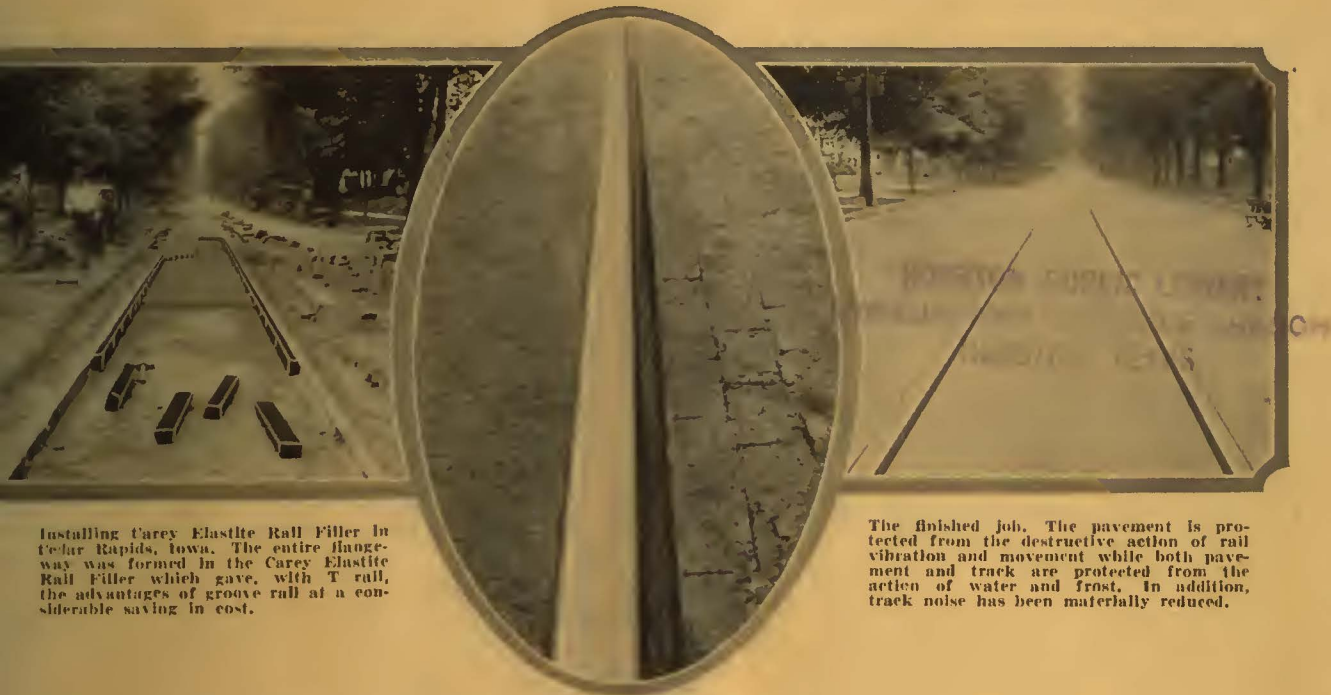


# ELECTRIC RAILWAY JOURNAL



Installing Carey Elastite Rail Filler in Cedar Rapids, Iowa. The entire flange-way was formed in the Carey Elastite Rail Filler which gave, with T rail, the advantages of groove rail at a considerable saving in cost.

The finished job. The pavement is protected from the destructive action of rail vibration and movement while both pavement and track are protected from the action of water and frost. In addition, track noise has been materially reduced.

## A water-tight track!

Fitted tightly against the head, web and base of the rail and bonding with the pavement, Carey Elastite Rail Filler seals the track against the entrance of water and frost. By absorbing rail vibration and other movement it *keeps* the track water-tight. Pavement does not disintegrate. Water does not get through to undermine the track and paving. The rail is protected from rust and scale.

Here is a tremendous advance in track-construction which solves the most pressing problems of track installation and maintenance. Water-seepage and frost-action cause most of the injury to track and paving that piles up repair costs.

The cost of Carey Elastite Rail Filler compares favorably with grout and brick fillers and it is as durable and lasting as the rail itself. Write for sample, information and prices.

THE PHILIP CAREY COMPANY

53 Wayne Ave., Lockland, Cincinnati, O.

**Carey Elastite**  
NAME REG. U.S. Patent Office  
**RAIL FILLER**

### Elastite Rail Filler

Carey Elastite Rail Filler is an asphaltic material easily installed forming a resilient cushion between the rail and the pavement, making a water tight joint, absorbing rail vibration and traffic impact and reducing track-noise. It is preformed to fit any rail section and is readily bent on the job to fit any curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.





### Multiple-Unit Train of the Long Island Railroad

Each Car Equipped with Two Type 308 Motors, 215 hp. each, and Electric Pneumatic Control.

The Long Island Railroad is extending its electrification approximately twenty miles to Babylon, in order to more efficiently handle the tremendous traffic in and out of New York City, which traffic has increased over 450% since 1905.

The order for the complete substation equipment for this extension, consisting of ten rotaries with their transformers and switching equipment, has been placed with the Westinghouse Electric and Manufacturing Company.

In addition, 40 motor-car equipments have been purchased, making a total of 638 Westinghouse multiple-unit equipments available to assist the Long Island Railroad maintain 100% service.

Westinghouse Equipment Leads the Way.

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East Pittsburgh, Pennsylvania

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# ELECTRIC RAILWAY JOURNAL

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By DWIGHT L. SMITH.  
New substation at junction with North Shore line controlled by power supervisor in general offices in Edison Building—2,000-kw. machine has full automatic features.

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## Illustrations

A FEATURE that always has characterized the ELECTRIC RAILWAY JOURNAL is the excellence of the pictures, diagrams and maps that illustrate both the technical articles and the news. The great quantity of this illustrative material that goes into the paper is seldom realized, even by those readers who have had occasion to comment on it. For instance, a recent issue of the paper contained 24 halftones and 16 line cuts — a total of 40 illustrations. The issue of Sept. 20 contained 64 halftones and 15 line cuts, 79 in all.

A recent analysis shows that this great mass of illustrative material is handled by our illustration department in an average time of 3½ days, as compared with other weekly periodicals which take from 12 to 15 days for similar work—and without sacrifice of quality.

This is but another example of ELECTRIC RAILWAY JOURNAL service, which gives its readers the latest and best industry information with almost daily newspaper speed.

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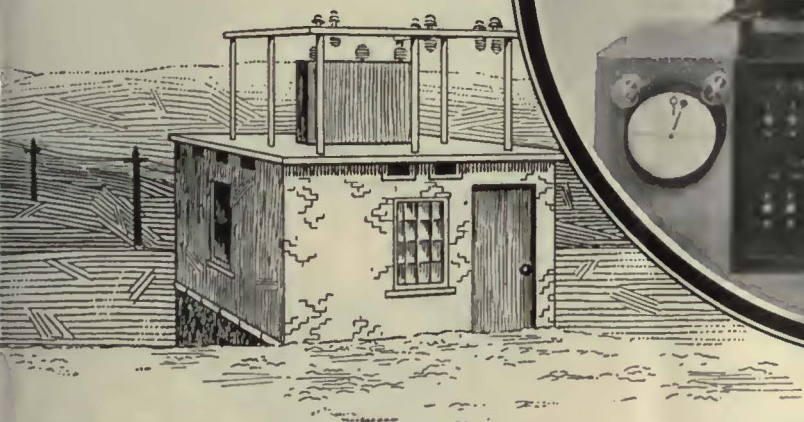
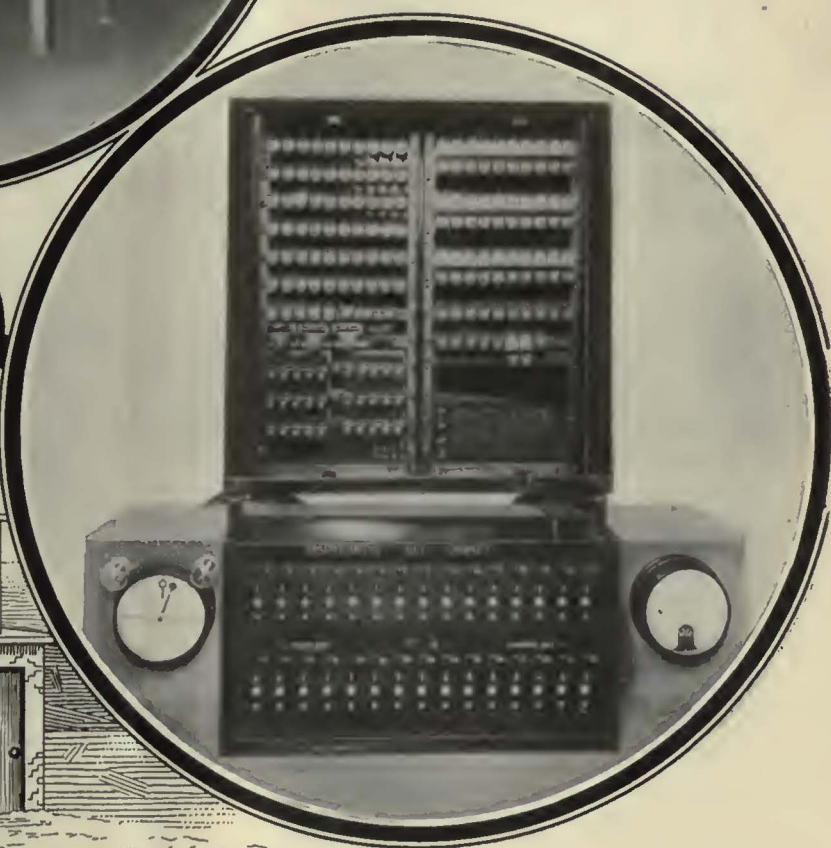
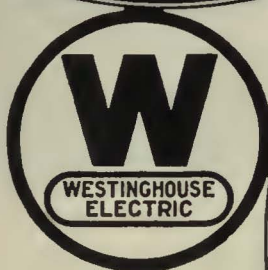
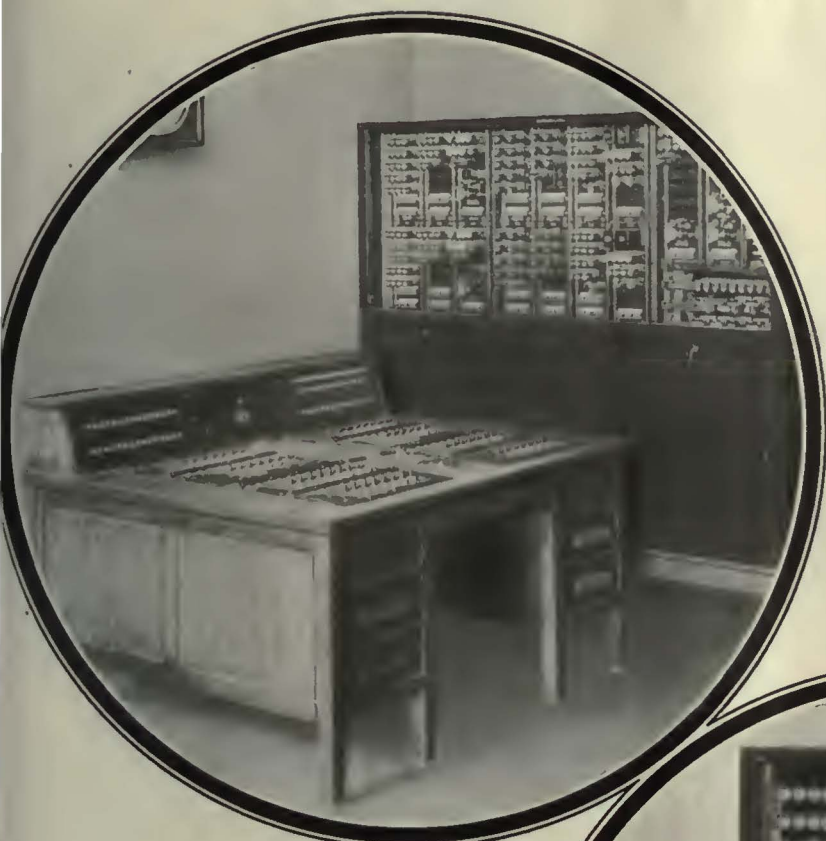
long distance operation over lines subject to inductive interference.

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Write for Circular 1694-A and supplement.

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(329)



"Reciprocating" Track Grinder



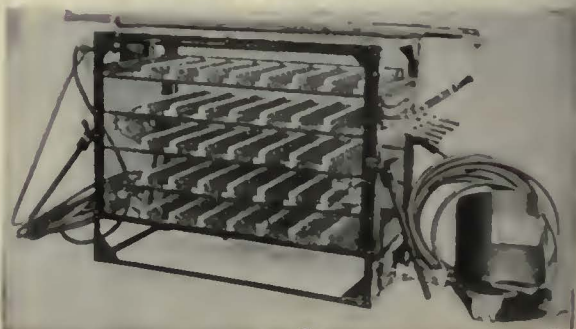
"Universal" Rotary Track Grinder



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ARE MADE



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*Let one of our engineers study your operating conditions and co-operate with you in considering what Interlocking and Automatic Block Signals will do for your Railway.*

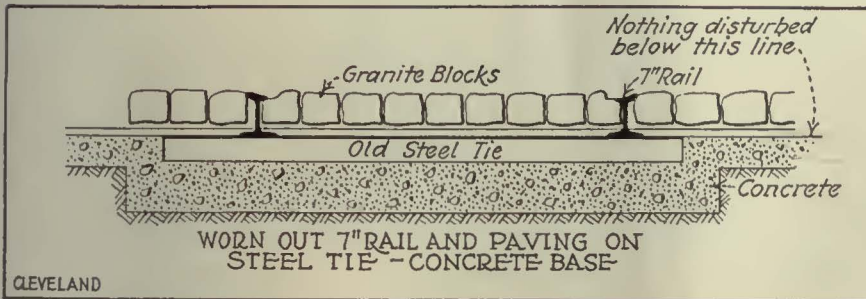


## Union Switch & Signal Co.

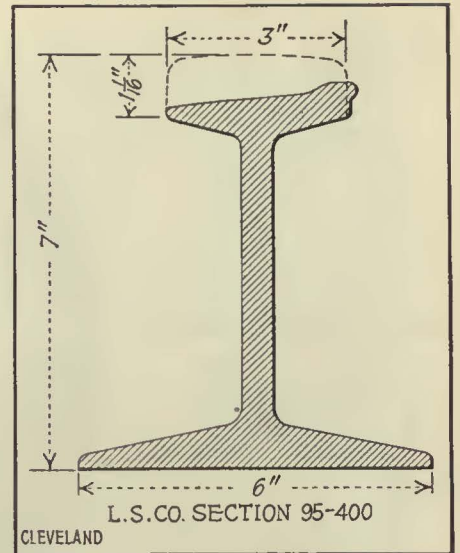
SWISSVALE, PA.



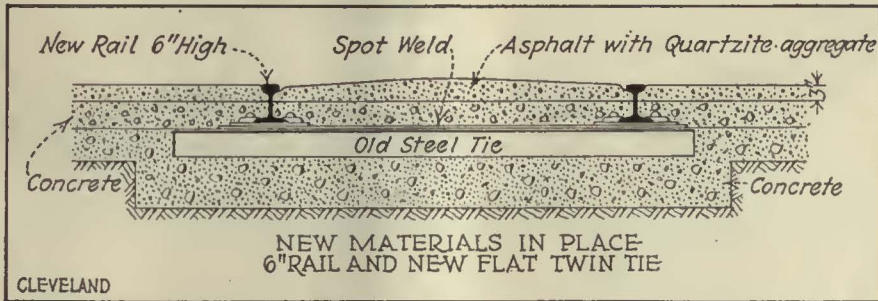




Cross Section Showing Details of Track Construction on Euclid Avenue, Cleveland. Rail Worn Out, Concrete Base Still in Good Condition.



Cross Section of Rail on Euclid Ave., Cleveland, Showing Wear on Ball of Rail



Details of method of Replacing Rail on Old Concrete Base, Using Special Flat Steel Twin Ties.

## Low Cost Construction that Outlasts the Rail

The most startling development in track construction for paved streets has been successfully worked out during the past two years in the renewal of rail and paving on a Steel Tie Concrete Base.

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The International Steel Tie Co., Cleveland, Ohio

# Steel Twin Tie Track

Economical — Permanent — Renewable



## The WABCO Smile

A sense of satisfaction comes to all those who have experienced the benefits of WABCO Brake Cylinder Packing Cups.

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✘ W A B C O ✘

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: WILMERDING, PA.

# WESTINGHOUSE TRACTION BRAKES



—most all storekeepers use this book!

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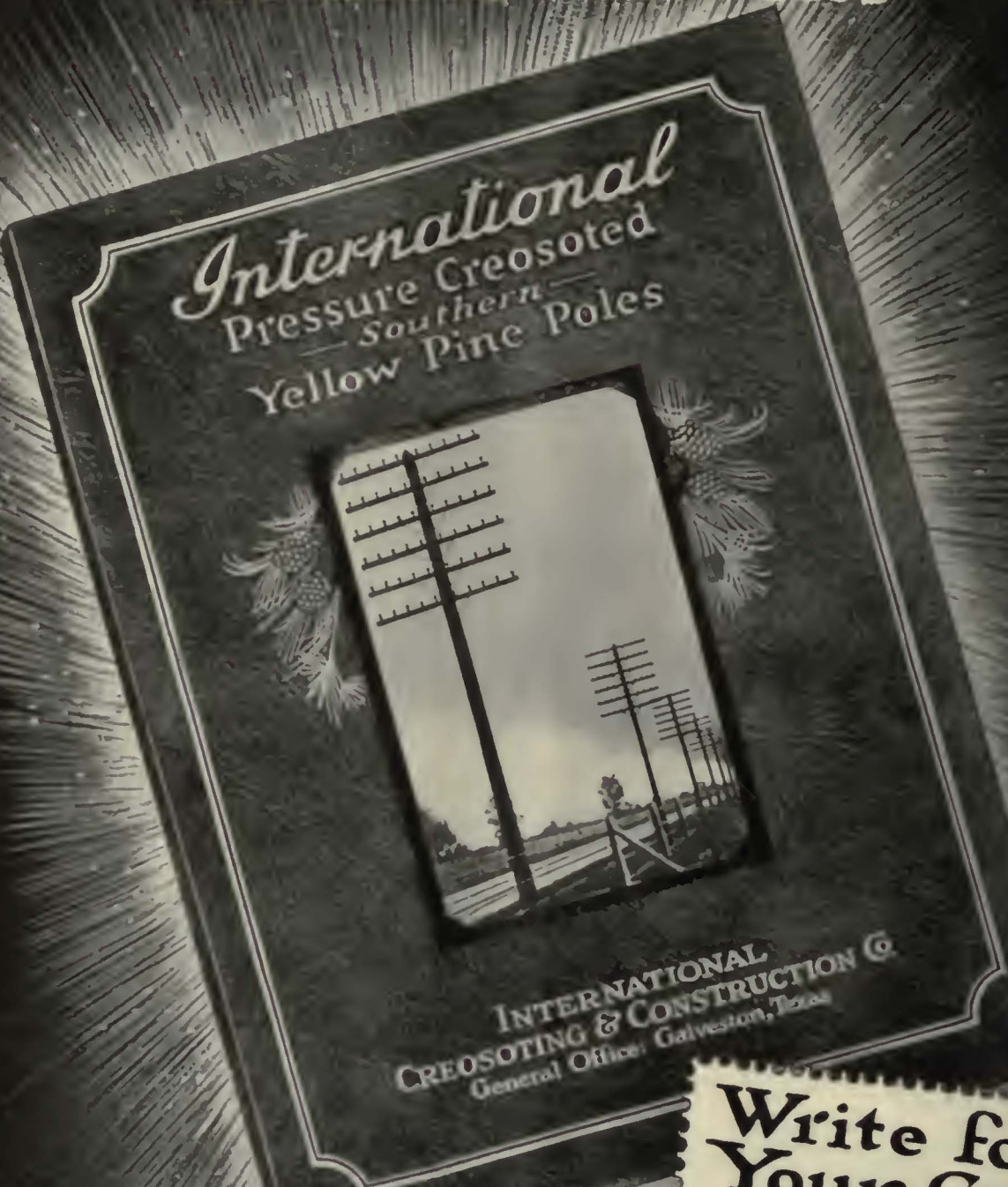
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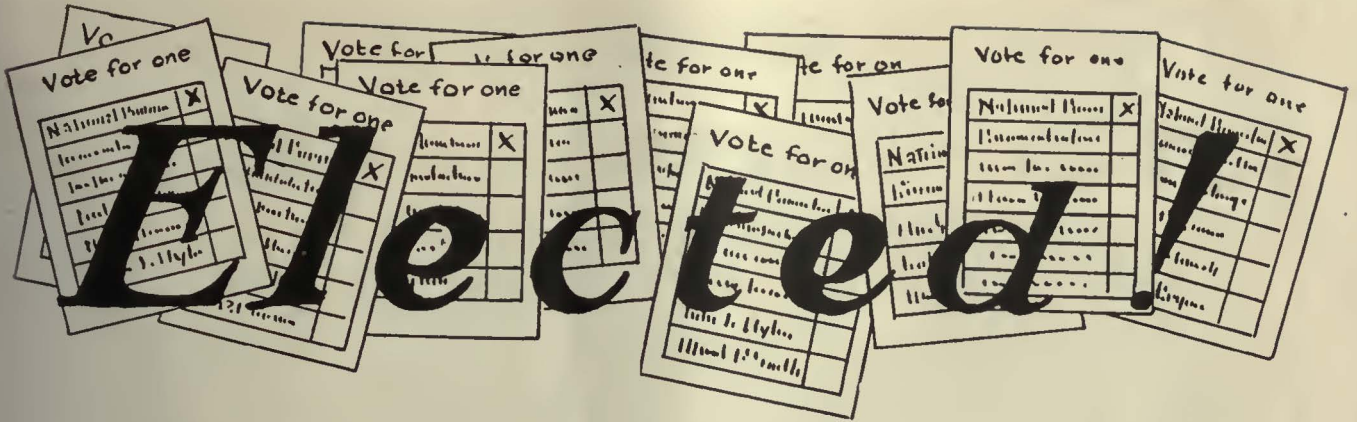
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 NOW!**

Free on request. It contains data and information of value to pole users.



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**O**VER eighty percent of all the electric railway companies in the country have marked their ballots for "National Pneumatic." All of these roads have cars equipped with one or more National Pneumatic Devices. The established reputation and time-tried satisfactory service of N-P equipment challenges any comparison, and any test. You're "safe" if you check "National Pneumatic" on all specifications.

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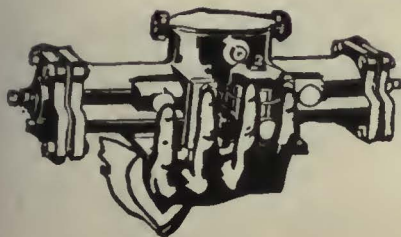
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*Manufactured in Canada by*

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White Cedar**



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That replacements might be reduced to a minimum, that we may add still more years to the already long life of the cedar pole.

That's the work so successfully undertaken by the Department of Research and Preservation of the National Pole Company.

*What has been the measure of their success?*

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They have developed the most effective processes of preservation known. They have lifted the National treated pole out of the class of the average. They have set new standards of service life and so perfect is their product that we have branded every National pole with the date of the year of treatment. How long will they last — time alone will tell.

# NATIONAL POLE COMPANY

**Escanaba, Michigan**

*Distributors:*  
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# Super-Service

One thing was clear to every visitor at the recent A.E.R.A. Convention. Of the dozens of buses shown, mostly beautiful parlor and de luxe types, this Fifth Avenue Bus stood out pre-eminently as the practical, multiple passenger carrier. Its increased seating capacity, its sensible every-day working style of design and construction and its short wheel base demonstrate its serviceability. Back of every Fifth Avenue Bus there stands a record of established performance and proved durability under heaviest traffic and most arduous transportation conditions in New York.

Here is an opportunity to give not merely bus service, but super-service. The Fifth Avenue Bus is the bus in which to carry the crowds.

***On an attractive price basis!***

Fifth Avenue Double-Deckers are not costly products. The prices quoted for a 55-passenger Type L compares favorably with those of much lower capacity single-deck vehicles.

## FIFTH AVENUE BUSES

### Type L

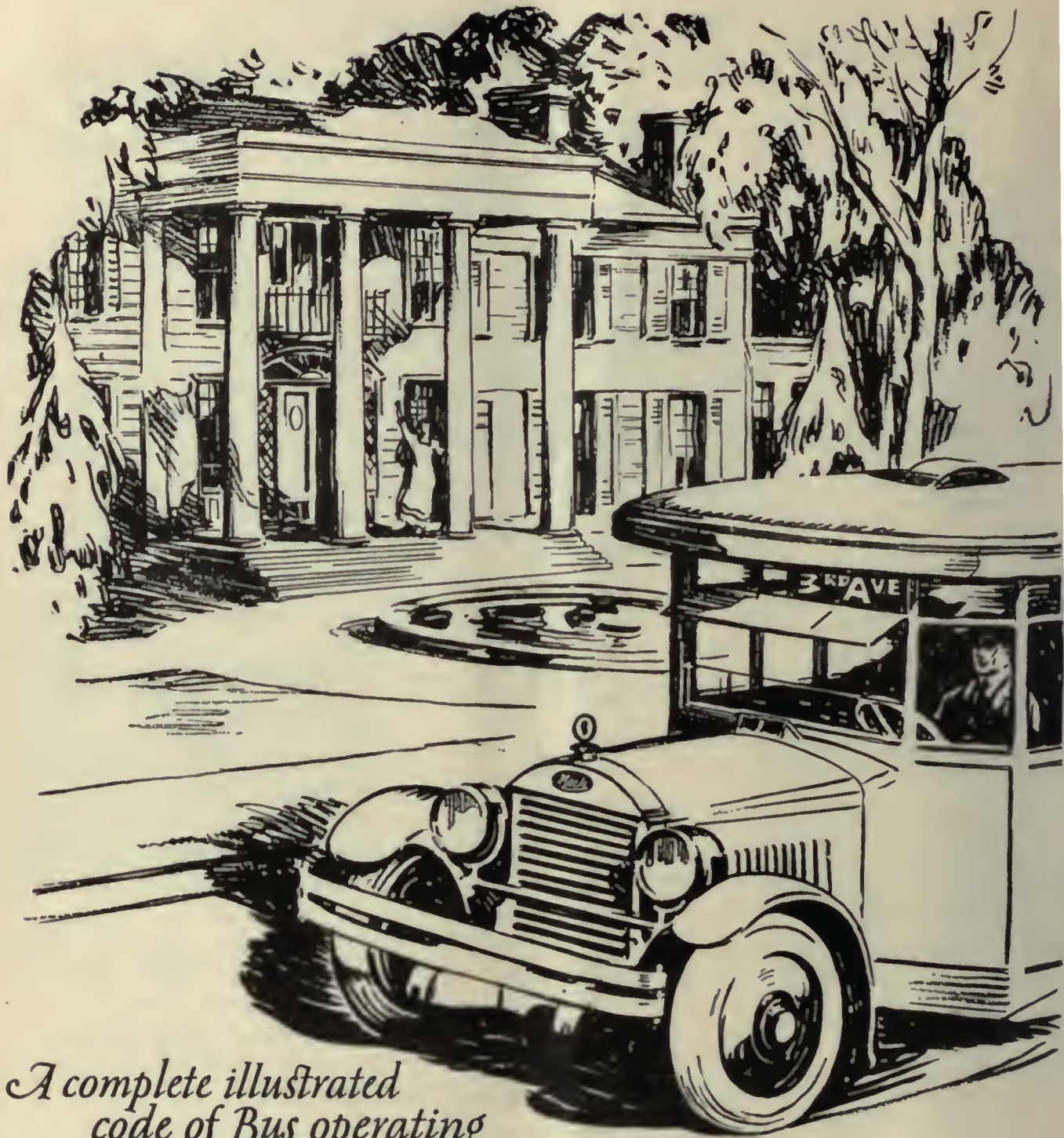
55 passengers

Short wheel base

Less than 14 feet high with top included



**NEW YORK TRANSPORTATION CO.**  
*New York, N.Y.*



*A complete illustrated  
code of Bus operating  
practice*

In other words a 250-page manual that should be in the hands of every railway now operating buses or contemplating bus service.

