectively used, neither do we intend to operate a bus where the use of a street car produces a more satisfactory result in the service to the public and in financial returns to our company.

Prior to 1916, like every other great industry in this country, the electric railway industry, which with steam shuttle service made up the only customary instrument of mass transportation, was extremely liberal in the use of man power from the fact that wages were low. With the increasing demand for man power and consequent increase of wages, the expenses of this industry increased enormously. Like every other industry, the relief was in an increase in the price of the

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THIS is the first of two articles on the motor bus, which reproduce practically in full an address made by the author before the Metropolitan Section, Society of Automotive Engineers, in New York on Feb. 17. The second article, which will be published next week, deals with interurban operation and certain features of bus design. The present article covers urban operation exclusively. It approaches the controversial bus-car question frankly and is one of the most able discussions of this subject ever published. Mr. Graham considers the bus to be a useful transportation tool and is interested in determining how best to use it. While he explodes some current claims for the bus and strikes directly at the "rubber urge" theory, he foresees for the automotive vehicle a much larger future in urban transportation than that of merely a street car on rubber tires. Every transportation man will be interested in what the author has to say. The JOURNAL will welcome comments by its readers on Mr. Graham's conclusions.

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product, which, in this case, was almost exclusively the carriage of local passengers. Increased rates of fare were thus necessary.

#### AUTOMOBILE COMPLICATED TRANSPORTATION SITUATION

However, unlike other industries, the price of the product could only be increased through a long siege of legal and political endeavors. In the very nature of human things the ultimate result would undoubtedly have been an increased price for the carriage of the public in the cities of the country proportionate to the increase in the expense, if there had not been another development contemporaneous with that which I have just described, greatly affecting mass transportation. This was the increase in the use of the private automobile. The increase in the use of the private automobile took away from the transportation industry a great part of its market at the very time when the cost of giving service was greatly increased.

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**T**HERE is hardly a city in the United States of 150,000 population that could not well support this supplementary service and the demand for vehicles for this service would furnish to the motor bus manufacturing companies a more stable market than the attempt to force into mass transportation at standard rates of fare vehicles wholly impractical to operate from a profitable standpoint.

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I am reviewing very hastily this development of the decade from 1916 to 1926, because so many people have in their minds a conviction that electric railways in some manner failed to keep progress with the step of the world and because there is a feeling in many quarters that they are in difficulties because they are a passing or obsolescent activity. This confusion of thought is increased by the fact that during the very period that increasing costs and increasing use of the private automobile has embarrassed the street railway companies, the automobile bus has been under process of development, and the tendency has been to reason that the bus is a radically new type of transportation and that in some manner the difficulties of the railway companies are a natural result of the development of a new type of transportation which they either would not or could not use and which is to succeed the electrically propelled vehicle.

Since the problem of mass transportation as distinguished from a service primarily directed to the comfort of the individual is to provide for the carriage of people in groups from point to point in an urban community, it is evident that the generic problems facing such an industry are the same regardless of the vehicle used. There is little difference between the problems encountered in transporting a given group of people with a bus or with a street car. These are simple compared with the great problems facing either class of vehicle as a result of the constantly increasing use of the private automobile, or, on the other hand, the constant increase in operating costs.

To make this point plain, let us assume that in a given city every individual owns a motor car and every individual uses this motor car for any trips that he has to make in the city; there would be no controversy then about the fact that it made no difference whether a public transportation company engaged in business in such a city used buses or street cars; its fate would be certain no matter what vehicle it used.

#### THERE IS NO "RUBBER URGE"

However, when buses first became more or less generally used in this country, there was persistent talk of the "rubber urge." The idea back of this slogan was that the bus was so much more attractive a vehicle than the street car that people who were no longer customers of the mass transportation industry would again become customers if the bus were used instead of the street car. If this was not the idea, then there would be no advantage to either the transportation company or the public in simply transporting tomorrow on the motor bus the same people that are being transported today on the street car. In other words, the idea back of the "rubber urge" theory was that people who had ceased to ride street cars would refrain from using their private automobiles and avail themselves of public transportation if the bus and not the street car were offered.

It is impossible to define the use of the motor bus in city transportation without giving the most careful consideration to the question of whether this so-called "rubber urge" exists. If there is an impelling factor that will cause people to ride motor buses in preference to their private automobile when they would not avail themselves of other forms of public city transit, then the motor bus occupies an essentially different position than it does if its use is dictated by such factors as flexibility, convenience, economy, speed, etc. To deny this so-called psychic "rubber urge" does not deny the bus a place in city transportation any more than there is denied a place for subway service, elevated service, trolley cars or street cars of varying types. Proper consideration of the question of the existence of this psychological factor would perhaps in the past few years have saved many heavy expenditures. Too much consideration cannot be given to the problem of whether such an urge exists.

In the first place, inferences have been hastily drawn ascribing to this intangible factor facts to which it never contributed. For instance, let us take the ordinary city of this country in which the streets are laid out in checkerboard fashion, as is common in the Middle West towns. On one of these streets there is a street car line, and six blocks from this street and parallel with it there is another street car line. People living on the street half way between the two car lines are compelled to walk three blocks to either line. If a bus is operated on this street, these people will no longer walk three blocks to the car but will patronize the bus line. Here there is no "rubber urge." It is just a matter of greater convenience. The same fact would follow if a car line were built down the street in question.

#### PEOPLE WILL USE MOST CONVENIENT TRANSPORTATION

Let us take another street car line on which there is a ten-minute headway. If buses are operated on this same street over the same route as that of the street cars, and splitting the headway of the cars, manifestly if similar service is given and the trip takes an equal



length of time, a part of the people will ride on the bus. This is not a result of a "rubber urge" but is merely again a matter of convenience.

There have been instances where street car tracks are worn out, the special work gone, the cars old, noisy and decrepit. When a bus entered into competition, practically no customers rode the decrepit utility. They patronized the utility which, under the individual circumstances, furnished them more convenient service. This again is not the influence of the "rubber urge" but is merely again a seeking by the customer of his own personal comfort and convenience. The same result would have followed if a different street railway company had laid new track down the same street, with new, modern, comfortable, easy-riding street railway equipment.

There are still other conditions existing which might lead to a confusion of thought in regard to the "rubber urge." For instance, a given street car route may cross a number of railroad tracks at grade, where there are many train movements or shifting movements, resulting in constant delays to the street railway service. There may be in the neighborhood some street traversing the same locality on which there is a separation of grade so that buses can be operated without the delays and discomforts attached to the steam railroad crossing. In that event there would be considerably more traffic given to such a bus line than to the street car line which had this disadvantage. If a new street railway line were constructed on the street having the grade separation it would possess the same advantage over the original layout.

Again, the street railway line may have been built to accommodate portions of the city as originally laid out, but there has been such a change due to shifting of population centers that there is a more direct route to where the population lives than is offered by the rail line. In such a case, either a bus or street railway line following the more direct route would naturally attract more travel than the old line.

After eliminating all these confusing factors, let us face the question squarely—is there an attraction in the bus itself, disregarding factors which can influence either bus or street railway traffic, that would cause

of 1 cent. All bus routes as well as all street railway routes are operated to the center of the city. There are no shuttle lines, either bus or street railway. The bus routes in general are extended into well built-up sections of the city. Duplicate service is not given. In general, the manner of operation for buses and street cars is substantially the same. As a result of five years of operation of bus lines in this manner, I would assert without hesitation that there is little preference shown by the citizens of Youngstown to either bus or street car, but where a choice can be exercised, the choice is generally in favor of the car.

Now I wish to call attention to a specific situation in which the materials for a test of the public's preference are, I think, complete and fair. There are in Youngstown a car line and a bus route which penetrate the same general territory. Both these routes are known

**H**OWEVER, there is a fourth, and I believe even greater, field than any of those enumerated for the use of this vehicle, and that is as a special, supplementary service at a much higher rate of fare to furnish unusual convenience to customers who do not object to this higher charge. In the city of Pittsburgh there are at present being operated several bus routes from the suburbs to the heart of the city where a 25-cent fare is charged and these routes are being operated with a high degree of success.

as Elm Street. The Elm Street car line is 2.6 miles in length and the Elm Street bus line 2.5 miles in length. For the greater part of their distance they are separated by a distance of three blocks. For less than half a mile they are separated by one block, and for the remainder of the distance by five blocks. This bus route was one of the first of those operated in Youngstown. Service has been continuous on the route for almost five years. An accompanying table shows the service given and patronage on these two lines for the month of October, 1926.

The car-miles operated for this month were 22,236. Bus-miles were 21,873. Street cars made 7,846 trips and buses made 8,568. The off-peak headway on both car and bus lines was ten minutes. However, to give this off-peak headway required four street cars and only three buses. Therefore the round trip by cars took 40 minutes and the round trip by buses 30 minutes, so that the service by buses was speedier. This is the fact because a large portion of the car line is single track with passing sidings. On the other hand, only one tripper car was used and three tripper buses were required. The cars operated were the small Birney cars seating 32 people. The buses were modern single-deck equipment seating 25 passengers. The cars had slat seats; buses were equipped with leather upholstered seats. The track of the car line is in as poor condition as any we have in Youngstown, but would be considered fair, average city track.

Thus, with these two lines penetrating practically the same section of the city, operated with absolutely equivalent service at the same rate of fare, the revenue from

TABLE I—GROWTH OF BUS OPERATIONS IN YOUNGSTOWN, OHIO, BY PENNSYLVANIA-OHIO ELECTRIC COMPANY. IN 1926 THE COMPANY OPERATED 80 STEEL CARS AND 57 BUSES

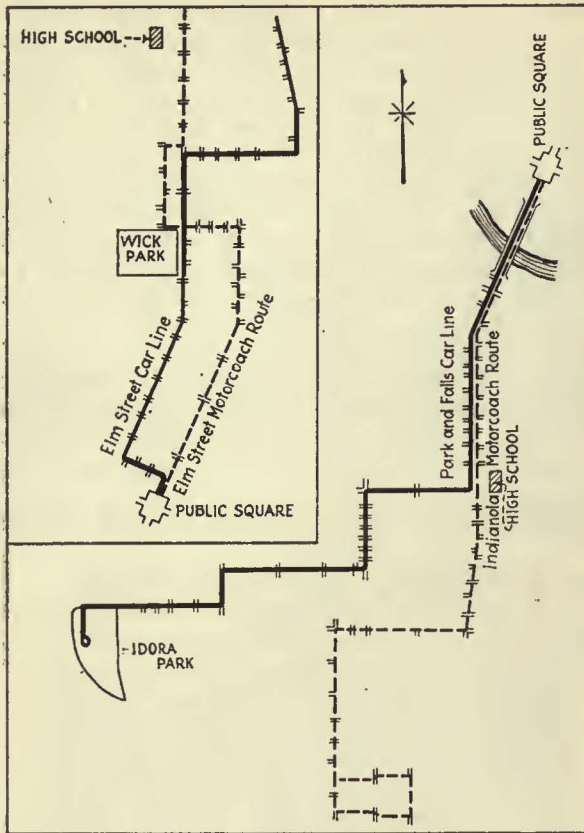
| Year | Gross Revenue | Passengers Carried | Bus-Miles |
|------|---------------|--------------------|-----------|
| 1922 | \$28,453.56   | 510,929            | 112,901   |
| 1923 | 228,425.53    | 4,032,882          | 918,644   |
| 1924 | 444,700.25    | 7,387,091          | 1,511,091 |
| 1925 | 511,347.59    | 8,361,236          | 1,738,930 |
| 1926 | 638,145.11    | 10,380,431         | 2,027,964 |

more customers to use a bus service than a street railway service under similar conditions? Leaving out of consideration for the present the question of expense of operation of the two modes of transportation, the query as to whether such an attraction exists is a very important factor in determining whether buses are a substitute for or a supplement to the electric railway car in mass transportation.

YOUNGSTOWN AFFORDS COMPARISON OF  
BUS AND CAR

In our operation in Youngstown we have eight bus routes and eleven street railway routes. They are operated with the same rate of fare, the fare being 8 cents cash, tokens seven for 50 cents, and a transfer charge





Above, Elm Street Car Line and Elm Street Motor Coach Route, as Referred to in Table II. Below, Park and Falls (Idora Park) Car Line and Indianola Motor Coach Route, Referred to in Table III. Car Routes are Shown in Heavy Lines and Motor Coach Routes in Light Lines

the cars for the month of October was \$7,833.49 and from buses \$7,585.08. The total passengers carried on cars amounted to 126,355, while 127,103 were carried on buses; 23,531 transfer passengers rode the cars and 23,933 rode the buses.

Now, I want to call your particular attention to the average number of passengers carried each trip. On the car this was 16.1, and on the bus 14.8. With a 25-passenger bus, an average load per trip, not round trip but one-way trip, of 14.8 is a very high load factor, being 60 per cent of the total seats offered. The car load factor is high, being 50 per cent of the total seats offered, but from this decreased factor of loading it is evident that more people enjoyed seats on the cars than on the buses. With the exception of the stretch of single track on the car line, there are no physical obstacles to the operation of either car or bus on either of these routes. There is a railroad crossing just outside the public square which holds up both bus and cars impartially. Both cars and buses are comparatively new, the cars being seven years old and the buses anywhere from one to four years old. Both buses and cars are clean and the schedules are well maintained. Both cars and buses are operated with one man each. The men wear practically identical uniforms and badges, and are well trained in courtesy and merchandising practices.

I believe that this exhibit indicates, or should indicate, to any unbiased and impartial observer who is interested only in working out intelligently the tools for mass transportation that there is no inherent attraction in the bus that would cause its choice as a vehicle by a prospective passenger in preference to using his own

TABLE II—COMPARISON OF OPERATING FIGURES FOR MONTH OF OCTOBER, 1926, ON ELM STREET CAR LINE AND SIMILAR BUS LINE SERVING SAME TERRITORY REFUTES THE EXISTENCE OF A "RUBBER URGE"

|                                       | Car        | Bus        |
|---------------------------------------|------------|------------|
| Length of line.....                   | 2.65       | 2.5        |
| Miles operated.....                   | 22,236.78  | 21,873.8   |
| Number of trips                       |            |            |
| Scheduled.....                        | 7,746      | 8,400      |
| Trippers.....                         | 100        | 168        |
| Number of cars for base schedule..... | 4          | 3          |
| Number of cars for trippers.....      | 1          | 3          |
| Maximum number of cars.....           | 5          | 6          |
| Headway—offpeak, minutes.....         | 10         | 10         |
| Headway—peak, minutes.....            | 8          | 6          |
| Round trip—offpeak, minutes.....      | 40         | 30         |
| Round trip—peak, minutes.....         | 40         | 36         |
| Schedule speed.....                   | 7.99       | 9.01       |
| Revenue.....                          | \$7,833.49 | \$7,585.08 |
| Revenue per mile.....                 | 0.3522     | 0.3467     |
| Hours operated.....                   | 2,781.05   | 2,427.58   |
| Revenue per hour.....                 | 2.817      | 3.132      |
| Total passengers carried.....         | 126,355    | 127,103    |
| Transfer passengers.....              | 23,531     | 23,933     |
| Passengers carried per trip.....      | 16.1       | 14.83      |
| Based on eleven months of 1926:       |            |            |
| Operating cost per mile.....          | 0.3102     | 0.2598     |
| Operating cost per hour.....          | 2.8219     | 2.4291     |

TABLE III—COMPARISON OF IDORA PARK CAR LINE AND INDIANOLA BUS LINE IN YOUNGSTOWN FOR MONTH OF OCTOBER, 1926. SUPERIORITY OF ELECTRIC CAR FOR LONG-HAUL, LOW-FARE SERVICE, IS SHOWN

|                                       | Car       | Bus        |
|---------------------------------------|-----------|------------|
| Length of line.....                   | 3.76      | 3.55       |
| To loop.....                          | 2.75      |            |
| Miles operated.....                   | 52,177.22 | 30,017     |
| Number of trips—Park.....             | 8,664     | 8,224      |
| Loop.....                             | 7,414     |            |
| Number of cars for base schedule:     |           |            |
| Weekdays and Saturday.....            | 12        | 7          |
| Sundays.....                          | 8         | 4          |
| Number of cars for trippers.....      |           |            |
| .....                                 | 12        | 7          |
| Maximum number of cars.....           | 10        | 12         |
| Headway—offpeak—Park, minutes.....    | 5         |            |
| Loop, minutes.....                    | 7         | 5          |
| Headway—peak—Park, minutes.....       | 4         |            |
| Loop, minutes.....                    | 45        | 36         |
| Round trip—offpeak—Park, minutes..... | 35        |            |
| Loop, minutes.....                    | 46        | 38         |
| Round trip—peak—Park, minutes.....    | 38        |            |
| Loop, minutes.....                    | 9.67      | 10.73      |
| Schedule speed.....                   | 21,944.90 | \$7,709.90 |
| Revenue.....                          | .4205     | .2568      |
| Revenue per mile.....                 | 5,397.37  | 2,796.54   |
| Hours operated.....                   | 04.065    | 07.756     |
| Revenue per hour.....                 | 359,476   | 121,937    |
| Total passengers carried.....         | 66,412    | 17,521     |
| Transfer passengers carried.....      | 22.35     | 14.82      |
| Passengers carried per trip.....      |           |            |
| Based on eleven months of 1926:       |           |            |
| Operating cost per mile.....          | 0.3102    | 0.2598     |
| Operating cost per hour.....          | 2.8219    | 2.4291     |

car that would not be equally applied in every respect to the street car.

BUS HAS BOTH ADVANTAGES AND DISADVANTAGES

I do not expect to carry conviction with a single isolated example. However, the example is a perfectly fair one. The result is confirmatory of our entire experience in this class of operation. I can hear immediately some one saying that the bus loads at the curb and the street car in the center of the street. This is true and in this respect is undoubtedly an advantage to the bus in attracting patronage. It is equally true that the standing passenger is more comfortable on the street car than on the bus, which is to the advantage of the street car. It is true that in congested areas the bus can make better time than the surface street car. It is also true that service with a bus is more flexible. There are many advantages offered by the one vehicle not enjoyed by the other, but in the main these are not fundamental. There is, however, one basic, serious and important distinction between the bus and the street car which at the present time sharply limits the use of the bus as an economic substitute for the street car in mass transportation, and that is its size.

It will be necessary for me here to call your attention to two outstanding features of American mass transportation which differentiate it absolutely from mass

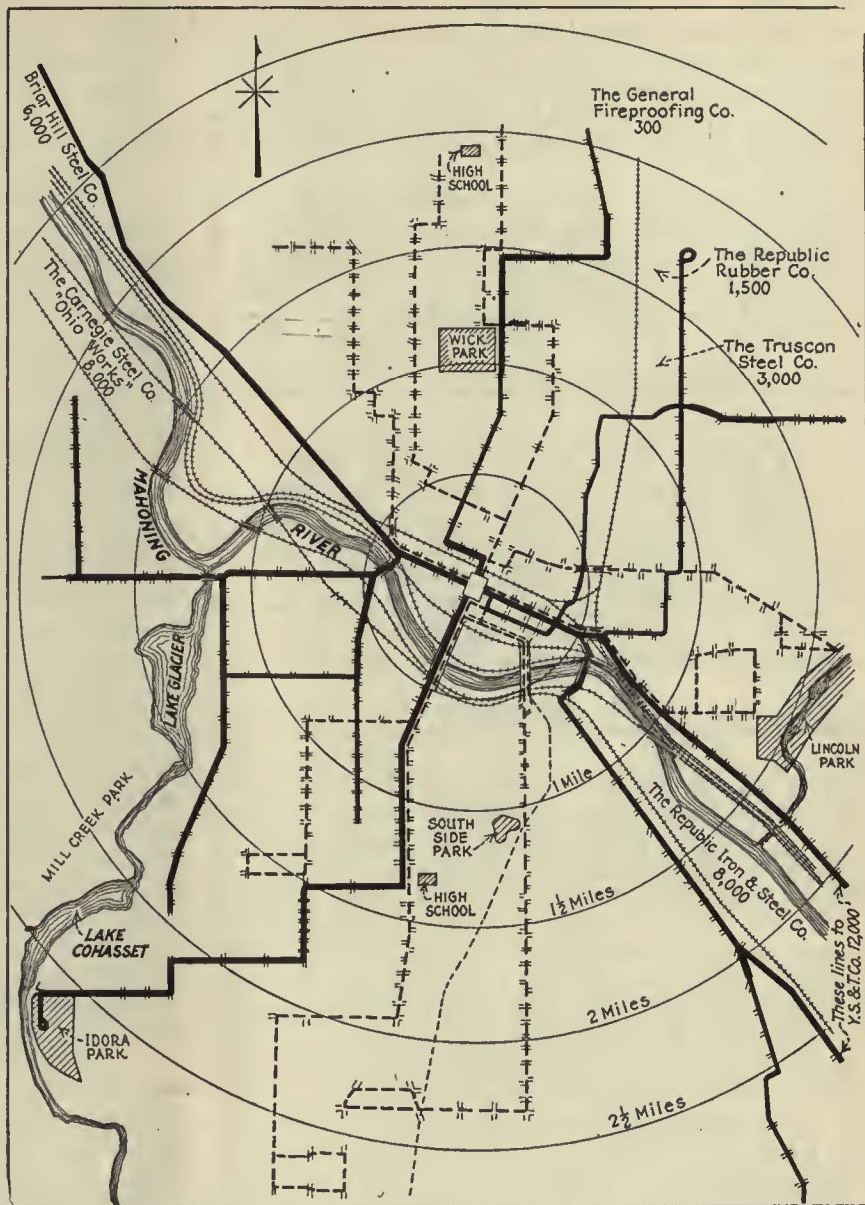


transportation in any other country. You are familiar with the fact that in every city of the United States public transportation is conducted on a flat fare, that is, the fare per ride remains the same regardless of the distance carried. This has become so universally the practice and has been the practice for so many years that as a measure of practical expediency it may be said that it is impossible to change or uproot it. You will remember the costly and elaborate experience that was made by the Public Service Company of New Jersey in an attempt to inaugurate a modified form of zone fares in the United States, which attempt was utterly unavailable. There have been numerous attempts, the last one being in the city of Pittsburgh, to create an inner and an outer city zone with varying fares, and these have been generally unsuccessful. Consequently it may be taken as typical of mass transportation in our country that the fare, whatever it shall be, is the same for any ride in the metropolitan zone, whether the ride be for one block or a distance of 9 or 10 miles.

The other distinguishing feature of mass transportation in this country is that with very few exceptions the maximum capacity of the vehicle is used only once on a single trip. With these few exceptions, there is no intermediate riding. In many foreign cities where the country has been for a long time in a high state of development and thickly settled, there are metropolitan areas which are really an aggregation of smaller urban communities. On a single transportation route there are many points on a one-way trip where passengers board and where passengers get off, so that the seating capacity of the vehicle is used over and over on a single trip. In the United States the growth of the cities, in the main, has been like the growth of fresh wood on a tree. The city extends outward in every practical direction from the nucleus first established. As a result of this, whether you go to Cleveland, Chicago, Kansas City, Omaha, Dallas, Houston or Los Angeles, you will find that there is little intermediate traffic. In the morning the workers in store and office ride from their homes to the store and office. In the evening they ride in the reverse direction. During the day there is the single ride from the home to the theater, to the shops and stores and then the ride home. But on any given trip the maximum capacity of the vehicle is in use but once. It is, therefore, a matter of the simplest elementary arithmetic to ascertain the earning capacity of a vehicle for at least 95 per cent of the trips in our cities.

LOAD FACTOR IS LOW

Mass transportation must begin in the early morning, when people commence to move to their work, and ends at night when the last theater, church or public enter-



Street Car and Motor Coach Lines of the Pennsylvania-Ohio Electric Company in Youngstown, Ohio. The Motor Coach Routes Are Shown in Light Lines and the Car Routes in Heavy Lines

tainment closes. Consequently the vehicles of any public transportation system must be operated for eighteen hours. During the rush hour in the morning the movement is all from homes to shops, stores and offices. In the evening the movement is in the reverse direction, so that even in peak hours the greatest traffic or movement is only one way. Between the peak hours of the morning and the afternoon and throughout the period when the vehicles are moving at night the traffic is small compared to that offered during the heavy hours. Therefore, in any public transportation utility, we find that there are not as many passengers as the seats offered by all vehicles during the entire period of operation. What we may term the load factor of such a utility is the ratio of passengers carried on all trips to the seats offered on all trips. This load factor for all the cities of the United States will not run above 40 per cent.

It is very plain that if we take the seating capacity of any public transportation vehicle, multiply it by the load factor we may expect and multiply that in turn by



the average rate of fare, we will get the earnings of such vehicle on a single trip. If we divide this sum in turn by the number of miles operated on such a trip, we have the earnings per mile. By taking general statistics good for the whole United States, we can reach a general figure of what earnings to expect per mile on any given vehicle.

The average fare per cash passenger in the United States today is 7.6 cents. The average fare per passenger, including transfer and free passengers and school rates, is approximately 7 cents per passenger. Therefore, if we take a 25-passenger bus with an ordinary load factor of 40 per cent, the average rate of fare

**T**HE history of present day transportation in all American cities shows that while the community as a whole may fight to the last extremity for a low rate of fare, there are certain elements in the community who pay little attention to the cost of transportation as long as such transportation is speedy and comfortable.

of 7 cents, we get 70 cents per average trip. If the length of line is 2 miles, we get 35 cents a mile. If the length of line is 4 miles, we get 17.5 cents per mile. If the vehicle accommodates 50 passengers, then we will get per trip \$1.40; if a 2-mile trip, 70 cents per mile, or if a 4-mile trip, 35 cents per mile. It is thus immediately apparent that there is a definite limit to the distance which the small vehicle can be operated. In order to reach this conclusion, we do not have to go very seriously into the question of operating costs. With our five years of operating experience as a basis for buses in city transportation, we are convinced that a fair figure for operating cost of a single-deck, 25-passenger bus is 25 cents without reserve for depreciation and 30 cents including all reserves. Our conclusion on this subject has been backed up by all the operating figures to which we have had access.

#### OPERATING RADIUS LIMITED BY FARE

If it costs at the rate of 30 cents per mile or even 25 cents per mile to operate such a bus, it is apparent that using the general figures throughout the United States for load factor, average rate of fare, the operating radius of the single-deck bus seating 25 people is very little more than 2 miles. However, it must be conceded that the smaller the vehicle the higher will be the load factor. Let us assume, for example, that for a given operation a minimum of six or seven passengers are carried on an average trip. This minimum will contribute more to the load factor of a vehicle seating 25 than it will to a vehicle seating 50 passengers. We may therefore assume that in the case of small vehicles the load factor will reach 50 per cent, or, under extremely favorable conditions, 60 per cent. With a load factor of 60 per cent on a 25-passenger vehicle, there will be fifteen passengers on the average for every trip, one way, during the entire period that the vehicle is operated. Applying the average rate of fare, we would have \$1.05 for a trip, producing an operating revenue of 35 cents per mile for a 3-mile trip. This is, manifestly, the absolute limit to which a 25-passenger bus can be

operated at a profit on the present average rate of fare.

I now wish to again refer to the comparison between the Elm Street bus and street railway lines. An accompanying table shows the operating figures of these two lines. The revenue per car-mile is 35.22 cents and the revenue per bus-mile is 34.67 cents. The operating cost per car-mile is 31 cents and per bus-mile practically 26 cents. In both cases, to make the results comparable, no depreciation or other reserves, or any return on the investment, is included. The street cars used on this line are the small Birney 32-passenger cars, so that the load factor in both the case of the cars and buses is high, there being sixteen passengers carried per car trip and 14.83 per bus trip. With a seating capacity of 25 passengers on the bus, the load factor is nearly 60 per cent. On a line of this length, it is evident that the bus is the better transportation medium from the standpoint of the public utility giving the service. By the use of a larger street car, the car-mile earnings might, perhaps, be increased, but only by decreasing the headway, and a decrease in headway would probably reduce patronage.

Now let us compare this situation with a case where we again have a bus line and car line going into similar territory, but where the lines are much longer. Such an example is offered by the Idora Park car line and the Indianola bus line in Youngstown. In this case, the car line is double-track and modern cars seating 54 passengers are used. The car line is 3.76 miles long and the bus line 3.55 miles. The buses are the same size as are used on the Elm Street line and the loading is the same, being 14.82 passengers per trip, or again, almost a 60 per cent load factor. Here the revenue per car-

TABLE IV—VARIATION IN COST OF MOTOR-BUS OPERATION IN YOUNGSTOWN WITH AGE OF EQUIPMENT. FIGURES ARE IN CENTS PER BUS-MILE. MR. GRAHAM ADVOCATES CHARGING HIGHER DEPRECIATION RATE DURING EARLY LIFE OF BUSES

|   | Sept.-Dec. |       |       |       | Ten<br>Months<br>1926 |
|---|------------|-------|-------|-------|-----------------------|
|   | 1922       | 1923  | 1924  | 1925  |                       |
| Equipment.....                            | 2.63       | 3.21  | 4.76  | 5.46  | 6.15                  |
| Conducting transportation.....            | 11.83      | 13.47 | 15.19 | 15.34 | 15.48                 |
| Traffic.....                              | 0.00       | 0.01  | 0.00  | 0.00  | 0.00                  |
| General and miscellaneous.....            | 2.03       | 3.42  | 4.06  | 3.54  | 4.18                  |
| Total operating expenses.....             | 16.49      | 20.11 | 24.01 | 24.34 | 25.81                 |
| Taxes.....                                | 0.65       | 0.48  | 0.97  | 0.86  | 0.66                  |
| Depreciation at 25 per cent per year..... | 2.31       | 2.98  | 4.22  | 3.93  | 2.83                  |
| Interest.....                             | 0.77       | 1.01  | 1.00  | 0.96  | 0.92                  |
| Total fixed charges.....                  | 3.73       | 4.47  | 6.19  | 5.75  | 4.41                  |
| Cost of service.....                      | 20.22      | 24.56 | 30.20 | 30.09 | 30.20                 |

mile is 42 cents and the revenue per bus-mile is less than 26 cents. The cost of operation per car-mile is 31 cents and per bus-mile 26 cents. Thus it is evident that here we have an operating profit of 11 cents per mile on the street car while we are operating the bus line at an actual operating deficit, and yet, from the standpoint of traffic, the line is as good as the Elm Street line. In fact, with a 60 per cent load factor, it may be said that the buses on the line are saturated to such an extent that it was necessary materially to increase the number of buses in the following month, which, of course, reduced the load factor and reduced the bus-mile earnings.

Therefore, reasoning from these two examples, we would say that with a bus seating from 25 to 29 passengers on a line practically 2½ miles long the bus is a better transportation medium than the street car, but on a line 3½ miles long it cannot be operated except at a positive loss. On the two lines compared the only difference is in the length of trip.



These two typical cases prove the formula we have just asserted. If, on the line  $2\frac{1}{2}$  miles long, with a very high load factor, we get a revenue of 35 cents per mile, we should naturally expect on a line  $3\frac{1}{2}$  miles long with the same rate of fare and with the same load factor to have the bus-mile earnings reduced in the exact proportion as the length of line is increased, and this is just exactly what has happened in these typical cases. Therefore, we have assumed, first, that single-deck buses cannot be operated at a profit even under the most favorable conditions of traffic at a city rate of fare for a distance longer than 3 miles. Second, that the only change in the situation that will permit the operation of a single-deck bus for a distance longer than 3 miles for a profit will be a substantial increase in the seating capacity of the bus. This increase must be substantial because it is entirely practicable to operate street cars seating as many as 60 passengers with a single man.