**BUS OPERATION PRACTICE** is a real treatise; an engineering, legal and service reference book. Chapters cover such important topics as: Establishing the Service, Picking Profitable Lines, Securing the Right to Run, Incorporating the Company, Physical Property, Operating Staff, Selling the Service, Establishing Public Relations, Making Good on Schedules, Operation, Figuring Profits.

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Get your request in for a copy.



# Where Residential restrictions *prohibit tracks* ~

Residential communities are friendly toward the modern bus. The quietness of the pneumatic tire, the graceful sweeping body lines, and the general tone of the vehicle as a whole win friends in the most select districts.

And a friendly patronage usually means a paying service.

Mack low one step buses swing along with a graceful, safe road-hugging motion, that fits any picture.

Mack bus engineers gave much thought to the outward lines when they planned the Mack. And in the Mack factories skilled craftsmen give the final touch. Mack manufacturing control is absolute.

The Mack bus is all bus from bumper to tail-light.

A sturdy long-life Mack engine.

A specially designed low bus chassis.

Wide front axle, assuring safety and permitting a short turning radius.

Mack dual reduction drive axle especially designed to give maximum road and underbody clearance.

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Dual system of brakes on wheels and drive shafts.

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Railways, everywhere, are solving many of their transportation and financial problems by enlisting the Mack as their ally. Sixty-seven per cent of Mack bus deliveries so far this year have been to railway companies.

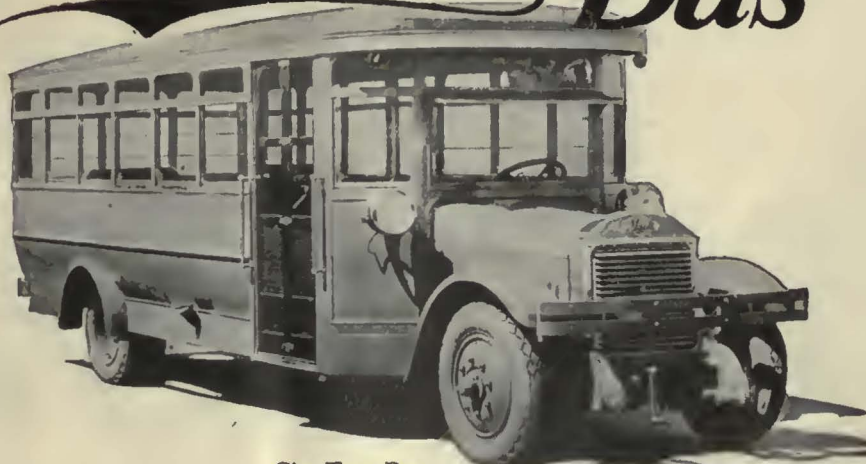
MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY  
25 Broadway New York City

*Builders of City and Sedan Type Buses*

Eighty-three direct factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

# The Mack Bus



City Type Bus

## Performance counts!

# Assured profits from extension and feeder service



The modern, six-cylinder Pierce-Arrow Motor Coach has solved the problem of extension and feeder service for electric railways.

This handsome, luxurious coach that glides smoothly, noiselessly and without vibration, attracts a wider range of patronage. Passengers are eager to ride in it because it is actually more comfortable than a fine limousine and assures a swift, safe, economical ride.

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Slow depreciation, freedom from high maintenance expense, ability to earn profits consistently over a long sustained period of time, are assured by the well known Pierce-Arrow qualities of permanence and reliability.

Our engineers will be glad to demonstrate this modern motor coach and to discuss with railway representatives the facts regarding its transportation ability. Complete information will be furnished on request.

THE PIERCE-ARROW MOTOR CAR COMPANY  
Buffalo, N. Y.

*Some Recent Purchasers of*

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New Haven—Connecticut Company.

## Standard Chassis \$4600

for 196-inch wheelbase, \$4750 for 220-inch wheelbase, at Buffalo; including starter, battery, generator, solid tires and electric lights. Pneumatic tires and disc wheels optional at extra cost. Either chassis will accommodate the Sedan, sight-seeing or pay-enter types of wood or steel bodies, ranging from 18-passenger capacity upward.

*Terms if desired*

## The Pierce-Arrow 6-Cylinder Bus Engine

The silent, dual-valve, dual-ignition Pierce-Arrow bus engine develops over 100 horsepower at 2500 revolutions per minute. It is so flexible that gear shifting is reduced to a minimum.

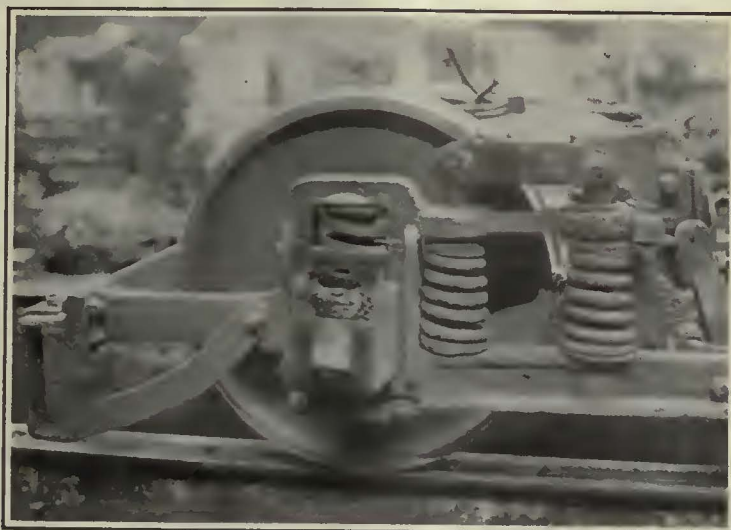
The bus is propelled by a trouble-free inverted worm-gear drive. The low-hung chassis has an unusually short turning radius.

# PIERCE

# ARROW

# SIX-CYLINDER MOTOR BUSES

# Galena Oils and Service



## Look at this journal box!

The cover cap is gone. The waste isn't packed right. It's full of dirt and grit. Hot boxes, worn journal bearings and other troubles would be rampant if this condition was general.

But a defective journal box like this is easily spotted. It is a very obvious trouble. Anyone can notice and correct it.

But there are many "hidden" losses in electric railway lubrication—losses in power and depreciation through excessive friction. Unsuitable oils will cause excess fuel consumption, involving a money value much greater than the cost of lubricants.

Galena Oils and Service prevent or minimize the hidden as well as the obvious losses of lubrication. Their installation is a literal assurance of lower maintenance costs as well as better lubrication efficiency.

## Galena-Signal Oil Company

New York    ◀    Franklin, Pa.    ◀    Chicago

and offices in principal cities



**Standard  
for Modern G-E Motors  
as follows**

GE-201	GE-260
GE-203	GE-263
GE-210	GE-264
GE-240	GE-265
GE-247	GE-275
GE-258	

**—and available  
for these G-E Motors**

GE-57	GE-73
GE-67	GE-80
GE-70	GE-88



*Don't purchase supplies at random.  
Use your G-E Catalog*

## A Renewable Carbon-way

Do you replace worn brush-holder carbon-ways promptly as you should? Or do you continue operation with the worn part and risk a higher motor maintenance cost?

Many railway motors now in service have worn brush-holders that should be replaced. Replace them now with the new G-E Renewable Carbon-way Holder. Then in the future just the carbon-way, the worn part, can be renewed at about one fifth the cost of replacing a complete holder.

Quite a saving. And remember, the other results will be fewer motor failures and better service.



**General Electric Company**  
Schenectady, N. Y.  
Sales Offices in all Large Cities



# GENERAL ELECTRIC

New York, Saturday, November 8, 1924

# Electric Railway Journal

*Consolidation of Street Railway Journal and Electric Railway Review*

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 64  
Number 19

## Now We Can Go Ahead Confidently

THE election of President Coolidge will be generally acceptable to electric railway men. On several occasions the President has shown his interest in the welfare of the electric railway industry, and while vice-president he was one of the speakers at the 1923 Midyear Meeting in Washington. But it is not only as a personal matter that President Coolidge's success at the polls may be welcomed. The hearty indorsement given to his policies in the election by the country at large shows that the majority of the people are conservative and have not been misled by the radical arguments of recent years.

It should not be forgotten that government ownership and operation of railways and other public utilities was one of the policies advocated by the party which carried but one state at the election on Tuesday. It also must not be forgotten that a most convincing reply to this policy of government ownership was broadcasted from Washington about five weeks before the election by Secretary of Commerce Hoover and published in full at the time in *ELECTRIC RAILWAY JOURNAL*. It must not be forgotten that the decisive defeat of Mr. La Follette also removes all cause to fear that the United States Supreme Court may be made subservient to the Congress.

Not the least of the good results of the election is the probability that we shall continue to have the services in high office of such men as Hoover and Mellon. This insures another four years of "more business in government and less government in business."

Altogether Mr. Coolidge's election and Mr. La Follette's thorough defeat means that we can go ahead with the business of public service, having full confidence that the rights of property will be inviolate and that honest private operation will not be menaced and strangled by a drive for socialism. The country has spoken unmistakably. It does not want any change in our form of government. It does not want socialism.

## More Attention to Tiring Will Save on Re-Tiring

IT SEEMS to be a very general condition now that the purchaser of motor buses gives little if any consideration to the size and type of tires with which the new vehicles are to be equipped. Likewise, the chassis manufacturer is not too particular about what he puts on, in the absence of definite specifications. This leads to much dissatisfaction with the tires and produces high operating costs, for the tire item is one of the principal expenses in motor bus operation.

The manufacturer of tires is particularly interested in this situation, for he realizes that if a wrong size

and type of his tires are placed on a bus the user is likely to feel that he had better choose a different make when he has to re-tire. One prominent tire engineer found pleasure at the number of tires of his own make with which buses at the Atlantic City convention were equipped, but was greatly disappointed at the fact that on many of these buses either the wrong size or the wrong type of his tire had been applied.

Tire manufacturers say that they have been unable thus far to arouse sufficient interest in this detail of equipment. This is naturally a condition which accompanies the newness of the use of buses. Tire manufacturers also say that their offers of advice by engineers who have made tire manufacture their life work have not been at all well received by bus operators. The latter have looked upon all such proffers of service as being merely sales schemes. While such an engineering service is, of course, an indirect approach to the later sale of tires, it is difficult to see why railway men should not accept the engineering services of these firms, just as they have learned to rely upon the engineering services of the manufacturers of railway equipment. Perhaps the tire manufacturers must go through a certain period of effort in establishing confidence, but surely the question of getting the proper tires on a bus is a matter of considerable importance.

## Street Railway Not Inherently Faulty in New York Situation

WITH the many applicants fighting to obtain franchises for bus operation in New York City, the situation of the street railways is commonly looked upon as hopeless. Perhaps the situation is hopeless—if present politics and present operating methods are to continue. But this is so only if these conditions do continue, and not because of any inherent weakness in the electric rail system as compared to any newer form of transportation now available.

New York City street railway operation, excluding Brooklyn lines, does not represent modern railway practice. The equipment in use is old and inherently slow. Even this old equipment is not operated as well or as rapidly as it could be. With their lackadaisical running and discourtesy, Manhattan trainmen have inspired much adverse criticism of the street car. They have given some cause for the idea prevalent that it is a back number.

A brief analysis on page 806 shows some of the troubles of the street railways in New York. One is that the speed of cars averages only 7.16 m.p.h. In Chicago the street cars are averaging nearly 11 m.p.h. That high figure cannot be attained in Manhattan, but

it is believed that 8 to 8.5 m.p.h. would be possible with modern cars designed for rapid loading and unloading and fast acceleration, and manned by well-schooled and disciplined trainmen. This would mean not only a large saving in operating expenses but would attract great numbers of short-haul riders who now make nearly as good time walking. The demand for street car service is certainly not lacking, as is evidenced by the high average car-mile earnings in Manhattan, which are about 70 cents as compared with 45 cents for the country as a whole. In fact, today, as pointed out in the annual report of one of the railways, page 822, the New York surface lines are carrying a larger proportion of the total number of passengers carried on surface, elevated and subway lines than at any time since the subways started. The use of street cars in recent years has increased faster than the use of subway and elevated lines.

Another of the troubles is that the street cars have average receipts of only 3.5 cents per passenger-mile, while the buses, both Fifth Avenue and municipal, get some 5.5 cents per passenger-mile. Were the Manhattan and Bronx railways receiving the same revenue per passenger-mile as the buses, which would be equivalent to an 8-cent fare, their receipts would be increased 57 per cent. Their net earnings would go up from \$3,489,000 to \$19,800,000. This would give a return of 22 per cent on their valuation after meeting taxes, even under the present low rate of speed, instead of the present actual return of 3.9 per cent.

In other words, if the street railways were to earn only a return of say 8 per cent, the service could be supplied at a revenue per passenger-mile considerably below that of the buses, even under present conditions. With the system thoroughly modernized, the advantage of the railway would be still greater. It might even be possible with the heavy traffic density in New York City that a 5-cent fare would suffice.

These considerations would not seem to indicate any inherent weakness in the street railway.

The present low speed of the cars is of course not entirely the fault of the cars and operating methods. Traffic regulation in New York City is not designed to assist street car movement. Parking regulations and their enforcement are lax. It is not unusual to see automobiles standing in double lines along the curb and forcing all moving vehicles onto the car tracks. Left-hand turns are allowed practically everywhere. Vehicles may turn around in the middle of the block, bringing all other traffic to a standstill. Much time is lost on account of the lack of flexibility of the interlocked traffic signal lights used on main thoroughfares. In short, traffic regulation in New York is probably the worst in any large city in the United States, from the street railway standpoint.

Part of the remedy for the railway situation is managerial in nature; the remainder is political. If the two interested parties will come honestly to the common purpose of providing good surface transportation for the citizens of New York City, the situation can be solved. The JOURNAL believes there is a way to work it out if progressiveness and co-operation on both sides can be brought about.

The fact that the existing system of surface transportation is not efficient is no reason to replace it by a system which is inherently unsuited to the conditions. The present situation is largely the fault of the public,

which for years has allowed the politicians to hamstring the railways upon every occasion. In the interest of good transportation it would be better to increase the efficiency of the street railway system than to allow public clamor to drive these companies into the operation of buses under conditions for which they are not fitted. Above all, it would be a grave mistake to allow a matter of this kind to be decided by fancy or sentiment instead of by cold, hard facts.

There is plenty of field in New York for the bus—to supplement the railways, but not to displace them.

### Akron Voters Wisely Approve Fare Increase and New Short-Term Franchise

NEWS deeply significant comes out of Akron, Ohio. At the election in that city on Nov. 4 the voters approved an ordinance under which co-ordinated railway and bus service will be continued. The term of the new franchise is only 4 years, which period, it is expected, will furnish a reliable guide to future normal prices and transportation costs. Neither the company nor the city thought it advisable to enter into a long-term contract at this time. Under the terms of the temporary ordinance which has been in effect since last February, when the company's franchise expired, the company would have had no right to operate after May 1, 1925. It would be idle to speculate upon the consequences which might have followed a rejection of the settlement proposal at the polls. Akron had no such thought. The size of the vote in favor of the new grant proves that.

It is only last February that Akron appeared to be determined to exact its pound of flesh from its railway. Since then, however, the thought of its experience without service has had its effect. Long ago Akron could have had all that is in prospect for it now without the turmoil that attended the suspension of railway and bus service there for a period of thirty days, but Akron was misled, badly misled. It knows that now.

The provisions of the new grant under which the joint bus and railway service will be operated for the next four years give great promise for the future. On the basis of the public inquiry which fixed the "bare" cost of carrying a passenger in 1923 at 5.55 cents, the company is assured a living wage, as the new fare will give a minimum revenue per passenger of 5.88 cents, this coming from the frequent riders who take advantage of the lowest rate of 17 tickets for \$1. The city is protected with respect to the conditions under which it can exercise the right to purchase the entire property. And the public is assured adequate service by car and bus at a low rate of fare.

The attitude of the city officials and the public press during the period incident to the campaign in behalf of the new settlement proposal was certainly in striking contrast to the sentiment expressed previous to the withdrawal of service last February. Critics of the Akron company there have been and probably always will be. This is the fate of any public enterprise. But there is no satisfactory answer to the argument of the company itself in behalf of the new grant. In effect, that statement was that it must be apparent to everyone that unless the company does supply good service in the next four years, it cannot hope to have the public good will necessary to continue to operate the system beyond the present contract period.

# Supervisory Controlled Substation on Chicago Elevated

New Substation at Junction with North Shore Line Controlled by Power Supervisor in General Offices in Edison Building—2,000-Kw. Machine Has Full Automatic Features—Building Located in Residential Section, Necessitating Artistic Design

By Dwight L. Smith

Assistant Electrical Engineer Chicago Rapid Transit Company

**E**XTENSIVE developments in supervisory control led the Chicago Rapid Transit Company to adopt this system in conjunction with its new automatic substation at Central Street, Evanston. This automatic substation is located near Linden Avenue, Wilmette, which is the junction of the Chicago Rapid Transit system with the Chicago, North Shore & Milwaukee Railroad, as well as being the location of a large storage yard. The substation at present includes one 2,000-kw. rotary converter, housed with switchboard and control in a building 25 ft. x 34 ft., and 16 ft. high inside. Oil switches, disconnects, and power and control transformers are located in an adjacent outdoor court. Sufficient ground space is available for the erection of the second building to house an equal additional capacity and for duplicate outdoor equipment. The station is full automatic with all modern protective devices, including two steps of loading limiting resistance for the machine, and has three automatic reclosing feeder panels for the control of two feeder sections for the Chicago Elevated and one for the North Shore Line, as well as a feeder panel for the Evanston Railway.

As the desired location for a station was within the exclusive North Shore residential district, it was located on the property of the Evanston Railway, where the latter already had a carhouse. Even three sides of this location faced directly on properties zoned for residences. On the fourth side, a golf course and a proposed boulevard along the North Shore drainage channel came between the substation and the right-of-way. To make the station fit these surroundings and conditions, the building was constructed of face brick, trimmed with artificial stone, matching the car station building. The outdoor equipment is inclosed on the street side with a neat face brick wall of similar design.

## TRANSMITTING THE PURCHASED POWER

The 60-cycle, three-phase, 12,000-volt energy is obtained from the Commonwealth Edison Company at the point where its transmission lines approach the station. It is carried to the station by a No. 00 transmission line built and owned by the Chicago Rapid Transit Company along its right-of-way. Not only was it desirable for the sake of appearance, but since the golf course and boulevard mentioned lay between the station and the railway right-of-way, it was necessary to bring all feeders and the transmission line into the station underground. A 16-duct line was built from a manhole on the right-of-way to a manhole in the street in front of the station. From this latter manhole ducts carry the high-tension cable to the steel structure in the outdoor court, the positive feeders into the switchboard pit and the negative feeders directly into the machine pit.



Central Street Automatic Substation of the Chicago Rapid Transit Company, in Which the Supervisory Equipment Is Installed

The telephone cable, containing the telephone and supervisory control lines, also comes through this duct line.

At the right-of-way, laterals extend from the manhole up a structure built between two poles 10 ft. apart. The cables extend up these laterals to disconnect switches at the top and thence to the various feeders and the transmission line. A grounding switch is mounted in the high-tension line at this point. All switches are locked and are available only from a platform 25 ft. high mounted between the two poles. The negative feeders run directly from the manhole on the right-of-way to the track rails.

The high-tension cable terminates in a pothead mounted on a steel structure in the outdoor court of the substation. This structure serves as a support for the disconnect switches, fused disconnects for the operating transformer and the choke coils. The type KO-36 oil circuit breaker is mounted next to this structure, with the current transformers between the oil circuit breaker and the power transformers. The latter are 700-kva. each, oil insulated and self-cooling. All transformers have 12,000-33,000-volt primary windings, and the transmission line and all high-tension wiring is insulated for the higher voltage. The outdoor apparatus is elevated on steel structures of sufficient height to place all live parts more than 10 ft. above the concrete floor of the court. The entire court is inclosed by a wire fence.

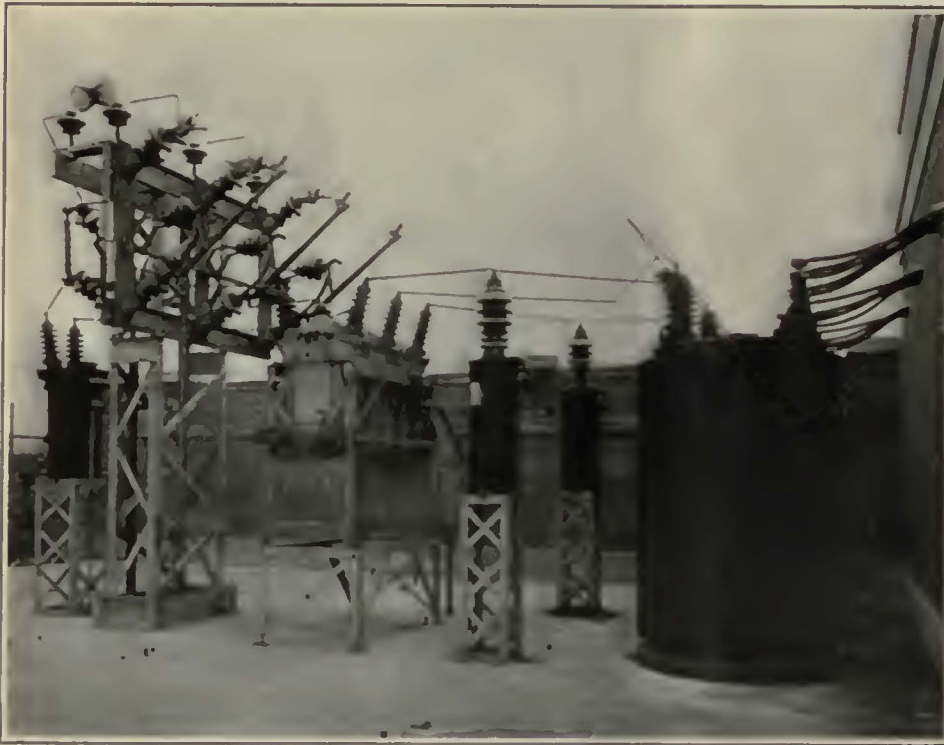
Inside the building the switchboard occupies the end of the building near the court, with the load-limiting resistances on the floor level behind the switchboard.

The contactors, high-speed circuit breakers and field rheostat are mounted on a structure above the switchboard. Slate runways are in front and behind the contactors and breakers. The converter is at the other end of the building near one side, leaving room beside it for the telephone booth, air compressor, steel workbench and steel lockers for tools, spare parts and supplies.

Connections from the low-tension side of the transformers are made by paper-insulated, lead-covered cables, which come into the station through wall bushings, thence down ducts leading directly to the converter pit and the pit in the rear of the starting panel. The d.c. connections from the rotary to the switchboard are made in a similar manner. Vertical legs from the starting panel and the a.c. rings on the machine are made with copper bus to which the cables are attached in the pits. A pit 26 in. wide and 24 in. deep runs the entire length of the switchboard in its rear and serves

and receiving features at both the power supervisor's office and the substations. It operates over three wires, No. 22 gage in the railroad company's telephone cable. For sending the supervisor has manually operated selector keys, one to open and one to close each controlled apparatus. These keys actuate pole-changing relays according to a predetermined code setting, notching up the selector having the same code setting at the substation. The substation selector operates an auxiliary relay through whose contacts the control circuit of the apparatus is looped. The opening of the auxiliary relay opens the control circuit and disconnects the apparatus, while the closing of the auxiliary relay completes the control circuit and permits the apparatus to function automatically.

The return indication is initiated by interlocks on the apparatus controlled. A change in the position of the apparatus actuates a motor selector key in the substation, operating a selector in the office and lighting



At Left, All High-Tension Apparatus Is Located in an Adjacent Outdoor Court, Enclosed by a Brick Wall and Wire Fence. At Right, Laterals and Switches Connect the Duct Line from the Substation with the Overhead at the Railway Right-of-Way

as a handhole for terminating these cables as well as all control wiring conduits, and as a runway for all control wiring. The pit has a removable slate cover, thus all wiring is neatly concealed but easily accessible.

In addition to the automatic features, a supervisory control system connects the station with the power supervisor's office, 15 miles distant in the main offices of the company located in the Edison Building, Chicago. This system provides means for the supervisor to lock out or release the machine and to open or close any feeder at will. It also gives an automatic indication by red or green lamps on the supervisor's board whether the machine is running or shut down and the feeders open or closed. This indication takes place whether the action has been performed by the supervisor or automatically.

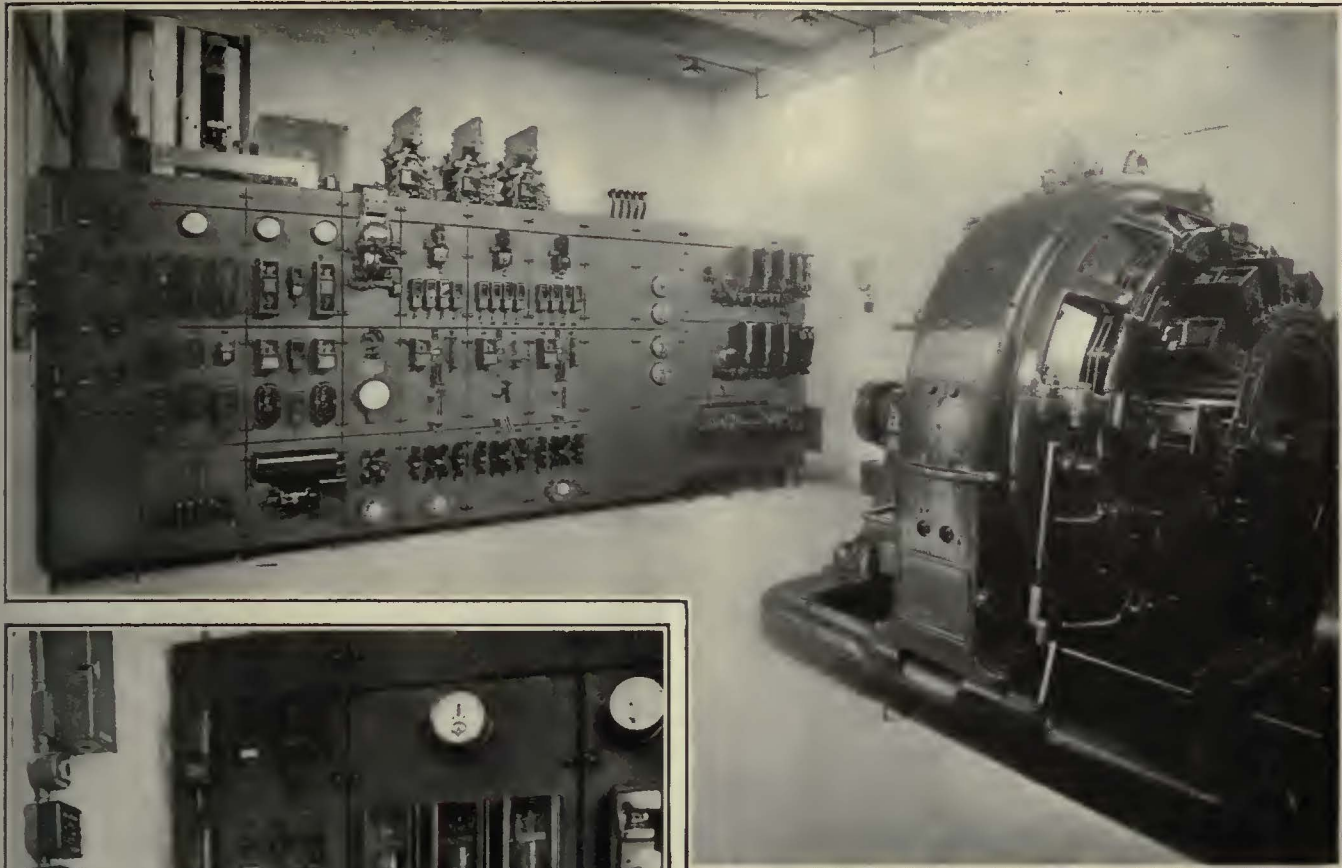
The supervisory control system consists essentially of standard telephone selector equipment with sending

the proper indicator lamp. Only one-half the number of selectors are used in the office as at the substation. As an additional protection insuring proper indication, the polarity sequence of the code for indicating the open position of any one piece of apparatus is reversed for indicating the closed position. The indication itself is finally obtained by the action of a polarized relay which indicates according to the polarity of the last impulse of the code received.