It may be argued that one remedy would be to increase the average rate of fare. The street railway industry has been carrying on a campaign for ten years to increase the average urban rate of fare and has progressed from 5 cents to an average of 7.6 cents, so that there would be very little chance of increasing the average rate of fare sufficient to overcome the penalty of the small seating capacity of the bus.

The next point that arises is the question of increasing the size of the bus. If this increase is brought about by an upper deck, such increase is of no practical value in the average American city. The double-deck bus would require two men and the only hope of transportation at our ordinary city rate of fare is the elimination of the second man on every transportation vehicle. To use a bus with two men in comparison with a street car operated by one man would cause the operating cost of the bus to be greater than the operating cost of the street car.

It may be argued that double-deck buses could be devised and have been devised to operate with one man. Here we enter on another extremely dangerous ground, that of the avoidance of accident cost. Twenty years ago the wheel height of the standard American street car was 34 in. At present the wheel height of the standard street car is 26 in. It has required the combined resources of the business over a period of twenty years to reduce the floor of our cars 4 in. for the purpose of eliminating the accident hazard attached to the carriage of the public in mass transportation. To arbitrarily add 6 ft. to the height which any of the passengers have to negotiate in order to reach their seats without the attention of a second man to regulate the motion of the vehicle would be utterly impracticable to the ordinary operating company.

It is impossible for me to understand how it can be argued that a 25 or 29-passenger bus can be successfully and economically operated on an average city route of more than 3 miles. There can be no question about the fact that our business, taking the country over, is without intermediate hauls. There can be no question about the load factor that can be expected. There can be no question about our average rate of fare. Therefore, to expect such a vehicle to prove profitable in operation on a long trip is an arithmetical impossibility.

#### BUS FIELD LIMITED FOR MASS TRANSPORTATION

You may therefore ask, where is the field in city transportation for the 16 or 21-passenger bus? My answer to this is that there is no such field in city mass transportation.

Where, then, in our cities can the 25 or 29-passenger bus be used? First, on routes not to exceed 3 miles where the traffic is dense. Second, on routes longer where through unusual or peculiar conditions there is intermediate traffic. For instance, crosstown lines crossing several street railway or other public transportation routes where passengers get on and off at many different transfer points might readily build up the bus-mile earnings to such a point as to render the use of the bus feasible. Third, and this I regard as the most important present use of the bus in urban transportation,

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**WE KNOW** that the American public is vitally opposed to a sweeping increase of fare for every one. On the other hand, there is no reason why any one should object to a higher fare for specialized service, when such specialized service does not interfere with the regular service given at a regular rate of fare.

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to furnish service in territory unserved by street car lines in a city where the financial condition of the street railway company forbids the installation of track but where the rendering of some form of transportation service is necessary in order to round out the function of the utility as a giver of transportation service in such community.

On our property all our long bus lines are operated for this reason and for no other reason. They are operated at a loss in order to give the public, as a whole, transportation to all parts of the community.

#### AN UNLIMITED FIELD FOR SPECIAL SERVICE

However, there is a fourth, and I believe even greater, field than any of those enumerated for the use of this vehicle, and that is as a special, supplementary service at a much higher rate of fare to furnish unusual convenience to customers who do not object to this higher charge. In the city of Pittsburgh there are at present being operated several bus routes from the suburbs to the heart of the city where a 25-cent fare is charged, and these routes are being operated with a high degree of success.

You see, it does not make any difference which factor of our equation we change; we can increase the bus-mile earnings through raising the fare, reducing the length of the trip, increasing the size, or increasing the load factor. If we triple the average rate of fare, we can either triple the haul or we can reduce the size of the bus. It is perfectly practical to operate a 21-passenger bus at a 25-cent rate of fare where it would be impossible to operate a 29 or 25-passenger bus at the standard rate of fare.

We know that the American public is vitally opposed to a sweeping increase of fare for every one. On the other hand, there is no reason why any one should object to a higher fare for specialized service, when such specialized service does not interfere with the regular service given at the regular rate of fare. This specialized service cannot be given by street car, as one condition would be a high average rate of speed, and an express street car service could not be run on the same tracks as the regular street car service. The pub-



lic would not permit the use of tracks to be put down in the street to serve only a selected portion of the community.

The history of present-day transportation in all American cities shows that while the community as a whole may fight to the last extremity for a low rate of fare, there are certain elements in the community that pay little attention to the cost of transportation as long as such transportation is speedy and comfortable. These are the elements that are at present using their private cars to go back and forth to their jobs, paying not only for the depreciation, upkeep and operation of these cars, but a substantial sum to house them in garages when they have reached their destination.

The modern bus with its high average rate of speed, which would be automatically made still higher by confining the number of passengers carried to the seating capacity of the bus and keeping the bus within reasonable limits of size, would exactly follow the needs of this class of citizenship and by the collection of fares approximating 25 cents per person, would be made a profitable transportation medium. There is hardly a city in the United States of 150,000 population that could not well support this supplementary service, and the demand for vehicles for this service would furnish to the motor bus manufacturing companies a more stable market than the attempt to force into mass transportation at standard rates of fare vehicles wholly impractical to operate from a profitable standpoint.

SEES ENLARGED FIELD FOR BUS

There may be a feeling that I am attempting to argue a restriction of the bus in urban transportation. I believe that by intelligently working out the best use of the bus, we enlarge its ultimate use. If the attempt had been made in Youngstown simply to parallel street railway transportation routes with bus routes, the investment in the buses would have been lost. Our company would have been crippled in its ability to buy either street cars or buses. However, as a result of the effort to co-ordinate bus service and street car service, using each class of service where it is best adapted, we are now operating nearly as many buses as we are operating street cars, and as a result, our street railway situation has been improved and our bus operation is self-sustaining. Surely this example is a vindication of the policy of co-ordination and not of substitution.

There is scarcely a city in the country where there

TABLE V—DETAILED ANALYSIS OF BUS OPERATING RESULTS IN YOUNGSTOWN, EXPRESSED IN CENTS PER BUS-MILE. EFFECT OF AGE OF EQUIPMENT ON OPERATING COST IS REFLECTED IN THE FIGURES

|  | Sept.-Dec.<br>1922 | 1923         | 1924         | 1925         | Ten<br>Months<br>1926 |
|--|--------------------|--------------|--------------|--------------|-----------------------|
| <b>Equipment:</b>                                  |                    |              |              |              |                       |
| Repairs—buildings.....                             | 0.36               | 0.11         | 0.10         | 0.05         | 0.02                  |
| Superintendence.....                               | 0.01               | 0.20         | 0.27         | 0.31         | 0.29                  |
| Repairs—chassis.....                               | 1.51               | 1.52         | 2.32         | 2.63         | 3.86                  |
| Repairs—bodies.....                                | 0.09               | 0.25         | 0.22         | 0.34         | 0.40                  |
| Tire repairs and renewals*.....                    | 0.03               | 0.83         | 1.59         | 1.66         | 1.56                  |
| Accessories.....                                   | 0.31               | 0.29         | 0.29         | 0.39         | 0.00                  |
| Shop expenses.....                                 | 0.37               | 0.12         | 0.07         | 0.08         | 0.02                  |
| <b>Total equipment.....</b>                        | <b>2.63</b>        | <b>3.21</b>  | <b>4.76</b>  | <b>5.46</b>  | <b>6.15</b>           |
| <b>Conducting transportation:</b>                  |                    |              |              |              |                       |
| Superintendence.....                               | 0.00               | 1.03         | 1.29         | 1.28         | 1.16                  |
| Chauffeurs' wages.....                             | 6.05               | 6.34         | 6.94         | 6.73         | 6.83                  |
| Miscellaneous service expense.....                 | 0.23               | 0.12         | 0.31         | 0.22         | 0.24                  |
| <b>Dispatchers' and street men's wages†:</b>       |                    |              |              |              |                       |
| Garage employees.....                              | 1.65               | 1.57         | 2.19         | 2.29         | 1.80                  |
| Garage expenses.....                               | 0.18               | 0.17         | 0.24         | 0.29         | 0.96                  |
| Gasoline.....                                      | 2.89               | 3.34         | 3.39         | 3.71         | 3.55                  |
| Lubrication.....                                   | 0.54               | 0.62         | 0.51         | 0.37         | 0.35                  |
| Miscellaneous transportation expense.....          | 0.28               | 0.28         | 0.32         | 0.45         | 0.59                  |
| <b>Total conducting transportation...</b>          | <b>11.83</b>       | <b>13.47</b> | <b>15.19</b> | <b>15.34</b> | <b>15.48</b>          |
| Traffic—advertising.....                           | 0.00               | 0.01         | 0.00         | 0.00         | 0.00                  |
| <b>General and miscellaneous:</b>                  |                    |              |              |              |                       |
| Salaries—general officers.....                     | 0.00               | 0.29         | 0.27         | 0.24         | 0.19                  |
| Salaries—general officers' clerks.....             | 0.00               | 0.15         | 0.14         | 0.15         | 0.14                  |
| Office supplies and expenses.....                  | 0.00               | 0.10         | 0.13         | 0.10         | 0.05                  |
| Miscellaneous general expenses.....                | 0.05               | 0.20         | 0.26         | 0.32         | 0.24                  |
| Liability insurance.....                           | 1.33               | 1.92         | 2.23         | 1.72         | 2.41                  |
| Fire insurance.....                                | 0.08               | 0.10         | 0.28         | 0.23         | 0.24                  |
| Stationery and printing.....                       | 0.02               | 0.01         | 0.02         | 0.02         | 0.03                  |
| Stores expense.....                                | 0.00               | 0.00         | 0.00         | 0.00         | 0.04                  |
| Rent of equipment.....                             | 0.00               | 0.18         | 0.01         | 0.09         | 0.00                  |
| Rent of garage.....                                | 0.55               | 0.47         | 0.46         | 0.39         | 0.79                  |
| <b>Total general and miscellaneous....</b>         | <b>2.03</b>        | <b>3.42</b>  | <b>3.80</b>  | <b>3.26</b>  | <b>3.89</b>           |
| Spent railway commissioner—salary and expense..... | 0.00               | 0.00         | 0.26         | 0.28         | 0.29                  |
| <b>Total operating expenses.....</b>               | <b>16.49</b>       | <b>20.11</b> | <b>24.01</b> | <b>24.34</b> | <b>25.81</b>          |
| <b>Earnings.....</b>                               | <b>25.20</b>       | <b>24.90</b> | <b>29.40</b> | <b>29.39</b> | <b>31.01</b>          |
| <b>Operating, net.....</b>                         | <b>8.71</b>        | <b>4.79</b>  | <b>5.39</b>  | <b>5.05</b>  | <b>5.20</b>           |
| Taxes.....   | 0.65               | 0.46         | 0.97         | 0.86         | 0.66                  |
| Depreciation at 25 per cent per year....           | 2.31               | 2.98         | 4.22         | 3.93         | 2.83                  |
| <b>Net.....</b>                                    | <b>5.75</b>        | <b>1.35</b>  | <b>0.20</b>  | <b>0.26</b>  | <b>1.71</b>           |
| Fixed charges—8 per cent investment...†            | 0.77               | 1.01         | 1.00         | 0.96         | 0.92                  |
| <b>Surplus or deficit.....</b>                     | <b>4.98</b>        | <b>0.34</b>  | <b>0.80D</b> | <b>0.70D</b> | <b>0.79</b>           |
| <b>Cost of service.....</b>                        | <b>20.22</b>       | <b>24.56</b> | <b>30.20</b> | <b>30.09</b> | <b>30.22</b>          |

\* Guaranteed.

† Included in "Superintendence Conducting Transportation."

have been sufficient street railway lines built in recent years to extend service into newer portions of the city. There is scarcely a city in the country where additional short bus routes cannot be operated to sections already served but not sufficiently served with street railway lines, and there is not a city in the country of more than 150,000 inhabitants that does not furnish a field for the specialized, superior bus transportation at a higher rate of fare.





## Old Rails Used to Surface Highway Crossings

This and Other Track and Overhead Methods Have Recently Been Developed by the Illinois Traction System

WITH its more than 500 miles of track, the Illinois Traction System has necessarily had to make a study of the best method of track construction at highway crossings. The fact that its lines are crossed many times in Illinois by improved highways, on which there

of practicability, economy and satisfaction of the public, that 30 additional crossings of similar construction have been installed.

Some other interesting methods followed by the overhead maintenance department and the maintenance way department follow:

The overhead maintenance department effected an additional economy by increasing the number of maintenance sections from six to nine and equipping the maintenance crew with a gasoline motor car and tower car so they would not have to depend on the regular line cars for their work. The combined crews maintain everything in their territory, such as substations,



Old Rail Is Used by I.T.S. Surfacing Highway Crossings at Various Points

telephones, signals, overhead trolley and pole lines. By reducing the length of the sections and eliminating the expense of train crews for line car operations and delays of the linemen a total saving of approximately \$1,000 per month was made. Each line crew is now equipped with a full set of "hot line" tools, which allow ordinary replacements and repairs without interruption of transmission service.

At substation locations where conditions permit desirable living quarters are maintained. This arrangement allows joint operation of the station by man and wife and makes possible the securing of higher type and more reliable employees. The service obtained and the conditions surrounding stations operating in this manner prove the wisdom of this arrangement.

In the maintenance of way department both maintenance and construction methods and practices have been planned and executed with the idea in view of economy and permanence. Since 1909 creosoted ties have been used almost exclusively for main track. During that period 1,081,199 treated ties have been installed. This number corresponds to 90.9 per cent of the total in service. During the same period practically all original ties have been replaced.

The cumulative saving as a result of creosoting is apparent, since had it not been for the use of treated ties it would have been necessary to renew more than 120,000 ties during the past year at a cost of approxi-

is a large amount of high-speed and slow-speed automobile traffic, has emphasized the need of both a satisfactory and durable form of laying pavement at these points. The methods followed are described in the brief filed by the company in connection with the Coffin Award contest.

After having tried numerous types and kinds of material for surfacing highway crossings the company decided that old rails would be the most economical foundation for construction of this kind because such paving would require less maintenance and have a longer life than other types. As shown, the old rails are laid parallel to the running rails, with all spaces between rails filled in except for the space required by the wheel flanges. The first crossings built in this way were so satisfactory, both from the standpoint



mately \$120,000. The actual cost of ties installed during this period was \$45,600 or a saving of \$74,400. Treated switch ties also have been used for several years, and during the past year maintenance and installations were less than 10 per cent of the total.

Thermit welding of track joints was tried experimentally two years ago, and this year was adopted as standard for track in paved streets. This applies both to maintenance of old track and the construction of new.

### Combined Snow Scraper and Sweeper

**I**NCLUDED in the equipment destroyed in the Hall Street carhouse fire of the Grand Rapids Railway, Grand Rapids, Mich., in July, 1924, were two sweepers and a snow plow. The company had two passenger cars which, due to extremely heavy weight, small vestibules and bulky proportions, were objectionable for regular service. It was decided to remodel these into combination snow plows and sweepers to replace similar equipment destroyed. These cars, originally built by the Cincinnati Car Company, were 44 ft. over all and 32 ft. over body. In remodeling these the interior of the car was completely stripped of its furnishings, the monitor deck was removed and the car body was strengthened to withstand the stresses set up by the operation of the scrapers and sweeper broom. An adjustable swinging scraper was purchased, together with a broom and frame. Root spring scrapers were placed at the ends and in addition a flanger was installed on each side of the car. This latter can be operated through chains from the inside of the car. The broom and propelling apparatus were placed midway between the trucks, which is quite a unique feature in sweeper design. A railway motor, old but in good condition, was used for propelling the broom.

The resistance units, air compressor, air reservoirs, etc., which originally were underneath the car, were removed and installed inside the car. Bins were also constructed for sand and salt, so that when out on the line the crew could salt switches or sand the rails where



All Electrical Equipment, such as Resistors, Compressors, etc., Is Installed Inside the Car

needed. The car is driven by four GE-70 motors and is arranged for double-end operation. An apron is used at the end of the broom to keep the snow down so that it will fall close enough to be taken up by the flanger, as otherwise it would be thrown far away and against windows and automobiles. When tested the plow performed admirably under all conditions. Snow was thrown outside by the plow and broom and was caught by the scraper and carried to the side of the street, there to be taken care of by the city.

By driving the broom with a separate motor greater efficiency has been obtained as compared with equipment previously used in which the broom was driven by the same motor that propelled the car. The use of this equipment has decreased the number of men in the snow-fighting crew, with resultant lower operating cost. The total amount expended in the reconstruction of this car to provide snow plow and sweeper was \$4,337.



Exterior View of Snow Plow with Side Flanger in Position so that a Space 10 Ft. Outside the Car Is Cleared



# Twin-Drive Bus Makes Its Appearance

New Vehicle Developed by F. R. Fageol Has Two Separate Power Plants Located Beneath Body — Absence of Hood in Front Leads to Radical Changes in Design from Ordinary Type



**D**ISTINCTLY different from anything that has been placed on the market heretofore is the new Twin Coach designed and built by Frank R. Fageol, Oakland, Cal. The bus, which is illustrated herewith, has two four-cylinder engines, one on each side of the chassis, which drive the two rear wheels through separate worms. According to the builder, the aim is to reduce the passenger-mile cost of transportation.

The new bus, which is built low to the ground; has an over-all height of only 8 ft. 4 in. The over-all length is 31 ft. 6 in. and the width 94 in. The general appearance is somewhat similar to that of the Birney street car, although there has been worked into the design a streamline effect that gives it a long, low, rakish look quite in conformity with present-day automobile tendencies. The wheelbase is 203 in., which gives a turning radius of 34 ft. The gross weight fully equipped is 13,000 lb. It is stated that the vehicle is capable of speeds up to 55 m.p.h.

In its construction the chassis and frame are more closely dependent on each other than in buses of the usual types. The chassis is a frame of light construction, channels running from front bumper to rear bumper being fastened together to form an H-shaped structure. On this is mounted the steel body frame, so built up that the two side structures of the body, together with the chassis channels, form individual trusses tied together by means of the chassis cross members and the sheet steel center panel of the roof. This arrangement allows for the flexing of the chassis along with the body.

On either side, mounted in a recess between the

chassis channel and the body side sill, is a four-cylinder engine, with 4-in. bore and 5½-in. stroke. Directly in front of each engine is mounted a radiator with header tank. Each of these power plants is incased in a sheet steel compartment. Power from each engine is carried through an individual clutch, transmission and short propeller shaft to an inverted worm drive mounted adjacent to the brake drum and wheel. There are thus two individual and self-contained driving units. The inverted worm housings are joined by a 3-in. steel tube which acts as a stiffening member. Each worm housing has a spring seat mounted close to the brake drum to minimize the bending action on the tubular tie.



The Interior of the Twin Drive Bus Is Not Unlike That of Other Types, Except Side Seats Are Placed Over the Motors

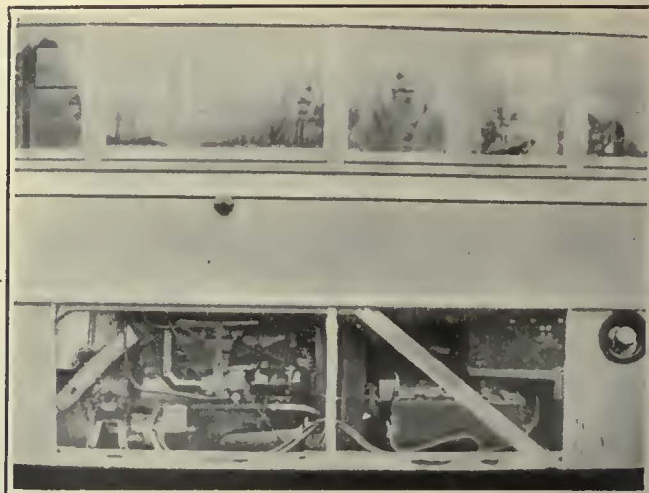


Because of the side location of the power plants it was found possible to incorporate many innovations in the design. On the forward end of each crankshaft is mounted a 600-watt generator and a 9-cu.ft. capacity air compressor. Together with the 6-volt, 300-amp.-hr. storage battery, these are carried on a shelf in front of the radiator. The 50-gal. gasoline tank is carried between the main frame channel members at the center of the chassis. Feed from the tank to the carburetor is through two Stewart vacuum tanks mounted in the side panels of the body just in front of the radiators. The filling pipe for the gasoline tank is on the left-hand side.

Air is carried through louvers on each side of the body through the radiator, thence it is driven by a fan down past the engine and out under the bus. To make the engine accessible a side plate may be removed as shown in one of the illustrations. The engines are built in pairs, right and left, so that the valve mechanisms and the carburetors are placed on the outside where they are available for easy adjustment and maintenance.

Steering is done in much the same manner as it is on the ordinary type of bus. The steering wheel, however, is mounted ahead of the front wheels, so that the drag link is to the rear rather than to the front. The 203-in. wheelbase and the length of the vehicle place the driver's position approximately 4 ft. ahead of the wheels. This position does not materially affect the "feel" of the driving.

The driver's position is to the left, directly back of the large front window, being similar to that in an electric street car. The control is practically identical with the type used in the ordinary single-motor bus. A single pedal actuates both clutches and a gear-shift lever both transmissions. Two accelerator pedals are mounted side by side. The two form a footrest and are used to synchronize the two engines. By rocking the foot the operator can feed additional fuel to that engine which does not appear to be pulling its share of the load. Two floorboard type starter buttons are located to the left of the driver's seat.



A Removable Panel on Each Side Gives Easy Access to the Driving Mechanism

All four spring mountings are identical, 60-in. x 3½-in. springs being used all around. Tires are single pneumatic on all four wheels. The mounting of the brake mechanism is compact and is built integral with the brake drum mounting.

Interior trim is steel with side paneling of mahogany-finished Haskelite. The floor is exceptionally light in weight, being of ¾-in. plywood laid in sections so that it can be removed readily for inspection of the driving mechanism. The roof is of the arch type, extended slightly at the front end to form a hood for the illuminated sign. There is a slight break in the middle, increasing the height about 1 in. directly over the aisle.

The lighting is indirect. The ten 21-cp. lamps are placed at the back of a molding located above the windows just below the advertising rack. Reflectors back of the lamps throw the light up against the advertising racks and onto the white enameled ceiling.

Folding doors are located at front and rear. They

Absence of a Hood in Front Makes the New Vehicle Economical of Street Space





are air operated. The floor level is 25 in. above the street. One intermediate step is used, 11 in. above the ground, so that the rise from the step to the floor of the bus is 14 in. Windows are framed with brass sash and are arranged to lift.

The corners of the vehicle are rounded and the glass in the corner windows is curved to conform to the body lines. Both ends of the body, which are identical in shape, are fitted with metal visors. The front has two headlights and there is a bumper at each end. Directly behind each bumper is a recess for a spare tire.

Seats are provided for 43 passengers, and there is room for 30 standees. Above each sheet-steel compartment housing for the engines is a side seat accommodating two passengers. Side seats are also placed over the four wheel housings, which cut up the body. Other seats in the body face forward. A lounge-type seat which accommodates six passengers is carried across the rear of the vehicle.

## The Readers' Forum

### Gross Net Tax Making Progress

AMERICAN ELECTRIC RAILWAY ASSOCIATION

NEW YORK, Feb. 15, 1927.

To the Editor:

I read with great interest your editorial in the *ELECTRIC RAILWAY JOURNAL* of Feb. 5, 1927, regarding taxation. In this you brought together the views of John J. Merrill of the New York Tax Commission and Prof. Edwin R. A. Seligman of Columbia University. It does not often happen that the theorist and the practical man are in such complete accord, but in this case you have it, and by bringing these views together you have made out a very strong case for tax revision in this state.

I feel sure that much will be accomplished throughout the various states, if the industry realizes that tax reform is no longer a mere theoretical matter but is a subject that can be approached with real hope of success. Within the last few days gross-net tax bills have been presented by the railroads in two of the New England States, and a third bill of the same nature will probably be presented in Wisconsin, as a result of the report of the interim committee on administration and taxation, in which the committee states:

That there should be a closer approach to uniformity in the taxation of public utilities is acknowledged by everybody, but the hitch comes over whether they should be taxed at the local rate or at the average state rate. To us it seems that there are valid objections to both of these bases. In fact, much is to be said against taxing utilities on their property at all. What is the true market value of a public utility is very difficult to determine and it is still harder to allocate this total value fairly to each of the several taxing districts in which its property is located. Undoubtedly it is simpler to tax utilities upon their earnings and also more equitable. Clearly, however, it will not do to base the tax solely upon net earnings, because this would often result in no tax at all from large companies. The best suggestion made is that public utilities should be taxed upon what is known as "gross-net earnings" basis, such as was proposed by a special legislative committee in New York some years ago. Under this plan both the gross and the net earnings are taken into consideration in determining the tax, and no company escapes entirely and the companies with the largest net earnings also pay the highest rates. That this method of taxing public utilities deserves serious consideration, we are convinced; but we have not been able to work out the details of this plan or to make

the necessary calculations to see where it would lead. We, consequently, refrain from recommending any change in the taxation of public utilities.

An editorial such as yours cannot fail to help our industry.

LESLIE VICKERS,  
Economist.

### Approves Use of "Popular" Transportation

CITY OF DETROIT

Department of Street Railways

Feb. 18, 1927.

To the Editor:

Allow me to compliment you upon the editorial appearing in the Feb. 12 issue of the *ELECTRIC RAILWAY JOURNAL* commenting upon the term so commonly used to designate that type of transportation which moves the multitudes.

Your suggestion to substitute the word "popular" for "mass" when referring to this type of transportation is indeed very appropriate because the mention of the word "mass" as applied to transportation generally carries with it a picture of a vast throng or jam of human beings, which certainly does not tend to popularize that form of transportation in the minds of the traveling public.

Another misnomer which is quite commonly used, at least in this part of the country, is the term "platform men" used in reference to motormen and conductors. It is the writer's opinion that "trainmen" is a more fitting term to use in designating that type of employment.

D. A. SMITH,  
Acting General Manager.

### It Hits the Nail on the Head

EAST ST. LOUIS LIGHT & POWER COMPANY

Feb. 15, 1927.

To the Editor:

I notice the suggestion regarding use of the term "popular transportation" instead of "mass transportation" in the leading editorial of the Feb. 12 issue of *ELECTRIC RAILWAY JOURNAL*, and I think it hits the nail exactly on the head.

I like, too, your thought for the future on "awakening the public to a demand for something better in transportation at an appropriate price."

JOHN H. MITCHELL,  
General Manager.

### Old Register Cards Used Again

FOR several years the Union Street Railway, New Bedford, Mass., has used a standard mimeograph machine to print letters, circulars, time-tables, notices, etc. Recently, however, this machine has been used extensively for the printing of forms on the backs of discarded register cards, meter cards, etc. The cards are made of heavy manila cardboard and after serving their purpose as accounting cards were formerly sold for old paper or used as note cards. As the backs were usually clean, they made excellent record cards when run through the mimeograph machine and stenciled into form cards. Among the uses found for these cards were inspector's traffic checking forms, tire change forms, mileage reports and several special checking reports. The cost of making these cards is nominal as the cost of the material is practically nil and they can be printed by the office clerks at times when they are not busily engaged with office work.



# Maintenance Notes

## Motor-Operated Wheel Jack

REMOVING a pair of wheels from a truck or installing a pair of wheels in a truck was always considered a slow and tedious process in the shop of the Lynchburg Traction & Light Company, Lynchburg, Va., until Master Mechanic Cochran designed and constructed a motor-operated jack for this work. The principal parts of this equipment are a line shaft, worm, pulley, lifting screw, gear, axle cradle, bearings and adjusting screw.

A 1½-in. diameter steel shaft 10 ft. long is designed with a worm of 3 in. diameter and 7 in. long, located about 12 in. from the end of the shaft.

About 10 in. from the end of the shaft opposite the worm is a 12-in. x 4½-in. iron pulley keyed and fastened rigidly to the shaft. The assembled shaft is mounted on four bearings fastened to the floor by lag screws, and sufficient clearance is allowed between the pulley and worm and the floor. A ¾-in. adjusting screw, mounted on the worm end of the shaft, provides a means for taking up lost motion between the worm and gear teeth. A 14-in. worm gear wheel in mesh with the worm drives a 3½-in. diameter lifting screw passing through its center. A 6-in. hole in the pit floor 7 ft. deep allows free and unobstructed upward and downward movement of the lifting screw. A heavy malleable-iron grooved axle cradle mounted on top of the lifting screw provides a means

for balancing of the wheels during the handling process. The jack is belt-driven by a General Electric 2-hp., three-phase, 230-volt, 1,800-r.p.m., 60-cycle motor, equipped with a 4-in. paper pulley. The lineshaft, bearings, worm, and in fact all parts of the jack adjacent to the

floor, are boxed in with 1-in. oak boards to prevent injury to the workmen.

This motor-operated wheel jack has resulted in increased production and decreased effort due to the rapidity with which it is possible to change wheels.

## Brake Gives Uniform Band Wire Tension



Close-Up View of the Brake, Which Is of the Automobile External Contracting Type. It Is Held Closed by Weights on the Lever, but Is Operated as the Tension on the Wire Turns on the Pulley Shown Just Above the Brake

leys, levers and brakes is in a wood framework approximately 2 ft. square by 7 ft. in height. It is located about 4 ft. in front of the banding lathe.