A control shelf at the power supervisor's office holds the pole-changing relay which furnishes the impulses to the selectors at either end, relays for the pilot lamps and buzzer indications to the supervisor of changes in indications and locking relays preventing the mixing up of outgoing and incoming impulses. This apparatus is mounted in a steel cabinet.

At the substation end there are mounted in a similar cabinet the selectors and motor-driven selector keys,





Above, Full Supervisory Control Apparatus Is Carried on the Left-Hand Panel of the Switchboard. The 2,000-Kw. Converter Is Shown in the Foreground

At Left, Near View of the Supervisory Control Cabinet and Panel Shown Above. Auxiliary Relays Operating Control Circuits Are on the Wall at Left of Panel and Indicating Relays at Right of Panel. In the Cabinet the Selectors Are on the Top Shelf, While the Motor-Driven Selector Key Is Beneath



station batteries consist of three 24-volt units which are used separately for the operating relays and motor keys and in series with each other and the 24-volt battery at the office end for the operation of the pole-changing relay for return indications. Batteries are trickle charged from 600-volt railway or 110-volt commercial sources with relays to disconnect them during operation.

The return indication features provide for storing of signals so that simultaneous operations of apparatus in the substation are sent to the power supervisor in a definite order without interference. Similarly incoming signals to him lock out his sending apparatus and interference between incoming and outgoing impulses is prevented. All circuits are normally open and a break or short circuit in line wires cannot produce any false operation or indication. These line wires are looped through jacks both at the power supervisor and substation ends. A test circuit with plugs for these jacks permits the supervisor and the substation maintainer to make a daily test for freedom from grounds and continuity of each of the three line wires.

#### SUPERVISING EQUIPMENT SAVES DELAYS

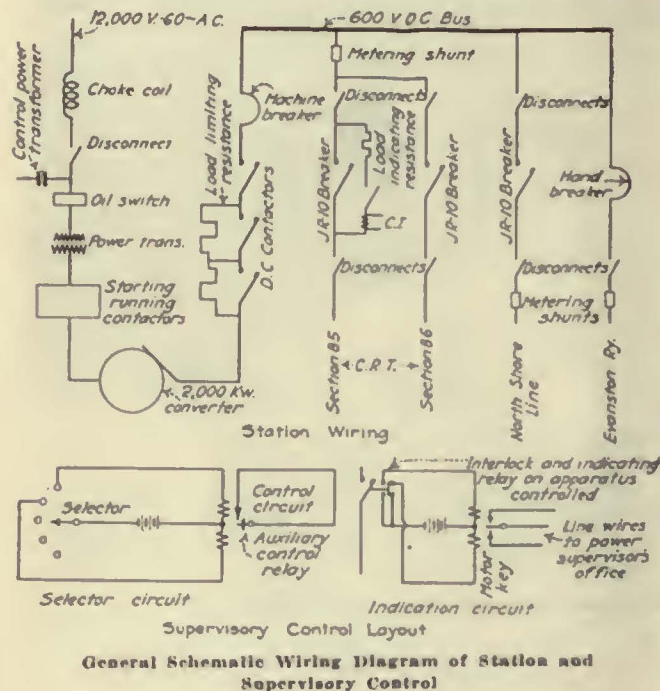
The supervisory control system has been found of great assistance in handling power, for not only can the operations be performed almost instantly, but the return indications are received just as quickly. Instead of having the delay incident to calling operators on

together with a locking relay which will prevent interference with indication signals from other substations when they are installed. On a switchboard panel are mounted the auxiliary relays operating the control circuits, and those actuated by apparatus interlocks initiating the proper indication code on the motor keys.

Energy for the operation of the system is supplied by small storage batteries, the office end having a 144-volt battery for the polarized impulses and a 24-volt battery for the operation of the relays. Pilot and indication lamps are supplied from a separate source. Sub-

the ordinary telephone system and waiting for their report back, the switching and indication is accomplished instantaneously. Although not done in this case, as ample telephone cable facilities are available, it is possible to utilize the control wires for the operation of telephones as well.

The automatic reclosing feeder equipment consists of a high-speed circuit breaker with control circuits and relays which provide protection for both the machine and the feeder section itself. The high-speed breaker with "trip free" feature has been entirely successful in protecting the rotary converter from flash-overs. Tests made by short-circuiting a feeder just outside the substation have opened the circuit breaker without so much as producing a "squeal" on the converter. The control circuit relays provide for taking



the control current from either the bus or the feeder, whichever has the higher voltage. The breaker will remain closed as long as the potential on either side is 250 volts or above, thus providing for feeding either out from the substation, or when the station is shut down for feeding through the station bus.

Thermal relays in the feeder busbar provide for opening the breaker when the bus becomes overheated, reclosing again when the temperature decreases. This feature, however, is unnecessary as the installation is designed to carry maximum useful loads while the high-speed breaker will care for short-circuit conditions. This breaker has a reclosing coil and a holding coil which holds the breaker closed. A bucking bar paralleled by an inductive shunt, in series with the load, produces a field opposed to that of the holding coils. When the field produced by the bucking bar becomes greater than that of the holding coil, the breaker is opened by a spring. The field of the bucking bar varies with the rate of increase of the load, a slow increase permitting a greater portion of the current to go through the inductive shunt than a rapid increase. Thus the breaker will open on a lower current produced by a short circuit with its rapid current rise than where the current is taken for ordinary uses with a comparatively slower rate of increase.

When the breaker is opened automatically a time delay relay starts. It completes its action in 15 seconds, closing a small feeling-out contactor which completes the feeder circuit through a load indicating resistance, in series with which is a current transformer. If the short circuit still exists the rush of heavy current through this transformer trips a relay which opens the small contactor and starts the whole cycle over again. At the same time the small contactor closes, an auxiliary time delay closing relay starts to close, its action taking long enough so that if the tripping relay operates it will be restored and again start its action at the proper place in the cycle. This action will be repeated until the short-circuit condition is removed and the current through the small contactor, resistance and current transformer is small enough to prevent a kick which will open the tripping relay. If the tripping relay does not operate, the auxiliary closing relay completes its action and closes the high-speed breaker. Variation of the current setting at which the breaker will trip is obtained by varying the reluctance of the magnetic circuit of the holding coil.

The apparatus is provided with disconnects on each side of the circuit breaker and thus can be isolated for inspection or maintenance. Although the main contacts of the circuit breaker are comparatively small for the current rating, no trouble has been experienced with them. The breaker is opened manually by a knife switch in the control circuit. The supervisory control operating relay contacts are in series with this same circuit.

All this apparatus and the station equipment were furnished by the General Electric Company.

Ventilation inside the station is natural through louvers placed low on the walls and four 3-ft. diameter ventilators in the roof. Two ducts lead from outside the station directly into the converter pit. On warm days the temperature inside the station rises well over 100 deg. F., but it was not felt that sufficient decrease in this temperature could be obtained by forced ventilation to warrant its use, and several protective relays have been redesigned to withstand these temperatures. The station is well lighted both inside and out, with an emergency throw-over switch so that the lights can be thrown onto any of the feeders entering the station.

The number of customers supplied from this one station has necessitated a complicated metering arrangement, but hourly reading printometers record accurate information not only of the daily output but of the hourly output, which is necessary for determining the maximum demand.

The station normally runs from 6 a.m. to 1 a.m. and during this time the load is such that it never shuts down from lack of load. During the other five hours of the day it is locked out by the power supervisor.

On the daily inspection, which takes one to two hours, printometer tapes are changed, meters and apparatus counters read, supervisory control lines are tested and a casual inspection is given to the apparatus. Once a week the maintainer makes a night inspection, which gives 5 hours during which the station is shut down for careful inspection and any work not possible while it is running. A daily report is made to the office, and by means of apparatus counter readings, voltmeter charts and meter readings a very accurate account is available of the operation of the station.

# Automatic Rear Exit Doors on Toronto Rebuilt Cars

Sixty Former Two-Man Cars Are Being Arranged for One-Man Operation by Installation of Automatic Doors at Rear—Passengers Will Enter at Front End Only, but May Leave at Either End

AS PART of a general program of remodeling 351 cars taken over from the Toronto Railway in 1921, the Toronto Transportation Commission is now converting 60 of these cars for one-man operation, utilizing a front entrance and exit in combination with a rear exit controlled by an automatic exit door. In the arrangement of the car and the door control a number of interesting features are included, some original with the Toronto installation and others adapted from designs in use elsewhere.

The automatic rear exit feature is patterned after the design which has been found successful on a sample car operated by the Washington Railway & Electric Company and which was described in the *ELECTRIC RAILWAY JOURNAL* of Aug. 30. In the case of the Washington car, however, the treadle arrangement is installed on each platform of a double-end car, so as to be used as a rear exit regardless of the direction of motion, while the new Toronto cars will be single end, and only one treadle per car will be necessary.

Originally equipped with longitudinal seats, these cars are only 8 ft.  $\frac{1}{2}$  in. wide over the side posts. They are now being equipped with cross-seats on one side, giving an aisle width of 2 ft.  $8\frac{1}{2}$  in., so as to encourage passengers to move toward the rear end instead of blocking the space at the front end of the body near the entrance door. The seating arrangement adopted, together with circular seats at the rear end, gives a total seating capacity of 51.

At the front end, a passageway for both entrance and exit is provided. The entrance door is pneumatically controlled from the brake valve, while the exit door at this end is manually operated by means of an auxiliary control provided for the purpose. The arrangement is such, however, that when the entrance door has been opened, it will in closing also close the front exit door if the latter is open at the time.

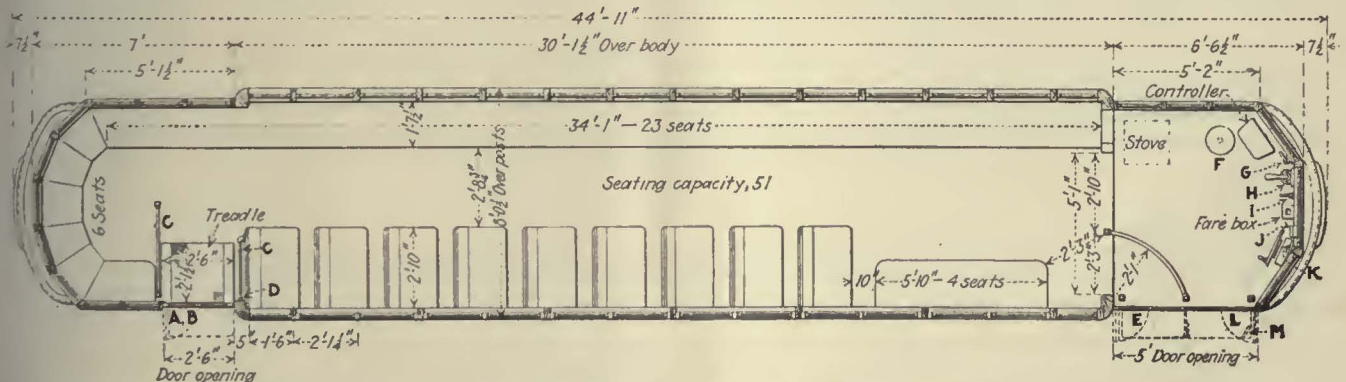
Control of the door engines is obtained from the brake valve. Two door-opening notches on the segment of this valve give a selective control between the front door and the rear treadle-operated exit. In other words, when the valve handle is set to the first door-opening notch, the rear exit door will open provided there is a passenger on the treadle, or this will occur whenever a passenger steps on the treadle while the valve remains in the same position. If the handle is moved to the second door-opening notch, the action of the rear door will be exactly the same, but in addition the front door will be opened. Under both settings of the handle, the rear door closes automatically as soon as the alighting passenger has cleared the step. Thus the rear door is automatically closed to prevent passengers entering at that point, and this also prevents the door from remaining open in cold or inclement weather any longer than is necessary to allow passengers to leave the car.

## DOOR ACTION SUPERVISED BY MOTORMAN

When the brake valve handle is returned to the release position the rear exit door does not close until alighting passengers have entirely cleared the exit step. When the step is clear the door then automatically closes. An additional safety feature is provided in the form of a small auxiliary control valve adjacent to the brake valve, which enables the operator either to lock the rear door against the action of the treadle when the front door is opened, or to open the rear door directly, if this becomes necessary for any reason when no passenger is on the treadle.

Mirrors are arranged at the front end of the car to enable the operator to see both the interior of the car back of him and the rear exit step, without turning around. Extra lights installed over the rear door are lit only when the door is open. At the front end a standard door interlock signal lamp is installed, and in addition an auxiliary red lamp is lit when the rear door is open.

Both the pneumatic door equipment and the automatic treadle device are being furnished by the National Pneumatic Company. The rear platform of the car is flush with the body floor, but the rear exit treadle is set down  $9\frac{1}{2}$  in. so that an alighting passenger steps down to the treadle and then to the exit step.



Automatic Rear Exit One-Man Car for Toronto

Passengers board at the front end, and leave either at that end or at the rear through an automatic rear exit door. Selective door control is obtained from the brake valve, and mirrors and signal lights are arranged so as to give the operator a view of the rear step.

A—Rear exit door is controlled by treadle. It is operative only when the air-brake valve is in "door open" position.

B—Extra lights installed over rear door are operated by the treadle, lighting when

the door is open and being extinguished when the door is closed.

C—Rear exit grab rail.

D—Push button for use of passengers standing on or near treadle.

E—Front exit doors are operated both ways manually, but will close pneumatically with entrance doors when the latter have been open.

F—Motorman's removable seat in socket.

G—Manual handle for operating front exit door.

H—Brake and pneumatic door control.

I—Valve to open or lock rear exit door independent of treadle.

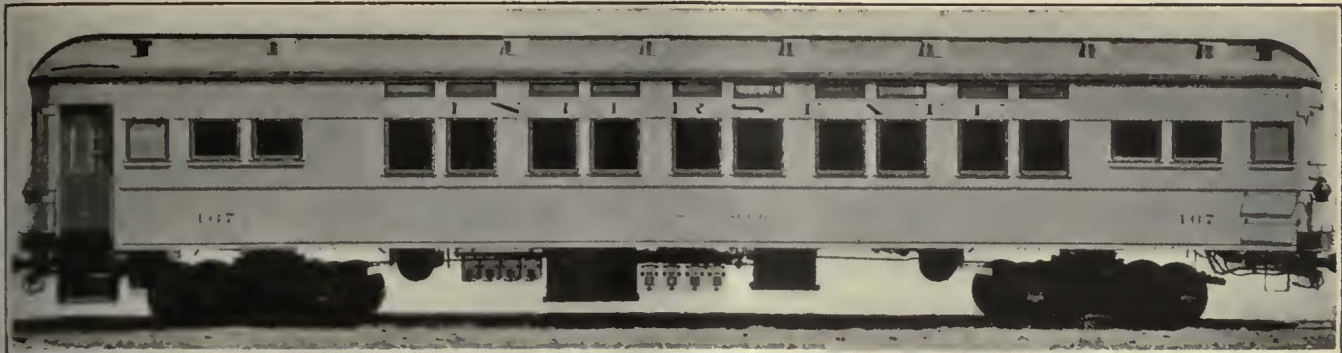
J—Signal lamps. Upper, standard door interlock signal lamps. Lower, red lamp, lighting when rear door is open, and extinguishing when door is closed.

K—Mirror for observation of interior movement.

L—Front pair of doors fully pneumatically operated from brake valve.

M—Mirror for observing rear step.





One of Three 62-Ft., 10-Section Sleeping Cars Recently Placed in Service Between Louisville and Indianapolis

# Sleeping Car Service Begun by Interstate Public Service Company

Extra Long Berths, with Windows Alongside Uppers; Large Washrooms and Easy Riding Qualities Are Features of Three Sleeping Cars Recently Placed in Service Between Indianapolis and Louisville—They Are Operated on a Slow Schedule with a Layover Before Entering Terminal—This New Equipment Cost \$100,000

**E**LECTRIC railway transportation between Indianapolis and Louisville was advanced another step when the Interstate Public Service Company began the operation of sleeping cars. To furnish this service, three all-steel 10-section sleepers were designed by the company. These cars embody the latest ideas to be found in steam railroad equipment of the same type. In addition they have several new features. In spite of limitations as to length, truck size, width and overhang the cars have been arranged so that the available space is utilized to such advantage that greater convenience and comfort is afforded than is found in a standard Pullman sleeper. These cars are not motorized. They were built by the American Car & Foundry Company. The three cost approximately \$100,000.

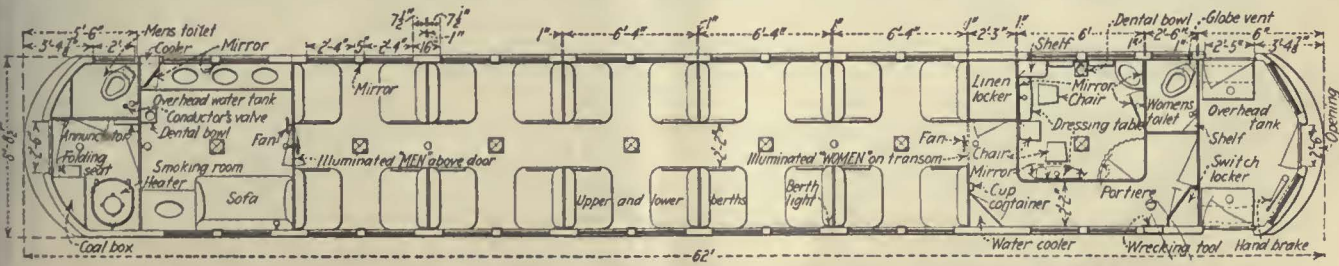
The car is 62 ft. long and 8 ft. 8½ in. wide, with a total weight of 50 tons. It is mounted on Baldwin interurban-type, four-wheel trailer trucks with special elliptic and coil springs to secure riding comfort. Rolled-steel wheels of 34-in. diameter and having 3½-in. A.E.R.E.A. tread are used. The Tomlinson M.C.B. automatic radial couplers at either end have G.E. 10-wire coupler plugs which carry the train control line, a 600-volt lighting circuit and a signal system. Air connections at both ends of the car provide for brakes and a service supply.

As most of the lamps within the car require a 32-volt current, an Edison 24-cell, 300-amp.-hr. battery of that

voltage is carried under the car. To charge this battery a motor-generator set has been installed instead of the resistor grids originally provided. This machine operates from the 600-volt trolley circuit, being supplied with power through the car-to-car jumper or by means of a pole hooked on the trolley wire when the car is standing at a terminal. The set is cut in and out by means of a relay actuated by a reversible watt-hour meter mounted on the switch panel. Two electric heaters located under the car and controlled by a thermostat supply hot water to the washrooms. These heaters have 5-gal. copper tanks surrounded by heating coils and asbestos packing. The coils receive energy from the 600-volt circuit.

The car has steps on both sides but only at the front end. It is to this end that the motor car is coupled. Although an end vestibule door has been provided at the rear, it is necessary to pass through the men's dressing room in order to leave the car at that end. Standard Interstate orange enamel, set off with red sash, doors and roof, gives the car an attractive appearance. The company name and the name and number of the car are lettered on the sides. The three cars have been named "Scottsburg," "Indianapolis" and "Louisville."

Passenger comfort and safety were the two outstanding considerations in the design. A heavy, sound-insulated trail car, without air compressor, motors, or trolley pole, was the result. The sub-frame is built up



The Floor Plan Shows How, Despite Size Limitations, the Interior Was Arranged to Accommodate Comfortably 10 Berth Sections

of two 7-in., 16.4-lb. channel center sills and 5-in. x 3½-in. x ⅝-in. side sills tied together with 7-in., 9.8-lb. channels with 8-in. x ¼-in. top and bottom plates, and 4-in., 5.4-lb. channel floor beams. The bolsters are built up of structural steel sections having ⅝-in. double web with a 26-in. x ⅝-in. top cover plate and a 12-in. x ⅝-in. bottom cover plate. The end sills are 7-in., 9.8-lb. channel sections with 12-in. x ¼-in. top cover plate. A 10-in., 15.3-lb. channel placed with flanges outward serves as a buffer beam at each end of the car. A 5½-in. Rico anti-climber 4 ft. long has been placed inside the channel at its center. This buffer is attached to the ends of the 7-in., 15.4-lb. channel platform arms, which extend to the bolster. The entire sub-frame is strengthened by 4-in., 8.2-lb. diagonal braces of Z section which extend between the bolsters

and a dental lavatory is between the two side windows. The finish of the woodwork and walls below the belt rail is light mahogany. Above the belt rail the side walls are finished in buff enamel decorated with gold. A dome light and three wall fixtures provide illumination over the mirrors. Two towel racks have been mounted over the side windows. The interior finish of the toilet room is white enameled Lincrusto wall-board with an embossed tile design.

The men's room occupies the entire width of the car at the rear end. It has a three-bowl washbench along one side and a single bowl and small upholstered seat on the other side. Water for use in the dressing rooms and toilets is supplied from a 100-gal. tank located over the vestibules and dressing rooms at each end of the car. The bowls were furnished by the Adams & West-



At Left—Each Berth Section Is 6 Ft. 4 In. Long and 3 Ft. Wide and Is Arranged in a Manner Similar to that of a Pullman.  
At Right—Ventilating Windows for the Upper Berth Are Provided and Two-Section Curtains.  
In the Foreground Is a Folding Table for Use During the Daytime

and end sills, and between the bolsters and the adjacent floor beams.

Mounted on this sub-frame is a steel-framed body. The wider side posts are 2½-in. x 2-in. x ¼-in. angles, while the narrow ones are single 3-in., 4.1-lb. channels. The letterboard is between the single sash windows and the small upper berth windows. The carlines are 2-in. x ¼-in. x ⅝-in. angles bent to form the monitor roof, and are continuous from side plate to side plate. A tongued and grooved ½-in. poplar roof is laid on yellow pine furring attached to the carlines. Over this is a layer of felt paper and a layer of canvas. The side sheathing is No. 11 steel, reinforced and attached to the side posts, side sill, belt rail and side plate.

#### MANY CONVENIENCES ARE PROVIDED

Every effort was made to have the interior of the car commodious and luxurious in appearance. The ladies' dressing room at the front end of the car, with a passageway to one side, is somewhat larger than that found on Pullman cars. A three-section mirror is located on each of the two side walls. Below each mirror is a dressing shelf and a hair receiver. Three low-back, upholstered chairs have been provided. A corner washbowl is directly under one of the windows

lake Company and are arranged with tilting lever faucets and drain. The interior finish of the men's room is of light mahogany throughout with the exception of the ceiling, which is finished in white enamel to correspond with the rest of the car. Artificial illumination is afforded by a dome light and five wall fixture lamps.

On one side of the rear vestibule is the men's toilet. The other side holds the coal box and Peter Smith hot water heater. Three rows of heater pipes extend the entire length of the car on either side.

#### BERTHS ARE EXTRA LONG

The car has 10 berth sections. Seating accommodations are sufficient for 40 people. Each section is 6 ft. 4 in. long and has a width of 3 ft. These provide a berth longer by approximately 3 in. than that in standard sleeping cars. The cushions and backs of the seats have spring-edge wood frames and are upholstered in green figured plush. The arrangements for making the berths are similar to those in Pullman sleepers of the latest type. Mexican mahogany with hand-rubbed finish is used for all interior trim. Fixtures are finished in dull statuary bronze.

Two windows 8 in. high and 23½ in. wide, arranged

so as to swing in at the top, are placed in the side wall of each upper berth. Permanent copper wire screens are fastened on the outside and the sash may be regulated to any desired position. In addition to the ventilation afforded the lower berth by means of a sliding type ventilator in the lower edge of the storm sash, an independent ventilator is located in the inside lining directly below the narrow side post. This has a slide cover in the inside wall, while its lower end opens under the car. Fifteen American Car & Foundry Company's exhaust-type ventilators are located in the monitor and have 6-in. x 12-in. registers. A 6-in. Globe ventilator is placed in each toilet room.

Floor lamps are installed under four of the seats, to illuminate the aisle when the deck lights are off and the berth curtains are closed. Each upper and lower berth has two shaded lamps. Berth lamps, floor lamps, dome lights in the main compartment, washrooms and toilet, and the fixtures in the dressing room are oper-

A Federal portable vacuum cleaner has been provided. Two electric outlets for attaching this are available, one in the men's washroom and the other in the passageway at the forward end of the car. Folding tables are also a part of the equipment.

#### SLEEPING CAR SCHEDULE IS SLOW

As it is only 110 miles between Louisville and Indianapolis and the running time for a high-speed train is only 3 hours and 45 minutes, it was considered necessary to arrange a new schedule for the sleeping cars in order to bring them into the terminals at a reasonable hour in the morning. A car is ready for occupancy in either terminal at 9 p.m. At 11:30 it is coupled to the last regular train out of the terminal, and by operating on what is known as a "slow drag" the car has a quiet trip going south from Indianapolis to Scottsburg, which requires approximately 3½ hours and is approximately 50 minutes run from Louisville.



The Men's Smoking Room at the Rear End Takes Up the Complete Width of the Car. Washbowls, Mirrors, Drinking Water and Seat Are Provided



The Ladies' Dressing Room Contains the Latest Appointments, Including Two Sets of Three-Section Swinging Mirrors, Three Chairs, Washbowl and Dental Lavatory

ated from the 32-volt storage battery. A single five-light, 600-volt circuit for emergency purposes consists of two unshaded lamps in the main compartment, one in the smoking room, one in the vestibule and one in the ladies' dressing room. Push buttons are connected to a 26-position annunciator located on the wall in the rear vestibule.

#### PRECAUTIONS TO DEADEN NOISE

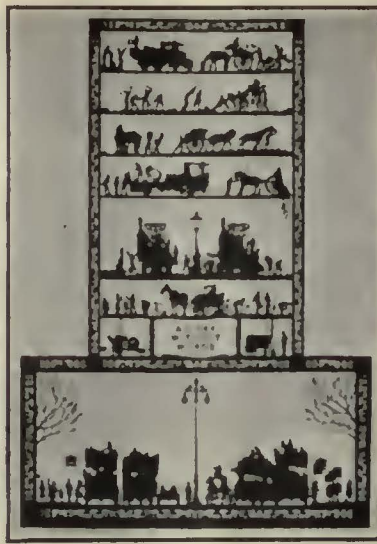
Insulation against road noises has been accomplished by means of heavy flooring. A 1½-in. yellow pine false flooring is cleated to the stringers; it is separated by a 1-in. layer of hair felt from the double tongued and grooved yellow pine flooring, the lower course of which is 1½ in. thick while the upper course is 1¼ in. A layer of building paper separates the two courses. Over the vestibule floor, trapdoors, passageway and smoking room floors is a layer of 1-in. red and green checkered inlaid linoleum. The ladies' dressing room, ladies' toilet and main section of the car are covered with a green figured Wilton carpet, with one layer of felt underneath. The floor in the men's toilet is of Flexolith, reinforced with galvanized-iron wire screening. The side and end walls are insulated with two-ply sal- amander composition fastened to the outside sheathing.

Here the sleeping car is detached from the train and placed on a siding. At 6:10 in the morning it is picked up by the first train into Louisville, arriving at the terminal at 7:05. A similar layover is provided in the other direction. Passengers are permitted to occupy the car until 9 a.m. The price of a lower is \$2.75 and the upper is \$2.

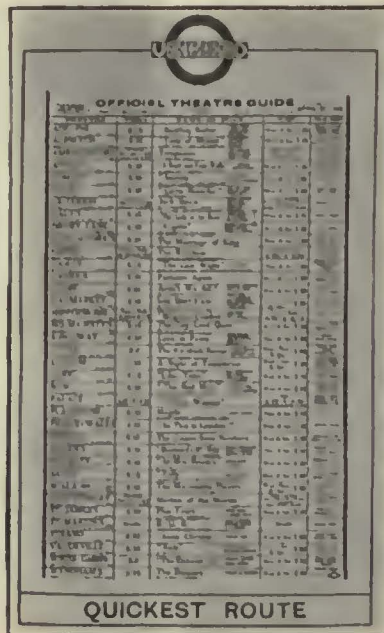
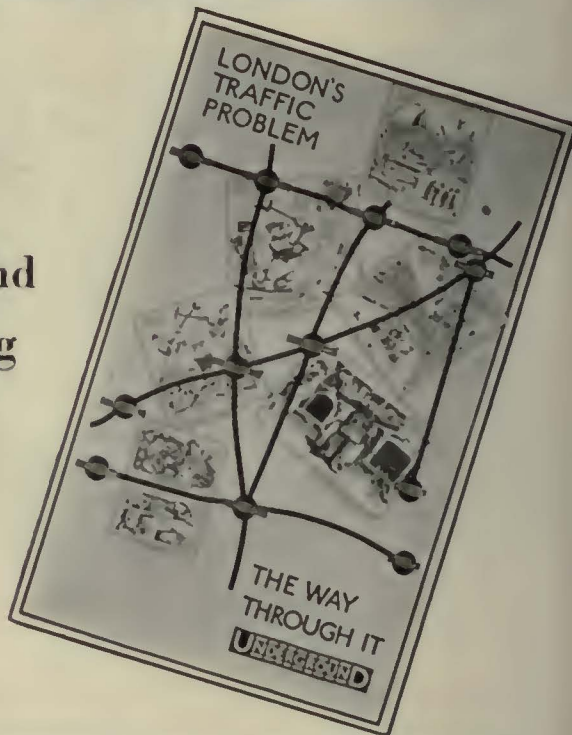
The public had opportunity to inspect the cars while they were in the terminals prior to the inauguration of the sleeper service. In order to give the operating staff an opportunity to perfect the service, the company waited until after the sleepers had been running for two weeks before doing extensive advertising.

#### Acts as Entertainment News Editor


CLINTON D. SMITH, general manager of the Beaver Valley Traction Company, New Brighton, Pa., has found a new way of stimulating riding on the railway lines to reach entertainments, lectures and the like. This is the editing of a "What's Going On" department in the Beaver *Daily Times*, which lists the amusements, sports, and other public events. These items are gathered by the commercial department of the railway and published without charge by the newspaper.



Recent  
London  
Underground  
Advertising  
Posters







LONDON HISTORY AT THE  
**LONDON MUSEUM**  
DOVER STREET  
OR ST. JAMES'S PARK STATION.

BLUE BELL  
TIME




**ARE**  
BEST REACHED BY THE  
**UNDERGROUND.**

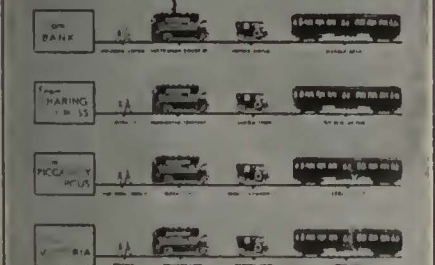
**W**HATEVER the message—advertising for traffic or to build public understanding and good will—the “Underground” of London seems to have a way of presenting it that tells much at a glance or has an especial appeal from sheer beauty. The reproductions here lose much of their effectiveness because they do not show the colors, but they give a good idea of the subject matter at least.

Aside from those whose attractiveness helps to “put over” the suggestion for seasonal riding, note the extent of the story that is told. The poster to the right gives a remarkable bird’s-eye view of the location of all underground stations. The poster itself measures 50 x 39 in. Another shows the increased distance that can be covered in 15 minutes on the Underground as compared to walking or riding the bus or the taxicab. Another tells a construction story without a word and still another shows the way to overcome delays due to traffic.



We Americans, though greatly superior in the character of our general magazine advertising, nevertheless lag far behind these London railway men in our transportation advertising.



**15 MINUTES  
AND WHERE ARE YOU?  
BY BUS, TAXI, AND TUBE**



**AN EASY FIRST!**

**K E W  
G A R D E N S**  
BY DISTRICT RLY  
DIRECT

**THE PROBLEM OF THE UNDERGROUND**

1923 REQUIRED  
**COAL** 275,000 TONS  
**OIL** 7,000 GALLONS  
**STAFF** 110,000  
 11,000,000,000  
 11,000,000,000  
 11,000,000,000



WHAT IT TAKES TO  
MOVE THE PASSENGERS

**306,000,000**  
TRAVELLED IN 1923

## Analysis of New York Surface Transportation

THE accompanying two tables give in brief form the main factors with which to compare the operation of the street railways in New York City with that of the Fifth Avenue Coach Company and the municipal buses. They were prepared by John A. Beeler, consulting engineer, New York, and it may be said that the information is from reliable sources.

SURFACE TRANSPORTATION—MANHATTAN AND BRONX—YEAR ENDED JUNE 30, 1923. ANNUAL OPERATIONS

	Fifth Avenue Coach Company	Municipal Bus Estimated	Surface Railways
Operating revenue (a).....	\$5,710,557	\$3,500,000	\$28,626,829
Operating deductions (b).....	\$3,978,823	\$3,018,000	\$23,008,040
Taxes.....	586,223	376,000(c)	2,129,689
Total operating deductions.....	\$4,565,046	\$3,394,000	\$25,137,729
Net earnings.....	\$1,145,511	\$106,000	\$3,489,100

(a) Includes passenger revenue and other revenue from operations.  
 (b) Includes operating expenses and reserve for renewals and retirements.  
 (c) Estimate based on cost to Coach Company on a ton-mile basis in order to make a true comparison of operations.

The commodity which all three systems are selling is transportation and the method that delivers the most car-miles per car-hour has an advantage over the others. At present the street car is last, making but 7.16 miles, while the coach leads with 8.17.

Traffic on Fifth Avenue is given every advantage

SURFACE TRANSPORTATION—MANHATTAN AND BRONX—YEAR ENDED JUNE 30, 1923. COMPARATIVE OPERATING STATISTICS

	Fifth Avenue Coach Company	Municipal Bus Estimated	Surface Railways
Passengers carried (revenue).....	55,924,100	70,000,000	502,350,281
Passengers carried (transfer).....	3,450,608		77,069,244
Passengers carried (total).....	59,424,718	70,000,000	579,419,525
Per cent total surface passengers carried.....	8.4	9.9	81.7
Maximum vehicles in daily service.....	293	206	1,599
Average seats per vehicle.....	48	20	44
Revenue-miles.....	10,019,805	9,022,500	43,909,814
Revenue-hours.....	1,224,493	1,203,000	6,125,732
Miles per hour.....	8.17	7.50	7.16
Passengers per revenue-mile.....	5.92	7.76	13.20
Seat-miles per passenger.....	8.10	2.58	3.32
Average length revenue ride, miles.....	1.85	.90	1.41
Average per cent seats occupied.....	23	35	42
Cash rate of fare, cents.....	10	5	5
Receipts per passenger, cents.....	9.62	5.00	4.95
Amount per mile, cents.....	5.41	5.55	3.54
Operating revenue per hour.....	\$4.67	\$2.91	\$4.68
Total operating deductions including taxes per hour.....	3.73	2.82	4.10
Net earnings per hour.....	.94	.09	.58
Operating revenue per mile, cents.....	57.0	36.7	65.4
Total operating deductions including taxes per mile, cents.....	45.6	37.6	57.3
Net earnings per mile, cents.....	11.4	1.1	8.1
Per cent operating expenses to total operating revenue.....	69.7	86.2	80.6
Per cent taxes to revenue.....	10.3	10.7	7.4
Per cent net earnings to revenue.....	20.0	3.1	12.0
Investment.....	\$3,612,000	\$2,500,000	\$88,714,429
Investment per dollar of total operating revenue.....	\$0.63	\$0.72	\$3.10
Investment per passenger carried, cents.....	6.1	3.6	15.3
Per cent return on investment.....	31.5	4.2	3.9

over the crosstown traffic under the present tower system. Another condition favoring the Fifth Avenue Coach Company is that its routes are in large part over thoroughfares free from intersecting streets, such as along Central Park and out Riverside Drive.

The municipal buses operate under much less favorable circumstances and are doing fairly well, making 7.5 m.p.h. Their operations are practically confined to short-haul crosstown routes in populous districts.

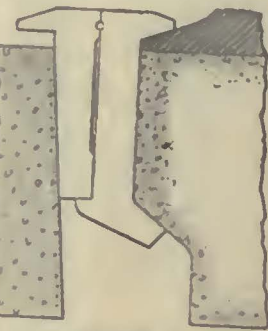
In order to make a true comparison of the operations, Mr. Beeler added taxes to the operating deductions of the municipal bus. As operated, however, this is not done and the buses actually enjoy an earning power of 13.5 per cent. The Fifth Avenue Coach Company earned 31.5 per cent. The street car, after all operating deductions including taxes, earned 3.9 per cent. With the street cars relieved of taxes, as are the municipal buses, they would show a net earning of 6.4 per cent, even under present low speeds.

Looking at the situation from another angle, the municipal bus with its short-haul riders and the Fifth Avenue Coach Company with its 10-cent fare average about 5.5 cents per mile per passenger, while the railway averages 3.5 cents.

## Concrete Ties Tried in Bangor

A TRIAL installation of reinforced concrete ties was recently made by the Bangor Railway & Electric Company, Bangor, Me. These ties are of unusual design, consisting of a rectangular block at each end and two steel connecting rods. The rectangular concrete blocks are of the same general cross-section as the ordinary wood tie, with beveled edges. The steel rods run throughout the length of the tie. Spike holes are made in the concrete when it is cast.

The rail rests directly on the concrete, to which it is fastened by a spike of special design. This spike secures its grip by hooking under a projecting edge of concrete. Driving the spike is facilitated by making it in two parts, which are inserted successively. After being inserted, the two parts are held in place by a cotter pin, as shown in the accompanying sketch.



Detail of Spike and Spike Holes in Concrete Ties

Thirty ties of this type have been installed on the



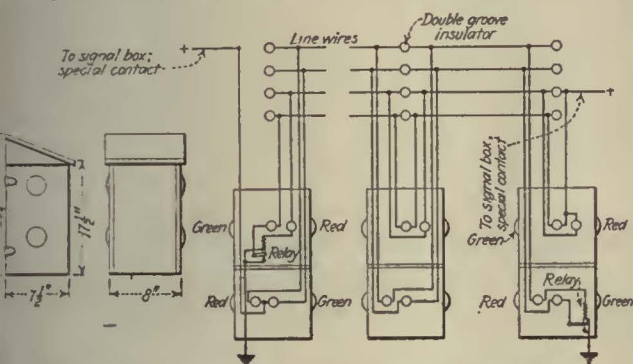
No. 1. Trial Installation of Concrete Ties on the Bangor Railway & Electric Company. No. 2. The Ties Are Made of Concrete Blocks Connected by Steel Rods. No. 3. The Special Spikes Used Are Made in Two Parts Held Together by a Cotter Pin

Chapman line on private right-of-way, under the supervision of E. W. Jennison, engineer maintenance of way. The ties are manufactured by the Maine Concrete Tie Corporation, Corinna, Me. They present a neat and attractive appearance, and so far as casual observations show, they make a track structure with about the same holding qualities as track built with wood ties.

### Duplicate Signal Protects Blind Curve

ON A DANGEROUS stretch of single track where there is a combination of blind curve and steep grade on the lines of the Androscoggin & Kennebec railway, Lewiston, Me., protection is afforded by a duplicate signal system. Several accidents have occurred at this point, and investigation showed that confusion existed at times in the matter of signals.

Chapman registering signals are standard on this railway. In the rush hours, however, trippers operate



Connections of End Signals and One Intermediate Signal



These Signals Duplicate Indications at Entrance to the Block

through this stretch of single track in groups of four or five. As these cars follow one another rapidly past the signal contactor it is difficult to tell whether all cars register properly. In case the last car fails to register, it is, of course, left unprotected in the block as soon as the preceding car has cleared the signal. Under these circumstances, the car on the single track being out of sight around the blind curve, an opposing car might enter the block.

To eliminate this danger the railway has installed auxiliary signal lights at two points on the curve. Each auxiliary signal contains a red and green light electrically connected to the main signal system. When the registering signals are set for an outbound car in the block, green lights show in the auxiliary signals. If a motorman has failed to set the signal when entering the block these lights will not be burning. If by chance he should be in the block running against an opposing signal the auxiliary lights will be red. In this way, motormen after entering the block are reminded of the signals and know whether they are proceeding in safety or not.

The signal boxes were built by the railway at the suggestion of the Chapman Company. There are four circuits in each box, two for each light. An arrangement has been made whereby a relay closes the second circuit if the first burns out. This installation has saved the necessity for double-tracking this portion of the line.

## The Readers' Forum

### Comment on Foreign Committee Report

THE INTERNATIONAL REGISTER COMPANY

CHICAGO, ILL., Oct. 23, 1924.

To the Committee:

Not until this morning have I had an opportunity of glancing at your report, but I have the very handsomely gotten up pamphlet reprinted from the *ELECTRIC RAILWAY JOURNAL* of Sept. 20, 1924, and I have spent an hour or more this morning glancing it over and am now starting on a thorough reading of it.

First of all, it is evident from your itinerary trip on page 114 that this was no junket, and you fellows surely did lay out a hard road to travel and evidently traveled it. It seems to me that this extended and complete report of yours is pretty nearly a classic and is something that is going to be read very carefully and sometimes several times over by those having any interest whatever in transportation problems.

I think you are to be congratulated most heartily on this most wonderful report. It shows not only the diligent study and careful inspection of what you saw but that you have the ability and have used that ability to put the facts before us in such readable form and yet so thoroughly condensed.

JOHN BENHAM,  
Vice-President.

From 300,000 to 400,000 miles without turning is obtained on the wheels of London Underground trailers by using "feroda" asbestos brake lining for the brakeshoes. Three or four layers of this material are bolted on to cast-iron backs held on the brakeshoe head in the usual way.

# Association News & Discussions

## New Englanders Resume Activities

The Program at Boston Last Week Featured Maintenance, Education and Bus Application

THE first meeting of the New England Street Railway Club this season, held on Oct. 30, attracted a large attendance on account of the diversity of topics included and the caliber of the speakers. Afternoon and evening sessions were held at the Copley Plaza Hotel, Boston, President Thomas Kendrigan being in the chair.

At the afternoon session W. C. Bolt, superintendent of rolling stock and shops Eastern Massachusetts Street Railway, Boston, presented a striking paper on "A Comparison of Maintenance Costs of Old and Modern Car Equipment," giving the results of the application of improved methods with increased production and lessened costs at the shops of this important system, and this was followed by a paper by H. N. Ransom of the Railway Improvement Company, New York, on "The Lubrication of Railway Motors." Abstracts of these papers appear elsewhere in this issue.

Following the usual dinner, Edward Dana, general manager Boston Elevated Railway and chairman of the educational committee of the A.E.R.A., gave a short talk on "Education"; A. E. Potter, president United Electric Railways, Providence, R. I., read an extended paper on "The Co-ordination of Motor Vehicle and Electric Railway Service by Electric Railways," and R. D. Hood, general manager Massachusetts Northeastern Street Railway, Haverhill, Mass., spoke on "Observations at the Recent A.E.R.A. Convention." Mr. Potter's paper is published in abstract on another page.

In his talk on education, Mr. Dana pointed out that through proper training in industry, many a "round peg can get out of a square hole" and find increased usefulness in congenial and well-fitted tasks. He outlined the work of the American Electric Railway Association during the past three years in the educational field and said that this movement, like the original "safety-first" movement, is slowly making headway but is surely gaining speed and scope. Many agencies are available to help utilities in this work, and some of the larger companies are big enough to set up their own educational activities. At present the success of a good deal of publicity work is spoiled by the ignorance of employees. The speaker paid a tribute to the pioneer work of the Milwaukee company and commended the educational activities of the operating organizations at Fort Worth, Tex.; San Francisco

and other places. He also referred to a useful pamphlet, printed by the A.E.R.A. educational committee, and entitled "Starting Educational Work on the Electric Railway."

Mr. Dana described briefly the work of the Boston company in the educational field. Several hundred men have taken courses under the auspices of the Massachusetts Department of University Extension during the past two years on the Boston system. This year 600 men are enrolled, and group conferences are planned at which talks will be given on various aspects of the company's departmental activities. Thus, in the maintenance group there will be a rolling stock session with talks on car-body painting and car repairs, and in the transportation de-

partment the fundamentals of operation will be set forth by qualified speakers. Each year in May there is a dinner at the end of the course, and the students have been addressed on these occasions by no less personages than the presidents of the Massachusetts Institute of Technology and Harvard University. The day will come, Mr. Dana said, when the Boston company will have its own educational director.

The educational committee does not propose to be a taskmaster to the industry, but merely to help in this work of organized instruction. In this connection Pennsylvania State College is preparing a practical, common-sense publication which will give in clear terms the fundamental economic principles of the public utility business.

## Reducing Maintenance Costs\*

Notable Savings in Cost and Greatly Increased Mileage per Pull-In Are Effected Through the Use of Modern Equipment

By W. C. BOLT

Superintendent of Rolling Stock and Shops  
Eastern Massachusetts Street Railway

THERE is a great difference between the service demands today and those of 10 years or even 5 years ago. Our standard of service efficiency has been greatly increased within recent years. We believe that on our property we have in a large measure met the new service demands of the riding public, and we are now able to operate approximately 1,700,000 electric railway passenger car-miles per month with approximately 100 car failures, resulting in car pull-ins.

It has become necessary in recent years to add a great many detailed equipment parts, including pneumatic door-operating equipment, folding doors, heat-regulating equipment, variable load brake equipment, destination signs, emergency air-brake equipment, air-sanding equipment, pneumatic snow scrapers, better lighting equipment, electric contactors and many other refinements. All of these parts necessarily require careful inspection, attention and maintenance. We cannot regard the cost of maintaining the modern car in the same light as the cost of maintaining the old simple car. It is wise business policy to provide each year some new equipment and replace old equipment which has become obsolete. Yet by scientific study the cost of maintaining our present modern cars has been reduced to a very low figure.

Our cost of car maintenance since 1918, in cents per revenue car-mile, is given in the accompanying table. This cost excludes all fixed charges, such as

depreciation and retirement of equipment, and represents only the following Interstate Commerce Commission accounts:

29—Superintendence of equipment
30—Maintenance of car bodies, trucks and air brake equipment
32—Maintenance of brakes and service cars
33—Maintenance of electrical equipment
34—Shop tools
37—Shop expense
39—Miscellaneous equipment

The average age of our car equipment, as of Jan. 1, 1920, was 12 years, some cars being 22 years old. The average age of our passenger equipment as of Jan. 1, 1924, was 7 years, there having been added to our complement of equipment within the last 4 years 225 safety cars and 75 double-truck, light-weight cars.

Our maintenance figures, as given in the table, include the cost of maintaining our rather extensive fleet of snow-fighting and service equipment, comprising 11 double-truck service cars and 114 snow-fighting units, of which 84 are double truck and 30 single truck. The expenditure for the year 1923, for instance, for rehabilitation of snow-fighting equipment was \$103,000.

We likewise include in these expenditures all indirect expense at our two major shops, such as services of watchmen, janitors, firemen, the expense of heating the shops, cost of a.c. power for operating machinery and the d.c. trolley power used in the shops on a basis of 2 cents per kilowatt-hour. The figures also include the cost of inspection of equipment at carhouses, some-

\*Abstract of paper presented at a meeting of the New England Street Railway Club, Boston, Mass., Oct. 30, 1924.

times charged to the operating group of expenditures. On the Eastern Massachusetts Street Railway this expense is considered a part of the maintenance of equipment group and represents approximately 0.7 cent per car-mile.

While the cost of maintaining our equipment as a whole is now 3½ cents per car-mile, we have some divisions where this cost is only 1.6 cents per car-mile. This figure, by the way, represents the actual cost of maintaining 10 standard Birney safety cars for a period of 44 months. These 10 cars during this period have made approximately 1,200,000 car-miles. Each car has had two complete shop overhauls and painting, one at the end of 60,000 car-miles and another at the end of 120,000 car-miles and each car is today in first-class mechanical condition. In other words, there is no deferred maintenance on these 10 cars. The cost of 1.6 cents per car-mile may be classified as follows:

Carhouse inspection labor per car.....	Cents 0.425
Replacement of rapidly wearing parts at carhouses.....	0.250
Shop expense, including overhaul and paint..	0.925

We define a car pull-in as "any car removed from service prior to completion of its regular prescribed run, for any mechanical or electrical failure." In July, 1920, we had 222 cases of air brake failures, 180 cases of controller failures, 339 cases of hot bearings, 101 cases of wire and cable failures, and numerous others, aggregating a total of maintenance pull-ins of 1,489, or a pull-in for every 1,400 miles. In September of this year we had a total of 104 car pull-ins, or one pull-in for every 14,500 miles. Even now we have a wide variation as between our several divisions. One of our larger divisions is now operating 75,000 car-miles for every car pull-in. These two illustrations clearly demonstrate the changed conditions. The table also gives the car-miles per maintenance pull-in from 1920 to date.

In July of 1920, when we operated a large proportion of old type equipment, we employed 346 so-called "carhouse employees," this representing one employee for every 6,000 passenger car-miles. At present our carhouse organization comprises 132 employees, or one employee for every 12,000 car-miles. Similarly at our major shops in July of 1920 we employed 447 employees, or one employee for every 4,700 passenger car-miles. Today we are employing 188, or at the rate of one employee for every 8,400 car-miles.

METER RECORDS AND OTHER IMPROVEMENTS

Early in 1921 it was decided to place our car maintenance on a systematic basis, and power meters were installed on each active car equipped with so-called "inspection dials." These inspection dials have materially assisted us in determining promptly and at minimum cost when individual cars become due for attention.

In 1921 we established a shop overhaul schedule of 30,000 car-miles. This was later increased to 45,000 car-miles. As rehabilitation of our equipment and

TABLE SHOWING DATA ON CAR MAINTENANCE, EASTERN MASSACHUSETTS STREET RAILWAY

	Total Charges to Car Maintenance, Exclusive of Depreciation and Obsolescence	Cost of Car Maintenance, Cents per Car-mile	Wage Level, Cents per Hour	Average Maintenance Pull-ins per Month	Car-Miles per Maintenance Pull-in
1918	\$1,361,000	5.02	37.0	.....	.....
1919	1,485,000	5.70	48.0	.....	.....
1920	1,418,000	6.20	58.0	1,203	1,550
1921	915,000	4.63	57.0	869	1,884
1922	857,000	4.42	54.5	414	4,035
1923	797,000	4.06	56.0	248	6,745
1924*	650,000	3.54	58.0	163	9,638

\* First nine months of year.

NOTE—Figures for car maintenance include cost of car overhauling and repainting.

materials of more suitable design and size were installed, the overhaul interval was later changed to 60,000 car-miles, and now all of our modern equipment cars are overhauled on a basis of 75,000 car-miles.

Our car maintenance today is carried out according to this schedule, and we are able through this means to maintain our equipment efficiently and at minimum cost. We have planned our work so that our organization is kept at a constant size, thus assuring the highest standard of work on the part of each workman. Each man is a specialist in his particular duties and he has no fears that he will shortly be without a job.

This plan has enabled us to reduce our carhouse requirements for small, rapidly wearing parts from a total of \$190,000 in 1921, or approximately 1 cent per car-mile, to \$87,000 for the year 1924, or less than ½ cent per car-mile.

Modern practice, together with modernization of equipment, has contributed largely to our substantial reduction in armature failures. In 1920 we were having armature failures at the rate of 500 per month. These failures were largely on motors of the old types, including GE-67, GE-80, GE-57 and GE-1,000, these representing 12 per cent of the total motors in service which failed during the one month period. At present our failures aggregate 65 or 70 per month, or 1.7 per cent of the total in service.

In 1920 we operated less than 5,000 car-miles per armature failure. Now we operate approximately 30,000 miles per armature failure, and this record could be substantially increased if these failures should be burdensome. It still is our practice, however, to run some of our armatures to the point of breakdown, thus securing maximum life of the armature winding. Every armature on our property is dipped and baked and thoroughly tested every 60,000 or 75,000 car-miles, and this procedure has very materially reduced our armature troubles.

Similarly, thorough examination, testing, dipping and baking of field coils every 75,000 car-miles has reduced our field coil failures from some odd 300 per month in 1920 to practically 100 per cent performance. As a matter of fact, we have not purchased any new field coils for some two or three years.

Modernization of our air brake equipment has produced results. In

1920 we had an average of 80 AA1 air armature failures per month, this representing approximately 12 per cent of the total number of AA1 air compressors in service. Today an air motor armature failure is practically unknown.

Substantial progress has been made in the matter of car lubrication. In 1920, with a larger proportion of old type equipment, we were using at the rate of from one to 1½ gal. of car oil per 1,000 car-miles. We are now using less than ½ gal. of car oil per 1,000 car-miles. I think, however, that our lubrication methods are still crude and that further progress can be made in this direction, not only for savings in oils and greases, but also in bearings themselves. Dust and dirt today are responsible for a great deal of wear in armature and axle bearings, and as soon as bearing housings are so constructed as to keep dirt and grit from getting into the wearing surfaces further savings will be possible, this affecting not alone oil and bearings, but also the rotating shafts. When this has been accomplished, we may expect perhaps 150,000 or 300,000 car-miles per set of axle and armature bearings, as distinguished from the 75,000 car-miles which we are now securing on our modern motors.

To overcome frequent resistance failures on our safety cars we have, within the past two years, installed the resistance on the roof of the car, and during the past winter we had no resistance trouble on cars which had been so arranged.

We believe in frequently repainting our cars, but by the paint-spraying system our repainting costs have been substantially reduced. We have always felt that the light yellow color with which our cars were painted has made the cars easily visible and has had a tendency of avoiding a great many accidents.

Within the past year we have removed cumbersome draw bar and fender apparatus from our cars. This has tended to eliminate at least some of the ordinary rattles and has also saved some weight.

Welding equipment has played an important part in our campaign of cost reduction. Many equipment parts are constantly being repaired and the purchase of new parts has been avoided. A great deal of welding has been done on our car trucks, so that they now operate with less noise and rattle than heretofore.