From the accompanying drawing it will be seen that the wire leaves the supply spool, which is carried on a shaft at the rear of the framework, to the feed pulley at the front of the apparatus. The path of the wire

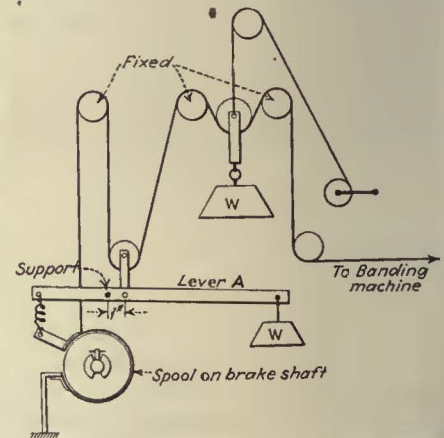
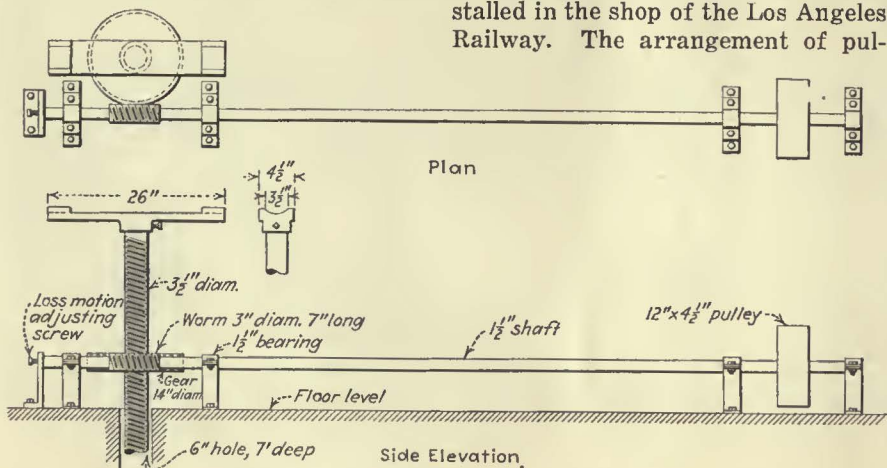


Diagram of Apparatus Which Maintains Proper Tension in Banding Wire and at the Same Time Holds That Tension When the Machine Is Stationary

PROPER tension is maintained in the banding wire as it is fed to the machine by an apparatus which automatically controls the release of wire from the spool and also holds the tension as the band is laid on the armature. The device is installed in the shop of the Los Angeles Railway. The arrangement of pul-

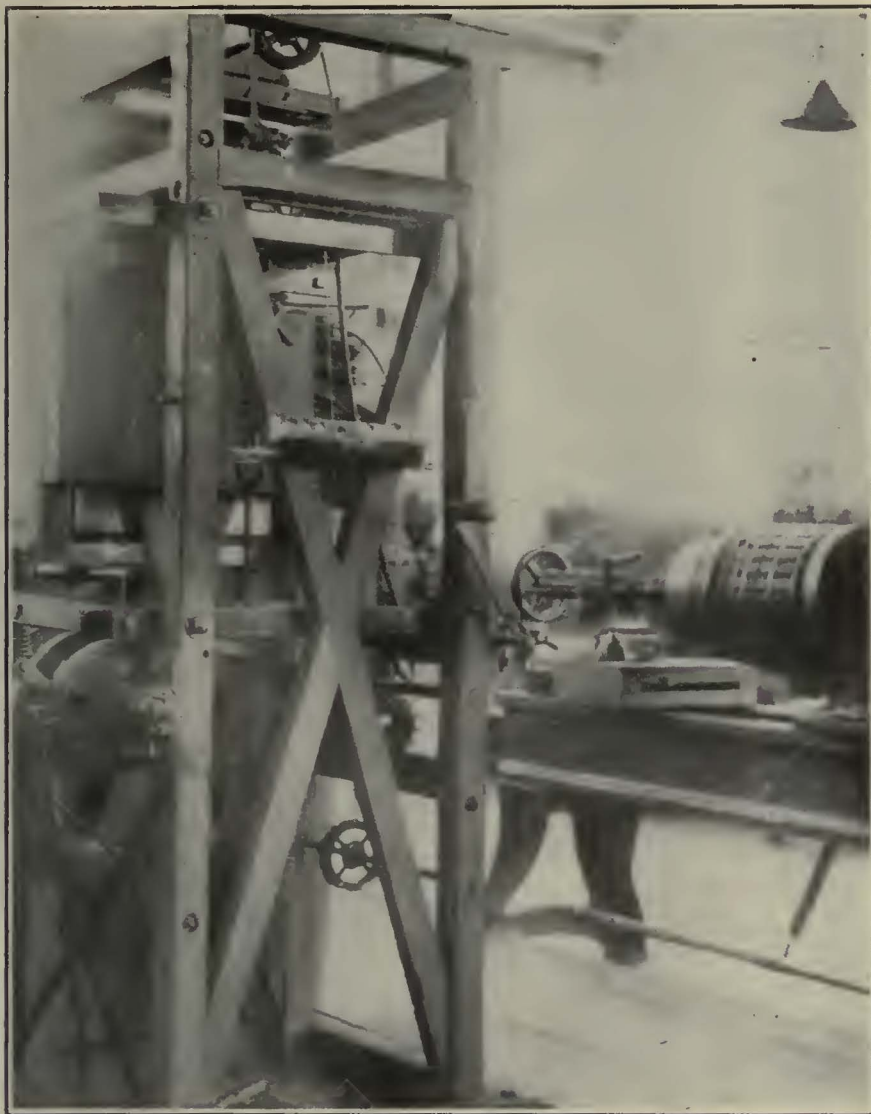
is such as to engage pulleys which are so mounted as to have an effect on releasing the brake mechanism and allowing the supply spool to revolve.

The wire carried upward over a pulley, then down to a pulley mounted on a shaft, which in turn is fastened close to the fulcrum of a lever arm. This same arm extended carries the tension weight at the extreme end and at its other end operates the clamp which closes or opens the band brake on the supply spool. From this pulley the wire is carried to three pulleys at the top of the machine, thence down to the feed pul-



Motor-Operated Jack for Installation or Removal of Wheels from Trucks





Bandling Wire Is Maintained at the Proper Tension in the Los Angeles Railway Shop by an Apparatus Which Includes an Automatically Operated Escapement Brake and a Device for Maintaining the Tension in the Wire When the Armature Is Not Rotating. It Is Placed Approximately 4 Ft. in Front of the Bandling Lathe

ley, which is a little below the level of the work in the adjoining banding machine. Of the three pulleys at the top of the machine two are stationary. The center one with weight attached may be lowered by a winch and rope. When lowered, the weight is hung on the wire to maintain the tension which ordinarily is set up by the rotation of the banding machine. Thus, when the machine is stopped for finishing off the banding, the tension is maintained until the wire is fastened. The movable pulley and suspended weight take care of this.

The frame of the apparatus is built up of  $2\frac{1}{2} \times 2\frac{1}{2}$ -in. wooden members securely braced and anchored to the floor. This takes care of the pull of the banding wire, which for No. 16 gage steel wire, as used on the Westinghouse No. 306 armatures, amounts to 400 lb. For the No. 24

wire used on compressor armatures a tension of only 40 lb. is used. This pressure is measured by means of a spring balance connected in the line at the time work is started on an armature. By adjusting the weight applied to lever A the tension may be controlled.

A feature of the apparatus is the ease with which spools of wire may be changed. The flange of the spool has been drilled to take a long set screw which fastens the spool to the shaft. The shaft in turn is fastened by means of a removable pin to the brake drum. By loosening the set screw and disengaging the shaft pin it is possible to slip the shaft out endways and change the supply

*Equipment repairs made in time  
Will save "pull-ins" from the line.*

spool without disturbing the set-up of the machine. By placing a crank handle on the end of the shaft, it is possible to back off—that is, rewind on the supply spool wire which already has been applied to the armature.

The banding lathe used is a rebuilt engine lathe driven by a small electric motor through a worm. A pedal operated cone clutch controls the drive between the motor and the lathe.

## Linoleum and Flexible Rubber Floor Covering

**B**ELIEVING that a neat, clean and attractive floor covering will have a tendency to attract the public, the Wilkes-Barre Railway, Wilkes-Barre, Pa., has equipped one of its car floors with linoleum and flexible rubber mats. Underneath the cross-seats the floor is covered with a design to represent tile work. The edges of this are bound with a 1-in. brass strip neatly screwed to the floor. Though the center of the car and in front of the longitudinal seats the floor is covered with a flexible hard rubber mat made of  $\frac{3}{8}$ -in.



Designs of Linoleum and Flexible Rubber Mats Harmonize

$\frac{1}{2}$ -in. pieces of hard rubber spaced  $\frac{1}{2}$  in. apart and bound by steel strips. The linoleum and mat are on the same level. The mats have a clean surface at all times since all dirt falls through to the floor.

This floor covering gives a very impressive appearance, and since the mats can be rolled up easily to permit sweeping this appearance can be maintained.

The linoleum, with its pleasing tile effect, and the brass binding strip create a pleasing interior effect.



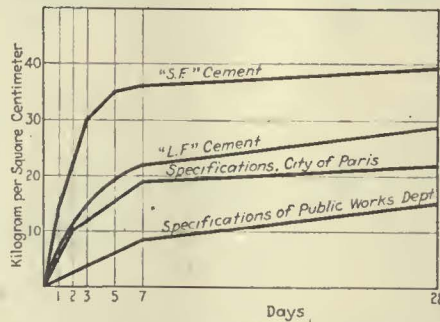
# New Equipment Available

## Time Saved by Quick-Setting Cement

**C**EMENT having high crushing strength and quick-setting qualities with a chemical composition which does not differ materially from ordinary cement is being made by the Société Coloniale des Chaux & Cements Portland of Marseilles, France, under the name "Super-Flambeau." It is handled in the same way as ordinary Portland cement. Its quick-setting feature does not hamper the mixing and pouring, which can be done at the same speed as when handling ordinary cement.

Advantages claimed for this cement on account of its strength and quick setting are: (1) Economy in wood plank forms, because the forms can be removed two or three days after the pouring; (2) economy in time, because the reinforced concrete object can be turned over as finished after five or six days; (3) general economy, because the sections of reinforced concrete girders, pillars, blocks, foundations, etc., can be reduced.

As a basis for calculation a strength of 100 kg. per square centimeter (1,420 lb. per square inch) on



Tensile Tests of Plastic Mortar Using a 1:3 Mixture of Super-Flambeau Cement

compression may be assumed. The strengths and setting time characteristics of S. F. cement are shown by accompanying curves.

The chemical analysis of this cement is as follows:

|                            | Per Cent |
|----------------------------|----------|
| Soluble silica.....        | 22.10    |
| Sand.....                  | 0.20     |
| Aluminum.....              | 6.70     |
| Iron oxide.....            | 2.75     |
| Chalk.....                 | 62.00    |
| Magnesia.....              | 1.62     |
| Sulphuric anhydride.....   | 0.59     |
| Ashes.....                 | 3.65     |
| Undetermined elements..... | 0.39     |
|                            | 100.00   |

S. F. cement shows the following sieve test:

|                                   | Per Cent |
|-----------------------------------|----------|
| Retained on 324-mesh sieve.....   | 0.0      |
| Retained on 900-mesh sieve.....   | 0.1      |
| Retained on 4,900-mesh sieve..... | 0.9      |
| Finest powder.....                | 99.0     |
|                                   | 100.0    |

Mixed with 25.5 per cent of its weight of water at 15 deg. C., the cement will begin setting after 2½ hours, and will have set completely after 4½ hours, while exposed to humid air. Immersed in water, the setting will begin after three hours, and will have been completed after six hours.

Tensile and compression strengths of samples of S. F. cement, at various ages, are given in the two accompanying tabulations.

The "Elimination of Waste Campaign" activity  
Refers especially to the "Short Strand Shoddy" variety.

## Improved Wiring for Switch Groups

**I**MPROVED design of main wiring for switch groups types 251 and 264 has been announced by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Use is made of the type 480 main wiring, eliminating many wiring troubles. New design of terminal studs permits assembling the switch units in place independent of the connection straps. Lock washers are used to keep the studs tight. In case any of the connection straps become loose in service the switch units are not affected. The connection straps can be removed without disturbing the switch units.

A cup washer replaces the two upper molded vulcabeston washers of the type 264 main wiring and the molded flat washer and thin cup washer, originally used on the type 480. It also replaces the fishpaper guard on top of the base plate. This new washer provides greater creepage distances and improved insulation. Shrinkage of the new micarta duck washers is much less than that of the vulcabeston. Where the new type of main wiring is used any shrinkage which may occur does not cause the connection on the straps to become loosened. This feature eliminates burning which occurs with the older design due to shrinkage and loosening of the straps.

New bent connection straps are used to replace the flat straps and copper spacing collars used with the old design. This eliminates the spacing collars, thereby reducing the number of contact surfaces and consequently the chance of burning if the straps become loosened.

### COMPARISON TESTS IN KILOGRAMS PER SQUARE CENTIMETER

| Mixture  | Number of Days |      |       |      |       |     |
|--|----------------|------|-------|------|-------|-----|
|  | One            | Two  | Three | Five | Seven | 28  |
| Cement—200 kg. Gravel—800 liters. Sand—400 liters. Water—5.7 per cent  | 66             | 131  | 165   | 204  | 215   | 248 |
| Average.....   | 65.5           | 129. | 163   | 200  | 208   | 255 |
| Cement—250 kg. Gravel—800 liters. Sand—400 liters. Water—6.5 per cent. | 72             | 152  | 190   | 245  | 281   | 325 |
| Average.....   | 72             | 155  | 191   | 248  | 281   | 330 |
| Cement—300 kg. Gravel—800 liters. Sand—400 liters. Water—7.2 per cent. | 60             | 167  | 191   | 246  | 299   | 361 |
| Average.....   | 60             | 161  | 192   | 244  | 298   | 352 |

### ULTIMATE TENSILE STRENGTH IN KILOGRAMS PER SQUARE CENTIMETER

|   | Number of Days |      |       |      |       |       |       |
|---|----------------|------|-------|------|-------|-------|-------|
|   | One            | Two  | Three | Five | Seven | 28    |       |
| Pure cement with 25 per cent water                    | 33.6           | 35.1 | 39.5  | 53.0 | 54.1  | ..... | 243   |
|   | 32.4           | 37.4 | 40.7  | 51.8 | 54.0  | ..... | 277   |
|   | 24.1           | 32.6 | 43.1  | 50.8 | 59.2  | ..... | 238   |
|   | 29.8           | 38.2 | 49.3  | 54.0 | 53.0  | ..... | 247   |
|   | 30.1           | 38.1 | 45.5  | 52.6 | 56.3  | ..... | 273   |
|   | 27.9           | 38.4 | 44.3  | 50.1 | 59.8  | ..... | 251   |
|   | Average.....   | 29.7 | 36.6  | 43.4 | 52.0  | 56.1  | ..... |
| Maximum....   | 31.5           | 38.0 | 45.1  | 52.8 | 57.4  | ..... | 262   |
| Mixture 1 cement and 3 sand with 10.6 per cent water. | 11.9           | 21.4 | 27.4  | 34.0 | 36.1  | 37.4  | 68    |
|   | 12.0           | 21.2 | 31.2  | 31.9 | 31.7  | 34.5  | 64    |
|   | 12.2           | 24.9 | 36.1  | 35.1 | 35.0  | 35.2  | 64    |
|   | 12.0           | 20.4 | 26.4  | 32.6 | 39.1  | 35.4  | 60    |
|   | 12.1           | 19.9 | 29.1  | 33.0 | 29.8  | 35.1  | 60    |
|   | 11.9           | 23.2 | 29.0  | 34.1 | 32.6  | 38.2  | 64    |
|   | Average.....   | 12.0 | 21.7  | 29.9 | 33.5  | 34.1  | 36.0  |
| Maximum....   | 12.1           | 22.4 | 31.4  | 34.1 | 35.7  | 36.6  | 65    |



# Association News & Discussions

## Co-ordination and Safety Discussed by Kentuckians

WHAT has been generally characterized by members as the most successful and interesting meeting in the records of the Kentucky Public Utilities Association was the two-day convention held at the Brown Hotel, Louisville, on Feb. 18 and 19, it being the tenth annual gathering of the organization. Business sessions were held on Friday afternoon and Saturday morning with the annual banquet on Friday night, in the Crystal Ballroom of the hotel, followed by a dance. The attendance was 278, while 389 persons were seated at the banquet.

From the standpoint of electric railway operators there were two talks of principal interest. One was by W. H. Sawyer, president of the American Electric Railway Association, who spoke on "City and Interurban Transportation." An abstract of Mr. Sawyer's address appears on this page.

Neil W. Funk, director of safety Louisville Railway, in discussing safety work, held that there was a time when the employer's first inquiry, following an accident, regardless of bloodshed and suffering, was "What's it going to cost us?" Everything else was secondary, instead of life and suffering being the first consideration. There were dangerous machines, poor lighting, and criminal negligence, no safeguards. Workers were so many foreigners, or what not. Mr. Funk held that no chances should be taken with the humblest of employees even to the losing of a little finger. The sentimental side of employment was stressed, and the argument made that even though the work did not save the company a cent it increased morale, affection of employees for employer, improved relations between capital and labor, and what was gained was well worth while, as it results in an organization. It results in a sense of loyalty where they have the inspiration given them by the company really caring for their welfare. He held that the safety movement was the greatest and grandest gesture that humanity has yet made.

President T. B. Wilson, in his annual address, touched on the electric railway and bus situation. He said that no one in the electric railway industry holds any doubts as to the future of that class of transportation in large cities. The electric car has demonstrated thoroughly that it will remain the backbone of mass transportation. The small city line still is a problem.

Harry Reid, president of the National Electric Power Company, New York, told of incidents in the growth of power and light utilities in Kentucky during the last twenty years. Mr.

Reid, a former president of the association, entered the utilities field at Versailles, Ky., twenty years ago.

Officers for the coming year, as named at the conclusion of the program, were as follows:

President, W. R. Power, Ashland, Ky., general manager Ohio Valley Electric Railway, Huntington, W. Va.

First vice-president, Samuel Riddle, Louisville.

Second vice-president, L. B. Herrington, Louisville.

Treasurer, A. A. Tuttle, Louisville. Secretary, E. F. Kelley, Louisville.

The new executive committee is composed of the officers, along with T. B. Wilson, Louisville, retiring president; J. P. Barnes, Louisville; W. H. Harton, Covington; J. P. Pope, Lexington; P. S. Pogue, Louisville; H. D. Fitch, Bowling Green; W. S. Cramer, Lexington, and H. J. Cochrane, Maysville.

## Transportation a Community Problem\*

BY W. H. SAWYER

President American Electric Railway Association

PUBLIC utilities as a group have much in common, and especially are their aims and desires to serve their communities distinctly in common. There are, however, phases of the electric railway problem which appear to me more complex than those of any other industry.

The light and power and gas utilities meet their customers perhaps once a month. We meet ours twice a day, and every time we ask them for money. The major item of our expense is for employees who meet the public as our representatives. This item is comparatively an inappreciable portion of the expense of the electric light and power or gas company. We want our conductors and motormen to be courteous and helpful, and taking into account the conditions encountered, I believe we are far more than fairly successful, but I just want you to realize that with 30 per cent of our total operating expenses paid to motormen and conductors we have a real problem, and one that is seldom fully appreciated.

You electric and gas men have your peak loads, and satisfactorily to meet peak demand conditions adds to your responsibility, but only to a comparatively minor extent. It is an economic impossibility with the street car or with the bus to give every customer a seat during the rush hours. Nor is it always practicable even approximately to meet this desirable condition. If we were to give a seat to every passenger during the rush hour a 15-cent fare would not give as much net revenue as would a 10-cent fare if we carried during the rush hour standees up to, but not to exceed, the number of seated passengers. To obviate one of the most common complaints, therefore, is economically impracticable. Please keep in mind that I am referring to city transportation with either buses or street cars used to take care of all the transportation requirements. The pub-

lic generally does not appreciate that with bus operation in the street car field the bus has to take care of only a portion of the total traffic. I have in mind particularly a more western city where bus service is given, paralleling and competing with the street car service in the cream of the traffic. The bus in this instance may give a seat for every passenger and charge but 10 cents, but it does not take care of all the traffic which may present itself. All it purports to do is to take care of traffic up to the seating capacity. When the blizzards and the rains come and the automobile user seeks public transportation it is the street car that must take care of his needs. Therefore, do not let yourself be misled into making an unfair comparison between the vehicle or system which takes cream traffic or limited traffic only and is not prepared at all times to take emergency and abnormal traffic.

### PLENTY OF ADVICE IN OPERATING STREET CARS

There is one other peculiarity about the street car business. Our customers become so familiar with our cars and our schedules and are brought into contact with us so intimately and so often that they really think they know all about our business, although we who have spent a lifetime in it realize that we have yet much to learn.

There is one other feature with which you other public utilities do not have to contend. You furnish light, power or gas to all classes and conditions of people, rich and poor, honest and dishonest, white and black, but when the electric wires or gas pipes enter one's home those wires or pipes are considered personal and individual. They furnish service for that one family or that one industry. On the street car the bitterest enemies may of necessity sit or stand shoulder to shoulder. There is also that eternal human desire to take the first car though it be crowded and a comparatively empty car follows closely.

\*Abstract of an address before the Kentucky Association of Public Utilities, Louisville, Feb. 18, 1927.



I have served as an executive of electric light and power and gas companies. The same executive in charge of a joint light and power and railway property will spend of necessity three-fourths of his time on his railway problems. This is also a fair comparison to make for the gas company. You other utilities should not judge us solely by financial results. Our public relations problem, our intimate contact with the public, the conditions under which we must do business with our customers are more personal and individual than yours.

A year ago I was down in Australia, called there to make a report on a government-owned utility. I had every opportunity to study public ownership from the inside. In Australia there is, broadly speaking, no graft or corruption in connection with the operation of the public utilities. The employees of the publicly owned public utilities there are not subject to political changes. They are not selected for their political leanings.

Nevertheless, I came back from Australia with the most definite conviction that those theorists advocating municipal ownership of our public utilities were not only in error, but that if their theories were put into effect the results would be disastrous. I was forced to the conclusion in my study there that no set of men will administer a public property as economically and in as businesslike a manner as would that same set of men if their own money were invested in that property. It just is not humanly possible to expect as economical results from a property administered by politicians as from one privately administered. I might add, also, that there is no attempt over there to confiscate privately owned corporations, as has been so many times attempted here.

#### UNFAIR TRANSPORTATION COMPETITION INDEFENSIBLE

Before the war practically all our city and interurban transportation was by electric cars. Then came the jitneys, followed by makeshift buses, operated by the same irresponsible element that had previously operated the jitneys. The street car man had a rightful, definite prejudice against the jitney. This prejudice followed the earlier buses. But today the electric car man has little or no prejudice against the bus. He wants and needs the bus and recognizes it as a progressive transportation tool.

We do most definitely object to the uses to which buses are put by irresponsible pirates who seek to blackmail us and jeopardize our investments so that we will buy them out. In thus objecting we are acting for the best interests of our communities, which must eventually pay the cost of such destructive competition. We also have definite objections to the shortsighted bus manufacturer who will willingly be a party to such competition. Irresponsible transportation operation is always a public nuisance. Keep in mind also that the responsibility of the so-called independent operator is measured in part by his ability to pay a \$100,000 loss if the bus you were riding in has an accident such as may happen and does happen at times even with the

### COMING MEETINGS OF *Electric Railway and Allied Associations*

*March 4*—American Electric Railway Association, Metropolitan Section, Engineering Societies Building, New York City, 8 p.m.

*March 8-10*—Oklahoma Utilities Association, ninth annual convention, Huckins Hotel, Oklahoma City, Okla.

*March 17-18*—Illinois Electric Railways Association, seventh annual joint convention, Hotel Abraham Lincoln, Springfield, Ill.

*April 26-29*—Southwestern Public Service Association, convention, New Orleans, La.

*May 31—June 1-2*—Canadian Electric Railway Association, annual convention, Winnipeg, Man.

*July 27-29*—Association of Equipment Men, Southern Properties, 12th semi-annual meeting, Atlanta, Ga.

*Oct. 3-7*—American Electric Railway Association, annual convention and exhibit, Public Auditorium, Cleveland, Ohio.

most careful of the responsible companies.

I have said before and I say again that we will need and use many more buses in the future than we do today, but those buses should be and will be co-ordinated with electric cars. Undoubtedly there are communities and some interurban lines where the bus should and will entirely supersede the electric car. A number of electric car lines, both city and interurban, were built because they were community builders, and those who constructed them were building for the community's future. Real estate values were increased manyfold and the electric railway builder was welcomed with open arms. This would not have been true if these railways had not been constructed by responsible people with something worth while to offer, and it is essential that due and careful consideration should be given to the protection of these community investments to the greatest extent practicable.

#### TRANSPORTATION CHARGES TOO LOW

Today a very considerable number of people are using the privately owned automobile who previously used public transportation, but public transportation still remains a civic necessity if our communities are to grow and prosper. In that connection I want to draw attention to what I believe is a fundamental fallacy. There is entirely too much agitation for too low a transportation charge. I do not find fault with my neighbor because he wants to buy his ride cheaper, but I do say to him and to you that what he really needs above all else is service. I maintain that the better service would be worth far more than the extra pennies it would cost and that no better community investment could be made from the standpoint of economy and of prosperity. The day will come, too, when more money will not be forthcoming

for needed improvements, unless the rate of fare pays the cost of the service, including the cost of money.

I believe that there are but few cities or systems where there has been as yet real co-ordination between street car and bus. The car must of necessity remain the vehicle to carry large masses of people at the lowest rate of fare. There is open a new and most attractive field for the bus, catering to those who desire a more expensive, more exclusive or faster service. The bus in semi-competition might carry a considerably less number of people per vehicle, give a seat to every passenger and make but comparatively few stops, or a limited car and local bus service might better serve the community. In many of our cities, even large ones, there are sections where, when the old track becomes worn out, new track should not be installed but buses should take the place of the electric car.

When I say that I see a broader field in many communities for the bus than has as yet been utilized, with that statement must go two others: first, the community must pay the cost of the ride whether it be by bus or electric car, or service such as I am speaking of is not possible; second, there must be co-ordination to the extent that is only possible when the electric cars and the buses are under one management and that management a responsible one.

There is also admittedly a prohibitive cost entailed if too much additional service is provided. There may temporarily be actual competition between the bus and the electric car. Such competition cannot eventually continue. It is against all economic laws. The community cannot afford to pay the price of duplicate service.

Referring directly to Louisville, I do not know what eventually will be the legal outcome of the bus competition and street car situation here, but I do know that eventually the people of Louisville cannot have a bus company in here taking away the cream of the traffic from the electric railway company and still continue to have that street car service which is necessary for their very lifeblood. An irresponsible pirate operating solely for his own benefit and under no obligation to serve all the people all the time has no moral right to take the cream of traffic and thereby weaken or break the organized transportation enterprise which operates under public control for the public benefit. I want here to commend those far-seeing bus manufacturers who with vision and foresight have so shaped their individual sales policies as to withhold aid or assistance to bus operators seeking to undermine the established transportation of a community.

When hard-headed business men like these bus manufacturers visage the fact and appreciate the necessity of doing business with responsible transportation companies, it would seem to me that there should also be a full community appreciation of the underlying facts and consequences.

#### BUS A MERCHANDISING VEHICLE

The bus has some undesirable features, due primarily to the mechanical limitations of the present status of the



art, but the bus is a merchandising vehicle and we electric railway men must go farther than we have in our appreciation of what the bus can do, not only as a transportation vehicle, but as a selling and merchandising tool, a vehicle with many features inviting to our customers. We recognize that we cannot meet the competition of the private automobile and other new and changed conditions of today if we continue to operate the same cars under the same conditions as we did ten years ago. We must not only modernize our equipment, but we must do what a considerable number of the progressive properties down in this part of the country are doing. Take the Louisville Railway, the Kentucky Traction & Terminal Company, and the Interstate Public Service Company—three properties with which I happen to be reasonably familiar—they are not doing

today what they were doing ten years ago. There is a new order in effect. Their car equipment is meeting today's conditions, and further, these companies are recognized nationally as leaders in a public relations policy, in a desire to satisfy their customers. It remains for the people of these communities, as of communities elsewhere, to choose and be given just the kind of transportation service they desire, but I must say again, and I say it in no mean way, that they must pay the cost of the service rendered. Here are men able and willing, and the financial groups behind them are able and willing, to go forward as distinct assets to the community served. It is for the public—our customers—to decide, but I believe that I as a representative of the electric railway companies would not be doing my duty did I not point out the underlying facts.

out the range of brake shoe wear—say  $1\frac{1}{2}$  in. There should also be provision in motor truck construction for the best location of the brake shoes on the wheel and suspension of the brake head or beam hangers at a proper angle and at such a point on the truck as will maintain a fixed location of the shoes on the wheel, regardless of whether the car is light or loaded.

Economy and safety are prime requirements in railway operation, and as the brake is a most vital safety factor it should have consideration commensurate with its importance. In the design of cars and trucks, ample space should be allowed for the application of the proper brake equipment, including a suitable foundation brake gear right down to the brake shoes. In the event of piston travel adjustment being neglected, the piston should strike the head before the radius bar, or levers foul.

## Air Brake Requires Proper Installation and Maintenance\*

BY W. M. C. HORNER

Mechanical Expert Westinghouse Air Brake Company

FOR many years the installation of the brake equipment on electric cars in many cases did not receive the consideration it merits. Consequently there are a great many cars which have been in service for a number of years that are equipped with brake cylinders much too small to provide a satisfactory brake and at the same time keep the leverage ratio within the prescribed maximum of 12 to 1. There are some cases where cars have had as high as 18 to 1 total leverage. Inasmuch as this is a subject in which every operating man is interested, I wish to take this opportunity to review a few of the essential factors involved in the design of an efficient air brake.

First, as to pressure: If more than 2 per cent braking power per pound of cylinder pressure is attempted, a very high braking power for light cylinder pressures is obtained and, therefore, the cars cannot be handled without shocks at low speeds, and either the range between the maximum and minimum braking power obtainable must be very narrow or else wheel sliding will result when the maximum power is used.

Second, as to area of brake piston: If the ratio of cylinder piston area to cylinder pressure is excessive, it means either a low leverage, which means great shoe movement, or higher leverage with low pressure, which means very narrow range between maximum and minimum braking power.

Third, as to leverage: If the leverage is too low, it means excessive air consumption and too much shoe movement; if too high (that is, brake cylinder too small for weight of car, and it is here that the principles governing brake design are violated most frequently), smooth and accurate handling of the car or train becomes impossible and the shoes are constantly grinding on the wheels, consuming energy, wearing out

the shoes and causing loss of time; or else piston travel must be lengthened out, thus greatly increasing the air consumption, lengthening the time of application and release and reducing both service and emergency braking power. The high leverage makes necessary a frequent adjustment of piston travel. Otherwise a constant and very rapid decrease of braking power will result. If high leverage is accomplished at truck levers, it necessitates low hung brake shoes, which, when suspended from a spring-supported part of the truck, will result in great increase of piston travel and consequent decrease of braking power with the loading of the car. The action of the brake itself tends to compress the truck springs and magnifies this condition. Consequently when the air pressure in the brake cylinder is released and the car is unloaded the brake will remain applied because all the shoe clearance has been absorbed by the false travel. This always occurs at a time when readjustment of piston travel is impracticable and when instead of a decrease of braking power an increase is greatly to be desired. In addition, the danger of the levers fouling is increased, particularly where the truck leverage ratio is high, and for that reason very frequent and careful inspection is required or the total loss of the brake may result.

### SATISFACTORY BRAKES REQUIRE PROPER INSTALLATION

All of the preceding could be very much elaborated upon, but it is thought that enough has been said to show that the braking problem warrants careful consideration with regard to both the kind of brake and its proper installation.

Coming to the mechanical requirements of the foundation brake gear, the most desirable features in connection with this matter are a motor truck that will permit a brake design providing a lower truck leverage ratio and an unobstructed movement through-

### SATISFACTORY PERFORMANCE LIMITS LEVER RATIO

While a total leverage of from 9 to 1 or a maximum of 12 to 1 is proper, yet the total truck leverage ratio should not exceed 6 to 1; i. e., 1 lb. exertion on the truck pull rod should not give more than 6 lb. of force distributed at the four wheel shoes. This, of course, would mean a ratio of 3 to 1 for each truck lever, but  $2\frac{1}{2}$  to 1 is even preferable. This latter would mean a total truck leverage ratio of 5 to 1. When this is exceeded, the travel of the top end of the lever becomes too great as compared with shoe wear. In addition the shoe has to be placed very low on the wheel and there is increased danger of the lever fouling on the shoe. The lower the truck ratio is held the less change of angle there is for a given shoe wear.

### UNIFORM PISTON TRAVEL IS IMPORTANT

Proper provision should be made for maintaining as near a uniform piston travel as practicable for the following reasons: (1) That the air consumption may be kept low; (2) that the braking power may always be uniform, and (3) that a full power brake is assured at all times. For satisfactory brake operation the following factors should be considered: Release springs of proper strength; brake shoes of proper thickness, area and friction; live and dead truck levers of the same proportion when motors are on each truck axle, or, if otherwise, proportioned to allow for motor and non-motor axles; ample provision for take-up of shoe wear, slack, etc.; levers and rods so proportioned that they will be at right angles to each other when brakes are fully applied; elimination, as far as possible, of lost motion in journal boxes, pin holes, center plates, etc. The car should have reasonably large truck centers to admit of proper connection of body levers to truck levers by means of pull rods; the hand brake should be equalized and the multiplication made so that a large force can be applied to the hand brake chain with comparatively small amount of chain wrap-up.

An important phase of brake maintenance which is often troublesome at this season of the year is the question of moisture in the air brake system. The amount of this moisture, of course,

\*Paper delivered before meeting of Central Electric Railway Master Mechanics Association, Toledo, Ohio, Feb. 3, 1927.



depends on the humidity of the atmosphere at any given time. Frequently these atmospheric conditions are such that a considerable quantity of water will enter the air brake system. The water contained in the air is in the form of a vapor which saturates the air to a lesser or greater degree. Relative humidity is expressed in percentage and is a measure of the degree of saturation of the air at any given pressure and temperature. If air is at 100 per cent humidity it contains all the moisture it can hold at that pressure and temperature. When the pressure of the air is changed the ability of the air to hold moisture changes. As the pressure is increased the ability of air to hold water is decreased. The effect of temperature is exactly the reverse; as the temperature is increased the ability of air to hold moisture is increased.

As air is compressed its temperature increases. Consequently there is little moisture in evidence near the compressor or for a considerable distance beyond, even though the pressure has been increased. However, as soon as the air cools down its ability to hold moisture at the increased pressure decreases. All the moisture which is present in excess of the amount necessary to saturate the air 100 per cent will be deposited in the reservoir or cooling pipe. The amount of water deposited depends on the percentage of moisture in the air when it is drawn into the compressor. After the air is thoroughly cooled to the atmospheric temperature it will be more or less expanded as it passes into the air brake system. This expansion will, of course, further cool the air, but the reduction of pressure and the tendency toward increase in temperature due to the then higher atmospheric temperature will operate to keep the air dry; i. e., at less than 100 per cent saturation.

#### WATER CAUSES MANY TROUBLES

The presence of water in the air brake system is decidedly objectionable from two standpoints: (1) Because of the harmful action of moisture on the working surfaces of air brake devices, and (2) because of freezing. Moisture distributed in the air brake system causes rusting of the interior iron surfaces, and frequently this rusting action is extremely rapid because of certain gases which are present in the atmosphere. These gases, such as carbon dioxide, tend to make this moisture of an acid nature. When water is present in any considerable quantities it tends to wash the rust and other dirt that may enter the air brake system into the triple valves, emergency valves and other devices, with the result that the operation of the brake equipment will be erratic, or even defective, unless the equipment devices are frequently cleaned. The cleaning of air brake devices is an expensive proposition and is frequently unnecessary if proper means are employed to eliminate moisture.

The freezing of moisture in the air brake system is, of course, a well known objectionable feature, because all air operated devices can be blocked by ice and rendered inoperative if sufficient moisture is present under such conditions. The solution of this problem is, of course, to keep the water

out of the air brake system. This can only be done where an adequate cooling system is installed. There are many railway cars now in service which have adequate cooling facilities provided in the main reservoir portion of their brake systems, and these operate daily in severe cold weather without freezing troubles. There are other brake installations which are not so satisfactory and therefore need a carefully planned arrangement of radiating pipe to obtain the desired cooling effect.

Unless care is taken in the installation of radiating pipe the full effectiveness will not be obtained. Sufficient length of pipe is often installed, but it is located above the sills, where it does not get a free circulation of air, and very often it runs close to resistance units which throw off considerable heat, thereby defeating the purpose of the installation. When radiating pipe is properly installed freezing troubles can be invariably eliminated.

#### FREEZING ELIMINATED ON THE N. O. P. & L.

Last winter the Northern Ohio Power & Light Company had a real epidemic of freezing, which was attacked in a real business-like fashion by making certain changes along the lines referred to above, that gave satisfactory results. The changes on some of the cars were rather elaborate and involved considerable expense. However, I believe Mr. See, master mechanic of that property, will tell you that the cost has been repaid. The man who thawed out cars last winter told me the other day that he formerly used 2 gal. of gasoline every day in a blow torch, but that he forgets to bring the torch out most of the time now as he has no need for it.

By way of contrast, it might be interesting to mention another property that could not be convinced that radiating pipe, properly installed, could be depended upon to obtain the desired results, and therefore refused to use it. In order to protect its equipment against freezing the emergency valve, governor, quick release valve, main reservoir cut-off valve and a combined check valve and strainer were installed in a well-made box which was lined with felt. In spite of this there was freezing, which was later eliminated by installing two 23-watt lamps inside the box along with the apparatus. On tests made when the outside temperature was 12 deg. below zero the inside of the box registered 36 deg. I have examined the valves on this property a number of times and have found that in two months the inside of the valves have become very rusty, showing the presence of considerable moisture. It is necessary to clean these valves every two months.

I have just examined several valves which have been in service approximately twelve months on a property where freezing is avoided by eliminating moisture by radiation and found the emergency valves in very good condition, free from rust and evidence of moisture. The difference in maintenance expense as compared with the other road mentioned where the valves have to be removed, cleaned and lubricated every two months is obvious.

I wish to lay special emphasis on the

desirability of suitable protection of the air compressors against the entrance of dirt. If an air compressor is kept clean it will run almost indefinitely without excessive wear. It was my privilege recently to examine some compressors which had been in service for six years on a property which has no regular general inspection or overhauling periods for compressors. The only time they get to the shop is when something goes wrong, but they have a very efficient suction strainer arrangement. The oil was almost entirely free of any sediment, the gear and pinion were in fine shape, it was only necessary to take out one shim in the connecting rod crankshaft bearing and we could detect only 0.0015 in. wear in the cylinders. The condition of this compressor showed very forcibly how simple it is to increase compressor life with very little cost for maintenance if clean air is furnished at the suction.

I would like to add a word or two concerning the composition packing which our company developed primarily for brake cylinder packings, but which is now being substituted for leather in all air brake devices except in a few cases where leather seems the best suited. We were obliged to go into the manufacturing of composition packing for brake cylinders because of the tendency of leather cups to lose the filler with which they are impregnated, causing them to become porous in a short time.

The new material, known under the trade name of "Wabco," is highly oil resisting, which insures against excessive brake cylinder leakage during the life of the cup. The packing cups are made fairly firm in order that a uniform bearing be maintained against the cylinder wall without the aid of an expander ring. Therefore, it is necessary to exercise reasonable care in handling, in order that the material is not cracked or broken before being installed. Rubber, which is used as a base in this composition, has a natural tendency to vulcanize with age. This results in gaskets becoming harder than they should be when carried in store-room stock for a considerable period. Gaskets that appear to be too hard for application to a device can be softened temporarily by soaking in warm water for a few minutes. We recommend that not more than a six months stock be carried.

#### Men of National Prominence to Address Oklahomans.

SEVERAL men of national prominence in the public utility industry will address the ninth annual convention of the Oklahoma Utilities Association at the Huckins Hotel, Oklahoma City, on March 8, 9 and 10. They include L. S. Storrs, who will address the morning session; Frank LeRoy Blanchard, New York; H. S. Bennion, New York; Martin L. Pierce, North Canton, Ohio; H. O. Caster, New York; W. S. Vivian, Chicago; H. B. Flowers, New Orleans; Samuel A. Chase, Mansfield, Ohio; Earl W. Hodges, New York. The latter will be the principal speaker at the annual banquet to be held at the Oklahoma Club on Wednesday night, March 9.



# The News of the Industry

## Higher Rates in Fort Worth Northern Texas Traction Hopes to Sell 5,000 Nickel Passes a Week— Intensive Campaign

Negotiations between the city of Fort Worth, Tex., and the Northern Texas Traction Company culminated on Feb. 1 in a unanimous vote by the City Council granting a fare adjustment. The conferences occupied only about two months. The company made formal application on Dec. 1, 1926, to the Fort Worth City Council for an adjustment of the rates. The rates finally agreed upon and mentioned in the *ELECTRIC RAILWAY JOURNAL* issue of Feb. 12, page 307, were: Cash fare, 10 cents; three tokens for 25 cents; nickel pass at 40 cents a week, plus 5 cents per ride; half fares, 5 cents cash with six tokens for 25 cents.

These new rates replace a 7-cent adult and 3½-cent children's fare. Fares on the motor coaches remained at 10 cents straight, this fare entitling the rider to transfer to and from cars.

The new rate embodied in the nickel pass is a departure. With twelve rides a week, the average fare on the ticket is 8½ cents. In its plea before the Council the railway stated that from 25 to 30 per cent of its passengers would ride on the nickel pass.

Having sold the nickel pass idea to the City Council, the next job on the part of the railway was to sell it to the public. This was accomplished by holding a week-end bargain sale of street car rides. On Feb. 2 at noon the operators on every city car handed a pamphlet to every street car rider. This pamphlet reproduced the nickel pass, good until midnight Feb. 6, and invited the public to use it with the railway's compliments. The result was that within 24 hours practically everybody in Fort Worth understood the nickel pass, how it worked and what its possibilities were. The effect was, of course, to carry everybody for a 5-cent fare from Feb. 2 noon until midnight of Feb. 6. During the 4½ days the riding increased about 10 per cent, while the city revenue decreased about 20 per cent. In addition a kindly feeling was created among the public that brought the railroad many compliments. It is the plan of the company to have the public educated to the point where it can sell 5,000 to 6,000 nickel passes a week.

The railway at Fort Worth, in addition to handing out the explanatory pamphlets, had inspectors and commercial representatives canvassing all of the stores and large establishments, giving out booklets describing the nickel pass. The result was that the railway received checks from a number of concerns to cover passes for all of the employees. Some concerns presented these to their employees with

their compliments. For example, the railway sold Sanger Brothers, one of the leading department stores, 300 nickel passes at 40 cents each, and to another concern it sold 100. The railway hopes to make this a permanent arrangement and to intrigue other concerns to follow suit.

As a preliminary to the installation of the new fares the company has been holding meetings of its city trainmen and adopting many novel stunts, with the result that when the new rates went into effect on Feb. 7 the company had about 500 of the most enthusiastic salesmen ready to do duty. The

complete application was reproduced as a page "ad" in several of the daily papers and pamphlets addressed "To Our Patrons" were distributed to many outbound passengers.

In addition to the beneficial effects of the new fares on the infrequent rider, the casual rider and the wholesale rider, the management sees an added advantage in the new schedule, namely, the getting away entirely from odd pennies. This is considered to be a tremendous help in speeding up service and relieving platform congestion, as service on the city lines is 100 per cent one-man.

## Utilities Not Stressed in Messages

### Only Slightly Do Governors' Addresses Affect Railway or Bus Industry— Motor Vehicle, Home Rule and Commission Regulation Mentioned

LEGISLATIVE sessions are being held this winter and spring in nearly all the states. Of the messages studied little is said on the subject of public utilities. Most of the governors made no plea or promised no legislation for the railways or their subsidiaries, but many of the chief executives stressed the need for continued construction and development of the highway, discussing in connection with the good road movement, the importance of renewed vigilance of safety for the public. The states from which this message of highway development emanated included New Hampshire, Maine, Delaware, Montana, South Dakota, Vermont, Minnesota and North Dakota. Of the 35 addresses to the various legislative bodies considered seventeen contained some pertinent remarks of interest to utility operators. This proposed legislation would affect motor vehicles, gasoline and other taxes, service commission duties, bus regulation and home rule. These were made in the states of New York, New Jersey, Ohio, Maryland, Rhode Island, Tennessee, Pennsylvania, Kansas, Oregon, Washington, North Carolina, Iowa, Connecticut, Wisconsin, Idaho, Massachusetts and California. Extracts of the messages in New York, New Jersey, Ohio, Maryland, Massachusetts and California follow:

#### NEW YORK

Governor Smith of New York called attention to the still unsolved phase of home rule, namely, the administration of local public utilities. He said that he had consistently called attention to the injustice to local governments brought about by the amendments to the public service law, made in 1921. In his opinion the state should return to the municipalities the free hand they once had to deal for themselves with the corporation with which they made

contracts at any time in the past. He was never able to find any fault with a policy of decentralization that would delegate to municipalities, where they desired to exercise it, the right of the state to regulate all public utility corporations operating wholly within their borders. The state should be empowered to delegate to localities when they so request or to an agency established and designated by the local government the regulatory powers now held by state agencies. He said: "It is time we ceased to hamper the freedom of municipalities to own and operate public utilities. Public ownership and operation are not untried theories."

The successful co-operation between the public at large and the officials charged with the administration of the motor vehicle law was in no small measure responsible for the decrease in deaths due to motor vehicle operation during 1926 compared with the year previous.

#### NEW JERSEY

The problem of improved transit facilities among the communities of northern New Jersey and between those communities and New York City, which has been the subject of serious study by the North Jersey Transit Commission, was referred to by the Hon. A. Harry Moore, Governor of New Jersey, in his message to the 151st Legislature. He said that this commission would report as to the progress of its work during the 1927 legislative session, that a careful study of that report would serve not only further to demonstrate the far-reaching importance to the state as a whole of these studies but also the tremendous difficulties and the enormous amount of work confronting this unsalaried commission before there could be solved the legal, financial and engineering problems involved in the establishment of



a rapid transit system functioning not only within the boundaries of New Jersey but requiring, as well, the crossing of the political geographical barrier of the Hudson River. He said that such a plan, when fully developed, would affect in one way or another every railroad with terminal facilities on the west bank of the Hudson and would require the active co-operation of the authorities of New York for its practical realization. Much work remains to be done.

#### OHIO

On the subject of public utilities, Governor Donahey asserted it was the duty of this session to submit three names for an entirely new commission, because of the failure of the last Ohio Senate to confirm his appointments to the Public Service Commission. The law, however, contemplated the appointment of only one new member every two years. He said the new appointment would be sent to the Senate for consideration in the near future and asked the present Senate not to adopt the policy of the two preceding ones in permitting important appointments to lie dormant in committee for weeks or months. He said that after consultation with the new commission he proposed to submit for the Legislature's consideration some concrete recommendations as to needed statutory changes in methods of operation and procedure of the Public Utilities Commission. He recommended an excise tax on motor transportation companies operating as public utilities "which up to this time have escaped this form of taxation," and this in addition to the special taxes which are paid for the privilege of using the streets and highways for the purpose of transporting passengers and property for hire.

#### MARYLAND

Gov. Albert C. Ritchie told the General Assembly of 1927 that experience had shown that certain amendments were needed to strengthen the powers of the Public Service Commission. He said that among the measures that would be submitted in this connection were bills providing for indeterminate rate orders; requiring the consent of the commission for the abandonment of franchises acquired and exercised before as well as after the enactment of the public service commission law; empowering the commission to fix the minimum as well as the maximum rates; empowering the commission to suspend proposed rates, pending a determination of their reasonableness; authorizing joint investigations, hearings and orders in conjunction with the commissions of other states or of the federal government in the case of interstate utilities, and restoring the office of general counsel to the commission.

#### MASSACHUSETTS

Gov. Alvan T. Fuller, speaking before both branches of the Legislature on Jan. 6, recommended further consideration of a gasoline tax of 2 cents a gallon with a corresponding reduction in the present registration fees. This would have the advantage of raising a substantial amount from visiting tourists, he claims, who now contribute

nothing toward the upkeep of the highways.

On the subject of public utilities, he said that the Department of Public Utilities should be responsible to the public for establishing and maintaining reasonable rates. The Public Utilities Commission should be the guardian of the public interest. It should require reports and be able to analyze them so that a proper relationship could be secured between returns to the stockholder and charges to the consumer, "always bearing in mind that the consumer has not been afforded that best protection which can be given to any consumer, namely, competition for his patronage." The advantage of this competition had been denied him by giving utility companies a monopoly. He asked if it were not surprising that all public service companies had not learned the lesson that the interests of the company could be best served by meriting the confidence and good will of the public.

On the control of public utilities he recommended legislation to meet the situation of public utility companies passing under the control of interests outside the state through the medium of holding companies. He quoted Section 10 of Chapter 181 of the General Laws and recommended that the statute be amended so that it would provide that whenever it should appear that a majority of the common or other stock having voting power in the domestic company was owned or controlled by a foreign corporation the Supreme Judicial Court should have jurisdiction in equity to dissolve such domestic company. As there were a number of these holding companies organized under the laws of the Commonwealth, the amendment to the law should be so drafted as to apply to holding companies, whether domestic or foreign.

Governor Fuller's message stressed the problems growing out of the Boston Elevated Railway, with its varied equipment for transporting the public. Among other things he suggested for public consideration legislation continuing the present public control of the Elevated for a period sufficient to effect a substantial decrease in dividends and interest. The assurances necessary to obtain these concessions in the return to be paid on capital could be given without actually involving the treasury of the Commonwealth in the least or binding the public trustees to do more than keep fares at a proper rate. In all that is done he believed the two great objects of suitable transportation and the lowest possible expense for the capital required ought to be kept constantly in mind.

#### CALIFORNIA

In his address before the Legislature of California on Jan. 4 Gov. T. S. Young recommended that the present Legislature provide for a commission to investigate whether the existing tax system, with periodic justifiable increases in the public utility tax rate, would continue to provide necessary revenues for the state's normally increasing expenditures, and if not, what modification should be made in the present system to put it on a safe, permanent and equitable basis.

### Tacoma Survey to Be Concluded

Officials of the Tacoma Railway & Power Company, Tacoma, Wash., have interviewed thousands of Tacoma citizens in the past few weeks in an effort to get data on what the public thinks of the city's railway service, and to learn what is wanted by the public in the way of additional or improved service. The survey is being made by the Beckmann-Hollister Company, San Francisco, with Miles F. Hollister of the company personally directing the work. The City Council and Mayor Melvin G. Tennant have been co-operating with railway officials in an effort to solve the railway problem.

### New Reserve Clause Inserted in Kansas City Franchise

A reserve fund for maintenance purposes of approximately \$400,000 will have to be set up by the new Kansas City Public Service Company, Kansas City, Mo., under a clause just inserted by the special committee in the proposed franchise. The reserve fund would be created gradually out of the earnings of the company and could be used only for emergencies. It is thought that this reserve fund is the only new feature not already made public that will appear in the proposed franchise, a 30-year grant to replace the one under which the company is now operating. The other terms of the franchise are said to follow closely the committee's recommendations made to the Council last December.

The new franchise is virtually ready to be presented to the Council. It remains only to be drawn up legally. One more meeting of the committee will then take place before the franchise is presented to the Council. After its introduction in the Council the grant would be referred to a committee, which would hold a public hearing within a week. The measure would come up for passage at the third reading in the Council.

### Rearrangement of Akron Operation Proposed

A. C. Blinn, vice-president and general manager of the Northern Ohio Power & Light Company, Akron, Ohio, has proposed a plan for changing railway and bus routes and schedules in Akron that will save approximately 1,600,000 operating miles annually, better the service and decrease operating costs. It will be put into effect when approved by City Council.

Alterations proposed by the company will help keep city bus and car fares down by enabling the company to reduce its operating losses on the Akron transportation system, Mr. Blinn told councilmen. He said:

N.O.P. transportation operations went heavily into red ink during 1926, as against a net of \$48,813 after taxes in 1925. If we fail to operate with a profit this year, there will be no alternative, but a higher fare when we seek a new franchise in 1929.

The transportation changes affect duplicating operations during dull periods, which eat heavily into operating costs, according to Mr. Blinn. Improved service is planned in rush hours.



## New Proposals Expected in Toledo

Following a lull of two months in railway negotiations at Toledo, Ohio, which were aiming at a revision of the Milner ordinance or a complete new plan of unified traction and bus service it is believed some new proposals may be made soon by the representatives of the Community Traction Company. An ordinance was prepared but after receiving disapproval of the street railway board of control and a special committee of the Chamber of Commerce was abandoned for the time being. Possibly the new negotiations may seek to use this ordinance and the construction suggestions as a basis for a new plan. Original negotiations to secure better service, lower fares and better street paving and maintenance arrangements were started nearly two years ago and involved a study of the transit system of Toledo by Prof. H. E. Riggs of the University of Michigan.

## The Rocky Mountain Canary Carols Its Tune in Denver

In the city of Denver, Col., there is an eight-page paper, 12 in. x 17 in., called the *Rocky Mountain Canary*. It is published every Saturday and the Denver Tramway is evidently one of the main distributors, the paper being placed in an open box in a prominent part of the cars, a sign thereon reading "Take One." Ten thousand copies are printed each week. In every edition there is an invitation to the public to submit a slogan for the big placards carried on the front of all the company's cars. The prize to the winner of slogan contests is 100 car checks, of a value of \$7.50.

As a sample of the winning slogan, the issue of the *Canary* for Jan. 22 prints: "Denver gets you in the end. It's a great place to live."

In the same issue the tramway offers a \$5 prize for the best letter of not more than 100 words on "Why I Ride the Street Cars." For any other letters on the subject that are used by the *Canary*, \$1 is paid, and then the *Canary* is going to print news of grocery bargains close to car lines, clothing bargains, meat bargains, etc., and says that in this way "we will make your car slugs pay."

## Rehearing on Syracuse Fares

Chairman Prendergast of the Public Service Commission on Feb. 17 heard the application of Mayor Hanna of Syracuse for a rehearing on the order of the commission establishing a rate of seven tickets for 75 cents, 10 cents cash fare, on the New York State Railway Lines in Syracuse. The commission had previously denied the application for a suspension of the order dated on Feb. 2, to be effective Feb. 10, pending this rehearing.

The city's request for a rehearing was based on the valuation of the property of the company and the order requiring that tickets be sold in blocks of ten for 75 cents, which it believed was injustice to the small wage earner. Mayor Hanna petitioned the commission to require that two tickets be sold

for 15 cents with four tickets for 30 cents. The railroad maintained that the order of the commission was fair to all parties and that to increase the number of transactions by selling tickets as suggested by the city would delay the operation of cars. Decision on the application for rehearing was reserved.

## Relief from Paving Cost Sought by Detroit Municipal Railway

Upon the suggestion of Del A. Smith, acting general manager of the Department of Street Railways at Detroit, Mich., the City Council has passed a resolution instructing the Corporation Counsel to prepare a charter amendment to relieve the municipal railway of the burden of paving between tracks. The amendment will place the cost of such paving between tracks on the general tax roll. The matter will be voted on by the people at the April 4 election.

In bringing the subject to the attention of the Council, Mr. Smith cited that between July 1, 1925, and Dec. 31, 1926, the D.S.R. expended \$542,652.02 in paving between tracks. John C. Lodge, president of the Council, in commenting on the proposal, cited that under the present system of making the car rider pay for the pavement between tracks. Mr. Smith cited the general tendency to relieve street railways of the paving burden, and said that the money expended in this direction in Detroit, if diverted to exclusive railway purposes, would most certainly add materially to transportation facilities.

## Postponement in St. Louis on Fare Hearing

Three federal judges, including two district and one appellate jurist, were not available at Kansas City, Mo., on Feb. 15 so the hearing could not be held on the application of Rolla Wells, receiver of the United Railways, St. Louis, Mo., that its 8-cent basic fare rate be made permanent. A postponement until Feb. 25 was ordered by United States District Judge Reeves, who issued the temporary restraining order against the Missouri Public Service Commission and other state officials under which Receiver Wells put the new rates into effect on Feb. 7.

Prior to announcing the postponement of the hearing Judge Reeves in Chambers listened to motions by City Counselor Muench of St. Louis and Attorney-General Gentry on behalf of the state, and J. P. Painter, counsel for the Missouri Public Service Commission, for a dismissal of the case on the grounds that the federal court lacked jurisdiction. The judge indicated that the points raised had caused serious doubt in his mind as to the right of the federal court to assume charge of the rate question. These motions will be taken up first on Feb. 25, when Judge Kimbrough Stone of the United States Court of Appeals and Districts Judges Reeves and Otis will pass on the case.

City Counselor Muench contended that inasmuch as Receiver Wells on behalf of the company on his own motion had appealed to the Missouri Public Service Commission for a higher

fare no action in the federal court should be had until the state commission has handed down its decision. The commission has had the rate question in charge since last June. However, Receiver Wells has contended that the state body has needlessly delayed a decision and that its failure to act has resulted in the confiscation of the company's property in violation of the United States Constitution.

## Early Subway Building Is Promised by Chicago Mayor

Assurance that Chicago's vital subway question would be disentangled, for the time being at least, from the main body of local transportation problems now confronting city and traction officials and apparently destined to indefinite delay was given by Mayor William E. Dever in a pre-election address on Feb. 17.

The Mayor revealed that a subway ordinance drawn up by Major R. F. Kelker, Jr., city engineer, in conformity with the Mayor's own recommendation and, in many respects, with the report of the citizens' subway commission, will be reported to the local transportation committee of the City Council in the next few days.

Mayor Dever has incorporated subway construction along the lines proposed in this ordinance as one of the chief planks in his campaign for re-election next April and is demanding immediate action toward that end.

He indicated that if the ordinance should be approved by the Council, it will probably be submitted to the voters at the judicial election in June. Then, if the referendum is carried, assessment proceedings will be started in the courts and construction begun at once.

Local regulation of public utilities is another important plank in the Mayor's platform. A petition sponsored by Mr. Dever is now being circulated by his party workers for a referendum on the question of home rule on April 5, the date of the mayoralty election. In order to give the city of Chicago control over its local utilities, enabling legislation must be obtained from the State Legislature at Springfield.

## Railway Project in Missouri

Willard E. Winner, pioneer developer, has associated himself with several citizens of Liberty, Mo., in the organization of a company to build and operate an electric railway from Liberty to Kansas City. A corporation capitalized at \$300,000 is being formed. The projectors plan to cross the Missouri River with their line at a point east of the city limits of Kansas City, at which place the river is especially narrow. From the river the line would go almost directly to Liberty, passing just east of Birmingham. At a point 3 miles out of Liberty there would be a branch east to the Atwood quarries.

The men listed as directors are: Lee Clark, Mayor of Liberty; C. P. Atwood; A. W. Lightburne; J. A. Reed; Robert Don Carlos, circuit clerk of Clay County; Pascal Parker; Harry Griffith; E. T. Brant; J. W. Pryor; J. S. Conway, and W. E. Barnes, city engineer of Liberty.



## New Crimson Limited in Texas Makes 1927 Appearance

The new 1927 Crimson Limited operated by the Northern Texas Traction Company between Dallas and Fort Worth was placed in service on Feb. 12 after having been exhibited in Fort Worth on Feb. 9 and in Dallas on Feb. 11. The new model was described in the *ELECTRIC RAILWAY JOURNAL*, issue of Feb. 5, page 246. Whereas the trailer is practically the same as on the new train put into service last October, the motor car has been completely changed, the biggest improvement being a very comfortable, heavily upholstered, genuine leather bucket seat.

In spite of the rain and sleet more than 1,100 people went through the train when it was exhibited and received a copy of the pamphlet describing service. Another 1,000 people went through it in Dallas in the Interurban Terminal. A check-up on the riding in Fort Worth reveals that already a number of local people who have been using their automobiles between Dallas and Fort Worth have now gone back to the interurban.

On the occasion of the installation of the 1927 Crimson Limited the company distributed an interesting and informative booklet on the advantages of riding in this de luxe interurban. The purpose of the booklet was to get the public to thinking along proper lines on the place of the bus and interurban in transportation.

## Another Fare Hearing in New Jersey Case

Decision on motion made on Feb. 16 to dismiss the application of the Public Service Transportation Company and the Public Service Railway, Newark, N. J., for adjustment of fare zones on eleven bus lines and one railway line will be reserved by the Board of Public Utility Commissioners of New Jersey until the entire case has been presented.

This was announced in an opinion by the board, at which motion by counsel of affected municipalities to adjourn the case three months was denied. The board set March 21 and 25 for the next hearings. In delaying decision on motions for dismissal, the board said:

At the close of the testimony given by the petitioners counsel for the various municipalities addressed motions to the board to dismiss the petitions on the grounds of lack of jurisdiction on the part of the board and also because of the insufficiency of the evidence to support the allegations and prayer of the petitions. Without going into the detail of the reasons raised by the motions, the board is of the opinion that the motions should be reserved to the end of the case and should not be considered until after all parties have had an opportunity to present their evidence.

Speaking on the request to adjourn the case three months, the board pointed out that the petitions of the companies were filed on Dec. 14 and they were brought on for hearing on Jan. 19. Adjournment was then taken until Feb. 16. The board said:

Under the circumstances the board feels that an adjournment to March 21 should allow ample time for the counsel of the municipalities to obtain the necessary data for the preparation of their case.

## News Notes

**Eight Cents in Sioux City.**—Fares on the lines of the Sioux City Service, Sioux City, Iowa, will be 8 cents cash or two tickets for 15 cents after March 1. The present rate is 7 cents cash or four tokens for 25 cents. Diminishing revenue since 1921 forced the change, according to W. J. Bertke, general manager. Competition of the automobile is blamed by the railway officials for the falling off in passenger revenue.

**Would Bar One-Man Cars.**—About 1,500 residents of Norwood, Ala., have requested the immediate removal of one-man cars from the Norwood line and intimated that refusal to remove the pay-as-you-enter cars would mean a demand for return of the jitneys. This was the message in two petitions presented recently to City Commission.

**Amplifiers in Montreal Cars.**—The Montreal Tramways, Montreal, Que., has decided to install amplifiers in its cars to enable passengers to hear street names as they are announced by trainmen. Difficulty arose when the one-man cars were placed in operation for the motorman has to announce street names with his back to the passengers, and it has been practically impossible to hear him. The device will be placed in front of the operators of the cars, who will speak into it in an ordinary tone which will be audible to every passenger in the car.

**No Change Expected in Transfer Charge.**—Following a recent hearing, attended by representatives of the Indianapolis Street Railway, before Clyde H. Jones, member of the Indiana Public Service Commission, it was learned there was little likelihood that the commission would alter an order of more than a year ago in which the transfer fee was fixed at 2 cents. The order for the increase from 1 to 2 cents was for a year, ending Jan. 1. It was continued at that time pending a hearing.

**Survey Under Way.**—The town of Irvington, N. J., is making a survey of its bus and electric railway transportation with especial respect to their coordination and to the plan for re-zoning recently submitted by the Public Service Transportation Company, a subsidiary of the Public Service Railway. To conduct the survey, the town has employed Fisk & Roberts, consulting engineers, New York.

**Group Insurance for Employees.**—The St. Louis & Hannibal Railway, Quincy, Ill., has adopted a group program providing the working personnel with approximately \$80,000 of life insurance, sick and non-occupational accident benefits and the advantages of a visiting nurse service. The insurance plan, underwritten by the Metropolitan Life Insurance Company, is co-operative, with the employer and employees sharing the cost through joint contribution toward the payment of premiums. Employees in the main group covered each receive \$1,000 of life insurance. Sick and accident benefits, based on weekly earnings, average

about \$10 a week. Included in the group contract is a clause which guarantees payment of the full amount of an employee's life insurance to him, if he becomes totally and permanently disabled before age 60.