DOUBLE-TRUCK, LIGHT-WEIGHT CAR

This discussion would not be complete without mention of the so-called "double-truck, light-weight car." We cannot always justify the purchase of new equipment entirely through anticipated savings in the cost of maintenance. This is particularly true with light-weight cars. While some savings in maintenance may be expected, the larger savings accrue from reduction in power consumption and the lessened wear and tear on tracks. The latter two items of saving should easily pay for the fixed charges on the new investment. Our records indicate that the total cost of maintaining a double-truck, light-weight car, weighing per-

haps 32,000 lb. and equipped with four 25-hp. motors, together with all of the other modern appurtenances, would be in the neighborhood of 2 cents per car-mile for the first 100,000 car-miles. This figure would include the reconditioning of each car at the end of this mileage interval. If we did not include the cost of reconditioning, the cost would be approximately 1.2 cents. During the second cycle of 100,000 car-

miles this cost would be slightly increased.

I attribute the success of the Eastern Massachusetts Street Railway and its present wonderful financial stability in no small part to the savings made in our maintenance of equipment as outlined. Modern equipment systematically maintained will result in efficient and uninterrupted service to the public and in low cost of maintenance.

## Seven Kinds of Bus Operation\*

United Electric Railways of Providence Has Already Undertaken Five Different Classes of Service—Direct Profit Is Not Expected—Chartered Buses Are Good Revenue Producers

By A. E. POTTER

President United Electric Railways, Providence, R. I.

WHEN the United Electric Railways formulated a program for the operation of buses it had seven plans of operation in view. The transportation system in Providence radiates from the center of the city like the spokes of a wheel, with Pawtucket and Woonsocket lying to the north and having similar radiating lines. Cranston is to the south and Arctic and the rest of the Pawtucket Valley to the southwest.

Plan No. 1 was to provide both local and express service, either the buses furnishing the local service and the electric cars running express, or vice versa. This method has been adopted on Broadway between the center of Providence and Olneyville Square. [See ELECTRIC RAILWAY JOURNAL for March 15, 1924.] The Broadway bus line shows earnings of 36.02 per cent per bus-mile for the nine months ended Sept. 30, 1924, and indicates what may be expected of bus operation on lines where there is some density of traffic.

Operation of cars running local between Providence and Pawtucket and buses running express was also considered. Pawtucket is a community of some 75,000 people, lying about 4 miles to the north of Providence. The reasons for considering a different arrangement were that the car lines between Providence and Pawtucket terminate in Pawtucket, and that four car lines operate to Pawtucket, branching out in four directions after leaving Providence. It was planned to reverse the Broadway operation and run the electric cars local and the buses express. Nothing has been done in inaugurating this type of service because part of the highway over which the electric cars operate has been widened and passing tracks installed and express electric car service established. [See ELECTRIC RAILWAY JOURNAL, July 12, 1924, page 45.]

Plan No. 2 was to provide direct interurban limited stop express bus service or to supplement electric car service on high-speed interurban lines which stop only at stations. A direct limited-stop express service has been put into operation, known as the Arctic bus line. Arctic is a community in the center of a mill settlement of more than 15,000 inhabitants, approximately

10 miles from Providence. There are also other settlements along the car line between Providence and Arctic, and to serve these other settlements the line takes a somewhat circuitous route. This is shown by the fact that the running time of the car is 70 minutes, against 40 minutes for the express bus.

There are independent jitneys operating on this line, this time being the one instance where the Public Utilities Commission granted the petition of several jitney operators for certificates of necessity. The decision was based on the fact that this route paralleled no tracks and the jitney route was established before the United Electric Railways began bus operation.

At first a street car type bus was operated. However, on March 4, 1924, three parlor car buses were put into operation and the patronage on this line increased considerably in a short time. But the mill depression, which has been particularly severe in Arctic and the vicinity, has of course been reflected in the revenue. Recently some of the independent operators who had been operating built-over touring cars have substituted 20-passenger buses. This bus line, with earnings of 24.22 cents per bus-mile for the nine months ended Sept. 30, 1924, should be one of the best paying bus lines operated by the company, and would be were it not for the fact that jitneys leave just ahead of the buses of the railways. There does not seem to be sufficient business for all and it is a question which can survive the longer.

The United Electric Railways is operating buses to supplement its car service on a high-speed interurban line between Providence and Oakland Beach, approximately 12 miles in length. The car line operates for a great part of the distance over a private right-of-way and stops only at stations. There are, however, scattered colonies along the line and in many instances a walk of a mile or more is necessary to reach a station. This bus line parallels the car line, following the state road, and passes through the several scattered colonies which are not served by the high-speed electric car line, cutting across country and crossing the electric car line at three points. Buses stop on signal. The colonies along both these lines are essentially summer resorts and in the winter both car and bus service is considerably reduced.

This bus line for the nine months ended Sept. 30, 1924, earned only 24.50 cents per bus-mile and should not be operated in the winter months except for the fact that it serves territories that are more or less remote from the trolley stations. In the summer it shows earnings in excess of 32 cents per mile.

Plan No. 3 was to furnish auxiliary service on heavy riding car lines. This type of operation has not been put into effect although it has been considered. Such lines may be relieved in the downtown congestion by supplementing the car service with bus service and using streets for loading where there are no tracks.

Plan No. 4 was to furnish auxiliary bus service on lines where the present car service has outgrown the existing turnouts, and where the street is not sufficiently wide to permit of double-tracking. As yet nothing definite has been done by the company in carrying out this program, although it has been considered in connection with two single-track lines on which it was becoming difficult to operate cars on schedule during the rush hour. The business depression, however, has lightened the traffic on these lines to such an extent that for the present it is not necessary to consider bus operation.

Plan No. 5 was to replace suburban car service with bus service where such lines are not earning sufficient revenue to take care of construction and renewal charges of track, overhead lines and substations. The United Electric Railways' greatest development in the bus field will shortly be in operating buses where car service has been abandoned. As an illustration of such operation the Pawtucket-Lakewood line, slightly more than a mile in length and connecting the end of one line 5 miles out of Providence with a point about 5 miles out on another line 13 miles long, never paid the full cost of operation. The tracks for a part of the route were along the state highway and the State Board of Public Roads notified the company that the state intended to rebuild the highway. This would have necessitated renewing a portion of the track, at a cost in excess of the price of a modern 29-passenger bus. Accordingly, the company took up its track and substituted bus operation, thus reducing the losses on this line. This bus line earns only 5.50 cents per bus-mile.

Car service will be abandoned shortly on the Woonsocket-Nanville line, approximately 6 miles in length. The line is a rather circuitous route, with a mileage of 5.93 against 3.40 for the bus. Permission has been obtained for the operation of this line, but the company has been waiting for the highway over the proposed route to be rebuilt.

Two other suburban lines, the Providence-North Scituate and the Barrington-Warren and Bristol, have operated at a heavy loss for some time. Buses are now on order for operation on these lines and deliveries are expected early in November. As soon as the buses arrive operation will be started.

Plan No. 6 was to provide feeder bus service in territories which have no car facilities, but which are not sufficiently developed to warrant the capital expenditures necessary for track and over-

\*Abstract of a paper before the New England Street Railway Club, Boston, Mass., Oct. 30, 1924.

head lines. One such bus line, the Pawtuxet-Warwick Downs, is in operation. It is approximately 14 miles in length and serves a summer colony. Only a few trips night and morning are run in the winter, although all-day service is given in the summer. Previous to inauguration of bus service, the residents had no transportation service whatsoever, either summer or winter, except what they could provide for themselves. This bus line showed earnings of 12.02 cents per bus-mile for the nine months ended Sept. 30, 1924, although in the summer months it shows earnings of about 20 cents per bus-mile.

Plan No. 7 was to provide crosstown bus service to connect up existing car lines or to provide a means of transportation between two or more communities each in the same section of the city where there is a community interest, but which communities cannot be reached by cars except by taking a roundabout way through the center of the city. One such bus line is in operation in the outer district of Providence, known as the Olneyville-Eddy Street crosstown line. It is located about 2 miles outside the business center of Providence and operates from Olneyville to Eddy Street, a distance of 2½ miles. It crosses six existing car lines and connects with a car line at each terminus of the line. At both termini of the line there are a number of mills and factories. Many of the workers in these mills and factories live along this bus route or continue their journey on one of the electric car lines which the bus route crosses or connects with. Transfers are issued to and from the electric cars and buses on this particular operation. The line for the nine months ended Sept. 30, 1924, shows average earnings of 31.12 cents per bus-mile.

The United Electric Railways has not found that the bus business is profitable, as is indicated by the earnings on the lines as a whole. The Broadway bus line and the Eddy Street crosstown bus line are more than meeting the cost of operation. Other of the bus lines are not meeting the cost of service, nor was it expected that they would at the time they were inaugurated. The Pawtuxet-Warwick Downs, Providence-Oakland Beach and Providence-Arctic lines were put on to serve territory that was not served by the cars or that could be served better by buses. The Scituate and Barrington-Warren and Bristol bus operation is to be operated to reduce the losses due to heavy track maintenance.

The company has just offered some of its bus equipment for special or chartered bus service. It was believed that spare bus equipment might be profitably used for this type of service and this belief is borne out by the fact that in the month of September, 1924, the earnings were 83.15 cents per bus-mile. However, due to the irregularity of the demand for this service, the investment charges for equipment used in this service would be excessive were it not for the fact that this extra equipment is used from time to time in regular service.

Most of the non-paying bus lines and car lines act as feeders to the rest of the system, so that the car rider on the

profitable lines is not actually obliged to pay any substantial sum on account of the rider on the unprofitable lines. Provided the operation of these non-paying car and bus lines is not over-

done, it constitutes one of the advantages to the car rider and the community of a unified system of transportation, with a co-ordination of electric car service and bus service.

## Obtaining Longer Life from Motor Bearings\*

Important Maintenance Considerations Include Keeping Bearings Tight in Housings or Motor Frames, Keeping Out Dirt and Water and Providing a Moving Oil Film in Bearings

BY H. N. RANSOM

Sales Manager Railway Improvement Company, New York, N. Y.

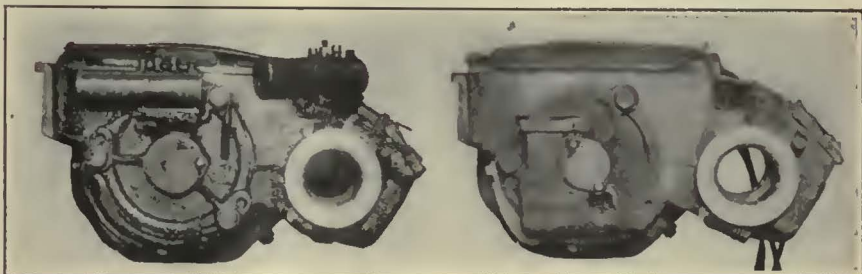
AT THE recent convention of the A. E. R. A. at Atlantic City, I was admiring the bearings of a railway motor and I asked the designing engineer this question: "If that motor was operating under load in this clean hall, and a can of oil was suspended over it, dropping oil every few seconds into the bearing housings, how long do you think the motor would run?" His answer was: "Longer than you and I will live."

When I inspected another exhibit showing a side roller bearing, I was told by the engineer that they did not

must be O. K., and not just two of them.

Careful attention is given to the armature bearings of railway motors due to the fact that the air gap tells the story, and it costs big money if the armature goes down on the pole faces; but how about the wear on axle bearings? Are they given the same care and attention?

The gear and pinion manufacturer has a perfect right to expect his gears and pinions to be operated within a safe margin for clearances of bearing wear. Loose axle bearings are as dan-



At Left, New Design of Axle Cap with Bearings Turned to Use a Solid Lower Half. At Right, Original Axle Bearing Arrangement

lubricate these bearings, due to the fact that oil or grease would collect dirt and grind the bearings out.

We all know that power-house apparatus and all types of stationary motors will run for years, and the bearings never seem to wear out. Last week I saw such a motor that had been in operation more than 20 years. If any engineer is asked why these bearings last longer than railway motor bearings, the answer always is: "Look where the car motor operates in all the dirt and water." If that is so, then how are the excellent results that are obtained from the bearings in air compressors accounted for? They are subject to exactly the same conditions as a railway motor. Why should one big railway spend in one year for motor bearings \$22,300 and use only six bearings in its air compressors?

Did you ever stop to think that the four bearings in your motors must be true and the clearances held to a minimum so that motor axle and shaft will be in line and operate under the conditions for which the engineers design it? There are four bearings in the transmission case of your automobile, and you all realize that all these bear-

gerous to gears and pinions as are loose armature bearings. From a half to two-thirds of the mileage of motors is lost by axles and shafts being out of proper alignment.

You are all 100 per cent on dipping and baking. Then why lose the good from such a process by allowing a hammer blow that will take place when the gear and pinion are not properly in mesh? These blows will loosen any armature coil and reduce the benefits from dipping and baking. I would suggest that you take your shop men out in one of your cars, operate it on a hilly route, open up the trapdoors, remove the gear case and watch what happens when the axle bearings and caps are worn and loose. An object lesson of this nature is often worth hours of talk.

Motors are manufactured with a clearance between the shafts and bearings to take care of metal expansion and to allow room for the oil. An armature shaft does not revolve on a bearing. It revolves on a sleeve of oil that in reality can be considered as a liquid bearing. How wonderful it would be if some one discovered a process whereby you could pour metal in a housing and form a new bearing without the great expense that is necessary to bring the motor into the shop and

\*Abstract of a paper before the New England Street Railway Club, Boston, Mass., Oct. 30, 1924.

open it up. In one sense that is just what can be done with oil, if the sleeve of oil is not broken or destroyed by water. The oil sleeve keeps the shaft off of the bearing, and it is cheaper to wear out the oil than the bearing. To obtain maximum bearing wear, this sleeve of oil must be maintained and the shaft protected from pounding and wheel wash.

If you take a motor with an extended armature shaft and slip on an extra bearing, you can hold this bearing in your hands with the motor in operation, if the bearing is lubricated. If water is poured in this bearing the twist will tear it from your grip. That is exactly what occurs in a motor when water enters the bearing, as the condition of the key, dowel pins and holes all goes to prove. These bearings are allowed to twist themselves loose and naturally wear on the outside, and also wear the frames or heads as well as the axle caps.

be correct and held so, which will eliminate the use of keys in armature bearings. I know of hundreds of motors that are in operation that do not depend on keys to hold their bearings in the housings. The next time it is necessary to remove a bearing from a housing, record the pressure required and check this against the pressure the manufacturer used when the motor was assembled. I believe it is around 4 to 5 tons.

You are all welding and know you are saving money, and how essential your welding outfit is to your shop. Then why not weld and bore your motor frames and axle caps? Is it that you cannot afford to bore, since the welding is not expensive? Welding and boring cost less per motor than a set of new bearings, as is shown by a road that has just finished boring and welding 8,000 motors. Its record shows the bearing life has been tripled. You can also save pounds of metal in your

saved, and remember that in the late type of motors with oil wells the waste window will only lift oil 3 in. There is a difference in the feed of oil to the shaft of 8 to 1 when oil in the window is lowered an inch. Many of the roads change from summer to winter grade of oil to counteract the change in temperature, but forget that a motor is subject to both electrical and mechanical heat. Heavy grades, trailers, and short circuits and stuck brushes will cause a variation of the motor temperature far greater than winter to summer climate conditions. It is most essential, if you wish to retain your sleeve of oil, to have oil in the bearing and not in your store room. Any bearing that shows oil coming out of the end is being well lubricated, and water cannot enter.

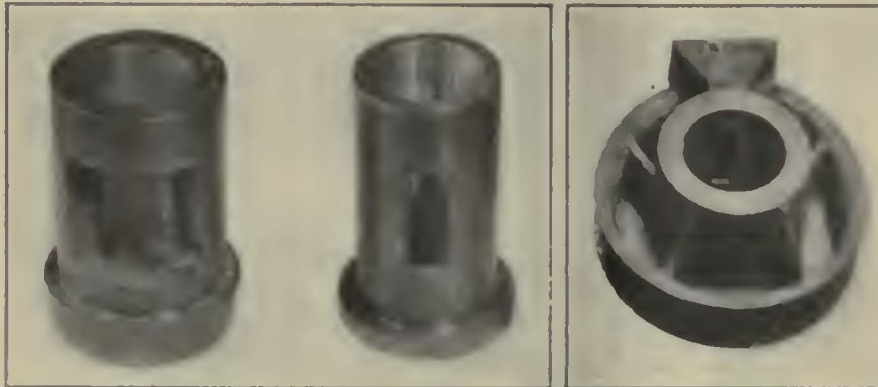
### Dr. de Ferranti Honored

**A**LUNCHEON was given at the Yale Club in New York, on Nov. 15, by the Founders' Societies in honor of Dr. S. Z. de Ferranti. John W. Lieb, vice-president New York Edison Company, acted as toastmaster and presided over the hand of professional fellowship and greeting to the guest of honor and spoke in a most complimentary way of his genius, broad vision and extraordinary ability as an engineer.

Dr. de Ferranti is president of Ferranti, Ltd., England, and one of the world's best-known engineers. He was one of the first to see the field of central power station, and he has been the inventor and the first to demonstrate the use of many of the developments which can be said to be responsible for the tremendous growth of the use of electricity. He is a past-president of the Institution of Electrical Engineers of Great Britain, a member of the English civil and mechanical societies, and an honorary member of the American Institute of Electrical Engineers.

Mr. Lieb called upon Fred R. Loring, editor of *Power* and president of the American Society of Mechanical Engineers; Alex Dow, president Detroit Edison Company and representing the American Society of Civil Engineers; J. V. W. Rinder, president-elect of the American Institute of Metallurgists and Mining Engineers, and Calver Townley, past-president of the American Institute of Electrical Engineers, who expressed the felicitations and welcome of the four founder societies.

Dr. Ferranti responded. He showed his broad concept of the engineering profession when he said that engineering is the accomplishment of great things for the benefit of the community. Engineers work to do these things on such a scale and at such a cost that they can become available to the people. He considered electricity as the greatest of labor savers and that it is of the greatest possible good to the whole of the people of any of the engineering products. He felt that there was nothing more worth while than to pursue its ultimate development. He reminisced on some of the original problems that he had had to work out in the very early stages of electricity supply in London and was greatly interested his audience of 100 admirers. But he said the field is open for development is even greater than the accomplishments already made.



A New Design for the Housing Has Permitted the Use of Bearings with Reduced Size of Windows. No Keys Are Required to Hold the Bearings and Larger Bearing Surface Is Obtained. At Left, Old Bearing. In Center, New Type. At Right, Housing Without Keys to Hold Bearing

When new motors are put in service, the first bearing mileage is tremendous. After replacing the bearings the mileage from the second lot is hardly a quarter of that obtained from the original, because these are not held tightly in the motor frames or housings. Water enters the bearings and the shafts pound, which results in destroying the sleeve of oil that the shaft is supposed to run on.

As the clearance in the frames or housings increases some try to correct it by the use of shims. The wear that has taken place is not even, consequently it is practically impossible to obtain a perfect fit for a bearing by the use of shims. This also applies to shimming of housings in motor frames. More bearings and housings are ruined from this cause than any other. If you will spin your motors with power when assembled, you will be in a position to judge whether the bearings are pinching or not, and it is far cheaper than having the car sent back to your shop with a hot bearing.

If a motor is worth a set of new bearings, it should be put in condition to receive these bearings. When you changed from split to solid gears, you depended upon a key for safety. Today you know that with a proper fit the key is not necessary. The same principle applies to a bearing in a housing. If the waste window is not too large, the bearing will not buckle when pressed in the housing and the fit can

bearings, as many of the old motors have bearings that will permit a cut in weight of nearly 50 per cent. You can also reduce the size of the waste window in both armature and axle bearings, which gives more metal to run on. A road operating high-speed service and using 7½-in. axles, by welding has been able to turn the bearings in the caps and use a solid lower half. The upper half is practically solid as only a 2-in. hole for the waste to come in contact with the axle is used, and as this hole is at the top the pounding really holds the waste to the axle and does not cause it to sag or drop away. This road is obtaining six times the previous life of its axle bearings.

I realize that most of the roads have specifications that call for well-chamfered bearings at the waste windows, but there are many bearings the edges of which are entirely too sharp, and I believe that it would be wise to have your men check this before the bearings are put in motors. A very good way to impress your men in regard to this point is to take a top feed motor and use a bearing properly chamfered on one side and one having sharp edges on the other. See that the clearances are kept to the minimum. Remove the waste and put in a cup of oil in each housing. On one side the oil will disappear around the bearing, while on the other it will be thrown out of the housing.

Use good wool waste. It's money



## American Association News

### Obstruction Is Necessary to Real Progress\*

At the Risk of Being Considered Reactionary Railway Men in New England Oppose Bus Operation Where This Would Duplicate Existing Service

BY ROBERT H. NEWCOMB

Assistant to the Vice-President New York, New Haven & Hartford Railroad

WITHIN the past few years there has grown up in New England a new form of transportation, the value of which, in many cases, is very doubtful and the permanence of which is even more open to question. This development first confined itself to the carriage of freight over highways in motor trucks, but more recently the passenger bus has been added. The tremendous pressure of business incident to the World War was largely responsible for the first. It is probable that the activities of the bus builders are responsible for the great recent growth of the second.

If this development has come to stay, and apparently to some degree it has, then, in all fairness to every one, motor vehicles should be subject to the same regulations as are the railroads, and should show before they are allowed to operate that public convenience and necessity are to be served by their introduction. Anything less than this is unfair to the older forms of transportation. This applies with equal force to the steam railroads and to the electric street railways. Both existing forms of transportation face the same results if unregulated competition is allowed to continue. Both work under franchises which have great value and the maintenance of service under these franchises is of supreme importance to the people of New England. If, then, we are to have a third factor introduced into the problem of transportation, surely that factor should be limited and controlled as are the two others.

The present situation in Massachusetts demands attention. Too much leeway is permitted the bus and too little regulation covers its operation. In fact, there is no regulation whatever. Beyond securing a local license nothing is required in Massachusetts. It is significant that failure to secure a local license has seldom acted as a deterrent. The situation in Rhode Island and Connecticut is better. In those states it is necessary to secure a certificate of convenience and necessity before a license to operate is obtained. It is not at all clear, however, that even there the commissions have deemed it best to prescribe rates, routes and service to the extent that these are prescribed for street railways and railroads. As far as it goes, therefore, regulation in Rhode Island and Connecticut is sound.

Recently a new angle has been added

\*Abstract of a paper presented before the company section meeting of the United Electric Railways, Providence, R. I., Oct. 1, 1924.

to the problem. It is now being contended that where a bus line operates between cities in different states neither state has authority over its operation. No state can prohibit or unduly restrict interstate business, but surely each state may exercise its authority over the use and abuse of its highly extensive road system. If the reasoning of the bus men is sound, then no commission or legislature has authority over local railroad service, nor the right to issue charters and enact laws governing transportation agencies which cross state lines. In a community of short distances like New England any such rule becomes absurd.

If there is any railroad man who thinks that the passenger bus can be abolished he certainly is suffering from a condition which is likely to prove fatal to his employment. We must concede that the bus is here to stay. Our problem is to find a way to co-operate with it and to secure a condition which will place all carriers on the same footing. In the course of this last effort it will probably be inevitable that the railroads appear to be standing in the way of progress. As a matter of fact this is not at all what the railroads propose. But unlimited and unrestricted free use of the highways to the injury of all concerned is not necessarily progress. It may mark an increase in bus output at the factory, and it may be progressive when viewed from a salesman's standpoint alone. Present conditions, however, do not, and never can, make for permanent progress. Progress is not a selfish thing. The present situation has selfishness for its only excuse.

At the risk, therefore, of temporary misunderstanding it will be the policy of the New England railroads to tell the truth about the situation. Where buses operate in territory adequately served by present facilities objection to their continuing will be raised and insisted upon. If they are allowed to skim the cream of the income, then existing service will have to be reduced. This is not said as a threat. It is a statement of simple business law. No manufacturer can go on indefinitely producing a product for which there is no sale.

So long as a good sized slice of the taxes paid by the railroads is spent to maintain highways which are free to buses and trucks in competition with those railroads, just so long will the railroads persist in an effort to have the tax situation corrected and the bus and truck contribute their fair share of the general burden. So long as the railroads are supervised by public serv-

ice commissions, regulated as to rates, service, and the like, then just so long will the railroads strive to have exactly the same supervision and regulation extended to buses and trucks. To combat the situation the railroads stand united. Progress to be permanently beneficial must be based on fairness to all, and not on the selfish interests of the few.

### "Shop Early" Campaign Renewed

SO SUCCESSFUL was the industry in the use last year during the holidays of the "Shop More from 10 to 4" posters that the committee on publicity has recommended that a more intensive campaign be made this year to encourage off-peak-hour shopping.

Therefore, the "Shop More" poster used last year has been revised so that it appears in more striking colors. This poster can be obtained from association headquarters in New York in the form of gummed stickers, window posters, window cards for stores and single, double and three-column mats for use in newspaper ads.

Many companies which used these posters last year state that they found it very easy to obtain the co-operation of merchants in this shop-early effort. Experience has shown that once it is made clear to the merchants that it is as much to their advantage as it is to the street car companies to scatter the traffic throughout the day, they are willing to lend their aid.

### Special Reports Available

THE Bureau of Information and Service of the American Electric Railway Association announces that the following special reports have been prepared and are available to member companies in good standing upon request:

*Customer and Employee Ownership of Electric Railway Securities:* Gives summarized accounts of campaigns by exclusively electric railway companies to sell their securities to their employees and the local public, including data on amount of securities sold, number of new security holders obtained, methods of conducting campaign, samples of publicity work, cost of selling campaign and opinions of executives as to the benefits derived.

*Transportation Service by Motor Bus Lines:* Results of an investigation made to determine the kind of transportation service, if any, now being given in territories where electric railways have completely abandoned service.

*Wages of Employees Other than Trainmen:* Compilation based on the reports of about 175 companies showing their classifications of employees and the wages paid in their shop, car-house, way and structure, power, overhead line and storage departments.

*Series of Charts Illustrating Developments in Electric Railway Industry:* Reproductions of charts first exhibited at the Atlantic City convention covering growth of electric railway riding habit, effect of automobile operations on electric railway traffic, recent trend of electric railway traffic and trend of revenues, expenses, wages and fares.

In addition to the above, supplements to the wage bulletin, fare bulletin and the cost of living studies have been prepared, bringing them down to date.

# Maintenance of Equipment

## Roof Mounting of Motor Resistors

By H. T. HURLOCK

Engineer of Rolling Stock and Shops,  
Eastern Massachusetts Street Railway,  
Boston, Mass.

THE mounting of motor resistors beneath the car body is generally recognized as good practice and under ordinary conditions proves quite satisfactory. The single-truck Birney cars on this property, however, have been exceptions.

The only available location for the resistors on this type of car was under the platform, where the necessary protection against dirt and water could not be obtained even with a generous application of splash guards. During the winter, the undersides of these cars became thoroughly saturated with water and a most careful installation did not prevent the frames from grounding. Because of low floors, the resistors were necessarily close to the street, and being located at the front end it was not uncommon to have the light-weight grids broken by stones or covered with ice and snow. Of the 154 Birney cars operated in the



Resistor Installed on Roof of Car

territory north of Boston during the winter season of 1922-1923, 84 were removed from service for resistance trouble, which constituted the largest cause for pull-ins on cars of this type.

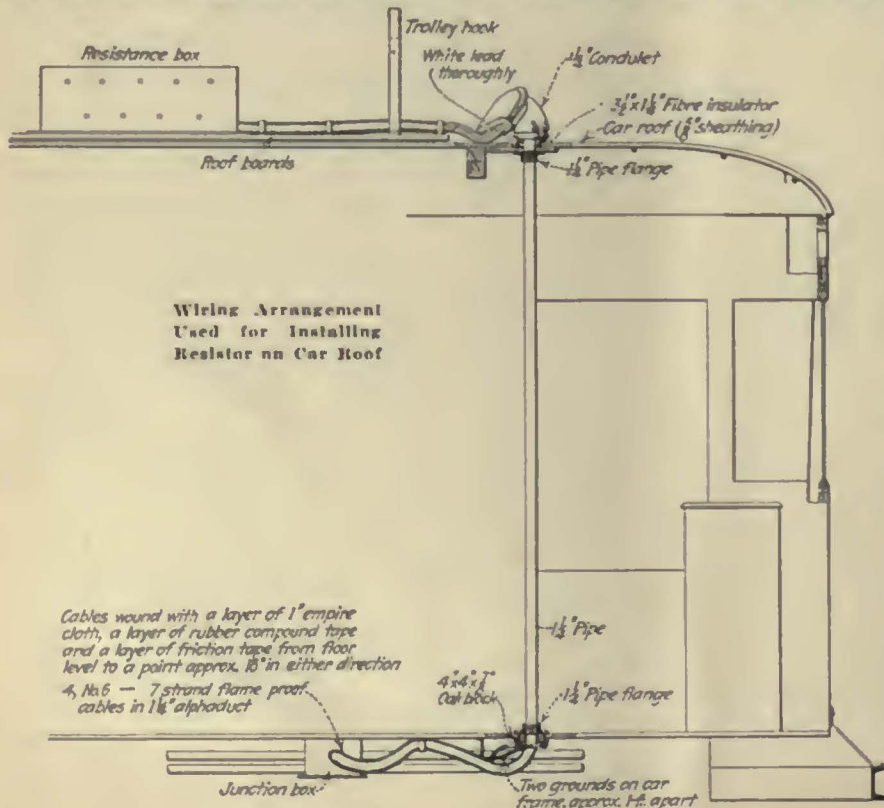
As a result, it was decided to locate the motor resistors on the roof. Five experimental cars were placed in service for several months, and the improvement shown was so great that plans are under way to make the installation on some 225 cars. To date 150 cars have been modified, and over an average period of six months there has been but one resistance failure and that due to breakage from vibration.

It was realized that an additional fire hazard was introduced by locat-

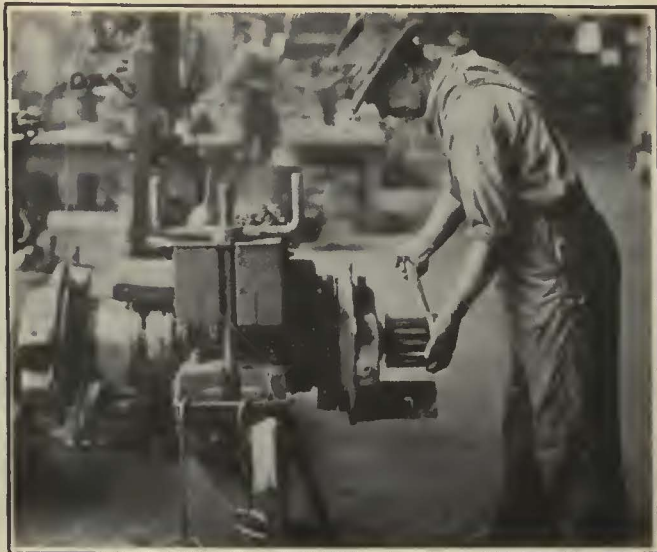
ing the resistors on the car roof. For this reason special precautions were taken to make the installation fireproof. The single frame is totally inclosed in a box of asbestos lumber, perforated with 1-in. holes for ventilation. The top and sides are held together by iron straps and hinged at the rear, permitting the box to be raised for inspection. The resistance leads are conveyed to the roof in a 1½-in. iron conduit and brought out at the top through an inverted type conduit. The conduit itself is thoroughly grounded to protect passengers. It is separated from the roof conduit by a 1½-in. fiber bushing. The arrangement prevents water from entering the conduit and at the same time eliminates the possibility of fire due to the trolley wire coming in contact with the metal roof conduit. Flameproof wire is used for the resistance leads.

## Air-Operated Arbor Press Makes Handy Shop Tool

AN OLD hand-operated arbor press, equipped with an air-operating cylinder in the mechanical department shops of the Twin City Rapid Transit Company, has been found to make a very handy ma-



An Old Brake Cylinder Mounted on an Arbor Press Makes a Very Handy Machine Tool in the Shops of the Twin City Rapid Transit Company



At Left—The Armature Clamp Is Hinged at One Side and Is Pulled Down Tight by Means of a Large Wing Nut. At Right—With the Armature Held Securely in the Clamp, One Man Easily Loosens the Nut or Removes Pinions Without Any Assistance

chine tool for a number of common electric railway shop uses.

This outfit is mounted on the end of the bed of a large lathe in the machine shop, where it is convenient for use on many of the jobs going through this department. The air cylinder is pivoted at the rear of the machine, and the power is transmitted to the spindle by means of an overhead lever. A large nut on the threaded upper portion of the spindle forms a stop and limits its travel to any predetermined amount.

For many drifting operations, such as that of drifting the holes in copper rail bonds, for pressing in and out brake-rigging bushings, and for other similar work, this simple home-made outfit has been found extremely useful and efficient.

### Wood Clamp for Holding Armatures

WHEN it is necessary to loosen the pinion nut for removing the pinion on an armature, a split block is used in the shops of the Kansas City Railways to hold the armature securely, so as to insure against any damage from rubbing or other cause while the nut is being taken off. This is a very simple rig, but it avoids possible damage to armatures.

The block is shown in the accompanying illustrations, both in open and closed positions. It clamps down on the laminations, holds the armature securely, and does not damage the coils. By holding the armature in this way one man changes pinions without any assistance.

As shown in the illustration, the

block is made up of heavy timbers formed for holding the armature between the two halves. For smaller armatures, a filler block is inserted to give the desired clamping effect.

### Automatic Lamp Control Saves Power\*

IN SPARSELY settled territory along the route of the San Francisco-Sacramento Railroad there are numerous small shelter stations in

\*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

the vicinity of which the company has no agent. In order that these stations should be adequately lighted when passengers are boarding or alighting from trains, it was customary to keep the lamps burning continuously. Recently, however, the railway has connected these station lamps to the block signal system in such a way that they are lighted only when the train is within 3 miles of the station coming or going. This has saved a considerable amount of power during the night when there are few trains on the line, and has also had a tendency to prolong the life of lamps. Similarly, the block signals themselves have been arranged so that they are now lighted only one block ahead of the approaching train.



On the San Francisco-Sacramento Railroad Signals of This Type Are Lighted Only in the Block Immediately Ahead of an Approaching Train

### Testing Contactor Mechanisms

A CONVENIENT method of testing various parts of control contactor mechanisms has been worked out in the Wheaton shop of the Chicago, Aurora & Elgin Railroad with the result that irregularities in the contactor operation are discovered and remedied before the mechanism is placed in service. The apparatus consists of a rack from which hang the three types of stationary contactor parts used by this property, including the magnet coil, arc chute, and framework for receiving the movable mechanism. The magnet coils are hooked up in parallel and are connected to a 220-volt d.c. line from the shop switchboard. By means of a switch located on a board back of the test rack,

any one of the magnet coils may be put in service.

The mechanism to be tested is attached to the stationary coil in much the same manner as it would be under a car. By making and breaking the connection to the magnet coil, it is possible to "pick up" or "drop out" the contactor armature upon which is mounted the contactor tip. In case of failure to operate the necessary adjustments or repairs are made to the movable mechanism.

The supporting bracket is made of 1-in. x 1½-in. steel held in position by a light framework at each end. Each stationary mechanism is labeled with the type of control system to which it belongs, thus facilitating the work of testing.

## New Equipment Available

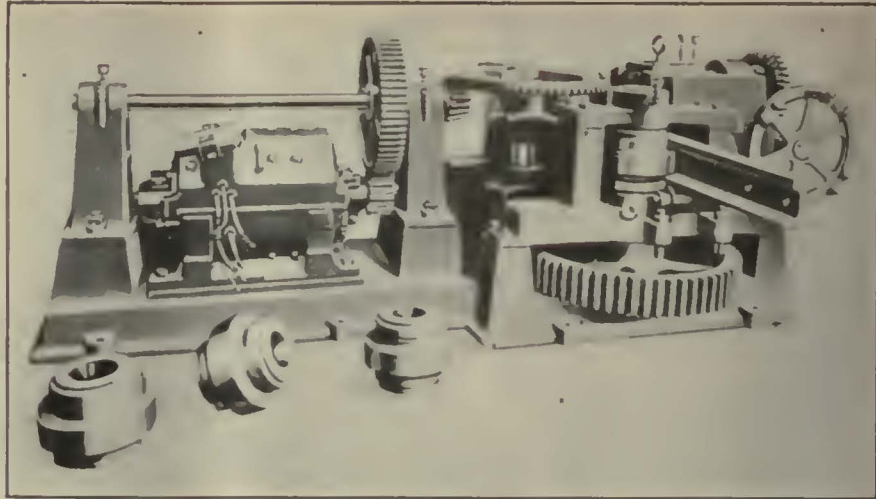
### Improved Power Rail Bender

**A**N IMPROVEMENT to its former type of power-driven rail bender has recently been put on the market by the Watson-Stillman Company, New York. This improved type apparatus will not only bend rails to any desired radius but it can be used also to straighten curved rails.

In operation three rolls fitting the section of rail are used. Two gear-driven feed rolls are spaced 32 in. apart center to center. The third or center roll is forced against the rail by two large screws operated by hand wheels, the position of this roll determining the curvature. The rails are passed back and forth between the rolls by using a reversible motor. In case the machine is belt driven the motion is controlled by a belt shifter with tight and loose pulley.

The frame of the machine is of open-hearth steel with cast-iron bed-plate. Gears have cut teeth and are made of either cast iron or steel as desired. Rolls are cast steel. The roll shaft and gear shaft are of machinery steel.

Rails are passed through the machine at a speed of about 50 ft. per minute. T-rails require one set of three rolls. Guard or girder rails require one set of six rolls for each rail section. All rolls can be changed easily by removing the frame cap and one gear. Guards are furnished



This Power-Driven Rail Bender Will Curve or Straighten Any Rail

with the machine to conform to safety laws. The machine is built in two sizes, 75 tons and 100 tons. The larger size has sufficient power to curve or straighten any rail section now in use.

### Friction-Head Screw Driver

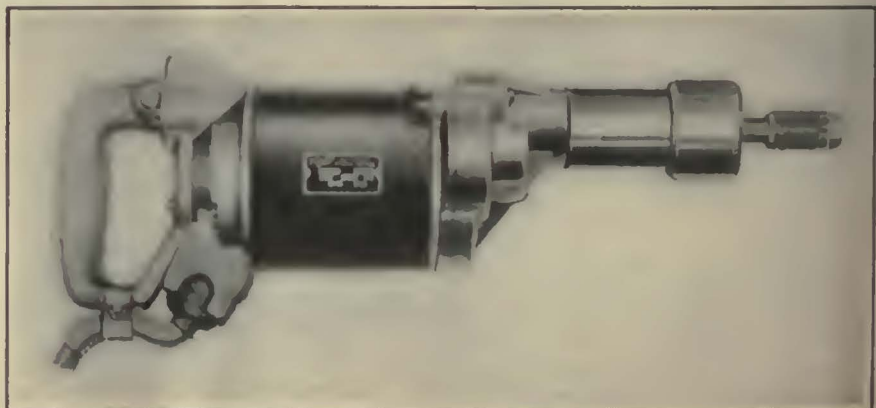
**A**N IMPROVED electric screw driver is being offered to the trade by the Hisey-Wolf Machine Company, Cincinnati, Ohio. New features in the design include a disk-type friction clutch, which is automatically adjusted according to the pressure applied by the operator. The clutch casing is of convenient size and serves as a grip when the work requires. The device is equipped with ball bearings throughout and is provided with a universal motor for operation either on direct or alternating current.

This machine can also be used for setting up nuts, and standard nut sockets can be furnished in sizes of ¼ in., ⅜ in., and ½ in. for either square or hexagonal nuts. These are recessed for bolt clearance to a depth equal to twice the bolt diameter.

### Light-Weight Insulating Board

**T**O MEET the demand for a light-weight low-cost insulating board with high dielectric strength, the Panelyte Company, Trenton, N. J., is placing on the market a new insulating material weighing only 74 lb. per cu.ft. This material is compounded of several well-known dielectric substances produced by nature, including cellulose fibers. It is not brittle and is easily drilled, tapped, sawed and polished. Panelyte has a black polished surface, which it is said is not affected by acids or oils. Sandpapering and rubbing with oil will produce a dull surface.

When ignited this material burns slowly. If left alone, the burning dies down and finally goes out without consuming the panel. It is claimed that the destructive effect of the burning does not penetrate all the way through the panel. Among the uses for which Panelyte is suited are controller backboard panels for switchboards, fuse blocks, exciters, converter panels, busbar supports and back-connected switches.



Electric Screw Driver with Friction Head

# The News of the Industry

## Compromise in Cincinnati

In New Traction Franchise Railways Make Concessions to City to Further Early Settlement

Surrender by the Cincinnati Traction Company and the Cincinnati Street Railway on six disputed proposals and compromise on two others, the compromise being in favor of the city of Cincinnati, is contained in the latest draft of a new traction franchise which will be submitted soon to the Mayor's citizen traction committee. Some of the conclusions of the conferees follow:

The Avondale and Bond Hill cars will continue to run on Fourth and Main, instead of only to Sixth and Main, as desired by the company.

The company agrees to pay half the expense of the upkeep of the city street car director's office, its share not to exceed \$15,000 annually.

The company agrees to pay rental for viaducts, instead of only share expense of track and overhead maintenance.

The company agrees to eliminate the wage proviso in the 7½-cent fare guarantee for the initial three years.

The company agrees not to increase fares on owl cars.

The company relinquishes the proposal that on purchase of the properties by the city there shall be a 10 per cent premium on stock.

A compromise was effected in the matter of court costs and extension of the "rehabilitation" period so that it goes to Dec. 31, 1928.

The printed draft of the ordinance will contain the proposal that the company shall pay not to exceed \$25,000 in any one year for street paving. But an alternative proposal is that the company shall share half of the expense of paving only on streets improved during or since 1920.

It was made plain by Walter A. Draper for the two companies and by City Solicitor Saul Zielonka that the changes and modifications were tentative and contingent. The companies make their concessions only on the consideration that the city accepts one or the other of the alternative paving proposals.

## Rapid Transit Agitation Renewed in St. Louis

Mayor Henry W. Kiel is expected to be a candidate for re-election to a fourth four-year term on the rapid transit issue next spring so the administration is expected to speed through the preliminary survey. C. E. Smith, consulting city engineer, has very decided views on the city's rapid transit needs. He favors a system of subways downtown with feeder elevated lines reaching into the outlying sections of the city and its suburbs.

The special transportation committee in its report to the Board of Public Service recommended that a system of zone fares be worked out so that those outside the city who will benefit by

rapid transit will have to pay part of the cost of building and maintaining the system.

The committee has recently repeated its former declaration that the cost of building a rapid transit system should not be laid at the doors of the car riders alone, but that private property which benefits should be as-

essed part of the costs as is done at the present time in street widening and paving projects.

The proposed rapid transit system for St. Louis would cost upward of \$100,000,000. The city under a recently enacted state statute has ample authority to vote bonds for that purpose.

## New Franchise Agreement Approved at Akron

Franchise Submitted to Direct Vote of Car Riders—Four Years of Operation Under New Fare and Other Conditions Proposed—Municipal Bus Plan Defeated

BY A VOTE of 28,682 to 24,872 the residents of Akron voluntarily took the traction issue out of politics Tuesday and gave to the Northern Ohio Traction & Light Company a new franchise for four years at a 7-cent cash fare, four tickets for 25 cents, or 17 tickets for a dollar. The new rate is to go into effect immediately. Express bus service is provided at a 10-cent fare. The company is given the right to use one-man safety cars, but they must be of double-truck design. No new railway extensions are provided, but the city has the right to order additional bus service amounting to the operation of 500,000 miles annually.

City officials, who by their refusal to grant the company an increased fare last February caused Akron to be without car service for four weeks, tacitly approved the agreement by keeping silent about it. They took no position for or against it officially, but by declining to oppose the agreement made it clear that they were not against it. In other words, the city administration maintained a "hands off" policy as did both of the leading political parties and one of the newspapers. One newspaper advised the people to vote against the franchise and another condemned the proposal and at the same time denounced the administration for failure to take a stand on the issue. Only one publication, a woman's magazine, bitterly opposed the franchise.

The franchise was submitted by the company through initiative petitions. More than 11,000 persons signed these petitions, although only 3,850 signatures were needed.

The company conducted its own campaign and appealed to the fairness of the public. Early in the campaign the company made its plea to the car riders and it may be said that it was the car and bus riders who voted for the proposal. The measure was opposed by independent bus operators, former jitney operators and by an organization

known as the Car Riders' League. In its campaign the company paid no attention to attacks made upon it. All of the work done was carefully mapped out in advance and in no way did the company deviate from the course laid down. Election day was fair and a very heavy vote was polled.

The new franchise takes the place of the temporary contract made Feb. 27, following a period of 27 days when the city attempted its famous motorization scheme. The old 25-year franchise expired on Feb. 1 and the city attempted to compel the company to continue operation for a period of three or six months at the old 5-cent rate of fare, the voters more than two years ago having granted the company that rate, the old rate being on a 4-cent ticket basis. When the settlement came in February, a temporary agreement was made until Dec. 4 at a rate of 5 cents cash with a 1-cent transfer charge. If no new contract had been adopted at the general election, the temporary proposal provided a 6-cent cash fare from Dec. 4 until May 1, 1925, at which time the company was to discontinue operations, under order of the Council.

One feature of the new franchise which was assailed was the company's right to abandon car lines and substitute buses on streets to be paved or repaved. The company took the position that it could not reasonably be expected to make heavy capital expenditures under a 4-year contract. Another feature which met opposition was the provision eliminating competition on routes where the company now operates.

The city administration submitted a bus bond proposal at the same election. This proposal provided for the issuance of \$3,000,000 of bonds for the purpose of establishing a municipal bus system in the city. The measure was defeated by more than 9,000 majority. Several other bond issues submitted at the same time were defeated with one exception.

## Chicago Elevated Answers Mayor's Strictures

An answer to Mayor William E. Dever's recent implications that the Chicago Rapid Transit Company (elevated railroads) would be unable to procure money to build a subway if granted permission by the City Council was embodied in a page advertisement taken by the company in the seven Chicago dailies.

The ad was headed "A Record in Railroad Building." It outlined the construction records being made on the Niles Center extension of the rapid transit lines, pointing out that the work is already two-thirds completed and that the line will be in operation by Feb. 1, 1925.

Permission was granted on April 3, 1924, by the city of Evanston, in the limits of which the railroad is being constructed, it being the first suburb directly north of Chicago. Therefore the railroad construction work will have consumed only ten months time.

In the center of the advertisement an editorial was reproduced which had been published in the *Chicago Tribune*, leading morning paper, berating the city's lassitude in subway matters. The editorial was headed "Laugh, Darn You, Laugh." It is considered a very good one from the point of the railroad. Part of it follows:

The elevated rattles around in downtown Chicago, depreciating property values, an offense to the eye, and an outrage to the ear. It is the only approach to rapid transit we have, and no doubt as good as is can be made with the limitations placed upon it.

When Mr. Insull begins to build outside the Chicago limits he deals with a municipal corporation which belongs in the year 1924. He is allowed to come down off stilts and get underground. He must wait until he escapes from Chicago before he is allowed to consider the general good of the community, the values of adjacent property, the possibility of giving real rapid transit to his passengers, or any of the requirements of modern metropolitan transportation.

Let's try and laugh this off. Evanston has a subway. The Chicago elevated is in it. Will Evanston take us in? Or should we apply at Dunning?

Incidentally, it should be mentioned that Dunning is the site of the Insane Asylum for Cook County, in which Chicago is located.

The advertisement was illustrated with six pictures of recent steps in the construction of the extension, and the text described several of the difficult engineering problems which were encountered in the construction work. In speaking for the company Luke Grant said:

It is the policy of the company in answer any statements of politicians regarding our affairs, whenever possible. In this case we attempted to show that we have already proved our ability to accomplish construction, similar, in a way, to that proposed in Samuel Insull's plan for a subway in Chicago.

## Trackless Trolley Installed in Cohoes

A test was made by the United Traction Company, Albany, N. Y., on Nov. 1 of the trackless trolley installed by that company in the city of Cohoes. The installation was made by the Capitol District Transportation Company, a subsidiary of the United Traction Company. The plans of the company called for the use of four vehicles at the outset. The route over which the

new equipment will be run is known as the Belt Line. The period of the franchise applying to the trackless trolley route is four years. It is stipulated that fares on the trackless lines are not to exceed the rate charged on the other lines of the company. Among the manufacturing companies that contributed to the installation were the Brockway Corporation, the General Electric Company and the Wason Manufacturing Company.

## Will Await Decision on Interstate Bus Companies

Decision as to the right of interstate bus companies to operate in Massachusetts without a license from local authorities, which has been asked of the Attorney-General of that state from a score of towns and cities, will depend largely on the decision in the case of *Buck vs. Kuykendall*, which is due to be argued before the United States Supreme Court on Nov. 10. Attorney-General Benton of Massachusetts says he considers the transportation issue on this point so vital that he will withhold his decision pending developments in the Supreme Court case and will go to Washington to hear it argued.

The Massachusetts Department of Public Utilities has also decided to enter this case and will be represented in a brief to be filed by John E. Benton, general solicitor of the National Association of Railroad and Utility Commissioners. The national association, which is composed of the state commissions, will take the attitude in this case that until Congress acts in the matter the various states may exercise regulatory power over bus lines operating over highways including those operating interstate, and that such regulation incidentally affects and does not unduly burden interstate commerce.

Chairman Henry C. Attwill of the Massachusetts commission says in his instructions to the general solicitor of the national association that every effort should be made to sustain the proposition that the state have jurisdiction to regulate motor vehicles running from one state into another state.

The case now before the United States Supreme Court grew out of the petition of a bus line for a license to operate a bus between the state of Washington and points outside the state. The Department of Public Works of Washington denied the petition on the ground that there was a bus line already in existence operating under a previous permit. Mr. Buck appealed that case to the federal court seeking to enjoin the state officials from interfering with the operation of his proposed line. The lower court denied the injunction and ordered the bill in equity dismissed, whereupon Mr. Buck appealed to the Supreme Court of the United States on the point that interference by state authorities with interstate commerce is in contravention of the commerce clause of the federal constitution.

Whatever the decision by the Supreme Court, it will affect all state commissions, and if the issues are similar to the issues which have been raised in Massachusetts regarding the bus lines that operate from various

Massachusetts cities to Providence, R. I., it will determine the course for those cases.

At present the lines in Massachusetts maintain they can operate from state to state without any license from local authorities.

## Increased Service in Indiana

A complete change in schedules, providing for more fast through cars between Fort Wayne and Indianapolis, about 120 miles, will go into effect shortly on the Indiana Service Corporation and Union Traction of Indiana lines, according to an announcement of local officials of the corporation. The main feature of the schedule change will be the establishment of six new fast trains to be known as the Hoosierlands and Wabash Valley Fliers. These cars will make the entire distance of the trip in four hours. These cars will augment the existing schedule, which calls for the operation of two fliers on each division daily. An equal number of fast trains will be started from the Indianapolis end of the system, providing fast through service at practically all hours of the day. Other changes will be made in the schedule to make possible better traction connections to all parts of the Middle West.

## Ten Killed in Chicago Grade Crossing Accident

Ten passengers were killed in a two score injured, some seriously, early on Nov. 2 when a Chicago, Milwaukee & St. Paul Railroad freight train, backing into the yards, wrecked an electric street car crossing the tracks. Most of the victims were neighbors returning from a Hallowe'en party.

## Contracts for Use of Indianapolis Terminal Facilities Hold

The petitions filed by the Cincinnati, Indianapolis & Western Railroad against the Indianapolis Union Railway asking that the plaintiff's contracts be rescinded with the Indianapolis company for use of its terminal facilities at Indianapolis were dismissed for lack of equity in an opinion given by Judge Hickenlooper in United States District Court at Cincinnati. In his opinion Judge Hickenlooper said that for two years after entering into the contract the plaintiff paid rentals under the contract. He held that, while the law provided relief for a mistake of law or fact, proceedings to rescind must be begun immediately.

The petitions were originally filed in the foreclosure suits of the Central Trust Company and Equitable Trust Company, New York, as trustees under mortgages against the Cincinnati, Indianapolis & Western Railroad, and sought to have rescinded contracts for use of terminal facilities. The railroad was to pay two-thirteenths of the fixed rental for its use of the terminal. The plaintiff alleged that when it purchased the property of the Cincinnati, Indianapolis & Western Railroad in 1914 it agreed to only one contract regarding the use of the terminal.

## Buses Supplant Maumee Valley Line

The Maumee Valley Railway, Perrysburg, Ohio, ceased operating cars at midnight on Nov. 1, and early the next morning the Maumee Valley Transportation Company, a subsidiary of the railway, put a fleet of seven Fageol coaches in operation over the former traction route. Five of the coaches are equipped with wicker chairs and two are of the street-car type for use at rush hours. The interurban station at Toledo is used.

The company has not yet received permission to operate on the west side of the Maumee River between Toledo and Maumee, but it is expected that the State Public Utilities Commission will authorize the company to use the old belt line as territory for the new bus line.

Rails, poles and other equipment of the railway will be removed and sold. The railway operated seven passenger cars over 23 miles of line.

## North Shore Transports Students to Automobile Plant

The Chicago, North Shore & Milwaukee Railroad recently carried 140 students of Lane Technical High School, Chicago, to Kenosha, Wis., for a trip through the Nash Automobile Company plant. Britton I. Budd, president of the North Shore Line, in order to increase the interest of the high school students in their trip, offered a gold watch as a prize for the best descriptive essay on the trip. The boys were picked up by a North Shore train at a station directly adjacent to their school and professors in charge of the tour were high in their praise of the service rendered by the company. At the Nash plant a short talk had been arranged for the high school students by the city manager of Kenosha.

## Boston & Maine Will Study Truck and Bus Transportation

The Boston & Maine Railroad, Boston, Mass., has announced the establishment of a department to study the subject of motor truck and bus transportation. Special attention will be given to the study of motor transportation, both passenger and freight, as related to the Boston & Maine traffic by Howard F. Fritch, formerly assistant general manager of the Eastern Massachusetts Street Railway. Frank I. Hardy will represent Homer Loring, chairman of the executive committee, in various investigations. Mr. Hardy was formerly manager of the Chelsea division of the Eastern Massachusetts. Both these newly appointed assistants to Mr. Loring were referred to in the *ELECTRIC RAILWAY JOURNAL* of Oct. 25.

According to the statement from President Hustis of the Boston & Maine, the work to be undertaken is of great significance. The inroads of motor competition in Boston & Maine territory have been constantly growing. The result of the question in some sections is whether the railroad or motor truck can best serve the territory. He believes it is apparent that in certain fields both

agencies cannot be continued and that either one or the other must prevail. He said further that the problem was not necessarily one of competition, but involved the elimination of expensive duplication and the adjustment of both forms of transportation to a logical and permanent basis.