## Foreign News

### Swiss Railroad Electrification

Traffic on the Swiss Federal Railroads has been slowly declining. This has been accompanied by a falling off in the receipts, the effect of which has extended to the railroad authorities' plans for further developments. The budget for 1927 provides a sum of only \$17,600,000 for new extension work as compared with \$21,400,000 in 1926. As in recent years, the bulk of the money, about \$11,000,000, is to be utilized for further electrification work. During the coming year this will be mainly centered in eastern Switzerland.

Among the lines in this district which are in progress of electrification or scheduled for electrification are the Richterswil-Sargans-Chur, Sargans-Buchs, Winterthur-Romanshorn-Rorschach and Winterthur-St. Gall-Rorschach routes. The budget also includes a large sum for the extension of the power generation plants; thus, \$800,000 is allocated to the extension of the Vernayaz hydro-electric station and \$1,400,000 to the construction of additional transformer stations. The budget provision for new rolling stock for the electrified railroad shows a considerable diminution compared to previous years, but a sum of \$4,400,000 is allowed for expenditure in this direction next year.

### New Hydro-Electric Station to Give Power to Brenner Line

Electric trains probably will be running over the Italian and Austrian sections of the Brenner line by next year if the hydro-electric station now under construction is completed in time. This station is located in the mountains about 3 miles from the railway depot of Innsbruck. Power available will amount to about 100,000,000 kw.-hr. a year. All power produced over and above that required for railway operation and for the zinc mines of Schneeberg, as arranged between the Societa Generale Electrica Tridentina and another Italian company, will go to feed the system of the first-named company.

### Polish Electrification Plan Progresses

Government and representatives of European and American utilities corporations are reported to have agreed upon the main points of the electrification project for Poland, involving an outlay of £5,000,000. The financing is to be guaranteed, it is said, by the Polish State National Economy Bank. The machinery required is to be imported from the United States.



## Glasgow's New Fares Successful

Graded fares in Glasgow, Scotland, of 1 penny, 1½ pennies, 2d., the latter being the maximum rate for any distance, are proving successful from the point of view of revenue. This new scale has been in operation since last summer. There has been a decided increase in comparison with the receipts shown during a corresponding period the year before, while there was a large decrease in the revenue from shorter journeys. This was more than counterbalanced by the increase from the 2d. fares.

## Liverpool Report Praises Trams

Belief in the tramcar as the best vehicle for handling heavy traffic was emphasized in the report of P. Priestly, general manager tramways department, recently submitted to the Liverpool Council, and accepted. Buses have their sphere of usefulness as feeders on routes where the traffic does not warrant the expenditure necessary to undertake tramway operation. If buses were to replace trams in Liverpool, it would require about 50 per cent more vehicles. This, in turn, would result in a bigger mileage and increased cost. Moreover, the additional vehicles would cause serious congestion.

In reply to a recent suggestion to "scrap the trams," the report went on to say that the Liverpool undertaking had a capital of nearly \$3,000,000 and payments for sinking fund and interest would have to be made from the bus revenue. In addition, there would have to be new capital expenditure on the purchase of buses and this would have to be repaid in seven to ten years, as against fifteen to twenty years for a tramcar. The tramway system paid approximately £45,000 per annum in taxes, and in addition £50,000 toward road maintenance. If the trams were scrapped the latter would have to be paid out of taxes, so that a total of £95,000, equal to nearly 4d. per £1, would have to be met out of general taxation instead of being paid by the tramway as at present.

Accidents caused by electric railway cars in the past year were fewer per mile than for any other passenger vehicle, the report stated. In foggy weather tram service can be run when all motor vehicles are brought to a standstill.

**Floor Signs Used to Direct Passengers.**—Traffic direction signs are being tried by the London Underground at the Charing Cross station. There are two types in use, one composed of aluminum letters inlaid in rubber and the other having illuminated glass letters. They are set into floors of passages to direct passengers.

**Trolley Line Proposed for Kavala, Greece.**—Influx of refugees to the city of Kavala has so greatly increased the population of that city that despite the narrow streets the proposal is being considered to build a single-track trolley line. The present population of 80,000 people is now transported almost entirely by taxicabs.

# Recent Bus Developments

## Another Respite in New York Bus Wrangle

No action was taken by the Board of Estimate, New York City, N. Y., at the meeting on Feb. 24 toward approving the franchise contracts on bus operation because of the plea of Deputy Comptroller Frank J. Prial, representing Comptroller Berry, that time was needed to study the proposed forms, which had just been submitted by the Board of Transportation. The matter went over for a week. This made it necessary to abandon the date, March 22, fixed by a resolution for the statutory public hearing on the contracts as the law requires the advertising of these contracts for 27 days. It was decided to fix a new date for a vote at the subsequent meeting.

## Toledo Bus Ordinance Being Prepared

Toledo, Ohio, has been without any bus regulatory legislation for nearly two years and in response to a public demand in recent weeks following a severe accident a comprehensive bus ordinance was prepared by city legal authorities. It was referred by the Council to the street railway board of control.

After study the board has stated that there was great need for protection of the public and regulations regarding equipment, safety and insurance; that nothing should be written into the ordinance which would embarrass the city in its effort to work out a unified system of bus and street railway service at some later date under a single company, and that in event of passage such an ordinance should be strictly enforced with licenses granted only to lines which would not compete directly with the Community Traction Company. The Council has indicated that it will follow the proposals of the board of control in completing the ordinance.

## Gary Line Prepares Site for 90-Bus Garage

The Shore Line Motor Coach Company, a subsidiary of the Gary Railways and the Chicago, South Shore & South Bend Railroad, recently announced the purchase of a site for a large modern garage in the city of Hammond, Ind., to be built and ready for occupancy by June 1 of this year.

The garage will have storage space for about 90 motor coaches and will contain a machine shop and an overhauling department where coaches will be repaired. The cost of this improvement, including the land purchased, will be approximately \$150,000.

Merger of the Calumet Motor Coach Company, which formerly operated ten local bus routes in Hammond and adjacent communities, into the Shore Line Motor Coach Company was approved by the Indiana Public Service

Commission last month, making the latter company one of the largest operators of motor coaches in the Middle West. Of the total of 132 motor coaches now owned by the Shore Line Motor Coach Company, 83 operate out of the city of Hammond.

## Eastern Massachusetts Receives Part Fare from Bus Company

The Public Utilities Commission of Massachusetts has granted authority to the New England Transportation Company, the bus subsidiary of the New York, New Haven & Hartford Railroad, to operate buses on the Boston-Providence route alternately operating through the towns of Walpole and Norwood in Massachusetts. The route thus covered by the bus company encroaches upon territory served by the Eastern Massachusetts Street Railway. An agreement between the two companies provides for the payment of 18 cents to the Eastern Massachusetts Street Railway for each passenger between East Walpole and Boston and between Boston and East Walpole. This agreement was not favorable to the commission. The commission says:

However unjustifiable and unwarranted the payment to the street railway of a portion of the fare received by the transportation company may be, it does not affect the question which presents itself on this petition. The sole issue before us is whether public convenience and necessity require the operation of motor vehicles over the proposed route.

This the commission believed necessary. It did, however, say:

In the operation of buses over the proposed route, the electric railway will not do anything to entitle it to compensation. The consideration of this payment, apparently, is in the electric railway refraining from objecting to the issuance of a certificate of public convenience and necessity.

We are of the opinion that expenditures of money of a public utility is unjustifiable. If the question of the reasonableness of the rate charged by the transportation company were now before us, we would without question disallow, as an item of expense, these payments to the electric railway.

However unwarranted and unjustifiable the payment to the electric railway of a portion of the fare received by the transportation company may be, it does not affect the question which presents itself on this petition. The sole issue before us is whether public convenience and necessity require the operation of motor vehicles over the proposed route. We think they do.

The certificate of public convenience and necessity heretofore granted by the department on April 30, 1926, to the New England Transportation Company for the operation of buses for the carriage of passengers for hire between Attleboro and Boston is hereby amended to the following extent:

Said petitioner shall be permitted to operate such buses over the following alternative route through the towns of Walpole and Norwood: from Walpole Square over Main Street, East Street, Short Street, Washington Street to the junction of Washington Street and Walpole Street in Norwood. And on said alternative route shall be permitted to make a stop in the town of East Walpole at or near the post office to take on passengers for Boston, or to let off passengers taken on at Boston.

Provided, however, that no local passengers shall be accepted at any intermediate point between any stopping place in East Walpole and any point in Norwood, and provided, further, that any other restrictions in the original certificate shall remain in force.



### De Luxe Service Between Newark and Hackensack

De luxe express bus service was started between Newark and Hackensack, N. J., on Feb. 13, when the Public Service Transportation Company started the operation of a line of "parlor car" buses between the two municipalities. This is the first line of the kind to be put in operation in that section of the state.

Under the schedule adopted the first bus leaves Hackensack at 7 a. m. and Newark at 8 a. m. and the last bus leaves Hackensack at 11 p. m. and Newark at 12 midnight and buses leave both terminals on the hour and half hour during the intervals between.

The through fare between Newark and Hackensack is 50 cents. The minimum fare northbound is 25 cents, good for a ride from any point in Newark to the north line of Lyndhurst. The minimum fare southbound is 10 cents, good for a ride from any point in Hackensack to Williams Street and Terrace Avenue, Hasbrouck Heights. The running time of buses between Newark and Hackensack is 50 minutes.

### Service Between New Haven and Guilford to Be Resumed

Bus operation by the New Haven & Shore Line Railway between Guilford and New Haven, Conn., was resumed on Feb. 9, following a suspension of a month. It was noted recently that the bill presented in the Legislature by Representative Harry R. Durant, Guilford, would be withdrawn. This bill asked that the charter granted the New Haven & Shore Line be repealed.

William Walker, manager of the New Haven & Shore Line Railway, in making the announcement regarding bus service stated that the people had demanded this type of transportation. It was brought out that the territory between Branford and New Haven also would be served by the cars of the Connecticut Company, but that the 8 miles between Guilford and Branford was too thinly populated to net much revenue.

Representative Durant had previously branded the company's suspension of the bus line as outrageous and something that should not be tolerated. He scored the argument of the Shore Line that it could not make any money with buses on that line in the winter. It was his belief that the railway had to take the bitter along with the sweet, exactly like other public service corporations in Connecticut.

### Bus Losses Concern Cincinnati

Increasing losses on several of the coach routes of the Cincinnati Street Railway, Cincinnati, Ohio, have caused the public and city officials much concern, due to the fact that under the "service-at-cost" franchise the loss is made up by the return from railway fares.

These losses are not regarded by the management as being of an alarming nature, but because the situation is looked upon by the public as serious, the management and the city are studying the problem with the view of

making the operation of these routes less costly and more profitable.

Walter A. Draper, president of the railway, has prepared an analysis of the situation showing how to reduce the losses. This he is now submitting to Edgar Dow Gilman, Director of Public Utilities, for his consideration and approval.

### Permits in Minneapolis

Permits to operate buses on East River Road have been granted by the Park Board at Minneapolis, Minn., to the Northland Transportation Company and the Jefferson Highway Transportation Company. These companies operate also on River Road in St. Paul on a through intercity route, without picking up passengers, and have been doing so for some time, between the Franklin Avenue and Lake Street bridges over the Mississippi River.

This decision will have a bearing on the Terminal Motor Bus Company, which has applied to the Minnesota Railroad and Warehouse Commission for permission to operate bus service between St. Paul and Minneapolis. At present three intercity bus lines are operating, all owned by the Twin City Motor Bus Company, a subsidiary of the Twin City Rapid Transit Company.

It is contended by C. G. Calderwood, the company's president, that residents of the midway district of St. Paul have for years felt the need of more direct transportation facilities, especially for students at the University of Minnesota in Minneapolis.

The Terminal Motor Bus Company is five years old. It operates out of St. Paul to St. Paul Park and to Prescott, Wis., and Durand, Wis., also chartered buses to various points in the United States and Canada. It will install on the new line 26-passenger coaches with parlor seats, heated by hot water. The same fare as other lines will be charged, or 25 cents a trip, but in addition the company proposes a 20-cent commutation ticket rate.

On the other hand the Park Board, Minneapolis, Minn., has granted permission for the Twin City Motor Bus Company to operate a bus line on Cedar Lake Boulevard, supplying service to a district now without transportation of the sort. The route is from the end of the Bryn Mawr car line on Cedar Lake Road, Superior Boulevard, Twenty-second Street and Cedar Lake Boulevard.

The ordinance passed by the Minneapolis Park Board on Nov. 3, 1926, permitting bus companies to operate on parkways and through parks upon payment to a minimum fee of \$10 and a maximum of 20 per cent of the state motor vehicle tax for each bus, has been attacked in the district court in a suit by A. S. Dowdall, through Attorney F. W. Booth. The fee money is utilized to maintain and improve city parkways. Default in payment of a bus fee may result in a fine of from \$5 to \$1,000. It is sought to have the ordinance nullified on the complaint that the ordinance is a public menace and that the rights the board extends to commercial transportation companies are beyond the powers and contrary to the traditions of the Park Board.

**Denver Tramway Gets Bus Permit.**—The Bus Transportation Company, a subsidiary of the Denver Tramway, Denver, Col., was given a permit on Feb. 16 to operate buses from Englewood, Fort Logan and Loretto Heights Academy. This service is a substitute for the former electric railway, abandoned because it did not pay.

**Buses May Replace Cars.**—The Yakima Valley Transportation Company, North Yakima, Wash., will probably replace its last street cars with buses as soon as a line of paving is completed along half a mile of streets which the city and county are doing jointly. The two buses now operated on the Yakima streets are said to be very satisfactory.

**New Line Starts.**—Operation of a bus line between Philadelphia and Doylestown, Pa., was started on Feb. 6 by the Philadelphia Rural Transit Company, a subsidiary of the Philadelphia Rapid Transit Company. The buses, which run in conjunction with railway service, pass over Old York Road from City Line to Willow Grove and over the Easton Highway from Willow Grove to Doylestown.

**Buses Replace Cars.**—Permission has been given by the Board of Public Utility Commissioners of New Jersey for the suspension of service on the Sixth and Eighth Streets lines of the Public Service Railway, in Camden, N. J. The board at the same time approved of operation of eleven buses by the Public Service Transportation Company, a railway subsidiary, on the Mount Ephraim route, between Camden and Woodlynne, N. J. The buses will replace the suspended railway service.

**Would Operate on White Plains Route.**—The Westchester Street Transportation Company, Inc., on Feb. 23 filed petition with the Public Service Commission for an order authorizing the operation of buses on a portion of its route in White Plains. The petition is filed under the provisions of Section 50-A of the Public service commission law. This company is a subsidiary of the Third Avenue Railway System of New York City. It proposes to substitute buses for street cars over a route beginning at the tracks of the New York Central Railroad on Main Street, in White Plains, to the city line and the town of Harrison. A public hearing will be held on this application.

**Bus Request Refused.**—The Public Service Commission recently dismissed the petition of the Rochester Interurban Bus Company, Inc., for permission to operate bus lines from Rochester, N. Y., to Manitou Beach, Grand View Beach and Island Cottage. Petition for these bus routes was filed on July 24, 1925. Subsequently, the company advised the commission it proposed to have these routes operated by the Rochester Railways Co-Ordinated Bus Lines, Inc., and asked that decision be withheld. Both of these bus companies are owned by the New York State Railways. In January, 1927, the Rochester Railways Co-Ordinated Bus Lines, Inc., filed a petition for these routes and hearing has been held on this petition also. The company agrees that the first petition be refused and the proceeding on the application be closed.



# Financial and Corporate

## International Claims 10-Cent Fare on Commission Valuation

In a formal statement filed with the Public Service Commission the International Railway, Buffalo, N. Y., asserts that a 10-cent fare would do no more than provide the additional revenue required by the company on the commission's own showing. A Public Service Commission accountant recently reported that the company was earning a fair return, assuming a rate base of approximately \$20,000,000, whereas the commission has allowed a rate base of \$23,000,000, two of the five members holding that it should be \$32,000,000.

On the basis of the commission's own valuation, which is one-third that claimed by the company, I.R.C. fails by \$460,000 to earn the return to which it is entitled, says the company's statement.

Decreased employment on the Niagara frontier causes a loss of riding, so that the additional revenue required to give the company a legal return would make a 10-cent fare necessary.

The company's statement alleges many errors in the report of the accountant for the Public Service Commission. It points out that while the subsidiary company, International Bus Corporation, pays International Railway \$1,000 a month as rent for Walden Avenue carhouse, and the commission accountant included the rent in income, he deducted a sum set as the value of Walden Avenue carhouse from the rate base. Many items of smaller amount were rejected because the necessity for the expense arose in a previous period. More than \$60,000 was deducted covering payment for actual service rendered and expenses incurred.

An item of \$10,551 expenses in connection with the investigation of the dynamiting of the high-speed train in 1922 was also deducted by the commission's accountant. The company's statement says:

There can be no justification for these deductions unless the commission takes the view that the collection and preparation of evidence against lawbreakers attaching the company's property and its patrons is beyond the scope of the company's duty.

## Balance Increased on Detroit System

The total operating revenue of the Department of Street Railways at Detroit, Mich., for the year ended Jan. 31, 1927, was \$24,713,591, against \$23,485,313 for the year ended Jan. 31, 1926. In these figures are included a railway operating revenue and a coach operating revenue of \$22,411,611 and \$2,301,979, in the 1927 period respectively, against \$22,556,758 and \$928,554 in 1926. The total revenue from all sources was \$24,985,481, against \$23,680,745 for the year ended Jan. 31, 1926. Total operating expenses were \$19,119,770 in 1927. Of this amount \$16,931,548 was for railway expenses and the remainder for coach expenses. The

total operating expense for the 1926 period was \$17,644,205. Of this amount \$16,746,622 was for railway operation and \$897,583 for coach operation. Net revenue from all sources totaled \$5,865,711 in 1927, against \$6,036,539 in 1926. Following the consideration of interest and other deductions a net income of \$3,183,299 remained, against \$3,389,536 in 1926. The balance for the period was \$583,001 in the 1927 period and \$570,940 for the year ended Jan. 1, 1926. The railway passengers totaled 481,011,056, against 484,509,830 for the 1926 period. Total coach passengers numbered 29,096,028, against 12,388,021 for the 1926 period. Railway revenue car-miles amounted to 52,419,362, against 53,463,391 and coach revenue coach-miles were 9,410,300, against 4,028,384 for the year ended Jan. 31, 1926.

## Fonda Road Protests \$1,442,130 Condemnation Figure

Work on the dam to be built in the Sacandaga River at Conklingville, N. Y., will be started within a month, Edward H. Sargent, engineer of the Hudson River regulating board, said on Feb. 21. This is in spite of the intention of the Fonda, Johnstown & Gloversville Railroad to appeal an award of \$1,442,130 made on Feb. 19 by a condemnation commission for 7 miles of the railroad's right-of-way along the Sacandaga River near Sacandaga Park.

William J. Maider, acting as attorney for the railroad company, said if the award is confirmed by the court the company will appeal. The railroad company put in a claim for more than \$4,000,000.

Within the month the board probably will advertise for bids for relocating the highways and for the big dam itself. The dam will impound 32,000,000 gal. of water and the land will be inundated a distance of 30 miles in length by 3 miles in width.

## Income Balance Higher

Washington Company Earns Less than 4 Per Cent on Property Value—Decline of 1 Per Cent in Passenger Traffic

FOR the year ended Dec. 31, 1926, the balance of income credited to profit and loss of the Washington Railway & Electric Company, Washington, D. C., was \$773,200, compared with \$644,857 for the preceding year. This fact was disclosed in the annual report of President William F. Ham submitted to the stockholders at the annual meeting on Jan. 15, 1927.

During the year the company's system carried 76,797,163 revenue passengers and 24,272,542 transfer passengers, or a total of 101,069,705 passengers. This is a decrease of 708,473 in the number of revenue pas-

sengers carried compared with the previous year, or slightly less than 1 per cent. The primary cause of this continuous loss in traffic is the increase in use of privately owned automobiles, the total now registered in the District of Columbia being 131,362, or 12.6 per cent more than those registered in 1925.

The rate of fare in effect on the street cars during 1926 was the same as that in effect since the spring of 1922—that is, 8 cents cash or tickets sold at the rate of six for 40 cents. Notwithstanding considerable improvement being effected in 1926 in all the operating departments of the railway, the results for the year show a return of less than 4 per cent on the value of the property within the District of Columbia as determined by the Public Utilities Commission.

In spite of this the policy of liberal expenditures for maintenance and reconstruction of way and structures was continued in 1926. The amount expended for general maintenance of track and roadway, together with allowances for depreciation, was \$904,511. The more important reconstruction projects completed during the year included the rebuilding of 8,175 ft. of underground conduit track and 21,905 ft. of overhead trolley track, at a cost of approximately \$312,156. In the summer of 1926 the company placed in operation fifteen modern up-to-date cars, with automatic rear-exit doors and leather-covered de luxe seats. The amount expended for the cars was \$235,000, or approximately \$15,700 per car. Fifteen new buses were purchased during the year, all of the Yellow Coach type, one with a seating capacity of 21 and the rest with a seating capacity of 29 each, at a total cost of approximately \$125,000. These additional buses acquired now bring the fleet to

### COMPARATIVE STATEMENT OF WASHINGTON RAILWAY & ELECTRIC COMPANY

|  | 1926        | 1925        |
|--|-------------|-------------|
| Gross earnings from operation  | \$5,012,619 | \$4,775,285 |
| Miscellaneous income (including dividends from Potomac Electric Power Company) | 1,149,113   | 1,025,501   |
| Gross income   | \$6,161,733 | \$5,800,786 |
| Operating expenses (including depreciation), taxes and miscellaneous charges   | 4,140,222   | 3,915,959   |
| Interest on funded and unfunded debt   | 688,151     | 730,600     |
| Payment of dividend on 5 per cent preferred stock                              | 425,000     | 425,000     |
| Payment of dividend on common stock (5 per cent)                               | 325,000     | 325,000     |
|  | \$5,578,374 | \$5,396,559 |
| Balance of income for year 1926 credited to profit and loss                    | 583,358     | 404,227     |
| Miscellaneous items credited to profit and loss                                | 189,841     | 240,630     |
| Total credited to profit and loss during the year                              | \$773,200   | \$644,857   |



57 buses, operating over routes with an aggregate mileage of 54.9, representing an investment of \$378,938 and all operating as auxiliaries to the railway lines.

The direct cost of operation of buses since they were started in May, 1922, has been \$175,916 in excess of the receipts, but the results for the year 1926 are somewhat more encouraging, President Ham said, than at any time since the company entered the field of this form of transportation.

There was a slight increase in the number of accidents compared to 1925 due to added congestion on the streets. Seventy-five per cent of the accidents in 1926 were with automobiles. Aside from the constant alertness of the supervising forces and the operators themselves to guard against accidents, quarterly "Safety" meetings are held throughout the year, where the subject of safe operations is discussed at length. These efforts are productive of results, as demonstrated by the fact that the expenditure for settlements of claims in 1926 was a little more than 3 per cent of the total operating revenues. This is not quite so good a showing as in 1925, but when considering the increase in vehicular movements in 1926 it indicates a degree of co-operation on the part of the employees of the operating departments that is worthy of mention and praise.

The total outstanding bonded indebtedness of the Washington Railway & Electric Company and subsidiary companies, including the Potomac Electric Power Company, is now \$25,906,900. This amount, added to the \$15,000,000 capital stock of the parent company, and \$2,002,850 outstanding capital stock of the subsidiary companies,

STATEMENT OF PASSENGERS CARRIED BY WASHINGTON RAILWAY & ELECTRIC COMPANY

|            | Revenue<br>Passengers<br>Carried | Decrease<br>Compared with<br>Previous Year |
|------------|----------------------------------|--|
| 1919 ..... | 91,488,735                       |  |
| 1920 ..... | 87,782,784                       | 3,705,951                                  |
| 1921 ..... | 85,481,656                       | 2,301,128                                  |
| 1922 ..... | 82,716,756                       | 2,764,900                                  |
| 1923 ..... | 81,518,607                       | 1,198,149                                  |
| 1924 ..... | 77,786,675                       | 3,731,932                                  |
| 1925 ..... | 77,505,636                       | 281,039                                    |
| 1926 ..... | 76,797,163                       | 708,473                                    |

makes the total outstanding capitalization at this time \$42,909,750. This excludes bonds purchased for the sinking funds and for temporary investments.

The total payroll for the year 1926 of the Washington Railway & Electric Company and subsidiary companies, including the Potomac Electric Power Company, was \$4,794,140, an increase over that of the previous year of \$135,112.

The number of employees in the service of the entire system is now 2,943, of whom 2,114 are members of the Washington Railway Relief Association.

Valuation Case to Be Appealed by Washington Company

The United States Supreme Court will be asked to pass on the authority of the Court of Appeals in deducting \$5,150,000 from the figures representing the valuation of the properties of the Capital Traction Company, Washington, D. C.

The appellate tribunal was asked on Feb. 17 by Attorney George E. Hamilton and G. Thomas Dunlop to stay its mandate long enough for the company to apply to the highest court for a writ

of review. A request of this sort is usually granted, especially when important questions and large figures are involved.

On Feb. 7 the Appellate Court fixed the value of the company's properties, for rate-making purposes at \$25,756,880, or the sum of \$5,150,000 less than the figure arrived at by the lower court. The sum of \$5,150,000 was added by the lower court as the amount representing the cost of the franchise and good will of the old Washington & Georgetown Railroad in 1895. This road, when merged with the old Rock Creek line, became the present Capital Traction Company.

Refinancing of Dayton & Western Completed

Refinancing of the Dayton & Western Traction Company, handed back to its original owners when there was a dissolution of the merged Ohio Electric System, has just been completed by stockholders. This includes the payment of outstanding obligations through the issuance of \$312,500 in coupon bonds, bearing 5 per cent interest. The Winters National Bank is made trustee. A first mortgage on the property and all equipment, along with a deed of trust, was filed by President Valentine Winters.

International Railway Reports Small Net Income

The yearly income account of the International Railway, Buffalo, N. Y., shows a net income of \$48,610 for 1926, compared with a deficit of \$210,355 for the year 1925. This is the first time in nine years that the company's receipts have exceeded expenses. For nine years no dividends have been paid to stockholders, who, according to President Bernard J. Yungbluth, have contributed in cash during this period for the maintenance of service \$4,140,445. During the same period more than \$5,000,000

Conspectus of Indexes for February, 1927

Compiled for Publication in This Paper by  
ALBERT S. RICHEY  
Electric Railway Engineer, Worcester, Mass.

|  | Latest                | Month Ago             | Year Ago              | Since War              |                       |
|--|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|
|  |                       |                       |                       | High                   | Low                   |
| Street Railway Fares*<br>1913 = 4.84                         | Feb. 1927<br>7.45     | Jan. 1927<br>7.42     | Feb. 1926<br>7.35     | Feb. 1927<br>7.45      | May 1923<br>6.88      |
| Electric Railway Materials*<br>1913 = 100                    | Feb. 1927<br>154.0    | Jan. 1927<br>156.0    | Feb. 1926<br>155.3    | Sept. 1920<br>247.5    | Oct. 1924<br>148.5    |
| Electric Railway Wages*<br>1913 = 100                        | Feb. 1927<br>228.7    | Jan. 1927<br>226.6    | Feb. 1926<br>223.8    | Sept. 1920<br>232      | Mar. 1923<br>206.8    |
| Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100 | Feb. 1927<br>202.9    | Jan. 1927<br>203.5    | Feb. 1926<br>201.9    | July 1920<br>256.4     | May 1922<br>167.4     |
| Eng. News-Record Construction Cost (General) 1913 = 100      | Feb. 1927<br>210.2    | Jan. 1927<br>211.5    | Feb. 1926<br>206.6    | June 1920<br>273.8     | Mar. 1922<br>162.0    |
| U. S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100       | Jan. 1927<br>146.9    | Dec. 1926<br>147.2    | Jan. 1926<br>156.0    | Jan. 1920<br>246.7     | Jan. 1922<br>138.3    |
| Bradstreet Wholesale Commodities 1913 = 9.21                 | Feb. 1927<br>12.52    | Jan. 1927<br>12.82    | Feb. 1926<br>13.72    | Feb. 1920<br>20.87     | June 1921<br>10.62    |
| U. S. Bur. Lab. Stat. Retail Food 1913 = 100                 | Jan. 1927<br>159.3    | Dec. 1926<br>161.8    | Jan. 1926<br>164.3    | July 1920<br>219.2     | Mar. 1922<br>138.7    |
| Nat. Ind. Conf. Bd. Cost of Living 1914 = 100                | Jan. 1927<br>166.9    | Dec. 1926<br>168.4    | Jan. 1926<br>170.4    | Jan. 1920<br>204.5     | Aug. 1922<br>154.5    |
| Steel Unfilled Orders (Million Tons) 1913 = 5.91             | Jan. 31 1927<br>8.800 | Dec. 31 1926<br>3.861 | Jan. 31 1926<br>4.883 | July 31 1920<br>11.118 | July 31 1924<br>3.187 |
| Bank Clearings Outside N. Y. City (Billions)                 | Jan. 1927<br>18.89    | Dec. 1926<br>19.76    | Jan. 1926<br>19.79    | Oct. 1925<br>20.47     | Feb. 1922<br>10.65    |
| Business Failures Number                                     | Jan. 1927<br>2227     | Dec. 1926<br>1979     | Jan. 1926<br>2083     | Jan. 1924<br>2231      | Aug. 1925<br>1353     |
| Liabilities (Millions)                                       | Jan. 1927<br>75.06    | Dec. 1926<br>91.88    | Jan. 1926<br>52.36    | Jan. 1924<br>122.95    | Aug. 1925<br>27.22    |

\*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fares in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 137 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

|                           | INCOME ACCOUNT OF INTERNATIONAL RAILWAY |              |
|---------------------------|---|--------------|
|                           | 1926                                    | 1925         |
| Operating revenue.....    | \$10,650,372                            | \$10,695,695 |
| Operation and taxes.....  | 9,193,277                               | 9,408,102    |
| Operating income.....     | \$1,457,095                             | \$1,287,593  |
| Non-operating income..... | 49,799                                  | 48,094       |
| Gross income.....         | \$1,506,894                             | \$1,335,687  |
| Income deductions.....    | 1,458,284                               | 1,546,042    |
| Net income.....           | \$48,610                                | *\$210,355   |

has been paid to the various municipalities served by the company.

The company is now faced with demands for track and paving reconstruction in each of the municipalities served, totaling in Buffalo alone more than \$2,000,000. This paving is within the tracks and 2 ft. outside, and constitutes 55 per cent of the total width of the street. The railway has contended that this cost is the result of antiquated laws, making the car rider responsible for paving, notwithstanding the fact that street cars are the only vehicles on the streets that do not use the paving.

Applications for higher fares to meet these costs and to provide the legal



return to stockholders are now pending before the Public Service Commission and the federal courts.

The accompanying statement shows the results of 1926 compared with 1925.

### \$2,500,000 of Notes of Baltimore Company Offered

The United Railways & Electric Company, Baltimore, Md., has sold to Alexander Brown & Sons \$2,500,000 of three-year notes of the company. They are to be dated March 1, 1927, due March 1, 1930, and bear 6 per cent interest. They were offered on Feb. 23 to banks and other investors at 99½ and interest to yield about 6.28 per cent. The Safe Deposit & Trust Company of Baltimore is trustee. Proceeds of the sale are to be used to refund company notes which mature on Aug. 1, 1927, and preference in allotments on subscription to the notes now offered will be given to those who agree before the subscription books are closed to make payments for the new notes with the old notes at par and interest.

### Directors Elected at Worcester—New Cars and More Buses

Seven new directors were added to the board and two of the old board resigned at the annual organization meeting of the Worcester Consolidated Street Railway, Worcester, Mass., on Feb. 23, the first meeting since the New York, New Haven & Hartford Railroad resumed ownership of the property. Henry C. Page, general manager, and Leverett Candee, treasurer, resigned as directors. Arthur P. Russell, one of the new directors and a vice-president of the New Haven, was elected vice-president to fill the vacancy caused by the death a few months ago of Col. George Bullock.

The new directors are: John E. White, president of the Worcester Bank & Trust Company and president of the Worcester Chamber of Commerce; Forrest W. Taylor, T. Hovey Gage and Harry W. Goddard, all of Worcester; E. G. Pearson, president of the New Haven; E. G. Buckland, vice-president of the New Haven, and Mr. Russell. The following directors were re-elected: Charles M. Rogerson and W. E. McGregor, Boston; Charles E. Ware, Fitchburg; Clark V. Wood, Springfield; Francis H. Dewey, Worcester.

The officers of the corporation are: President, Clark V. Wood; vice-president, Arthur P. Russell; secretary, William F. Crowe; chairman, Francis H. Dewey.

President Wood, in discussing plans for the future of the road under the management of the New York, New Haven & Hartford Railroad, said recently:

I believe that when the new cars are placed in service the patronage on all the lines will be increased and that the losses noted during 1926 will not be so large this year. We plan to increase the number of buses. This will lessen our operating expenses. Our profits in 1927 should be larger than in 1926.

Mr. Wood stated that plans for new cars were in the hands of officials of the railroad and that bids will be requested

soon. The number of buses also will be increased. Several electric lines will be discontinued in favor of bus service. Mr. Wood said there were several lines in Worcester which could be taken care of by buses. There may also be many changes in schedules to serve the patrons better.

As further evidence that the rehabilitation program is already being followed, Mr. Wood stated that plans are being drawn by the Henry R. Kent Company, Rutherford, N. J., for a new carhouse and for a garage for the buses which the company operates. Many of the cars now being operated will be overhauled and others, in service a long time, will be junked.

### Abandonment of Mesaba Railway Sought

Hearing on a petition for permission to abandon operation of the Mesaba Railway, Virginia, Minn., was set to take place in district federal court at Duluth on Feb. 23, under an order signed by Federal Judge John B. Sanborn and made public on Feb. 14 by James C. Chestnut, a receiver of the railway.

The petition, seeking authority to abandon the operation of the line and to dismantle and dispose of the property, was made by Mr. Chestnut and Oscar Mitchell, receivers. The line has been operating at a loss for a number of years, according to the receivers. If authority is granted, the line will probably be abandoned about April 19. The company operates 40 miles of line.

### Denver & Interurban Railway Sold

The Denver & Interurban Railway, Denver, Col., which operates an electric railway from Denver to nearby northwestern points, was sold on Feb. 17 at auction by the federal court for \$88,850. The road will be dismantled. The sale was at the instigation of the Guaranty Trust Company, New York, which is trustee under the first mortgage bonds for \$1,078,000.

**Increase in Net Income.**—For the seven-month period ending Jan. 31, 1927, the total operating revenues of the Brooklyn-Manhattan Transit System, Brooklyn, N. Y., were \$27,177,699, against \$26,142,270 for the period ending Jan. 31, 1926. Total operating expenses increased from \$17,008,778 to \$17,525,563 in 1927. Following the consideration of income deductions there was a net income of \$3,752,623 for the seven-month period ending Jan. 31, 1927, against \$3,378,057 for the same period of the year previous.

**Loss in Schenectady Larger.**—The Schenectady Railway, Schenectady, N. Y., reports to the New York State Public Service Commission for the quarter ended Dec. 31, 1926, a net loss of \$291,397 after fixed charges, compared with a net loss of \$10,851 in the corresponding period of 1925.

**New Directors Named in St. Louis.**—Two new directors for the United Railways, St. Louis, Mo., were named at the annual meeting of the stockholders

on Feb. 8. Walter W. Smith, vice-president of the First National Bank in St. Louis, and Herman C. Stifel, broker, replaced A. Siegel, who died recently, and A. C. Brown, who declined re-election.

**Net Corporate Income Lower.**—For the six months period ended Dec. 31, 1926, the passenger revenue on the Brooklyn City Railroad, Brooklyn, N. Y., was \$5,677,845, against \$5,688,734 for a similar period the year previous. Operating expenses and taxes increased from \$4,852,726 to \$4,900,749 in 1926. After the consideration of income deductions there was a net corporate income of \$624,466 for the 1926 period, against \$721,516 for the period ended Dec. 31, 1925.

**Would Increase Stock Shares.**—The Indiana Service Corporation, Fort Wayne, Ind., in a petition just filed with the Indiana Public Service Commission, has asked to increase by 30,500 the number of shares of its preferred stock and by 200,000 the common stock shares in order to reimburse the company for betterments and extensions for 1926 and those planned for 1927. The petition states that the present authorized stock is 40,000 shares of preferred with a par value of \$100 and 500,000 shares of common.

**Discontinuance Threatened.**—Employees of the Peterboro Radial Railway, Peterboro, Ont., Canada, have been notified that the service may be discontinued after April 1. The notice from the management, the Hydro-Electric Power Commission, was posted in the power house. It is said that the intimation of the possible abandonment of the system is the result of higher power rates in Central Ontario.

**Lease Extended.**—The Capital Traction Company, Washington, D. C., on Feb. 18 announced it had extended for six months its lease with the Washington-Maryland Railroad on the latter corporation's line from Fourteenth and Kennedy Streets northwest to Takoma Park, Md. Negotiations are pending for purchase of the line by the Capital Traction Company, but there has been disagreement over the terms of transfer. The present lease expired on Feb. 20 and the extension is for the purpose of permitting further negotiations.

**Will Hear Abandonment Plea.**—Hearing on the application of the Lake Shore Electric Railway to abandon its line between Sandusky and Norwalk, Ohio, will be held on March 3, before the Public Utilities Commission of Ohio. The railway points out that there was a decrease in receipts from \$65,045 in 1920 to \$17,616 the first eight months of 1926. During the entire time the expenses have exceeded the gross revenue. The deficit of this division from Jan. 1, 1920, to Aug. 31, 1926, is placed at \$74,618. The company has paid \$30,500 in taxes on this property. It points out that the territory covered by this division is not thickly populated, and that transportation needs will be fully cared for before the establishment of a bus line between Sandusky and Norwalk, as proposed by the Lake Shore Motor Coach Company, a subsidiary organized by the railway.



## Personal Items

### H. R. Whitney in Worcester

Operating Vice-President of Massachusetts Road Enters Upon His New Duties

Howard R. Whitney, recently named operating vice-president of the Worcester Consolidated Street Railway, Worcester, Mass., has begun his duties in that city and already a start has been made on the rehabilitation program planned for that road by the New York, New Haven & Hartford Railroad, which has again come into possession of the line.

Mr. Whitney has been associated with railroading, both steam and electric, for the past twenty years and his various connections have taken him all over the United States. Equipped with a mind that has shown ability to grapple with major problems, he has been called upon to supervise some of the most important transportation questions that have come up for consideration in various places.

Mr. Whitney is essentially an engineer, both by professional training and bent of talent and mind. He rejoices in working out problems that present obstacles. Quiet and unassuming, he studies his problems, finds the solution and then moves to put his ideas into effect. It is these qualities that have led to his consistent advancement in connection with the Springfield and the Worcester railways.

He became affiliated with electric railways in 1914 after he had accumulated a wealth of valuable engineering experience in the transportation field in the West. His first job with the electric railways operating in the cities of Worcester and Springfield was engineer of maintenance of way, and the thoroughness with which he did his work soon attracted the attention of his superiors. It was not long before his engineering responsibilities were increased. The augmented work acted as an incentive to spur him to greater effort and industry, and the reward in the form of an appointment as a special assistant to Clark V. Wood, the president, was the result. In this position, his ability to accomplish things and his talent for solving vexing problems came under official eyes in a more intimate way and he was made a vice-president of the railways.

Mr. Whitney got the railroad fever almost as soon as he had finished his college course in 1905. He was born in Boston, educated in the grammar schools and the English high school of that city and then entered Tufts College. He matriculated in 1905, returned to the college to teach mathematics for a time and then got his first chance in the field of endeavor which was to be his life work.

G. M. Thompson, a consulting engineer of Boston, much impressed with the enthusiasm and industry of young Whitney, employed him on various projects which his firm was handling.

In this way Mr. Whitney had the good fortune to come under counsel and advice that was to stand him in good stead in his future railroading activities. He helped in surveying for a projected electric railway from Fitchburg, Mass., to Boston, Mass., and in working out plans for the elimination of grade crossings on the Boston, Revere Beach & Lynn Railroad and for the four-tracking of the road. Early in his career he virtually built the branch of the Lowell & Fitchburg Street Railway that runs from North Chelmsford to Westford.

The year 1907 found him with the Missouri Pacific engineering force in St. Louis as assistant on the engineering corps, a position which could not have been more humble. But here again his talents were manifest and in



H. R. Whitney

rapid order he passed through the various grades of assistant engineer, resident engineer on construction and acting division engineer. Finally he became acting division engineer of the important central division with headquarters in Van Buren, Ark.

But the East called to Mr. Whitney. His home ties and his boyhood memories were in that part of the country and he returned to New England as resident engineer of the Grand Trunk Railway with headquarters in Woonsocket, R. I. From the Grand Trunk Mr. Whitney went to the Boston & Maine Railroad as assistant engineer and then as resident engineer. Then he ventured into business for himself, becoming actively affiliated with a contracting firm in Nashua, N. H., which handled many big engineering jobs in New England.

His affiliation with the electric railways at Springfield and Worcester followed and he has been connected with them since. He has an attractive personality and has the ability to make employees work with him. The manner in which he has begun his work in Worcester is typical of the man. He has shown a disposition to get at the bottom of things, to scrutinize condi-

tions carefully and be fully informed before going ahead. Once he has gained the knowledge, he desires there is no hesitancy in his decisions or determination. Mr. Whitney was not constrained to talk about his work, but he did consent to go on record to this effect:

The big job of a public transportation company is to furnish adequate and satisfactory transportation, to satisfy the public as far as can reasonably be expected and profit from the good will which is bound to come from a public that knows you are trying to serve it.

### Lachlan Mackinnon Succeeds Mr. Dalrymple

Lachlan Mackinnon, hitherto deputy manager of the Glasgow Corporation Tramways, Glasgow, Scotland, has been made general manager in succession to James Dalrymple, retired. He was selected by the corporation for the post by a vote of 54 to 23, following a recommendation by the tramway committee. No other name was suggested, but the minority, consisting largely of Socialists, contended that the vacancy should be advertised. Bailie Burt, chairman of tramways committee, pointed out that London was the only center in which the city could hope to find a man with tramway experience equal to that of Mr. Mackinnon. All other administrators capable of filling the position were associated with undertakings smaller than that of Glasgow. He was satisfied that Mr. Mackinnon was the best man the corporation could select, for he was admirably qualified by experience, personality and local knowledge to succeed Mr. Dalrymple.

### Changes on Interstate Property

Charles D. Hardin, Seymour, Ind., who has been acting traffic manager for the Interstate Public Service Company, Indianapolis, Ind., since the death of Bert Weedon, several months ago, has been appointed to the position. Mr. Hardin has been connected with the company for a number of years.

L. D. Halstead, Louisville, Ky., has been appointed general agent for the Interstate Public Service Company to succeed C. D. Hardin. He has moved to Seymour, Ind., to take up his new work.

### Harry Bullen of Detroit Resigns

Harry Bullen has resigned as general superintendent of the Detroit United Railway, Detroit, Mich., effective Feb. 1, after being with the company for nearly 40 years. At the time of his resignation he was the oldest officer of the company in point of length of service.

He started work in Detroit in 1888 following construction of the old Citizens' Company lines. His rise included promotions from dispatcher to assistant division superintendent, division superintendent, assistant general superintendent and general superintendent in turn. Since Jan. 1, 1904, he has been general superintendent of all the city and interurban properties of the Detroit United Railway.

Mr. Bullen was born in England in 1864, and when he was six years old



his parents moved to Toronto, Ont. He was associated with Albert Stanley, now Lord Ashfield, head of the London underground system, when Lord Ashfield was connected with the Detroit United Railway and is a close personal friend of the head of the London system.

Mr. Bullen plans to divide his time between California and his cottage and hunting lodge in Michigan.

### Changes in Title in Montreal

Alfred S. Byrd has had his title changed to superintendent, power department, Montreal Tramways, Montreal, Canada. He was previously superintendent of power plants, including the power houses, substations and power distribution.

William M. Bolan, who was assisting Mr. Byrd, but without a title, was appointed assistant superintendent, power department.

### Promotions Announced on Pacific Electric System

Due to the death of W. C. White, late superintendent of the Western division, Pacific Electric Railway, Los Angeles, Cal., and H. C. Ward, trainmaster, Southern division, changes in the staff of the transportation department have been put into effect.

O. P. Davis, superintendent of the Southern division since 1913, has been transferred to the Western division post vacated by the death of Mr. White. Mr. Davis has had long experience as an operating officer.

Edwin Clark, formerly assistant superintendent of the Southern division, has been selected to fill the post vacated by the transfer of Mr. Davis. Mr. Clark began service with the Pacific Electric Railway as a conductor in June, 1903, and successively was promoted and served as switchman, dispatcher, chief dispatcher, carhouse foreman, trainmaster, and assistant superintendent of the Northern, Western and Southern divisions.

S. H. Cox, previously assistant trainmaster, succeeds Mr. Ward as trainmaster, Southern division. Mr. Cox entered the service of the company as passenger conductor in December, 1913, later serving as motorman, freight switching foreman, dispatcher and assistant trainmaster.

S. H. Hand, formerly supervisor, was appointed to succeed Mr. Cox as assistant trainmaster. He entered the service in August, 1912, as a motorman, Southern division, and in 1920 was appointed supervisor, which position he held until his present appointment.

A newly-created position—terminal trainmaster, Southern division—was given to E. B. Whiteside. This position involves jurisdiction over the division's freight service and within the switching limits of the Santa Monica Air Line. Mr. Whiteside entered the service of the Los Angeles & Redondo Railway as timekeeper in August, 1906, serving successfully as assistant agent in Redondo, wharfmaster, assistant trainmaster and trainmaster (freight.)

J. G. Blake was named as the successor of Mr. Whiteside, formerly train-

master, Southern division. Mr. Blake also is a veteran, having entered the service of the company as a motorman in December, 1911, successively having served as freight conductor, terminal foreman and assistant trainmaster, until his present appointment as trainmaster of the division.

The post vacated by Mr. Blake was filled with the appointment of F. O. Bradley as assistant trainmaster. Mr. Bradley entered the employ of the company as car clerk, Los Angeles yards, in April, 1912, which post he filled until September, 1919. He later was employed as freight conductor.

### G. J. Kerwin Chief Adjuster at Grand Rapids

George J. Kerwin has been appointed new chief adjuster Grand Rapids Railway, Grand Rapids, Mich., to succeed the late F. M. Webster. Announcement to this effect is made by L. J. DeLamar, vice-president and general manager. Mr. Kerwin is known in the in-



G. J. Kerwin

dustry as a very capable adjuster. He began his service with the Grand Rapids Railway in June, 1905, in the adjustment department and for many years was assistant to Mr. Webster.

### Changes in Dayton

At the stockholders' meeting of the City Railway, Dayton, Ohio, on Feb. 10 George G. Shaw was elected president, succeeding J. M. Markham. R. K. Landis was elected secretary, replacing W. S. W. Edgar in that capacity.

### D. H. Goodwillie Reappointed to Toledo Board

David H. Goodwillie has been reappointed a member of the Board of Street Railway Control at Toledo. Mr. Goodwillie has just completed a two-year term as chairman of the board. He has served the entire six years since the Milner ordinance became effective. Under the rotation plan adopted by the board Henry C. Truesdell, vice-president of the Toledo Trust Company, has been named chairman and W. W. Knight of the Bostwick-Braun Company becomes secretary.

### W. N. Albertson Heads New Holding Company

Walter N. Albertson, Milwaukee, has been chosen president and general manager of the \$10,000,000 holding company formed in Omaha to operate public utility properties in Iowa, Nebraska, Minnesota, North and South Dakota to be known as the Central West Public Service Company, Inc. Mr. Albertson is president of W. N. Albertson & Company, Milwaukee, public utility engineers and president of the reorganized Central West Public Service Company. He expects to move from Milwaukee to Omaha soon to establish headquarters of the new enterprise there.

George N. Kalweit, formerly general auditor of the Milwaukee Electric Railway & Light Company, who held the post of vice-president and treasurer of the old Central West Public Service Company, will continue in that capacity with the new holding company.

Homer B. Carter, Sioux City, Iowa, has been appointed general counsel; R. C. Hill, Milwaukee, operating engineer; E. T. Sadler, Milwaukee, auditor, and J. F. Bailey, Jamestown, N. D., construction engineer.

### Ezra Brainerd Confirmed as Commerce Commissioner

President Coolidge's nomination of Ezra Brainerd, Jr., of Oklahoma to the Interstate Commerce Commission has been confirmed by the Senate. Mr. Brainerd is a New Englander, the son of the late Ezra Brainerd. He is a lawyer and vice-president of the oldest bank in Oklahoma. He was graduated from Colgate University and the University of Michigan Law School.

P. Leroy Harwood, New London, was recently elected treasurer of the Groton & Stonington Traction Company, Mystic, Conn., following a reorganization of the company. He replaces E. A. Harris.

L. C. Lemon, present assistant general manager of the Tri-City Railway of Iowa and of the Clinton, Davenport & Muscatine Interurban Railway, Davenport, Iowa, has been given the additional duties of assistant general manager of the Tri-City Railway of Illinois. This change was made in connection with the promotions previously announced by the company following the assignment of T. C. Roderrick to the post of general manager of the Ottumwa Gas Company, Ottumwa.

R. M. Vaughan, engineer with the California Railroad Commission for the last twelve years and valuation engineer for the last six years, resigned that position to become associated with the H. M. Byllesby Company of Chicago. Mr. Vaughan completed his electrical engineering course at the University of Missouri in 1903, and since that time has been actively engaged in engineering in Chicago and on the Pacific Coast, having been associated with Bion J. Arnold, Stone & Webster, J. G. White & Company, Puget Sound Power & Light Company and British Columbia Electric Railway.



# 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

## Public Service Orders 212 New Buses

Public Service Transportation Company, Newark, N. J., a subsidiary of Public Service Corporation of New Jersey, has placed orders for 147 buses with the Mack International Motor Truck Corporation and for 65 buses with the American Car & Foundry Motors Company, according to an official announcement made Feb. 24 by John L. O'Toole, vice-president in charge of public relations.

Forty of the Mack buses will be of the gas-mechanical type, 70 of the gas-electric type, with four-cylinder engines and one electric motor, and 37 will have six-cylinder engines and one motor. The electric equipment of the 107 gas-electric buses will be manufactured by the General Electric Company.

The 65 A.C.F. buses will have six-cylinder engines, driven by two electric motors. The electric equipment will be manufactured by the Westinghouse Electric & Manufacturing Company. Bodies for all of the 65 buses are to be constructed by the company in its own shops. They will be equipped with air brakes manufactured by the Westinghouse Traction Brake Company.

The new orders will bring the company's new equipment up to 953, of which 567 will be gas-electric and 386 gas-mechanical type.

## Cincinnati, Hamilton & Dayton Acquires New Carhouse

Involving an expenditure of upward of \$500,000, the Cincinnati, Hamilton & Dayton Railway has purchased the buildings of the Smith Gas & Engineering Company at Morraine City, Ohio, which will be converted into carhouses and modern shops.

Purchase of the plant is part of the

\$1,500,000 program of reconstruction and rehabilitation recently launched by the company. The property, acquired early in February, consists of one large concrete, brick, steel and glass building, 422 ft. x 111 ft., and another structure

160 ft. x 101 ft. They are located on a 7.9-acre lot on the west side of the Springboro Pike.

In connection with the sale, 1.23 acres was purchased from the Morraine Development Company on the east side of the pike in order to provide space for the track layout. In addition to providing for the comfort of workmen and the housing of the supervisors, the new plant will contain a modern shop, all machinery to be operated by electricity. At the new plant also will be located the general offices of the company, which will be removed from the National Bank Building in Dayton.

## Migration Ill-Adjusted to Business Cycles

THE flow of human tide that sweeps into the United States in boom times and out during depressions is not well timed with the fluctuations in employment opportunities, the lag varying from a few months to one year, according to a report entitled "Migration and Business Cycles," just completed by the National Bureau of Economic Research.

The report, prepared by Dr. Harry Jerome, contains the findings of an investigation intended primarily to deal with the shortage and surplus of labor in the United States and it is the first of what is to be a comprehensive series dealing with the general effects of migration upon the economic activities of the nation.

In general contour, the curves showing the fluctuations in male immigration and factory employment in the period from 1890 to the outbreak of the great war bear a marked resemblance, according to Dr. Jerome, who points out, however, that "when the two curves are closely examined to determine the extent to which the major turns in the two curves coincide, it appears that they agree most closely when it is assumed that the fluctuations in immigration lag from two to four months after the corresponding fluctuations in the employment curve."

Regarding the sensitiveness of migration to business conditions, Dr. Jerome observes:

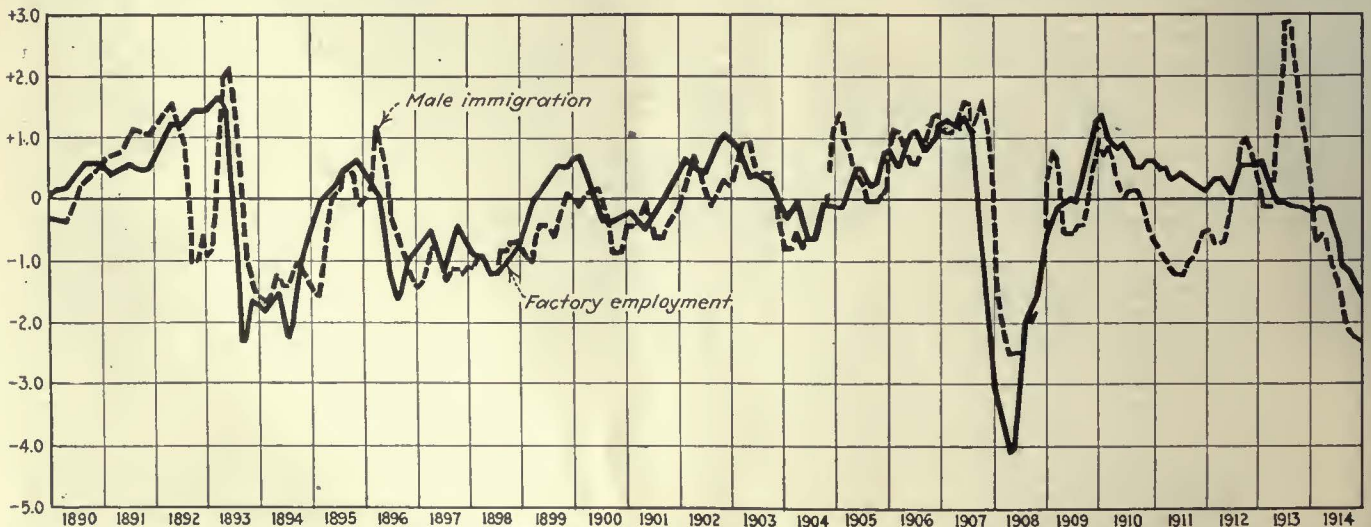
"A comparison of data pertaining to male immigration, pig iron production

and factory employment in the pre-war period reveals the fact that cyclical fluctuations in male immigration are ordinarily associated with prior changes in the same direction in production and employment. The influence of a major cyclical change in industrial conditions is usually apparent in immigration within less than half a year. The cyclical movements in emigration are inversely correlated with those of immigration and employment with large emigration in depression periods and relatively small emigration in boom periods.

"The fluctuations of 'net immigration' exhibit a high degree of sensitiveness to employment conditions in the United States. This is evident when immigration and emigration are jointly considered either in terms of the ratio of emigration to immigration or in terms of the numerical excess of arrivals over departures or of departures over arrivals."

The pre-war period is more significant for the investigator's purposes, because there were at that time, on this side of the Atlantic at least, fewer legal or unusual barriers to the free flow of migration in accordance with the pull of economic motives.

During the war ordinary migratory movements were hindered by the hazards of ocean travel, the restraints placed upon their nationals by the belligerent countries and similar obstacles to the normal movement of migrants.



Curves of Factory Employment and Immigration 1890-1914

Courtesy National Bureau of Economic Research.



"Yet we must not conclude that there were no migratory movements actuated by economic motives in this period," Dr. Jerome warns. "Prior to our entry into the war a considerable fraction of the usual flow continued from neutral countries and even from the allied countries and the number of 'immigrants' recorded from British North America increased, exceeding 100,000 in each of the fiscal years 1915-16 and 1916-17. The numbers from Mexico also increased, particularly if we include those admitted during and immediately following the war period by special provision waiving the literacy test and admitting for temporary conditional sojourn to help meet the demand for labor.

"On the return of transportation to something akin to normal conditions, thousands of foreign-born residents of the United States who had been forced by war conditions to postpone a trip to their former home sailed for Europe. Among these were many returning because of changed political conditions. For example, in the three fiscal years 1920, 1921 and 1922 the emigrant aliens destined to reconstituted Poland numbered more than 90,000, most of them of the Polish race.

"Immigration, likewise, was somewhat slow to recover, not quite reaching the 250,000 mark in 1919 (calendar year). The incoming movement, however, exhibited a growing momentum and reached a total of more than 700,000 in the calendar year 1920, not including non-immigrants and even in 1921, despite industrial depression, did not drop below 50,000 per month until June, 1921, by which time the 3 per centum quota law had gone into effect.

"This law was apparently due, in part at least, to the fear that the volume of immigration in 1920 was but an indication of the growing momentum of a flood of immigrants which had been dammed up by war conditions and which now, spurred by actual or impending economic and political chaos in Europe, threatened to inundate this country with an unprecedented volume of aliens.

#### ECONOMIST'S PROBLEM MORE DIFFICULT

"Whatever the facts may be concerning the probability of the expected inundation, steps were taken in the law of May, 1921, which make the disentanglement of the economic trends in the subsequent period more than usually difficult. Because the quotas began to be available in July, and 20 per cent of the quota of any country could be admitted in a single month, the law has tended to concentrate the arrivals in the second half of the calendar year, thus creating a seasonal movement materially different from that characteristic of the pre-war period and obscuring the effects of industrial prosperity and depression except for those countries which were obviously falling short of the quota or, like Canada and Mexico, were not subject to the law.

"Since 1921 emigration has been consistently low, not only because of the industrial recovery from the depression conditions of 1921-22, but also because of the fact that the restriction of the incoming flow and the fear of those who are here that they may be unable

to return readily if they once leave, combined with the deterring effect of unsettled political conditions and industrial depression in European countries, have kept emigration to a minimum.

#### MOVEMENT FROM CANADA

"The post-war movement of immigration from Canada is of special interest because the 1921 quota law did not apply to natives of Canada or to persons born in other countries who had resided there for five years.

"Leaving out of consideration citizens and non-immigrants and including only the 'immigrant alien' group, the immigration in calendar years from Canada and Newfoundland to the United States is recorded as follows:

| IMMIGRATION FROM CANADA |         |
|-------------------------|---------|
| 1919 .....              | 81,179  |
| 1920 .....              | 85,249  |
| 1921 .....              | 52,929  |
| 1922 .....              | 63,089  |
| 1923 .....              | 182,369 |

"When adjusted for typical seasonal variation, the curve of immigration from Canada exhibits a substantial decline during the greater part of 1921; in fact, through most of 1920 a slight tendency to decline is evidenced in immigration from Canada, though the general movement of immigration from all countries is still on the up-grade, suggesting that the decline in industrial activity in the United States affected immigration from Canada more quickly than from Europe.

"That the wage-earning element in migration is most susceptible to depressions in this country may be illustrated by the fact that in severe depression years the ratio of laborers (farm laborers plus general laborers) to total immigration decreases, while the 'no occupation' group becomes a larger fraction of the total. The fiscal years 1904, 1908, 1911, 1914 and 1922 correspond with industrial depressions, and in each one of these years the 'laborers' group, in terms of percentages of the total, decreases relatively and the 'no occupation' group increases."

#### Canadian Car Company Slated for Montreal Car Order

According to latest reports from Montreal, the order for the 50 new cars required by the Montreal Tramways will be placed with the Canadian Car & Foundry Company in the near future. Definite decision on a few details of construction is the only thing delaying the official issuance of the order.

It is understood the contract will cover 25 motor and 25 trail cars, to be operated as two-car trains. As the approximate cost of the cars is around \$17,000 each, the total amount of the contract will run in the neighborhood of \$850,000. Delivery is scheduled to commence during the fall, which will give the car company the summer months in which to complete construction.

The addition of this order to the business already booked since the beginning of the year gives the Canadian Car Company around \$10,000,000 worth of work with only two months of 1927

having passed. The carry over from last year amounted to \$1,800,000. Taking into account the passenger and freight car orders totaling \$5,000,000, approximately \$1,000,000 for steel castings and specialties to be supplied to other car building plants, the present street car order, at \$850,000, and some small business from the C.P.R. amounting to about \$100,000, the total is \$8,750,000.

Other miscellaneous business, including springs, switch and trackwork, should bring this up to the \$10,000,000 mark, which is in excess of the total business handled in any year since 1924.

#### Worcester Consolidated Uses 500 Tons of Salt

Worcester Consolidated Street Railway recently gave the citizens of Worcester, Mass., an insight into some expenses which it must meet that are not generally known. In response to the inquiry of the city editor of a local newspaper, the company revealed that it expends about \$5,000 a year for salt, which is used in winter to keep switches open. Officials of the road estimate that they use about 500 tons of salt a year at an average cost of \$9.50 a ton.

#### Start Work on Wilkes-Barre Shops March 1

Work on a new quarter of a million dollar car shop for the Wilkes-Barre Railway Company will be started at Wilkes-Barre, Pa., on March 1 by the H. K. Ferguson Company, engineer and builder of Cleveland, which has been awarded the general contract. The car repair shops and machine shops will be completed by the middle of July, according to provisions of the contract.

#### Percy Owen Heads Brake Materials Corporation

The American Brake Shoe & Foundry Company, New York, announces that its new subsidiary company, American Brake Materials Corporation, which will manufacture and sell American "brakebloks," with main offices and factory in Detroit, will be under the presidency of Percy Owen, for years prominently connected with the automotive industry. Other officers are largely leading officials of the American Brake Shoe & Foundry Company.