## Stunned by Injustice, Boise Railway Is Ready to Quit

Discontinuance of city service by the Boise Valley Traction Company is considered probable, should the City Council grant a 10-cent bus franchise. W. R. Putnam, vice-president of the railway, has written to Mayor Sherman pointing out the injustice of the proposal. He says in part:

The owners of these properties could have no other conclusion when a 10-cent bus franchise is granted than that street car service, at a cost considerably less than bus service, is not desired, and therefore would be warranted in taking steps to discontinue city street car service.

At present 90 per cent of the fares paid for city service are 5 cents, and the average fare paid by all city riders is less than 5½ cents. We have been quite interested in the situation that has developed, namely, that some of the very people who have objected to our receiving an average fare in excess of 5½ cents are now advocating a 10-cent fare for other types of transportation. This is of particular significance when one considers that the installation of buses in the city presumably means that street cars in Boise are considered a thing of the past and their operation will be shortly abandoned.

## Station Plans Announced for North Shore Line

Developments announced recently on the Niles Center extension of the Chicago, North Shore & Milwaukee Railroad, over which trains of the Chicago Rapid Transit Company will be operated for a distance of 5½ miles, are the announcement of the plans for the stations and the laying of the first sections of permanent track.

The stations are of three types, directly above the tracks where the road is in the open cut; below the tracks where the road is elevated; between the tracks on the surface. There will be a large terminal station.

Granite terra cotta, steel, concrete, art marble and tapestry brick are among the materials to be used in the construction. Beauty of design is embodied in the station plans, in order that they may harmonize with the suburban surroundings of the territory served.

Engineers in charge of construction maintain that they will have trains running early in January, 1925, their original schedule. If they do it will constitute a record in railroad construction. Details of some of the construction problems were outlined recently in the *ELECTRIC RAILWAY JOURNAL*.

## New Agreement in Fostoria

A wage and working agreement was recently reached between the union and the Toledo, Fostoria & Findlay Railway, Fostoria, Ohio, after several conferences at which were present Elmer Smith, general manager of the line, and H. Lee Camp, business representative of the union, and a committee represent-

ing the employees. Under the agreement conductors and motormen on passenger cars are to receive 47 cents an hour for the first year in service, 49 cents an hour for the second year, and 52 cents an hour thereafter. Freight car crews are to receive 2 cents an hour above that schedule in the three classifications. No run is to pay for less than the 10-hour minimum day. No change was made in the wages of shopmen, but improved working conditions were provided.

The Toledo, Fostoria & Findlay is about to take over the Fostoria & Findlay line. In the event of the consolidation the new agreement is to cover the men on that line. The contract is operative from Oct. 1, 1924, to Oct. 1, 1925. There is a plan for an agreement between the various interurban lines in that section of the state to establish through service between principal points on the various lines. In that event the new agreement provides that the men on the Toledo, Findlay & Fostoria line are to get 50 per cent of operations north of Findlay.

## Change in Boston Fare Made Nov. 5

The 6-cent fare did not go into effect on the Boston Elevated System on Nov. 1 as first planned. Owing to the amount of detail involved in preparing for the change, the increase from 5 to 6 cents was withheld until Nov. 5. On the bus lines the introduction of the 6-cent fare will be gradual, as the buses come under the jurisdiction of the city and town authorities, by whom they were licensed to operate at a stipulated fare unit.

## Indiana Company Will Transport Coal

Transportation of coal by traction will be inaugurated for the first time in Indiana during the coming year, if plans now being formulated by officials of the Interstate Public Service Company, Indianapolis, Ind., materialize. It is the plan of the company to begin transportation of coal from the Ohio river landings to Indianapolis in large volume early next year. This, it is understood, will mean a substantial reduction in transportation costs between the coal fields of West Virginia and western Pennsylvania and Indianapolis, part of which may be reflected in lower fuel prices to the consumer.

In order to enter this field the Interstate, Bert Weedon, traffic manager of the company, said, would purchase 100 new gondola coal cars and make necessary improvements at the Ohio River, such as running of switches along the riverfront and installing loading equipment at the docks, all of which may entail an expenditure for equipment and trackage of approximately \$300,000.

Little Rock's Service Better.—In accordance with the recommendations made by Ross W. Harris, traffic expert, recently employed by the city of Little Rock, the Arkansas Central Power Company has made changes in its tracks and lines which are helping to solve Little Rock's traffic problems and giving better service to the patrons.

## Bureau Opposed to Jitney Competition

The Board of Commissioners of Charlotte, N. C., recently passed an ordinance requiring definite routes and schedules to be maintained by buses and the posting of indemnity bonds of \$5,000 each. This action was taken for the "sake of the safety of the public." The commissioners reserve to themselves the power to revoke the license wholly or in part whenever in their estimation the buses as operated are unduly interfering with the use of the streets by the public or traffic rules and regulations are violated or when the schedules as outlined are not followed. The North and South Carolina Public Utility Information Bureau has recently expressed some concern over the jitney competition which seems to be prevalent throughout the states of North Carolina and South Carolina. It feels that Charlotte in regulating her buses has taken a step which should be followed by other larger municipalities in the state. It calls attention to the fact that in Asheville, N. C., the unregulated jitney is jeopardizing the street railway, with the public indifferent enough to deny protection to the company's franchise.

## New Tariff Increases Rates

The Syracuse & Eastern Railroad, operating lines to Fayetteville and Manlius from Syracuse, N. Y., has been granted permission by the Public Service Commission to increase its cash rates from 3 to 3½ cents a mile and for ticket fares from 2 to 3 cents a mile, with an increase in 50-trip commutation tickets from 1½ cents to 2 cents a mile. The minimum cash fare will be 7 cents and the minimum ticket fare 9 cents. The new tariff became effective on Oct. 20. Harvey D. Gross, general manager of the company, explained that the increase was sought because he was convinced that the public would not ride in cars in any greater numbers solely because of lower fares. He said that the fare was decreased in 1921 to 6 cents, with the view that people would give greater patronage; that the rates had not been changed since then, but that the extra number of passengers had not increased materially. The company operated at a loss in 1923 and the profits this year so far have been small. The company is making an effort to induce commuters to use the line. These will benefit by a rate of 2 cents a mile, with the 50-trip ticket selling for \$4 instead of \$3.

## Orders Service Continued

Modifying a previous order, the New Jersey Board of Public Utility Commissioners has directed that trolley service be continued by the Trenton & Mercer County Traction Corporation to the northern limit of Pennington. Early in August the board granted permission for the abandonment of service at a point near the center of the town. Pennington residents objected to half of the town being without trolley service.

Substitution of buses for cars on the

Hopewell branch of the Trenton & Mercer County Traction Company between Pennington and Hopewell was authorized some time ago by the Board of Public Utility Commissioners of New Jersey. The commission pointed out that the trolley line showed an operative deficit of more than \$7,000 for the last year. Testimony was offered that the county purposes to pave the streets in Pennington and Hopewell over which the tracks run, insisting upon the installation of modern tracks, the estimated cost of which would have been more than \$50,000.

## News Notes

**Invites Criticism.**—Seeking better to serve the patrons on the various bus lines, S. S. Crane, general manager of the Logan Valley Bus Company, a subsidiary of the Altoona & Logan Valley Electric Railway, Altoona, Pa., is distributing questionnaires to the patrons urging them to make constructive suggestions.

**Electric Railway Planned.**—It is reported that plans for the construction of a \$2,500,000 electric railway between Manitowoc and Sturgeon Bay have been announced by C. D. Smith of Fond du Lac, president of the Wisconsin Southern Railway, and C. V. Sheldon, chief engineer. The contract for the project is reported to have been awarded to the Ed Shuster Construction Company.

**Authorizes Fare Increase.**—The Maine Public Utilities Commission on Nov. 1 rendered its decision on the application of the Bangor Railway & Electric Company, Bangor, Me., for permission to increase its fares on all lines from 7 to 10 cents. A protest against the increase was made on behalf of the University of Maine students, many of whom live in Bangor.

**Bus Line Asked.**—The Los Angeles Railway, Los Angeles, Cal., has filed an application with the State Railroad Commission for permission to run a bus line from San Pedro Street and Florence Avenue to Florence and Pacific Boulevard. The north half of Florence Avenue is in the city of Huntington Park. The city trustees of Huntington Park have been notified of the proposed new service.

**Changes Made in Fare.**—The Public Service Commission has approved the fifty-four-trip monthly commutation ticket fare of \$25 on the Olean, Bradford & Salamanca Railway between Olean and Salamanca. The fifty-four-trip commutation ticket fare of \$24.50 between Olean and Killbuck was canceled. The changes are effective Nov. 28.

**Wants Suggestions on Operations.**—C. D. Smith, general manager Beaver Valley Traction Company, New Brighton, Pa., has sent out a circular to all employees soliciting suggestions relative to the operation of the road. Employees of the Beaver Valley Traction Company and the Pittsburgh & Beaver Street Railway are included in the program, whereby suggestions are

to be submitted to William A. Coyle, chairman of the committee on suggestions, subsequently to be considered for prizes, which are offered every three months. The prizes vary from \$1 to \$75. The suggestions can apply to any part of the property of the Philadelphia Company and affiliated corporations, including the Pittsburgh Railways.

**P. R. T. Carriers Successful.**—The demand for the P. R. T. carfare carriers has far exceeded the supply, 65,000 having been sold from Oct. 30 to Nov. 2. The company is making every effort to renew its supply in sufficient quantity to meet the need. On Nov. 10 distribution of carriers on the cars will be resumed. These token carriers were referred to in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 1.

**Plans Faster Interurban Service.**—In its plan to cut from 20 to 30 minutes from the running time of its present interurban service out of Milwaukee to Watertown, East Troy, Burlington and intermediate points, the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has purchased land for rights-of-way in the towns of Lake and Wauwatosa, thus avoiding the longer route now used through West Allis. A cut-off is under contemplation to speed up the Racine and Kenosha service.

**Minimum Fare of Ten Cents.**—The Gardner & Templeton Street Railway, Gardner, Mass., has abolished the 5-cent zone fare collection system and put into effect a minimum fare of 10 cents. The new fare affects the employees of an industry in Templeton and another in East Templeton and residents between Johnson's Switch and West Gardner Square on Parker Street, who have been riding for 5 cents.

**Abandonment Hearing Deferred.**—A hearing will be held on Nov. 15 before the California Railroad Commission, when the towns of Chula Vista and National City will present their reasons for their opposition to the application of the San Diego Electric Railway for permission to discontinue railway and bus service between National City and Chula Vista. The railway is seeking to abandon service because operation in these parts is a losing proposition. Until a final ruling is made railway and bus service will be continued by the company. The commission heard evidence submitted by the company on Sept. 12 to show that the car and coach services failed to meet expenses.

**Jitneys Again in El Paso.**—Jitney competition has aroused public ire in El Paso, Tex. The El Paso Herald, under recent date, stated its desire to hear from readers the reasons why jitneys should be allowed to operate again in the city of El Paso. The item compared jitney operation with railway operation, with the argument strongly in favor of relegating the jitneys off the streets of the city, and concluded by saying that Mayor Dudley would have the backing of all the people if he would take the necessary steps to break up the jitney competition "that is just now beginning to become a real menace." Jitneys ceased operating in El Paso on April 30, 1923, following the enactment of an ordinance. An-



other Texas city where jitneys have been ruled out is Fort Worth. The Supreme Court of Texas at Austin handed down a decision on Jan. 24, 1924, declaring valid the city ordinance prohibiting the operation of jitneys within the Fort Worth limits. The jitney operators had previously secured a temporary injunction against the enforcement of the terms of the ordinance.

**Greater Use of Bus Recommended at Toronto.**—After a survey of the transportation system in Toronto H. S. F. Langsdown, traffic superintendent of the London General Omnibus Company, has stated that the city is ready for omnibus service paralleling the electric railway lines in the downtown districts. Mr. Langsdown said that instead of taking traffic from the trolleys, the new mode of transportation would encourage motorists to leave their cars at home and ride downtown in a bus. He suggested that the buses be used in the surrounding country on Sundays and holidays. The railway in Toronto is municipally owned and operated.

**Safety of Operation to Be Discussed.**—Charles Hansel of New York city, consulting engineer of the Pennsylvania Railroad, the Philadelphia & Reading system, the Central Railroad of New Jersey and a member of the presidents' conference committee representing all the rail lines of the country, is in Buffalo, at the invitation of Herbert G. Tulley, president of the International Railway, for consultation in matters affecting the operation of the local and interurban lines. The purpose is to determine if it is desirable to rearrange any conditions respecting the safety of operations. Mr. Hansel is thoroughly familiar with the properties of the International Railway and, at the request of President Tulley, he made a report in July, 1923, suggesting some minor changes, all of which were promptly made by the International Railway. Special attention will be given to the Buffalo-Niagara Falls high-speed line division of the International since the Oct. 19 wreck at Ellicott Creek crossing.

**Supplement for Business Purpose.**—"Current Topics" will hereafter carry a supplement with reliable and specific information to the employees and officials of the Illinois Power & Light Corporation and its allied companies as to the products of the industries in the various cities served by them. By this move it is hoped to "turn business to the industries in our territory." In the November issue a Topeka supplement is published, telling in detail of this pioneer city of Kansas.

**Wants to Extend One-Man Service.**—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has applied to the Railroad Commission for authority to extend its one-man car service to its Walnut Street line, which passes through the downtown section of the city into the northwest section of the city. The company is now operating one-man cars on three other lines in the city.

**Allowed to Operate Ten Buses.**—Five decisions granting permission to the Central Transportation Company, a

subsidiary of the Trenton & Mercer County Traction Corporation, Trenton, N. J., to operate ten buses in Trenton have been handed down by the Board of Public Utility Commissioners of New Jersey. These buses are already being operated under city ordinances, but since they parallel the same streets with trolley tracks approval had to be given by the state body. The company has also been authorized to operate a bus between Trenton and Allentown.

**Appleton-Sheboygan Bus Service Started.**—The Wisconsin Traction, Light, Heat & Power Company has commenced the operation of its Appleton-Sheboygan bus service. Connections will be made at Sheboygan with the trains of the Milwaukee Northern Railway, an electric railway operating on an hourly schedule to Milwaukee.

**Rerouting Plan Proposed.**—A comprehensive plan for the rerouting of the car lines of the United Railways & Electric Company serving northwest Baltimore has been prepared by the transportation bureau of the Public Service Commission and sent to the United Railways for study. The plan was prepared by Ben Haughey of the commission staff.

**Opposes Bus Line.**—The Cincinnati Traction Company, Cincinnati, Ohio, has filed a protest with the Ohio State Public Utilities Commission against the application of Walter King and William McDaniels for authority to operate a bus line between Lebanon and Cincinnati. The traction company asserts that service between the two places is already adequate.

**Will Run One-Man Cars.**—General Manager D. W. Harvey of the Toronto Transportation Commission, Toronto, Ont., has stated that one-man cars will be operated on a 10-minute schedule on the York Township car lines. He also confirmed the previous announcement that tickets would be sold on the township cars at the rate of 11 for 50 cents.

**Buses to Continue Operating.**—The City Council of Oskaloosa, Iowa, granted another 90 days to the Oskaloosa Traction & Light Company for operating buses instead of street cars over certain sections of the city. The trial period for bus operation was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Aug. 2.

**Will Soon Operate One-Man Cars.**—One-man cars will be placed in service on the Clinton division of the Clinton, Davenport & Muscatine Railway, Davenport, Iowa. The bodies of the cars were made in the Rock Island shops.

**Bus Service Extended.**—Extension of the River-Bayside Street bus service to Thirty-fourth and Kromer Streets, in Everett, Wash., as an experimental service will be started immediately by the Puget Sound International Railway & Power Company, under the direction of C. C. Coates. The extension is the second since the first of the year and is another step the company announces, in its desire to cover the city with transportation as fully as possible. Continuance of the service is contingent upon support by the

public and safety of operation. The need of some sort of service to this district has long been outstanding. The buses will furnish 18-minute service.

**Awaiting Wage Decision.**—Trainmen of the Middlesex & Boston Street Railway, Newtonville, Mass., are awaiting a decision in the recent arbitration proceedings. The 350 carmen are demanding 70 cents an hour for a working day of 8 hours, the present scale being 55 cents an hour for a working day of 9 hours. Early in the present year the men were granted an increase of 4 cents an hour, the award being retroactive to July 1, 1923, and to continue in force until June 30 of the current year.

**Railway Wants Relief.**—The Chickasha, Okla., City Council is attempting to find ways and means to co-operate in securing continued car service for Chickasha. A letter from C. F. Woodworth of Wakefield, Mass., treasurer and general manager of the Chickasha Street Railway, advised the Council that the company was operating at a loss and would be compelled to discontinue service unless substantial relief measures could be adopted. An 8-cent fare, a substantial reduction in taxes and a lower power rate for electricity are suggested as three needed measures of relief. The City Council is believed to be anxious to co-operate and has asked the Chickasha Gas & Electric Company to consider the possibility of reduced power rate. It is stated that the road has paid no bond interest this year and has had a net loss from operation.

**St. Louis Survey Planned.**—The survey of rapid transit engineering and financial methods to be made under the direction of President E. R. Kinsey of the St. Louis Board of Public Service will require probably nine months' time. C. E. Smith, consulting engineer for the city, will do most of the work and will be assisted by men from his own office and certain members of Mr. Kinsey's staff. Compilation of data as to plans followed in other cities will come first. It will also be necessary to make a survey to ascertain what sewer, water, cable and gas lines will be affected by the proposed subways.

**Wages Increased Two Cents.**—An increase of 2 cents an hour in the pay of employees of the Rochester, Lockport & Buffalo Railway, Buffalo, N. Y., was granted on Oct. 30 following a lengthy conference between James Laggay, vice-president of the street railway union, and W. W. Foster, president of the railway. The new wage became effective on Nov. 1. Trainmen were receiving 53 cents an hour and were seeking 57 cents.

**Bonus Awarded for Safety.**—Trainmen of the Nashville Railway & Light Company, Nashville, Tenn., were paid \$3,980 in bonuses for the first eight months of 1924, because accidents were reduced. Thirty-four motormen and operators on Aug. 31 had gone throughout 1924 without one accident and without failing to attend a single safety meeting by the company in the interest of accident prevention. Both of these accomplishments are the objectives of the bonus awarded every four months by the company.

# Financial and Corporate

## Net Falls Off

**Third Avenue Railway Reports a Decrease of \$226,014—Will Provide Bus Service If Necessary**

For the fiscal year ended June 30, 1924, the operating revenue of the Third Avenue Railway System, New York, N. Y., was \$14,649,265, an increase of \$242,481 compared with the fiscal year ended June 30, 1923. This statement was contained in the recent report of S. W. Huff, president, to the stockholders of the company. The operating expense was \$11,173,480, an increase over the previous year of \$446,496. The increase in expenses was greater than the increase in receipts, due to several causes, especially to the increased traffic congestion in the streets, resulting in the slowing up of service and the increase of accidents.

Mr. Huff said that the increase in congestion on the streets was making it more difficult to render an attractive service and was adding to the cost of operation. He stated that from data collected by his company at a number

of traffic points it was shown that it took from five to seven times as much street space to pass a single passenger through the streets by means of automobiles and taxicabs as was required to pass them in street cars.

On the question of bus operation the report stated that there was unquestionably a field for bus operation, and at the present time there was a desire on the part of the public to ride in buses. President Huff said there were streets in which travel was not sufficient to justify the installation of electrical equipment, or where, for other reasons, such installation was undesirable, where buses could operate more satisfactorily and where the public was willing to pay for the increased cost of bus transportation. He said that such bus operation could be made more efficient and serviceable to the public when co-ordinated with existing trolley lines.

President Huff said it was interesting to note that today the electric surface lines of the greater city of New York were carrying a larger portion of the total number of passengers carried on surface lines, elevated lines and subway lines than they had since subway lines became a big factor in the transportation of the city. The use of surface car lines in recent years has increased faster than the use of subway and elevated lines. During the fiscal year ended June 30, 1924, more than 42 per cent of all the passengers carried by subway, elevated and surface cars were carried on the surface cars of the city.

He said that considering the present bus agitation the directors felt it was their duty to the security holders to make application for franchise for a bus system, to be operated in co-ordination with the electric lines; that the plan generally is to charge a 10-cent fare on the buses and to give free transfers to the electric lines. He said that the company had changed its motive power from the horse to cable, and from cable to electricity as the efficiency and desirability of each class of motive power was developed, and to the extent that buses are desirable as a supplement to electric car operation or as a substitute for it the directors of the Third Avenue Railway felt that they should offer them to the public.

The consolidated statement of income for the years ended June 30, 1924 and 1923, is contained in the accompanying table.

## New Orleans Earnings Sufficient to Care for Interest Obligations

The report of the New Orleans Public Service, Inc., for the twelve months ended Sept. 30, 1924, gives the net operating income of the company at \$3,466,603 for the year, a gain of \$119,236 over the preceding year. The rate base of the company, upon which it is allowed a rate of return of 7.5, increased from

\$52,939,371 to \$55,242,089, or approximately \$2,203,718. This resulted in a decline in earnings to 6.48 per cent, as compared with 6.61 for the twelve months ended Sept. 30, 1923. The outstanding obligations of the company are only about 6 per cent of the rate base, which will make its earnings of 6.48 per cent for the year ample to care for all interest and dividends in outstanding securities. The total assets of the company increased from \$61,126,208 to \$67,838,787. Cash on hand when the report was closed was \$1,335,700, with \$1,576,963 on hand for materials and supplies. The sum of \$1,420,592 was spent during the year for renewals and replacement reserves.

## Court Refuses to Dismiss \$30,000,000 Subway Suit

Judge Knox in United States Court has denied the city's motion to dismiss the suit brought by Lindley M. Garrison as receiver for the New York Municipal Railway Corporation to recover approximately \$30,000,000 from the city because of delays in the fulfillment of contracts to build subways. The motion attacked the jurisdiction of the federal court and the legality of naming the city as a defendant.

Judge Knox held that the federal court had full power "to award relief in equity upon a strictly legal demand." He wrote that the suit would "involve an inquiry which for detail, itemization and proof will probably surpass any accounting with which the court is acquainted, and it would be most unfortunate if jurors were called upon to undergo the hardships of such an ordeal."

The city's motion was made after the New York Rapid Transit Corporation, as owner of the assets of the New York Municipal Railway Corporation, had been granted leave to intervene as a party plaintiff in the suit instituted by the receiver.

## Another Block of Chicago Property's Stock Offered

Sale of 10,000 shares of prior lien, 7 per cent stock of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., under the customer-ownership plan was announced recently by officials of the company. The stock will be sold for \$100 a share, par value. This is the second block of prior lien authorized for sale by the Illinois Commerce Commission, the first block of \$1,500,000 having been sold about a year ago. The second block, as in the case of the former sale, will be disposed of by employee-salesmen, every employee of the railroad who signifies his interest being made an authorized salesman of the stock.

The sale was opened at two special meetings of employees called for the purpose, which were addressed by Britton I. Budd, president, and other officials. The first block met with a ready market among patrons of the North Shore Line and it is believed that the additional \$1,000,000 will go even better because of the establishment in the minds of the people of its value.

THIRD AVENUE RAILWAY COMPANY AND CONTROLLED COMPANIES YEARS ENDED JUNE 30, 1924 AND 1923

	1924	1923
Operating Revenues:		
Transportation.....	\$14,232,952	\$14,008,415
Advertising.....	150,000	150,000
Rent of tracks and terminals.....	25,649	26,005
Rent of buildings and other property.....	175,577	174,695
Rent of equipment.....	52,610	34,551
Sale of power.....	12,474	13,117
Total operating revenue.....	\$14,649,265	\$14,406,784
Operating Expenses:		
Maintenance of way and structures.....	\$1,829,554	\$1,425,233
Maintenance of equipment.....	1,523,495	1,334,189
Depreciation accruals.....	206,142	733,347
Power supply.....	1,090,857	1,223,968
Operation of cars.....	4,959,323	4,574,373
Injuries to persons and property—expended.....	1,165,882	1,074,590
Injuries to persons and property—reserved.....	*208,630	*203,613
General and miscellaneous expenses.....	600,855	564,794
Total operating expenses.....	\$11,173,479	\$10,726,984
Net operating revenue.....	\$3,475,785	\$3,679,800
Taxes.....	988,048	968,044
Operating income.....	\$2,487,737	\$2,711,756
Interest revenue.....	276,603	287,348
Gross income.....	\$2,764,340	\$2,999,104
Deductions from gross income:		
Interest on first mortgage bonds.....	\$548,080	\$548,080
Interest on first refunding mortgage bonds.....	879,620	879,620
Interest on adjustment mortgage bonds.....	1,126,800	1,126,800
Track and terminal privileges.....	14,231	14,524
Miscellaneous rent deductions.....	8,248	7,782
Amortization of debt discount and expense.....	21,870	21,315
Amortization of limited franchises.....	9,355	10,904
Sinking fund accruals.....	33,480	33,480
Miscellaneous.....	47,392	55,322
Total deductions.....	\$2,689,078	\$2,697,829
Net income.....	\$75,261	\$301,275

\*Deficit

### California Commission Reviews Valuation Cases

Important work has been done by the California Railroad Commission during the last fiscal year in the matter of valuations of properties of public utilities either in rate-making proceedings or in proceedings involving condemnation of those properties by municipalities; also in the valuation of railroad properties in co-operation with the Interstate Commerce Commission. An important part of the valuation work carried on during the year has been the appraisal of lands owned by public utilities within the State of California, which has involved the determination of the value of lands amounting to approximately \$20,000,000 in connection with the various proceedings.

In addition to the valuations carried on in connection with the regulatory work of the commission, a limited amount of work has been done in connection with the valuation of the Los Angeles Gas & Electric Corporation's electric properties involved in the condemnation proceeding filed by the city of Los Angeles. A relatively large staff of engineers has been employed during the entire year in connection with the determination of the value of the city properties of the Los Angeles Railway and the Pacific Electric Railway. This involves property exceeding \$50,000,000. Toward the close of the fiscal year work was commenced in connection with the valuation of all the electric properties of the Pacific Gas & Electric Company and Great Western Power Company in the city of San Francisco.

### New Corporation to Develop Cities Service's Utilities

Formation of a new \$100,000,000 corporation by the Cities Service Company, New York, to provide a vehicle for the development and expansion of its public utility enterprises is under way, to be known as the Cities Service Power & Light Company. Its authorized capitalization will consist of \$20,000,000 of bonds, \$10,000,000 of preferred stock, \$5,000,000 of second preferred stock and \$65,000,000 of common stock.

The Cities Service Company will own all the common stock of the Cities Service Power & Light Company, into which will be placed the common stocks of public utility companies operating in 15 states and serving a population of more than 2,000,000 scattered over 400 communities. Among the impor-

tant properties to be included will be the Toledo Traction, Light & Power Company, which owns the Toledo Edison Company; the Ohio Public Service Company; Public Service Company of Colorado, including ownership of the Denver Gas & Electric Company; Kansas City Gas Company; the Empire District Electric Company and the St. Joseph Railway, Light, Heat & Power Company.

Gross business of the properties comprising the new corporation, it is understood, will total more than \$49,000,000.

Formation of the new company will have no effect on the financial structure of the parent company except to provide a more flexible medium for development of the public utility phase of its business. This step is understood to have been long contemplated to establish a clear-cut division between the oil and utility enterprises of Cities Service and to make more effective the activities of the parent company in both fields.

Officers of the new company will include the principal executives of the Cities Service organization.