The manufacture of American "brakebloks" is the result of years of study on the part of the American Brake Shoe & Foundry Company, to find a method whereby the railroad principles of braking may be applied not only to automotive vehicles but also to all industrial uses where long life and the elimination of replacement are essentials.

The problem was to evolve a material which should be so hard as to be practically non-wearing, thus largely eliminating replacement, and yet of a character which would not score brake drums; which would be so effective that it could be placed in segments, rather than in a continuous unit, thus allowing the dissipation of heat as well as the dissipation of destroyed surface



material which would otherwise invalidate the friction surface. The company says of the new product:

After a great deal of research and experimentation, a material was invented which has the hardness of 35 carbon steel, but which will not score brake drums, which is not readily conductive of heat, which acts equally well even when drenched with oil or water, which does not squeal and which is of such durability as to outwear by three or four times all previous friction materials developed.

It will be seen, therefore, that the invention of this material makes possible an entirely new system of automotive braking, which will of course at first be of particular interest to bus and truck manufacturers and manufacturers of passenger cars who wish to equip their vehicles with the ultimate in safety, eliminating at the same time for the car user the necessity for frequent replacements, with resultant loss of vehicle use.

The company is arranging for production at its factory in Detroit to supply some of the largest manufacturers of buses and trucks with American "brakebloks" for utilization in their braking systems.

### B.-M. T. Equipping New Triplex Cars

Work has been begun by the Brooklyn-Manhattan Transit Corporation in its new Coney Island shops on equipment of the first of the 67 new triplex cars ordered about a year ago from the Pressed Steel Car Company and delivered two weeks ago. Mechanics commenced equipping this three-car unit early last week. The single car now undergoing completion is the first triplex unit of the original group purchased by the B.-M. T. Within a week five more of the 67 are expected to reach Brooklyn, and ten days later regular deliveries of two or three a week are expected.

### Rolling Stock

Lorain Street Railroad, Lorain, Ohio, is reported as a possible purchaser of new street cars and other equipment. Engineers and traction experts are now making an investigation to determine the type of cars and kind of equipment which can be used most successfully, according to Martin Ackerman, general manager of the Lake Shore Electric Railway, the parent company.

Stark Electric Railroad, Alliance, Ohio, has purchased three one-man cars from the Boston Elevated Railway, Boston, Mass. One car is in service, while the others are en route. The equipment thus secured will replace three cars borrowed from the Northern Ohio Power Company, when one-man service was adopted for Alliance city service several months ago. The Northern Ohio Power cars are to be returned.

### Track and Line

Worcester Consolidated Street Railway, Worcester, Mass., has filed three petitions for track changes with the city authorities growing out of the city's assent to the act authorizing the New York, New Haven & Hartford Railroad to resume control of the trol-

ley property. The first petition seeks authority to lay a single track through Commercial Street from Foster to Front Street. A second petition asks permission to add a second track on Foster Street from Main to Commercial Streets. A connection for the proposed double-track line on Foster Street with the Summer Street tracks is covered by the third petition recently filed.

Pacific Electric Railway, Los Angeles, Cal., has approved more than \$650,000 worth of roadbed improvement for attention by engineering department forces at various points on the system. The work, for the most part, involves replacement of worn trackage to the amount of approximately 15 miles, with 90 and 128-lb. rail and fittings. In addition, the work of constructing temporary shoofly track is now under way, preparatory to the construction of the Pico Boulevard grade separation on the West Sixteenth Street line at Vineyard Junction.

### Power Houses, Shops and Buildings

Worcester Consolidated Street Railway, Worcester, Mass., has taken the first steps toward the erection of a new carhouse in the parking space which it has used for car storage on Grove Street in that city. Henry R. Kent & Company of New York, engineers, have been engaged to study the possibilities of the site not only from the operating carhouse point of view but from that of the garage facilities as well. If the plans of the company are followed the carhouse will be used for minor repairs and the yard facilities employed for storage. The Market Street carhouse, which is located nearer the center of the city, will then be overhauled and used only for major repairs to cars. The proposed new carehouse will be 200 ft. x 190 ft., of brick construction, and will have a capacity of about 40 cars. There will be a starter's office, a lobby for the men, stock room, repair shop and car washing room.

### Trade Notes

Hill Clutch Machine & Foundry Company, Cleveland, Ohio, recently appointed Charles C. Phelps, 473 Getty Avenue, Paterson, N. J., as sales engineer for the metropolitan New York and northern New Jersey district. The Hill Clutch Machine & Foundry Company manufactures everything for power transmission such as shafting, couplings, bearings, clutches, pulleys, sheaves, belt tighteners, speed transformers, agitators, gears and sprockets. The featured products of the company are the Cleveland type oil-film bearings, Smith type friction clutches, steel arm automatic belt tighteners, forged cast spur gears, industrial type spur gear speed transformers and flexible couplings.

Root Spring Scraper Company, Kalamazoo, Mich., is making life guards for the sixteen cars being built by J. G. Brill, Philadelphia, Pa., for the Honolulu Rapid Transit Company.

### New Advertising Literature

Electric Controller & Manufacturing Company, Cleveland, Ohio, has just published two bulletins, 1037-C and 1042-F. Bulletin 1037-C describes type B limit stops for use with alternating and direct current motors. Bulletin 1042-F describes automatic compensators for 100 to 550-volt a.c. squirrel cage and synchronous motors.

Irving Iron Works Company, Long Island City, N. Y., is issuing a descriptive folder of its subway flooring grills which are applicable to street car steps, etc.

Ohio Brass Company, Mansfield, Ohio, has issued a novel folder directing attention to the co-operation of its engineers in the recent catenary installation on the Chicago, South Shore and South Bend Railroad. The text matter is a reprint of an article "High Current Capacity with Exceptional Flexibility Feature of Catenary" by L. W. Birch, line material engineer of the company, which appeared in the ELECTRIC RAILWAY JOURNAL for Nov. 27, 1926.

Lebanon Steel Foundry, Lebanon, Pa., is mailing out a descriptive folder covering its steel castings for electric furnaces.

Crouse-Hinds Company, Syracuse, N. Y., is issuing bulletins Nos. 220, 2097 and 221 setting forth electric flashing beacons, groundulets and its type B automatic variable timing switches and control cabinets, respectively. Bulletin No. 220 has some interesting diagrammatic sketches illustrating the use of electric flashing beacons as a protection for safety zone platforms in street railway work.

D. B. Flower, manufacturer of electric railway accessories, Philadelphia, Pa., has just issued two booklets describing the application of the Flower new type brush-holder. The design and performance of this new device are adequately presented by pithy text matter and illustrations.

J. G. Brill Company, Philadelphia, Pa., has a new bulletin in the mails describing its 76-E truck with outside hung motors. The bulletin also contains information on such accessories as solid forged side frames, transoms, side bearings, bolster guides, graduated spring systems, etc.

### Metal, Coal and Material Prices

| Metals—New York  |       | Feb. 23, 1927 |
|--|-------|---------------|
| Copper, electrolytic, cents per lb.                          | ..... | 12.746        |
| Copper wire, cents per lb.                                   | ..... | 15.00         |
| Lead, cents per lb.  | ..... | 7.40          |
| Zinc, cents per lb.  | ..... | 7.16          |
| Tin, Straits, cents per lb.                                  | ..... | 69.875        |
| Bituminous coal, f.o.b. Mines                                |       |               |
| Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons | ..... | \$4.625       |
| Somerset mine run, Boston, net tons                          | ..... | 2.00          |
| Pittsburgh mine run, Pittsburgh, net tons                    | ..... | 1.85          |
| Franklin, Ill., screenings, Chicago, net tons                | ..... | 2.175         |
| Central, Ill., screenings, Chicago, net tons                 | ..... | 1.875         |
| Kansas screenings, Kansas City, net tons                     | ..... | 2.425         |
| Materials  |       |               |
| Rubber-covered wire, N. Y., No. 14, per 1,000 ft.            | ..... | \$5.50        |
| Weatherproof wire base, N. Y., cents per lb.                 | ..... | 16.75         |
| Cement, Chicago net prices, without bags                     | ..... | 2.05          |
| Linseed oil (5-bbl. lots), N. Y., cents per lb.              | ..... | 10.80         |
| White lead in oil (100-lb. keg), N. Y., cents per lb.        | ..... | 14.50         |
| Turpentine (bbl. lots), N. Y., per gal.                      | ..... | \$0.69        |



# Canadian Electric Railways continue to specify—

Hamilton Street Railway, Hamilton, Ont., Canada, expects delivery in May, 1927, of 24 single-end, semi-convertible street cars, ordered Nov. 12 from the National Steel Car Corporation, Ltd., also of Hamilton. The units will be of semi-steel construction, steel frames and steel girder plates for the inside side finish being specified, while the outside sheathing below the windows will be of 1/4-in. Plymetl. Seats for 48 passengers will provided, these to be upholstered in genuine Spanish leather. Following are the principal specifications:

- Weights:
  - Car body .....19,000 lb.
  - Trucks .....8,000 lb.
  - Equipment .....7,000 lb.
  - Total .....34,000 lb.
- Bolster centers, length .....18 ft. 2 in.
- Length over all .....40 ft. 11 in.
- Truck wheelbase .....5 ft. 4 in.
- Width over all .....8 ft. 3 1/4 in.
- Height, rail to trolley base .....10 ft. 9 3/4 in.
- Body .....Semi-steel
- Interior trim .....Cherry
- Headlining .....Haskclite
- Roof .....Arch
- Air brakes .....Westinghouse
- Axles .....4-in. steel
- Bumpers .....Anti-climber
- Car signal system .....Consolidated Car Heating Co.
- Center and side bearings .....Perry-Hartman ball bearings
- Compressors .....Westinghouse
- Control .....K-35
- Couplers .....Emergency
- Destination signs .....Hunter
- Door-operating mechanism .....National Pneumatic Co.
- Fare boxes .....Cleveland
- Fenders .....H-B life guard
- Gears and pinions .....Helical
- Hand brakes .....Peacock Staffless
- Heater equipment .....Consolidated Car Heating Co.
- Headlights .....Golden Glow
- Journal bearings .....Friction
- Journal boxes .....MCB
- Lightning arresters .....Westinghouse
- Motors .....510-A-2 Westinghouse Interpole, inside hung
- Paint .....Duco
- Sanders .....O. W. Melsner's
- Sash fixtures .....O. M. Edwards
- Seals .....Ottawa Car Company
- Seating material .....Spanish leather
- Slack adjuster .....Westinghouse
- Springs .....Coll and elliptic
- Step treads .....Irving Subway
- Trolley catcher .....Ohio Brass
- Trolley base .....U. S. No. 13
- Trucks .....National Steel Car
- Ventilators .....Nichols-Lintern
- Wheels .....20-in. rolled steel
- Special devices, etc. .... Westinghouse treadle step, automatic air control

## “Peacock” Staffless Brakes!

REG. U. S. PAT. OFF.

No matter where new cars are ordered, invariably “Peacock” Staffless Brakes are included in the specifications. Many of the Canadian electric railway cars are thus equipped, and the Dominion’s railways are specifying them on nearly all their modern cars.

The latest Canadian property to specify “Peacock” Staffless Brakes is the Hamilton Street Railway of Hamilton, Ontario.

They are specified on nearly all modern cars because they occupy little platform space, they have three times the braking capacity of ordinary hand-brakes, almost unlimited chain-winding capacity (144 inches if necessary), low installation and maintenance cost and are simple to operate.

May we furnish you with performance facts and figures?



The  
“Peacock”  
Staffless

**National Brake Company, Inc.**  
890 Ellicott Square Buffalo, N. Y.

Canadian Representative:  
Lyman Tube & Supply Co., Ltd., Montreal, Can.



## YOU NEVER KNOW HOW HOT TIRES GET

Did you ever see an inner tube taken out of a tire after a few thousand miles of running?

Notice how the shape of the rim, the edges of the flap and every other depression or ridge was molded right into the surface of the tube?

That's from the heat. Heat caused not so much by the road as by the friction or constant rubbing of the plies of tire and tube, as the sidewalls bend under the weight of the car.

Most tubes are over-cured from such service. They soon become brittle, so they split, wear thru and puncture.

And this heating and over-curing goes on even faster with balloon tires because the sidewalls bend more under lower pressures.

The India True-Blue (HEAT-PROOF) Inner Tube is the first to overcome this condition. For three years in laboratory aging tests and in actual service, this True-Blue tube has proven it can stand the heat and aging without losing its ability to stretch and wear and hold.

Stop at the India dealer's store. See and feel of an India True-Blue (HEAT-PROOF) Inner Tube.

You will be impressed with its quality. You will understand why it makes any tire give better mileage.

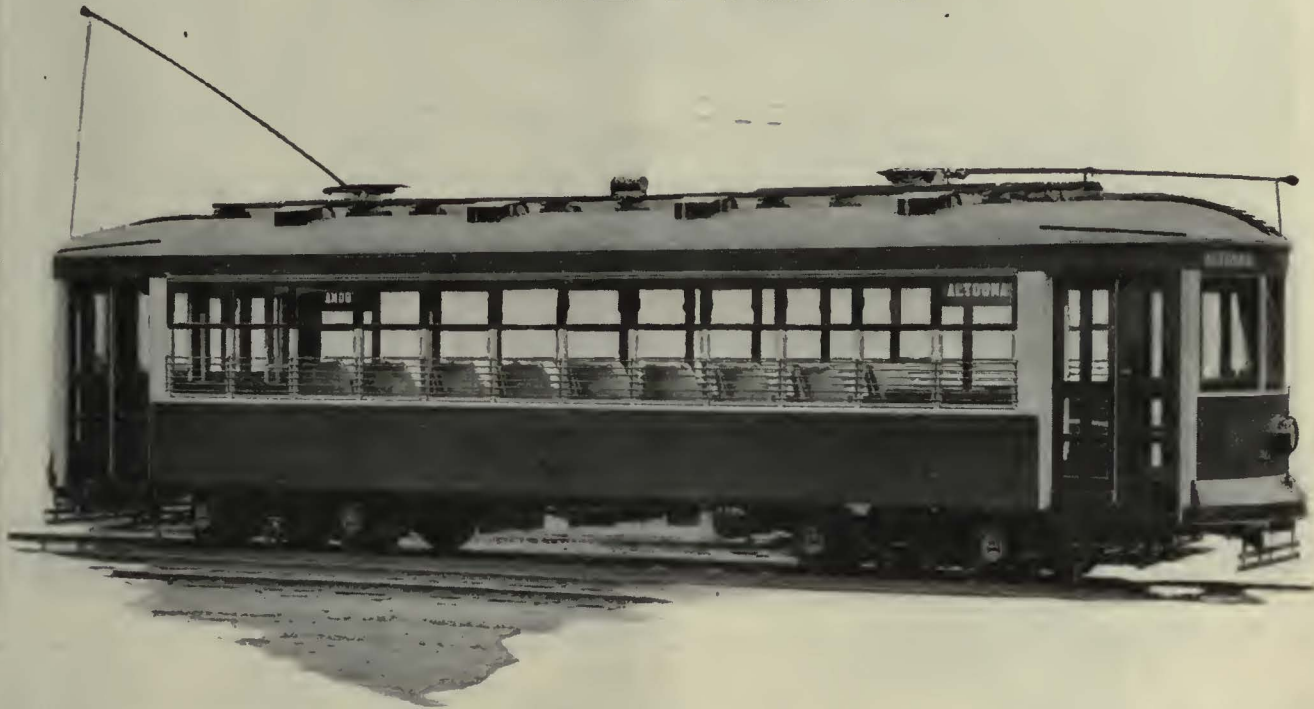


**INDIA**  
TRUE BLUE  
**HEAT PROOF**  
INNER TUBE





# "STANDARD" STEEL PARTS



## Maintenance That Starts With Purchase

**M**AINTENANCE of cars is not merely a matter of inspection, replacement, shopping and repair. Farsighted maintenance must start with purchase—in the selection of equipment which will cause the least concern, call for the least attention and entail the least expense thereafter. To specify "Standard" Steel Axles, Armature Shafts, Wheels and Springs is to simplify your maintenance problems.



# STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES:

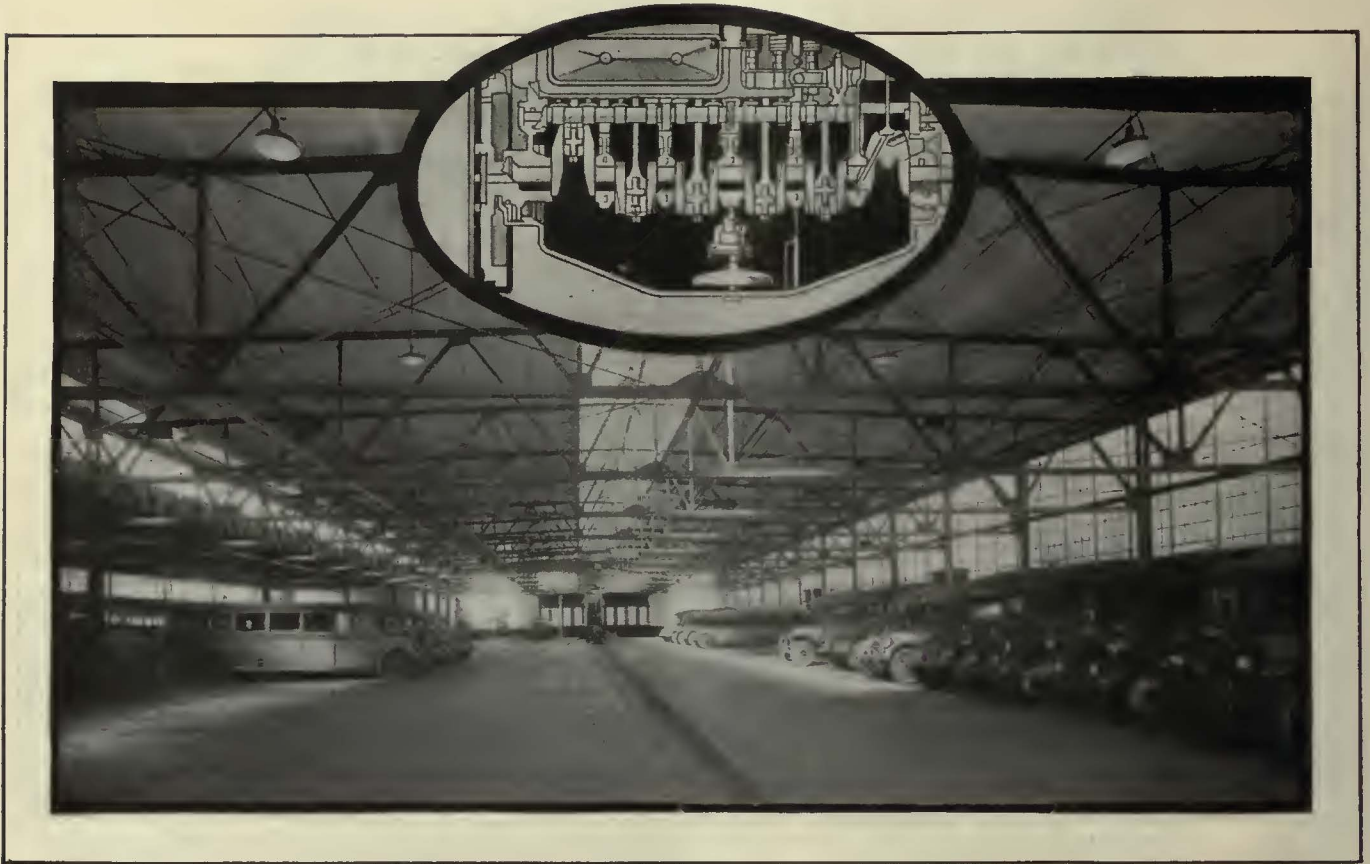
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## *Their lubrication need not be wasteful!*

The first step to increased dividends without fare raising is the elimination of waste in operating practices. It's the same with electric cars or buses.

In the case of buses, the De Laval Crankcase Oil Reclaiming Outfit justifies its installation by savings many times in excess of its cost. Savings not only of oil, but of increased bearing life, and reduced labor hours because of fewer inspections or overhaul periods.

Because of the comparatively low cost of reclamation oil can be changed more frequently—before it becomes an abrasive rather than a lubricant. More hours on the road and fewer in the re-

pair shop is the natural result. That's what really increases dividends.

The reclaimed oil is clean as a hound's tooth. Ready to be put back into the same crankcase from which it was drained—without *any* new oil as make up—cleansed of the solid and liquid contamination that destroyed its value as a lubricant.

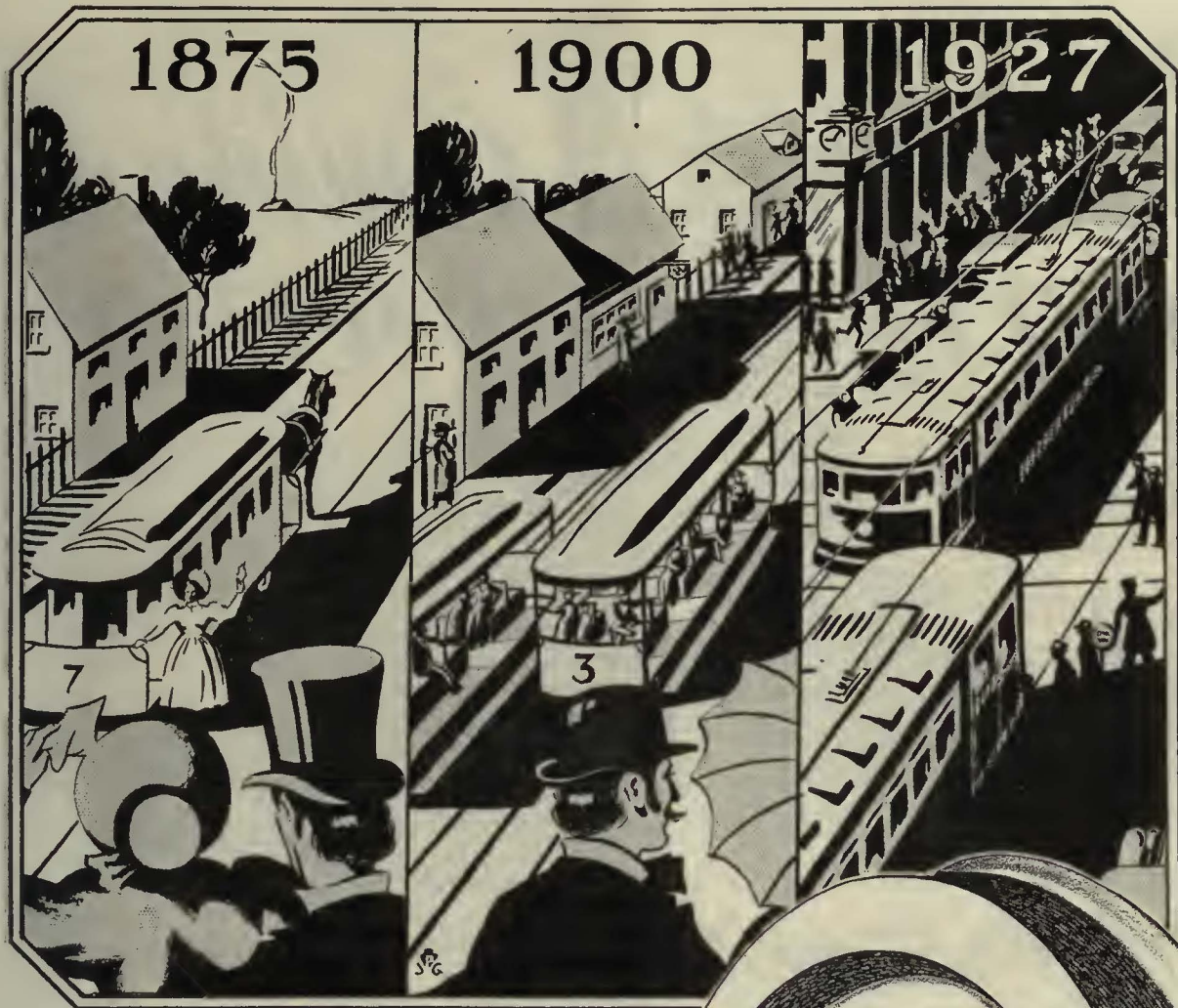
In writing for further information be sure to ask for Bulletin 108-R. If you operate electric cars ask about a combination outfit to reclaim car axle oil also.

THE DE LAVAL SEPARATOR COMPANY  
165 Broadway, New York 600 Jackson Blvd., Chicago  
DE LAVAL PACIFIC COMPANY, San Francisco  
ALFA-LAVAL CO., Ltd., 34 Grosvenor Road, London, S.W. 1

# DE LAVAL

*Crankcase Oil Reclaiming Outfit  
Car Axle Oil Reclaiming Equipment-Transformer Oil Purifiers*





*Growing . . . Growing . . .  
Growing*

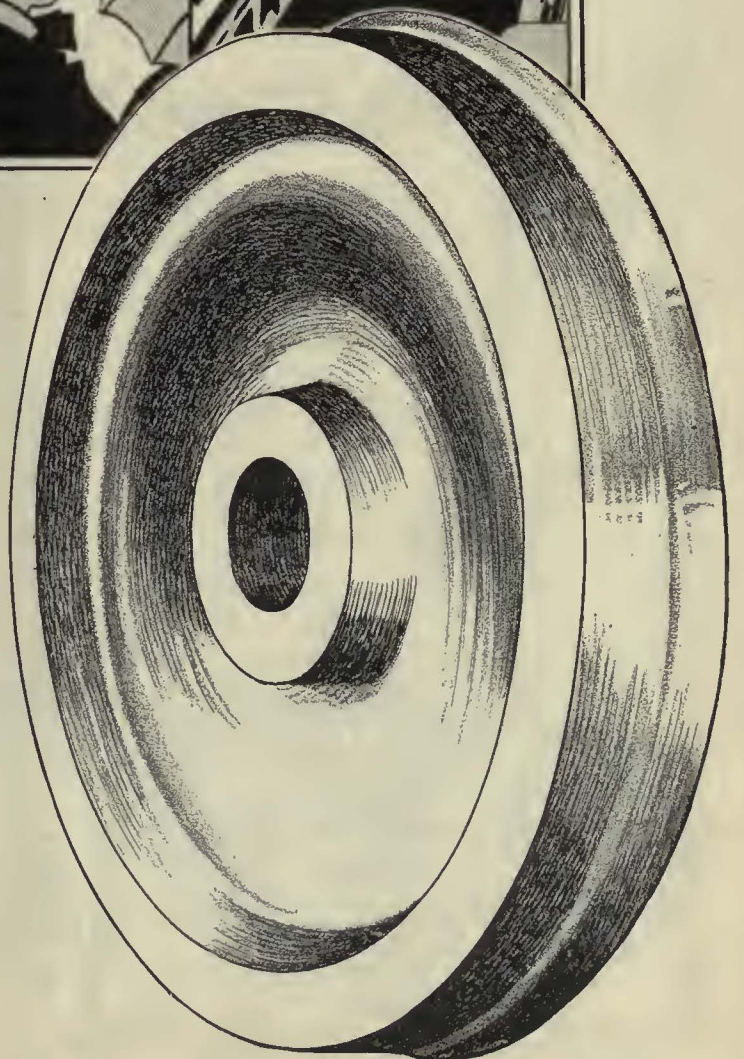
Year by year metropolitan population grows larger, more active, more congested. . . . Year by year, as a result, greater and still greater demands, are made upon transportation.

How the electric railway industry has met these demands is best indicated by the rapid evolution from the horse car and cable car era to the era of the big comfortable cars of today.

While it is the coach of the electric car that carries the passengers, it is the *wheels* that carry the coach, . . . Gary Wrought Steel Wheels are especially designed to meet the strenuous demands of present day traffic conditions.

**Illinois Steel Company**

General Offices:  
208 South La Salle Street  
Chicago, Illinois



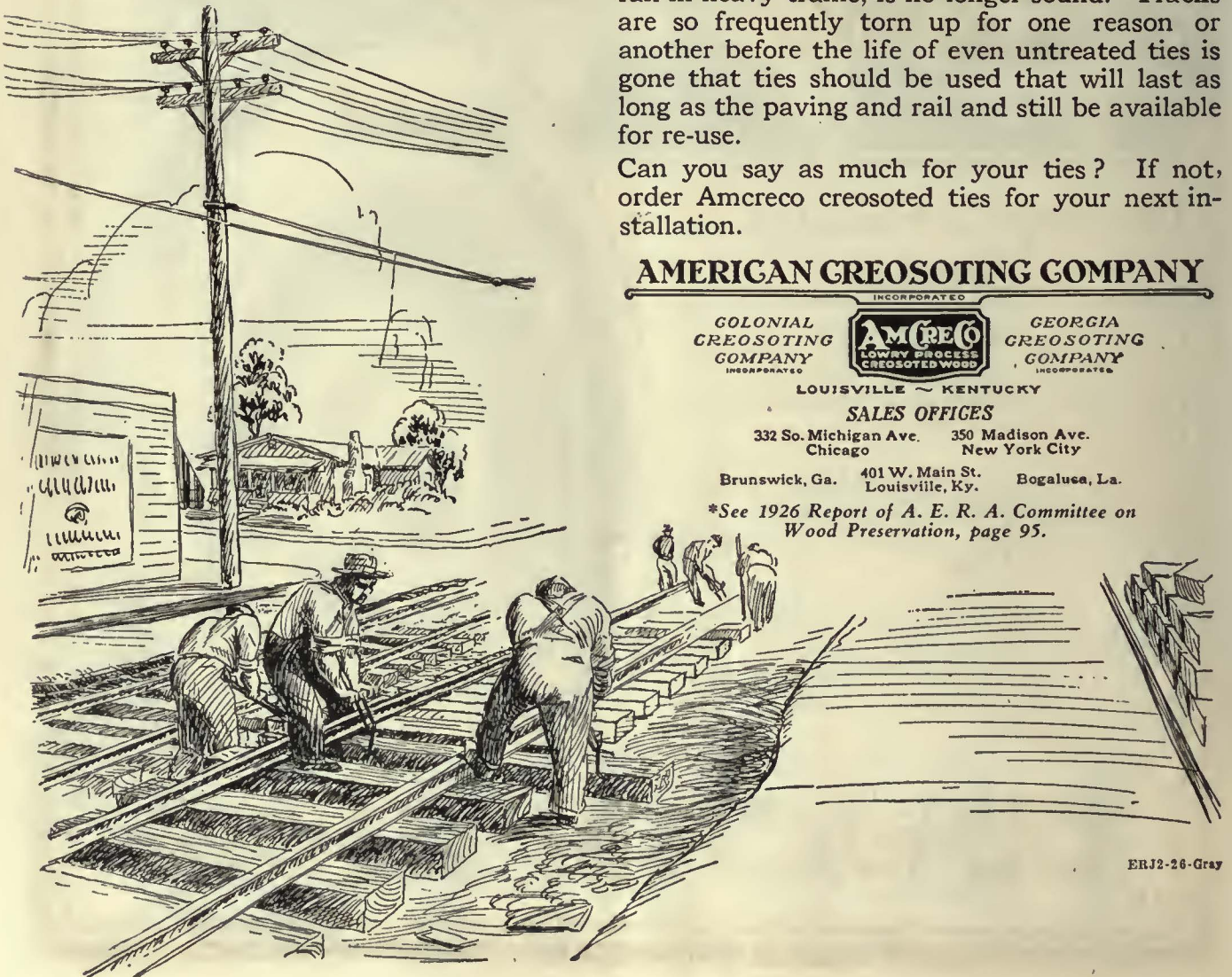


# Ties in perfect condition after 14 years of service..

IN WIDENING paved streets in New Orleans recently, street railway tracks were torn up which had been built with creosoted pine ties 14 years ago. These ties treated with 12 lbs. of oil per cubic foot were removed from concrete pavement and found in perfect condition. They were stored for future use. In all new construction, pine ties with a 6 lb. open cell treatment were used.\*

Modern methods of roadway construction demand treated ties. The old policy that ties need not last longer than the paving, or the life of the rail in heavy traffic, is no longer sound. Tracks are so frequently torn up for one reason or another before the life of even untreated ties is gone that ties should be used that will last as long as the paving and rail and still be available for re-use.

Can you say as much for your ties? If not, order Amcreco creosoted ties for your next installation.



## AMERICAN CREOSOTING COMPANY

INCORPORATED  
COLONIAL  
CREOSOTING  
COMPANY  
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INCORPORATED  
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### SALES OFFICES

332 So. Michigan Ave. Chicago  
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\*See 1926 Report of A. E. R. A. Committee on Wood Preservation, page 95.



# TONCAN For Permanence



*at a reasonable cost*

Following are the makers  
of Toncan Culverts.  
Write the nearest one:

- The Berger Manufacturing Co.  
Roanoke, Virginia
- Tri-State Culvert Manufacturing Co  
Memphis, Tenn.
- The Canton Culvert & Silo Co.  
Canton, Ohio
- The Firman L. Carswell Mfg. Co.  
Kansas City, Kan.
- The Berger Manufacturing Co.  
Minneapolis, Minn.
- The Berger Manufacturing Co., of Mass.  
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Jacksonville, Florida
- The Pedlar People, Limited  
Oshawa, Ontario, Canada

**T**HE mechanical advantages of the corrugated type of culvert are thoroughly established.

Safety in shipment; ease of handling; a saving of 75% in installation costs; and strength to meet the most severe requirements have been proven by thousands of installations.

Corrosion is the corrugated culvert's worst enemy and now that too is checked by making the culverts of Toncan Iron. To iron that has been thoroughly refined are added copper and molybdenum. These two elements alloy with the iron and impart a corrosion resistance that has never been reached before.

Thus Toncan Iron is particularly fitted for the permanence which is so necessary in culverts. Yet Toncan costs no more.

CENTRAL ALLOY STEEL CORPORATION, Massillon, OHIO

Makers of Agathon Alloy Steels

- |           |            |               |             |           |
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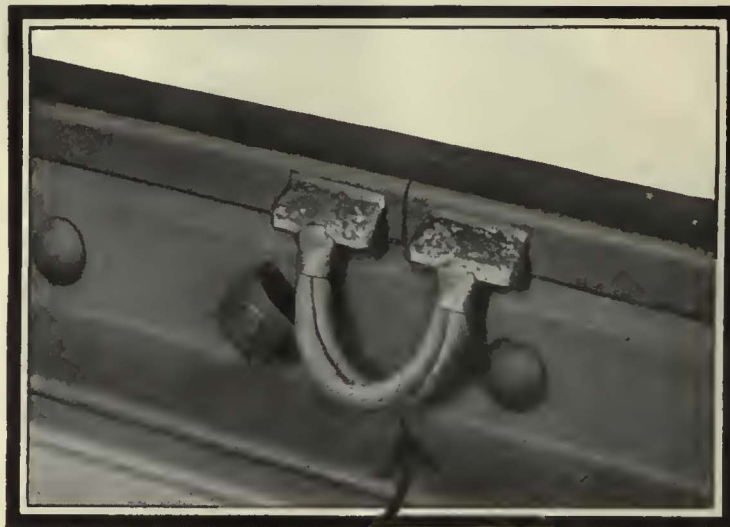
# TONCAN IRON



# American Steel & Wire Company's

## ARCON RAIL BONDS

Trade Mark Registered



PATENTED

Arcon "A" Bond in detail and installed

A NEW principle of design is embodied in Arcon Rail Bonds. *This is the open terminal.*

The open terminal has many distinct advantages. All terminals provide for *easy* arc manipulation. The end of the copper conductor is approximately one-eighth of an inch from the rail, and located in an open space which insures per-

fect welding of the copper wires. The sloping surface of the terminal after welding is a novel and important feature in arcweld bonds.

Be convinced by a practical demonstration which we will gladly give you at your convenience.

Prices and literature mailed upon request.

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| MINNEAPOLIS - ST. PAUL . . . . . Merchants Nat'l Bk. Bldg., St. Paul | MEMPHIS . . . . . Union and Plasters Bank Bldg. | ATLANTA . . . . . 101 Marietta Street |                                       |  |

UNITED STATES STEEL PRODUCTS COMPANY, San Francisco, Los Angeles, Portland, Seattle



# RELIABLE

**A** LINE is no more reliable than its poles. For power and service lines, where reliability is paramount, use Creosoted Yellow Pine Poles for they are strongest longest. Past performances during terrific storms prove the superiority of Creosoted Pine. A large company operating through the storm area showed only 0.3% of Creosoted Pine Poles broken while more than 9.0% of the Poles of other species were destroyed. Creosoted Pine's excellent showing is due to its 44% greater strength over the nearest other pole species and to its permanent strength. There is no decay. Nor is there that gradual decrease in strength immediately after setting, which makes untreated poles easy prey for wind and ice storms.

*International* poles are quality poles. They have been time tested by more than 28 years of service with less than 1% of renewals; and they are in use from coast to coast.

*Illustration shows International Creosoted Pine Poles near North Platte, Nebr.*

**International Creosoting & Construction Co.**

Texarkana Beaumont Galveston

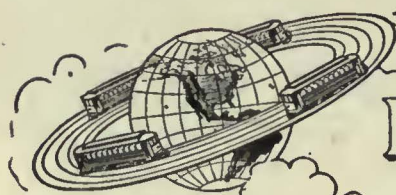


**International  
Creosoted Yellow Pine Poles**



An increasingly large portion of the actual income derived from car card advertising service must be devoted to building and maintaining the prestige of car card advertising in the face of the active competition of all other media.

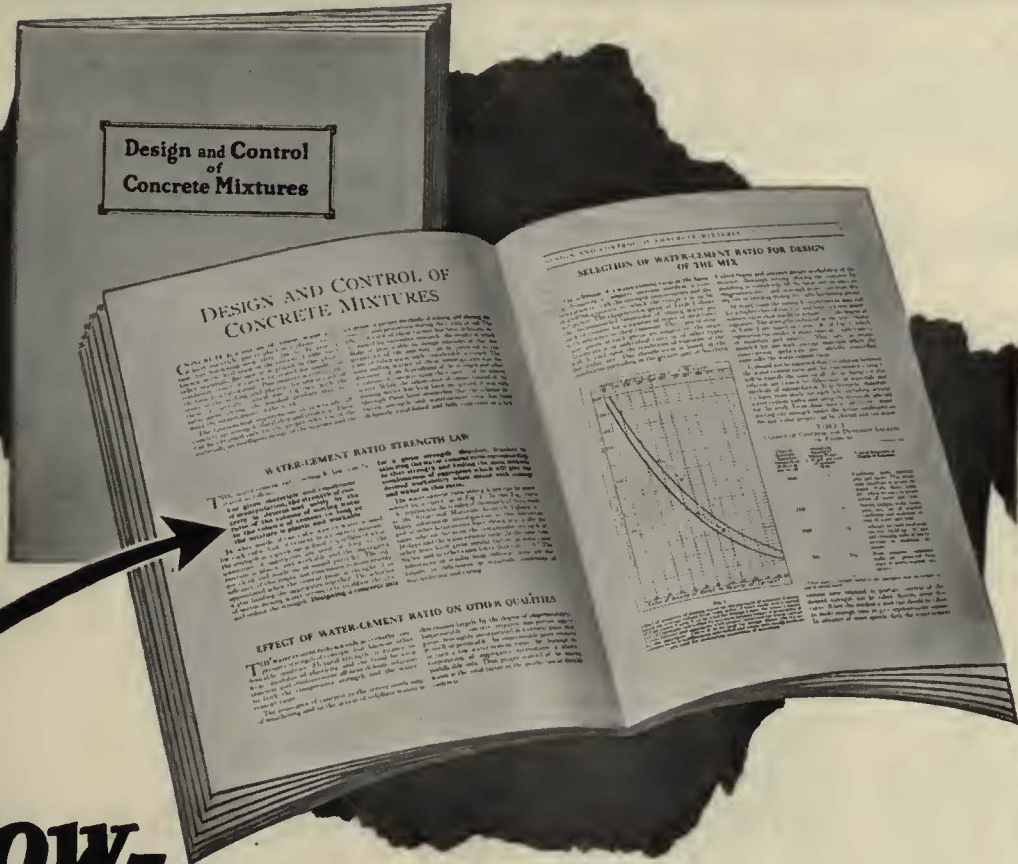
Creating and protecting our mutual interest is a costly item.



**Barron G. Collier**

INCORPORATED  
CANDLER BLDG. NEW YORK





**Now-  
Predetermined Strength and Quality !**

“ For given materials and conditions of manipulation, the strength of concrete is determined solely by the ratio of the volume of mixing water to the volume of cement so long as the mixture is plastic and workable. ”

The application of the Water-Cement Ratio Strength Law, as quoted from the newly published booklet, "Design and Control of Concrete Mixtures," makes possible the production of concrete of *predetermined* strength and quality.

This book emphasizes the importance of Water-Cement Ratio on the other qualities of concrete—such as water tightness and durability. A considerable section is devoted to selection of

materials, estimation of quantities, importance of curing, and control of concrete in the field.

It is difficult to overestimate the importance of these subjects to all who employ concrete in building. They are thoroughly explained and discussed in the new booklet which is a practical aid to designer and builder. A free copy of "Design and Control of Concrete Mixtures" will be sent to you upon request.

**PORTLAND CEMENT Association**  
*Concrete for Permanence*  
 CHICAGO



# "WELD PLATES"

## For EFFICIENT, ECONOMICAL JOINTS

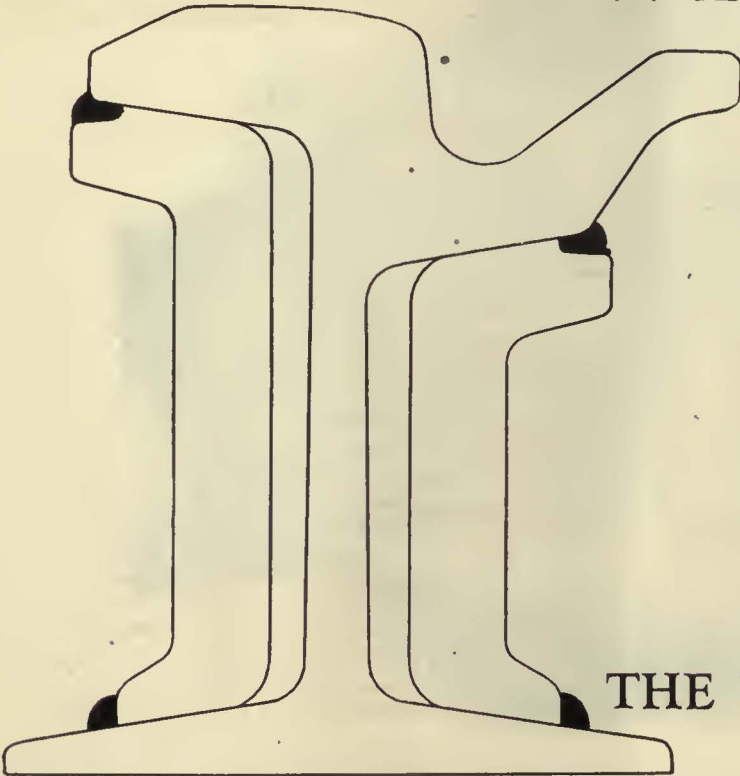
Do you believe in statistics? Rely on performance records? If so the performance records of the many "Weld Plates" now in use will convince you that they lead the bar-weld joints in efficiency and economy.

"Weld Plates" represent the most modern welding practice. They are the strongest and most up-to-date plates rolled especially for electric welded joints. Note the shape—the grooves for retaining plenty of weld metal along the upper edges—the wide contact areas at top and bottom—the suitability for the use of short bolts.

A trial will convince you of their efficiency and economy.

### THE RAIL JOINT COMPANY

165 Broadway, New York



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WE MANUFACTURE various types of trolley equipment. The quality of metal, conductivity, resistance to friction, effect on overhead, shape and size of wheel groove, have all been carefully worked out and perfected. In addition to the highly specialized V-K Oilless Trolley Wheels and Harps, More-Jones make the most complete line of lubricated trolley wheels and harps to meet all requirements. Let us quote you.

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## Griffin Wheel Company

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## Griffin Wheels

with  
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and

## Chilled Back of Flanges For Street and Interurban Railways

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# Shuler Front Axles



For: Motor Busses

## No Compromise With Safety

In Manufacturing the FRONT AXLE—which takes all the bumps, ruts and irregularities of the road “Head-on”—there can be no compromise with safety.

This is a paramount thought in the selection of your FRONT AXLE for the Motor Bus.

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Member of Motor Truck Industries, Inc. of America

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## Standard Helical Gears



The contact between a gear tooth and a pinion tooth is a combination of sliding and rolling, and the sliding contact is the cause of wear.

In Nuttall Helical Gears this sliding contact is at least 50% less than in spur gears, so the wear is materially reduced, and is uniformly distributed over the entire contact surface. As a consequence the teeth retain their correct involute form until worn to a sharp edge.

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Do you want to see actual operating cost data to prove this?

Write for our  
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District Offices are Sales Representatives  
in the United States for the Nuttall Electric  
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# Nuttall



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Builders since 1868 of  
Water Tube Boilers  
of continuing reliability

Makers of Steam Superheaters  
since 1898 and of Chain Grate  
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CHICAGO, Marquette Building  
CINCINNATI, Tracton Building  
ATLANTA, Candler Building  
PHOENIX, ARIZ., Heard Building  
DALLAS, TEX., 2001 Magnolia Building  
HONOLULU, H. T., Castle & Cooke Building  
PORTLAND, ORE., 805 Gasco Building

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NEW ORLEANS, 344 Camp Street  
HOUSTON, TEXAS, 1011-13 Electric Building  
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Barberton, Ohio

## A. B. COLE

*Commercial Consultant*

Merchandising and Co-ordination  
of Transportation

500 Shelbourne Ave., Wilkesburg, Pa. (Pittsburgh)

Our advertisement in the issue of February 19 showed how

## HASKELITE and PLYMETL

cut the dead load and increase the factor of safety in reconditioned cars. Haskelite has been specified on two recent orders for repair work for Dayton & Western Tracton Co., Dayton, Ohio.

*Another ad will appear next week.*

HASKELITE MANUFACTURING CORPORATION  
133 W. Washington St., Chicago, Ill.

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50 Church St.      Street Railway Inspection      131 State St.  
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OXYGEN  
ACETYLENE



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Branches:      New York      Pittsburgh      Toledo

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



## Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

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Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

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# "IRVINGTON"

Black and Yellow  
Varnished Silk, Varnished Cambric, Varnished Paper

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Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.  
Irvington, N. J.

*Sales Representatives in the Principal Cities*





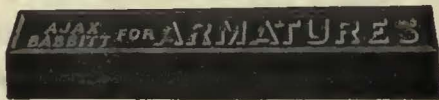
**Cold Dinners**  
for *your* passengers?

Not if you use

**AJAX**

**BABBITT for ARMATURES**

*keeps the rolling stock rolling*



**The Ajax Metal Company**

Established 1880

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Seat and Curtain Materials

*There is no substitute for Pantasote*

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Roofing—Headlining—Wainscoting

*The only homogeneous panel board*

*standard*  
*for electric railway cars*  
*and motor buses*



The **PANTASOTE COMPANY** Inc.  
At 46th 250 Park Avenue Street  
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People's Gas Bldg., Chicago, Ill.

*Where performance counts*

use

**Le Carbone Carbon Brushes**

*They talk for themselves*

**W. J. Jeandron**

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Fifteenth Street, Hoboken, N. J.

Pittsburgh Office: 634 Wabash Bldg.

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San Francisco Office: 525 Market Street

Canadian Distributors: Lyman Tube & Supply Co., Ltd.  
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## Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



**THE STAR BRASS WORKS**

KALAMAZOO, MICH., U. S. A.

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*Standard on*  
*60 Railways for*

- Track Maintenance
- Track Construction
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- Coal Hauling
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*Use These Labor Savers*

- Differential Crane Car
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- Differential Car Wheel Truck and Tractor

**THE DIFFERENTIAL STEEL CAR CO., Findlay, O.**



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"Searchlight" advertisements will get you in touch with the important men of these important fields.

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### POSITIONS WANTED

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SUPERINTENDENT of rolling stock, 24 years' experience, open for position. PW-960, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT of transportation available, broad experience and fine record of achievements on large properties in East and Central West. Recognized as operating official of exceptional ability, successful in public relations, rehabilitation of properties, skilled in handling labor; capable taking over any property and getting results under any condition. High-class references. Correspondence invited and treated confidential. Willing to locate anywhere. PW-949, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

UTILITIES executive available. Engineering graduate, broad operating and executive experience, railway, also light and power. Young and progressive with tried and proven ability. Railway activities known to the industry. At present employed; seek opportunity with larger interests. The opportunity for past successful methods to produce relatively greater results. PW-972, Electric Railway Journal, Tenth Ave. at 36th St., New York.

### WANTED

### MOTORS

Several 201D, in good condition.  
W-973, Electric Railway Journal  
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### SPECIAL

4 Standard BRILL single truck  
BIRNEY CARS  
equipped with Westinghouse 508 Motors,  
DH 16 Air Compressors and all safety devices  
\$1750.00 each  
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15 BIRNEY SAFETY CARS  
Brill Built  
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Cars Complete—Low Price—Fine Condition  
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In First-Class Condition  
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Inspection Invited

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BIRNEY CARS  
4—32 seating capacity, Westinghouse 508A motors. Fully equipped. Splendid condition.

SOUTHERN CARS  
5—Double Truck, 42 passenger. One man operation.

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1—Double Truck Snow Sweeper. Fully equipped.

TOWER TRUCK  
1—2½-3 ton White Tower Truck, McCordle three section tower, electric starter and lights. Fully equipped. New 1923.

H. E. SALZBERG CO, Inc.  
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### FOR SALE

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12 with WH-S Westinghouse and General Electric 264 Motors, DH-16 Compressors, K-63 Controllers, each.....\$1350.00

5 with General Electric 258 Motors, DH-16 Compressors, each.. \$1000.00

TRANSIT EQUIPMENT CO.  
501 Fifth Ave., New York City

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25—GE-57,  
3 turn,  
Railway Motors  
Inspection Invited

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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**Air Brakes**  
Westinghouse Air Brake Co.

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

**Appraisals**  
American Appraisal Co.

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Columbia Machine Works  
Elec. Service Supplies Co.

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Ramapo Ajax Corp.

**Automatic Safety Switch Stands**  
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Bethlehem Steel Co.  
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Illinois Steel Co.  
St. Louis Car Co.  
Standard Steel Works  
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Shuler Axle Co.

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Stuckl Co., A.

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General Electric Co.  
Ohio Brass Co.  
Railway Trackwork Co.  
Una Welding & Bonding Co.

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Braces, Trench  
Duff Mfg. Co.

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Differential Steel Car Co.  
St. Louis Car Co.

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General Electric Co.  
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Brill Co., The J. G.  
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American Car Co.  
Brill Co., The J. G.  
Cincinnati Car Co.  
Kuhlman Car Co., G. C.  
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Electric Equipment Co.

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Standard Steel Works

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Archbold-Brady Co.

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Pantasote Co., Inc.

**Ceilings, Plywood, Panels**  
Haskelite Mfg. Corp.

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General Electric Co.  
Hubbard & Co.  
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Ohio Brass Co.  
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Elec. Service Supplies Co.  
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St. Louis Car Co.  
Samson Cordage Works

**Cord Connectors and Couplers**  
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Samson Cordage Works  
Wood Co., Chas. N.

**Couplers, Car**  
American Steel Foundries  
Brill Co., The J. G.  
Cincinnati Car Co.  
Ohio Brass Co.  
St. Louis Car Co.  
Westinghouse Traction Brake Co.

**Cranes, Hoists & Lifts**  
Electric Service Supplies Co.

**Cross Arms (See Brackets)**

**Crossing Foundations**  
International Steel Tie Co.

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

**Crossings, Frogs & Switches**  
Ramapo Ajax Corp.  
Wm. Wharton, Jr. & Co.

**Crossings, Manganese**  
Bethlehem Steel Co.  
Ramapo Ajax Corp.  
Wm. Wharton, Jr. & Co.

**Crossings, Track (See Track Special Work)**

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

**Culverts**  
Central Alloy Steel Corp.

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Van Loan Corp., Irving S.

**Derailing Devices (See also Track Work)**

**Derailing Switches**  
Ramapo Ajax Corp.

**Destination Signs**  
Columbia Machine Works & M. I. Co.

**Elec. Service Supplies Co.**

**Defective Service**  
Wish-Service, P. Edward

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Cincinnati Car Co.

**General Electric Co.**

**Hale-Kilburn Co.**  
St. Louis Car Co.

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Safety Car Devices Co.

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John A. Roebling's Sons Co.

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Una Welding & Bonding Co.

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Railway Trackwork Co.  
Una Welding & Bonding Co.

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Bibbins, J. Rowland  
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Cole, A. B.  
Day & Zimmermann, Inc.  
Ford, Bacon & Davis  
Hemphill & Wells  
Holst, Engelhardt W.  
Jackson, Walter  
Kelker & DeLeuw  
Kelly-Cooke Co.  
Linn & Marshall Co.  
McClellan & Junkersfeld  
Richey, Albert S.  
Sanderson & Porter  
Stevens & Wood  
Stone & Webster  
White Eng. Corp., The J. G.

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

**Exterior Side Panels**  
Haskelite Mfg. Corp.

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Cleveland Fare Box Co.  
Percy Mfg. Co.

**Fare Registers**  
Electric Service Supplies Co.  
Ohmer Fare Register Co.

**Fences, Woven Wire & Fence Posts**  
American Steel & Wire Co.

**Fenders and Wheel Guards**  
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Cincinnati Car Co.  
Consolidated Car Fender Co.  
St. Louis Car Co.  
Star Brass Works  
Wood Co., Chas. N.

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

**Field Colls (See Colls)**

**Floodlights**  
Electric Service Supplies Co.

**Floor, Sub**  
Haskelite Mfg. Corp.

**Floors**  
Haskelite Mfg. Corp.

**Forgings**  
Brill Co., The J. G.  
Cincinnati Car Co.  
Duff Mfg. Co.  
Standard Steel Works

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

**Frogs, Track (See Track Work)**

**Frogs, Trolley**  
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Ohio Brass Co.  
Westinghouse E. & M. Co.

**Furnaces, Electric**  
American Brown Boveri Corp.

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Consolidated Car Heating Co.  
General Electric Co.  
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General Electric Co.

**Gaskets**  
Westinghouse Tr. Br. Co.

**Gas Producers**  
Westinghouse E. & M. Co.

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Brill Co., The J. G.  
Cincinnati Car Co.  
St. Louis Car Co.

**Gauges, Oil and Water**  
Ohio Brass Co.

**Gear Blanks**  
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Standard Steel Works

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Columbia Machine Works & M. I. Co.  
Electric Service Supplies Co.  
Westinghouse E. & M. Co.

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Nat'l Ry. Appliance Co.  
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Lorain Steel Co.

**Gongs (See Bells and Gongs)**

**Greases (See Lubricants)**

**Grinders & Grinding Supplies**  
Railway Trackwork Co.  
(Continued on page 42)





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Babcock & Wilcox Co.
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Plows, Sweepers and  
Brooms)
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- Switches  
American Brown Boveri  
Corp.
- Switches and Switchboards  
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Co.  
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General Electric Co.  
Westinghouse E. & M. Co.
- Switches, Tee Rail  
Ramapo-Ajax Corp.
- Switches, Track (See Track  
Special Work)
- Tampers, Tie  
Railway Trackwork Co.
- Tapes and Cloths (See Insu-  
lating Cloth, Paper and  
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Railway Trackwork Co.  
Ramapo-Ajax Corp.
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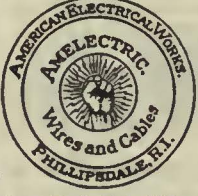
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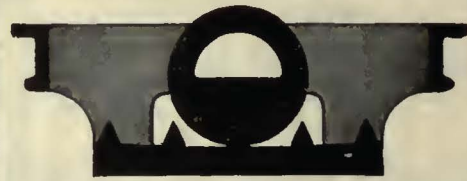
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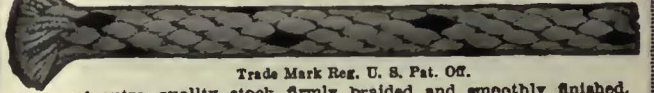


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## New Brill Modern Cars for the "Sunshine City"



## St. Petersburg, Florida

Keeping Abreast  
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It's no longer a whim. Too many companies have enjoyed the experience to leave any doubt as to the economic advantages of new Brill Modern Cars. There is not only a reduction in operating costs, due to comparatively light weight, but enhanced appearance, increased comfort and greater convenience are factors which are

contributing their part toward increasing public patronage.

The eight double-truck safety cars, recently built by the American Car Company for the City of St. Petersburg, Florida, in design and construction details resemble cars placed in service in the "Sunshine City" within recent years, but in appointments are in keeping with the higher standard of the times.

*Linoleum floor covering, genuine mahogany finish, headlining and leather-upholstered seats are improvements noted in St. Petersburg's latest cars.*

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## New Brill Modern Cars for the "Sunshine City"

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**The Brill No. 177-EX Truck**

for light-weight modern cars is designed for inside-hung motors and equipped with the various patented devices, as well as solid-forged sideframes, for which Brill trucks are noted. As a result this type of truck is capable of meeting every requirement of modern city service as far as riding comfort and minimum maintenance is concerned.

**The Brill No. 201-A Type Seat,**

upholstered in genuine leather, proves immensely popular with the riding public. Its cushion is 4¾ in. deep at front. The well-known Brill



"Winner" reversing mechanism assures positive action with a simplicity in design and such few parts

as to eliminate any tendency to get out of order. Inviting comfort and minimum maintenance, there-

fore, are its two outstanding characteristics.

**Brill "Exhaust" Ventilator**

Symmetrical and attractive in appearance, the Brill Exhaust Ventilator exhausts impure air from the carbody without subjecting the passengers to unhealthy draughts.



**Brill Renitent Post Casings**

hold the window sash under compression, keeping out rain, dust and air, eliminate any tendency toward sash rattle, and permit the installation of new sash without the aid of tools when window is broken, thus making it unnecessary to take the car out of service.

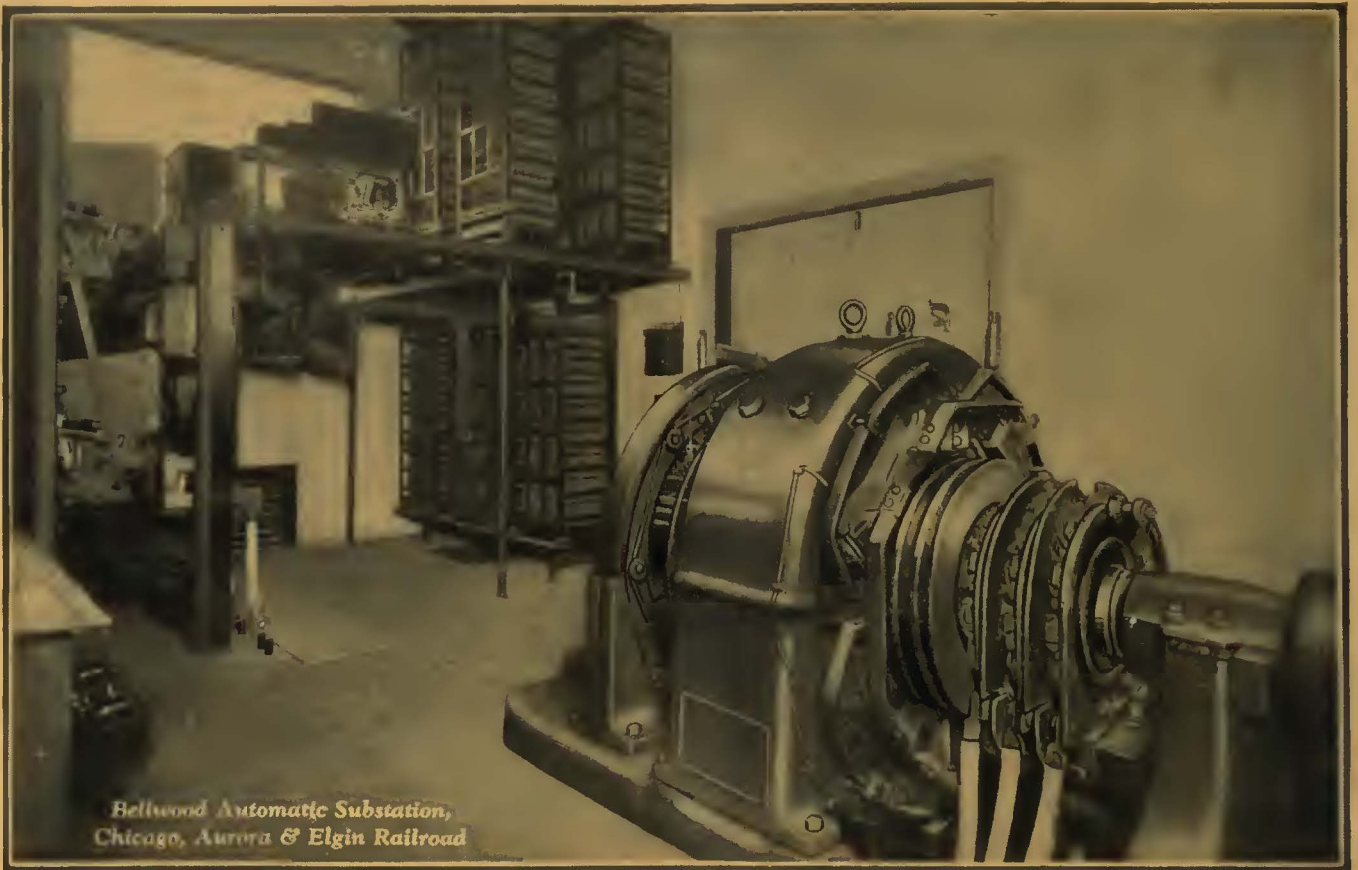


**Brill Full-vision All-Metal Sash**

A bright and cheerful interior also adds to a car's attractiveness. The use of Brill all-metal sash in place of wooden sash reduces the amount of "dead light" construction. Note comparison between metal and wood in the illustration.







*Bellwood Automatic Substation,  
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Some idea of the severe overloads encountered by substations of the Chicago, Aurora & Elgin Railroad is obtained from the fact that frequently two 6-car trains are started at one time, each normally requiring 4000 amperes.



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