### Right to Discontinue Lines Sought in Mobile

Discontinuance of certain railway service at Mobile is sought by the Mobile Light & Railway Company in a petition filed with the Alabama Public Service Commission. The petition was accompanied by a financial statement for the year ended Sept. 30, 1924, to the effect that the company's net income from railway operations for the year amounted to less than 1 per cent of its valuation. The company asked permission to take up tracks on Wilkinson Street from Charleston Street to Washington Avenue and on Washington Avenue from Wilkinson Street to South Carolina Street and to abandon service on Wilkinson Street and Washington Avenue and further asks to be permitted at any time during the next two years to take up the track on Old Government Street from its intersection with Government Street to Williams Street.

### Traffic Declines on Detroit Street Railways

The city of Detroit, Department of Street Railways, has given out operating statistics for the months of July, August and September. Income and traffic figures are included in the accompanying table.

CITY OF DETROIT, DEPARTMENT OF STREET RAILWAYS

	July, 1924	July, 1923	August, 1924	August, 1923	Sept., 1924	Sept., 1923
Total revenue from transportation.....	\$1,598,875	\$1,660,055	\$1,592,551	\$1,671,959	\$1,587,292	\$1,766,670
Total operating revenue.....	1,669,815	1,764,174	1,639,962	1,754,349	1,654,788	1,843,027
Total operating expenses.....	1,175,483	1,299,326	1,168,345	1,314,975	1,170,524	1,360,890
Net revenue railway operations.....	\$494,332	\$464,848	\$471,617	\$439,375	\$484,264	\$482,137
Taxes and rent deductions.....	59,798	59,158	59,798	59,188	59,706	59,158
Net operating income.....	\$434,533	\$405,689	\$411,819	\$380,186	\$424,558	\$422,979
Total non-operating income.....	27,898	1,274	46,600	4,682	14,155	1,059
Gross income.....	\$462,431	\$406,963	\$458,418	\$384,868	\$438,713	\$424,037
Total deductions from gross income.....	432,312	376,012	428,102	376,929	412,192	364,824
Net income.....	\$30,119	\$30,951	\$30,316	\$7,939	\$26,521	\$59,213
Total car-miles operated.....	3,828,996	4,327,150	3,774,519	4,346,975	3,683,651	4,157,839
Total passengers carried.....	35,159,475	40,934,203	34,962,639	41,308,449	34,825,027	38,385,837

### \$7,000,000 Refunding Issue Approved at Worcester

Stockholders of the Worcester Consolidated Street Railway at the annual meeting in Worcester, Mass., on Nov. 5, voted to ask the State Department of Public Utilities for authority to create \$7,000,000 in first and refunding mortgage bonds. The board of directors will have power to issue and sell bonds at such times and in such amounts as may be necessary to meet the maturing bond issues of the company. The bonds will be sold in series with different maturity dates and different coupon rates, depending entirely on the bond market at the time the money is needed. None of the bonds will bear interest at more than 6 per cent.

Clark V. Wood, president of the company, said the amount the directors suggested to the stockholders as a limit for the new bond issue was considerably more than the amount needed to meet the two maturities falling due in 1925. The mortgage will be so drawn that it will cover the entire property and equipment of the railway subject to the present underlying liens. Eventually, with the maturing of these liens, the new issue would become a first mortgage.

Two issues mature next year which must be met by the company. They are the Worcester & Southbridge Street Railway first gold 4½s, dated June 1, 1905, and due June 1, 1925, and the Worcester Consolidated Street Railway debenture gold 7s, dated March 1, 1900, and due March 1, 1920, but extended to March 1, 1925. The first of these issues is outstanding at present to the extent of \$200,000 and the second to the extent of \$700,000.

These two issues are the first of a series that will fall due within the next three years involving \$3,083,000. Of the company's funded debt only three additional issues will be outstanding after 1927. One of these, totaling \$1,449,000, will mature in 1930 and two others, totaling \$124,000, will mature in 1939.

President Wood said the earnings of the company had been increasing slowly in the last quarter. The decrease in the gross earnings and the falling off in the number of passengers carried earlier in the year he assigned to unfavorable industrial conditions.

### Form of Electric Railway Supplement to "Chronicle" Changed

"The Public Utility Compendium" is the title which the *Commercial & Financial Chronicle*, New York, has applied to the publication issued by it on Nov. 1 to replace that paper's former "Electric Railway Section." The compendium will be issued twice a year without extra charge to every annual subscriber of the *Chronicle*.

As the change in name implies, the new publication is much more comprehensive than the old, both in character and scope. It covers public utilities of every kind and description. Light and power companies are now represented, as well as the electric railways, and in addition there are water and gas companies and tele-

graph, telephone, cable and radio corporations. It is explained in part, as follows:

In one particular the change has been forced upon us. The operation of the electric railways, urban and interurban, is now quite generally combined with the light and power business, and it is no longer possible to differentiate between the two. The development has grown out of the wonderful extension in the use of electricity which is the distinctive feature of recent times. The next step was to unite the local units so that they might serve larger areas, and out of these undertakings have grown in turn the big combinations which, by reason of their splendid achievements in electrical development and in serving the advanced needs of man, are exciting the wonder and the admiration of the world.

### Brooklyn City Declares an Extra of 5 Cents a Share

Directors of the Brooklyn City Railroad on Nov. 6 declared a regular quarterly dividend of 20 cents a share and an extra dividend of 5 cents a share on the 1,600,000 shares of stock now outstanding, or \$400,000. The stock is of \$10 par value.

The company has paid three quarterly dividends of \$300,000 each on the 1,200,000 shares of capital stock outstanding prior to Sept. 30. For the full calendar year the company will have paid to stockholders \$1,300,000 in dividends, and the company's surplus, according to President H. Hobart Porter, will have been increased by about \$450,000. These results are based on estimated net earnings for the year of \$1,750,000, which is applicable to dividends and surplus. For the first three-quarters of the year the net was \$1,394,087.

### Guaranteed Bonds of Lake Charles Property Offered

Stone & Webster, Inc., recently offered at 95 and interest \$750,000 of first mortgage 5½ per cent gold bonds, known as Series A, of the Lake Charles Electric Company, Inc., Lake Charles, La., with guaranteed principal and interest by the Eastern Texas Electric Company of Delaware. The bonds were dated Aug. 1, 1924, and are due Aug. 1, 1949.

The Eastern Texas Electric Company recently purchased the street railway, electric light, gas and water systems and plants in Lake Charles, La. The purpose of the issue is to provide a portion of the funds required for the purchase of the above properties. The balance has been raised by the sale of capital stock of the Lake Charles Electric Company, Inc., the entire issue having been purchased by the Eastern Texas Electric Company of Delaware, which also controls, through stock ownership, the Eastern Texas Electric Company of Texas and the Port Arthur Ice & Refrigerating Company. The Eastern Texas Electric Company (Delaware) was recently organized to acquire and hold the stock of the Lake Charles and other companies.

The Eastern Texas Electric Company of Delaware guarantees the payment of principal and interest on this issue of series A bonds.

The Lake Charles Electric Company, Inc., has obtained new franchises during the current year, which run for a 25-year period and are free from re-

strictive and burdensome clauses. The properties are under the executive management of Stone & Webster, Inc.

**\$400,000 in Shares Sold.**—The Wisconsin Traction Light, Heat & Power Company, Appleton, Wis., has disposed of \$400,000 of its \$500,000 issue of 7 per cent preferred shares. The sale was started on July 16 and the shares have been purchased by 700 new owners, most of whom are residents of the fifty-one places in which the company supplies a utility service.

**Wants to Remove Certain Tracks.**—The Union Traction Company, Santa Cruz, Cal., has applied to the Railroad Commission for permission to abandon service to Cliff Drive and to remove its tracks on Mission Street from Locust Street to Pacific Avenue.

**Carhouses Sold.**—The United Electric Railways, Providence, R. I., has sold two trolley carhouses used for storage purposes and two more are for sale at the present time.

**Authorizes Track Removal.**—Permission has been granted to the Trenton & Princeton Traction Company, Trenton, N. J., to remove as much of its track as lay between the terminus of the line in Lambertville, N. J., and the center of the bridge spanning the Delaware River between Lambertville and New Hope. Abandonment of the company's line in Pennsylvania has already been sanctioned by the Public Service Commission of that state.

**Net Income Falls Off.**—For the nine months period of the present year the Twin City Rapid Transit Company, Minneapolis, Minn., reports gross revenues of \$9,527,686. This compares with \$10,210,796 last year. The operating expenses decreased from \$7,267,192 for the nine months period of 1923 to \$6,968,918 for a similar period of the present year. The net income fell off about 36 per cent. It was \$1,151,756 for the months of January to September, 1923, inclusive and \$739,526 for the similar months of the current year.

**Earnings Decrease.**—For the third quarter of 1924 the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., reports earnings for the railway department of \$209,042. Compared with a similar period in 1923 the railway receipts showed a decrease of \$37,794. The decrease in the earnings of the railway department has been gradual since the beginning of 1922, only two quarterly periods during that time showing a slight increase compared with the previous quarter. The banner quarter for the railway department was the last quarter of 1920, when receipts were \$318,571. They are now averaging about \$100,000 less than that amount.

**Manitoba Property to Suspend Service.**—The Brandon Municipal Railway, Brandon, Man., it is reported, is to cease operating and is to be replaced by buses. The Brandon Electric Railway was incorporated by the Manitoba Legislature in 1911. According to the *Canadian Railway and Marine World*, plans at that time were made for building 10 miles of line and arrangements were discussed for the city to issue debentures to aid in the construction. Finally it was agreed to take a vote of

the citizens on the question of private or public ownership and the result was a vote of 458 to 176 for private ownership. A 30-year franchise was arranged and approved by the voters on May 21, 1912, but following some difficulties the city took over the project and authorized the raising of \$300,000 by debentures for construction purposes. Operation for first year ended June 30, 1914, showed a loss of \$14,542 and each succeeding year has continued to show a loss, with a reported loss in 1923 of \$41,000. The line consists of 9.91 miles of track. It is said that tenders have been invited for the operation of buses.

**Abandonment of Lines Authorized.**—The Oklahoma Corporation Commission has authorized the Oklahoma Union Railway to abandon its Forrest Park line and the Five Place line. The company is also given permission to take up its tracks, poles and wire on the streets included in these lines. The company first secured permission of the city through a city ordinance to abandon the lines and then took the matter up with the commission, as was noted in the *ELECTRIC RAILWAY JOURNAL* of Oct. 25.

**Buys Bus Line.**—The bus line between Hammond and Crown Point, Ind., has been purchased by the Gary Street Railway and is being run by that company. Three buses are now in operation between the towns and passengers are carried to Griffith, Highlands and Munster. Service to Calumet City is included in the schedule for the Gary Street Railway bus line.

**Nearly \$4,000,000 in Taxes.**—Electric railways in Wisconsin, numbering twenty-one operating light, power and heat properties in connection therewith, will pay \$3,560,968 in taxes for 1924, based on a valuation of \$125,375,000. In 1923 these companies paid taxes of \$2,171,140 on a valuation of \$104,410,000. The Milwaukee Electric Railway & Light Company again heads the list with a valuation on its properties of \$71,500,000 and a tax debt of \$1,476,985.51.

**Revenue Falls Off.**—For the three months ended Sept. 30, 1924, the passenger revenue of the Brooklyn City Railroad, Brooklyn, N. Y., was \$2,786,005, against \$2,877,627 for the corresponding three months a year ago. The net corporate income fell off from \$486,438 for the period ended Sept. 30, 1923, to \$331,192 for the period from July to September, 1924.

**Branch Line to Be Sold.**—The receiver of the Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, recently asked authority of the State Public Utilities Commission for permission to abandon and sell the branch road running from Dayton to Union City. This action was in accordance with an order of Federal Judge Killits of Toledo ordering sale of this line. The Union City branch has been losing money for some years, according to a statement made by J. M. Pogue, general manager of the company. A request has been filed by the Dayton-Columbus Transportation Company, a subsidiary of the traction company, for a certificate to operate a bus line between Dayton and Union City by way of Greenville, between

Dayton and Brookville and between Urbana and West Jefferson. It is said that the light-weight traction cars now being operated over the present route will be sent to Springfield, where they will be placed in service on the Springfield-Lima route.

**Receiver Named for Long Island Electric.**—A petition has been presented to Justice Leander B. Faber in Queens Supreme Court on behalf of the Chase National Bank, asking for ap-

pointment of a receiver in a foreclosure action which has recently been started against the Long Island Electric Railway, Long Island City. It is revealed that it is planned to try to unite the surface lines in Queens and Nassau and into one system as feeders for the elevated lines and subways that are being extended into Queens. Lincoln C. Andrews, who was formerly the general manager of the Long Island Electric Railway, has been appointed receiver.

velopment of this phase of the industry from its inception, considering the field of this vehicle and types of equipment desirable. Trackless trolleys and gas or battery rail cars are also treated briefly in this chapter.

To make room for the added material the chapters on "competition" and "freight and express" have been omitted from the second edition. The authors state that the former is covered in the chapter on motor-bus operation, while there have not been many changes in freight and express practices since 1917.

## Book Reviews

### Electric Railway Handbook

A reference book of practical data, formulas and tables for the use of operators, engineers and students. By Albert S. Richey, consulting engineer and professor of electric railway engineering Worcester Polytechnic Institute. Second edition, 798 pages, illustrated. McGraw-Hill Book Company, New York. \$4.

Since the publication of the first edition of this book in 1915 there have been many changes in electric railway practices. Unlike "Electric Railway Transportation," the second edition of which is reviewed on this page, Richey's "Handbook" treats of the material side of the railway property. While the fundamental principles of electric railways have not changed, as is indicated by the retention in the second edition of most of the matter dealing with theory that appeared in the former edition, there are striking changes shown in applications. Particularly is this true with regard to the light-weight types of car. The chapter on rolling stock has been completely rewritten.

A much greater use of track construction and maintenance machinery made necessary the complete revision of that subject. Other sections have been revised more or less extensively to conform with the latest practices. In this connection particular reference is made to the standards and practices of the American Electric Railway Engineering Association, many of which are quoted in full or in part. Numerous references to articles appearing in ELECTRIC RAILWAY JOURNAL also are included.

Comparatively few cost data appear in the new edition, but where such figures are given they are accompanied either by basic unit costs or the dates which apply, so that they can be converted to the present level.

There is much of value to the electric railway engineer in the volume, and with the many changes that appear in the new volume it is well worth while substituting it for the earlier edition.

### Transactions Index, Volume 1-45, 1880-1923

Published by the American Society of Mechanical Engineers, New York, 1924. \$3.

The present index to the Transactions of the American Society of Mechanical Engineers is the fifth which has been published, although none has been issued since the appearance of

Vol. 27, which contained the index to Vols. 1 to 25, inclusive. For that reason, and because comparatively few complete editions of the Transactions are available, the present index applies more particularly to Vols. 26 to 45, inclusive.

The general style of the Engineering Index, published by the society, has been followed, grouping alphabetically all items under authors' names and subjects. This index should greatly increase the value of the Transactions for reference.

### Electric Railway Transportation

By Henry W. Blake, editor ELECTRIC RAILWAY JOURNAL, and Walter Jackson, fare and motor bus consultant. Second edition, revised. McGraw-Hill Book Company, Inc., New York. 449 pages, illustrated. Cloth, \$5.

This is a thorough revision of the book published in 1917 by the authors. While the same general form of presentation and chapter headings has been adhered to, there are many changes throughout the book.

When the first edition appeared the effects of the World War were just beginning to be felt. Five-cent fares were in force on nearly all city railways in America, the one-man car was just being introduced, "jitney" operation was still in its infancy, and only very few electric railways had even considered the operation of buses. The idea of merchandising transportation had made little headway, largely because most managements were content to take what revenue came naturally without special efforts toward ride salesmanship.

Many new types of cars are discussed in the chapter on "Car types in relation to traffic," showing the great progress that has been made in the design of street and interurban cars, particularly the development of light-weight and one-man designs. The chapters on adjustment of service to traffic and preparation of timetables have both been revised in the light of new developments looking toward greater utilization of men and equipment.

The complete revolution which has taken place in fares and fare collection methods and practices is shown by the entire revision of the chapters on these subjects. Practically every type of fare and fare collecting method in use in this country, and many developed abroad, are discussed.

A new chapter on motor bus operation by electric railways traces the de-

### Elektrische Zugförderung

Train or Car Operation. By Dr. E. E. Seefehlner, Vienna. With a chapter on Rack and Cable Railways, by H. H. Peter, Zurich, 659 pages; 751 illustrations. Second and enlarged edition. Published by Julius Springer, Berlin.

This is the most extensive and scholarly volume on electric railway engineering published in Germany since Zehme's important treatise. As in the first edition, which was published in 1922, Dr. Seefehlner has limited the scope of his book very largely to the purely electrical engineering side of electric railroading; that is to say, he does not include track except so far as the return circuit is concerned, considers power stations only briefly, and does not discuss transportation questions. Heavy electric traction is treated more comprehensively than tramways, and there is an especially valuable section of 84 pages giving data, drawings and photo-engravings of the principal electric locomotives in different parts of the world. The subject of train resistance is very thoroughly discussed and in this section, as elsewhere in the book, mathematics is used extensively where it helps to clarify the discussion. In the chapter by Mr. Peter, the cable railways considered are primarily those for mountain installations. A valuable feature of the book is the inclusion, with the discussion of each subject, of an extended bibliography on that particular topic. American practice is treated in the book, and the ELECTRIC RAILWAY JOURNAL is extensively quoted.

### Principles of Business Writing

By T. H. Bailey Whipple, literary critic Westinghouse Electric & Manufacturing Company, published by the Westinghouse Technical Night School Press, East Pittsburgh, 192 pages.

Originally the chapters in this book were prepared by Mr. Whipple for "Sales Letter," a Westinghouse publication intended for private circulation, and its purpose was to help in the production of clear letters and reports by those to whom it was addressed. The demand from outside, however, became so great that it was decided to put the material in book form. There are five parts as follows: I. Introduction. II. Principles of Business Letter Writing. III. Words and Phrases Often Misused. IV. Report Writing. V. Letter Writing. There is also an appendix, including some suggestions to authors of technical papers. The book is well worth inclusion in the library of every one who has occasion to do much business or technical writing.

## Personal Items

A. C. Jordan, general electrical superintendent of the Elmira Water, Light & Railroad Company, Elmira, N. Y., has been relieved of the supervision of the maintenance of railroad equipment department. F. G. Maloney, superintendent of the railroad department, now has charge of the maintenance of equipment department as well as of track and transportation departments. These changes were made effective Oct. 22.

Sterling T. Dow will resign as manager of the York Utilities Company, Sanford, Me., on Dec. 1. He has been connected with the railroad company for fifteen years, being assistant treasurer for ten years, before his promotion to general manager. He was at one time freight agent of the Maine Central Railroad at Bangor and resigned to become assistant treasurer of the York Utilities. The York Utilities Company, formerly the Atlantic Shore Line Railroad, operates cars from Sanford to Biddeford, through Kennebunk and from Town House to Cape Porpoise and Kennebunkport.

A. L. C. Fell, general manager of the London County Council Tramways, is retiring, owing to ill health. He has occupied the post for 21 years. Much regret is felt in British tramway circles, as Mr. Fell is one of the best known and most highly esteemed men in the fraternity. Prior to coming to London he was manager of the Sheffield Corporation Tramways. He is a prominent member of the Municipal Tramways Association. He is an engineer by training and has been able to supervise alike the technical and administrative sides of the business. Mr. Fell is 55 years of age. He will receive a retiring allowance of about £1,000 a year. Mr. Fell was one of the men who took great pains to assist the A.E.R.A. committee on foreign operation in making its observations this past summer.

W. H. Sawyer was the principal speaker at a meeting of the Women's Republican Club of East St. Louis shortly before election day. It is not often that a public utility man will make the personal sacrifice to get out and do his bit for the cause of good government. Mr. Sawyer spoke at some length in behalf of Mr. Coolidge and Mr. Dawes, both of whom he has known personally for some 40 years.

W. W. Tarleton became assistant purchasing agent of the Georgia Railway & Power Company on Oct. 1. He was formerly purchasing agent of the Dixie Construction Company, a branch of the Alabama Power Company.

Fred W. Spring, superintendent of the Westbrook division of the Cumberland County Power & Light Company, Portland, Me., for the last 32 years, recently retired. His first position was that of a railroad conductor when the company was building the Westbrook road in 1891. For six months Mr. Spring was in charge of the construction work. When the road was opened

on June 28, 1892, Mr. Spring was appointed superintendent. He has held that position continuously since then. Mr. Spring's son, Frank B. Spring, who has been his assistant for a number of years, has been promoted to succeed his father. Harry K. Higgins will become the assistant superintendent.

### D. S. McManus Superintendent at Lake Charles

The new superintendent of the Lake Charles Electric Company, Inc., Lake Charles, La., is D. S. McManus, who was transferred recently from the Houston Electric Company, Houston, Tex.

Mr. McManus has been in the railway field a comparatively short time, but in a period of four years he has proved himself invaluable to his management. He entered the employ of the Houston Electric Company, a Stone & Webster property, on Sept. 1, 1920,



D. S. McManus

after being graduated from college as electrical engineer. He served in the various departments until July 1, 1921, at which time he was made assistant to the manager of the Houston Electric Company and the Galveston-Houston Electric Railway. In that capacity he remained for more than a year and was then transferred to Lake Charles, where he is now in charge of the street railway, construction and distribution systems of the light and power, water and gas departments, as well as the delivery departments of the ice plant.

The property with which Mr. McManus is now associated is under the executive management of Stone & Webster and is controlled by the Eastern Texas Electric Company of Delaware. The Lake Charles Electric purchased the old Lake Charles Railway, Light & Water Works Company on Aug. 1 of this year.

Unosuke Kurihara, chief secretary of the car operation department of the Municipal Electric Bureau, Tokio, is on a visit to this country to study electric

railway operation, particularly rapid transit conditions. Later he expects to visit Europe.

Iver Fraser, publicity manager of the London Underground electric railway companies, has resigned that office to become manager of the *Morning Post* in London. A. L. Barber, commercial manager of the companies, will for a time carry on the duties of publicity manager in addition to his regular work. It was under Mr. Fraser's direction that much of the excellent work in bettering public relations in London has been done for the so-called Underground group. This work included the advertising of the lines, one of the most important features of which was the use of art posters, which have attracted attention in all parts of the world. American electric railway men will remember Mr. Fraser as one of the party of London Underground railway officials that visited this country in May, 1923.

## Obituary

Maurice Tremper, roadmaster of the Seattle Municipal Railway, Seattle, Wash., a system which comprises 23 1/2 miles of line, for ten years, died in that city recently, at the age of 57 years. Mr. Tremper before going to Seattle was roadmaster of the Detroit United Railway for 12 years.

Charles A. Piper, for ten years superintendent of the Key System Transit Company, Oakland, Cal., died suddenly in that city, Oct. 26. Mr. Piper was identified with the Key System ever since its establishment in Oakland. During the first ten years of the company's existence he served as general superintendent. He was 57 years old.

F. J. Frey, division superintendent of the Fresh Pond division of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., died recently, after an illness of several months. Mr. Frey started in as a motorman with the Brooklyn Company twenty-nine years ago. He was appointed division superintendent. Mr. Piper was 57 years old.

William Gray Evans, a pioneer of Colorado and the man who took a conspicuous part in the organization of the Denver Electric & Cable Company, now the Denver Tramway Company, died Oct. 21, after an illness of three weeks. For many years he was president of the latter company, but resigned that office in 1913. Mr. Evans was the son of John Evans, who founded Northwestern University at Evanston, which is named after him. John Evans was appointed Governor of Colorado by President Lincoln. William Evans inherited many of the sturdy characteristics of his illustrious father, so much so that the son was characterized at one time as the most dominating personality in Denver life. He was interested in several banking institutions and at one time was head of the local Republican organization in Denver. It was Mr. Evans who had the idea of the Moffat tunnel through the Continental Divide. When the story of the Denver & Salt Lake Railway (Moffat Route) is told, his name will be linked with that of David H. Moffat.

## 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

### \$7,000,000 Spent at Los Angeles for Equipment

During the present year the Pacific Electric Railway management has contracted for varied freight and passenger equipment the cost of which entails an outlay of \$4,377,000, all of which will be delivered and available for service during the current year. For its local lines 50 new 600 class cars, of the new type used in the Hollywood service, are now being built by the Brill Company of Philadelphia. Delivery at the rate of six cars weekly is scheduled to begin within 60 days, and following their arrival will be sent to the Torrance shops of the company, where electrical equipment will be installed. These cars, seating 65 passengers, have proved highly satisfactory both to the public and management and were so designed as to be capable of being operated in three-car units, which will be done upon the completion of the Hollywood-Glendale-San Fernando Valley tunnel now in course of construction.

To augment its freight equipment, 1,350 assorted freight cars were ordered several months ago, approximately 33 per cent of which have been received in recent months and complete delivery of which will be fulfilled within the next few months. With these cars available the Pacific Electric, which is the third largest carrier in point of freight volume handled in California, will be in a position to meet any demand made upon it by Southern California shippers. This lot of 1,350 freight cars cost approximately \$3,000,000 and is the largest freight equipment order ever placed by the Pacific Electric.

Additional power will be supplied through five 60-ton freight locomotives, material and equipment for which is now being assembled for construction at the Torrance shops of the com-

pany. The railway's shops were the lowest bidders on the construction of this equipment and the work was awarded to its own mechanical department. These locomotives are the largest and most powerful type ever built on the Pacific Coast and cost approximately \$45,000 each.

Both single and double deck motor coaches have been delivered or ordered during the present year to the extent of \$150,000. Several double-deck buses will be delivered soon and will go into service on the lines of the Los Angeles Motorbus Company, jointly owned and operated by the Los Angeles and Pacific Electric Railways.

The foregoing equipment represents rolling stock ordered during the present year, but does not include 50 600-class cars and 50 1,100-class interurban cars ordered during 1923 on which delivery has been made recently. This lot of equipment represents an outlay of \$2,850,000, which, together with that ordered during the present year, makes an aggregate outlay of \$7,227,000 for equipment, all of which will be delivered during the present year.

### Railway Modernization in Java

The Java State Railways is buying modern cars and trailers for suburban passenger service in the section that includes the cities of Batavia and Meester Cornelis. The General Electric Company is electrically equipping 10 of the cars and the Westinghouse Electric & Manufacturing Company 5. The other 15 of the 30 cars on order are trailers. The Electric Storage Battery Company is furnishing Exide batteries and the J. G. Brill Company the car seats. The pneumatic door-opening mechanism is manufactured by the Consolidated Car Heating Company and the rubberoid by the Standard Paint Company. The all-steel bodies are being built in Holland.

The trolley voltage is 1,500 d.c., and each motor car will carry a motor-generator set to supply 65-volt current for operating the control mechanism and air compressors, supplying the lights and charging the storage batteries. The so-called subway type of ceiling fan will be used in motor cars and trailers.

### Free Nation-Wide Employment Service Urged

The establishment of a free nation-wide public employment service, to be maintained by the states in co-operation with the federal and local governments, for the benefit of men, women and juniors in all walks of life, is recommended by the Russell Sage Foundation in a 600-page report on employment methods, needs and agencies which was made public on Oct. 20 as the result of a five-year study which took the foundation's investigators into more than 70 cities of the United States and Canada.

The full report is being submitted to President Coolidge and to the governors of the states. The outstanding facts in the foundation's findings and its recommendations will be brought to the attention also of municipal and county officials, employers' associations, labor organizations, civic and social agencies and the executives of other organizations concerned with the general problems of employment or unemployment. The importance of the foundation's studies in this field becomes apparent when it is recalled that a preliminary statement made public several weeks ago showed that unemployment is no longer an occasional problem, but a constant phenomenon affecting large numbers of workers in every community.

Shelby M. Harrison, director of the department of surveys and exhibits of the Russell Sage Foundation, was in charge of the studies on which the report is based.

In conclusion the report says:

Whichever proves finally the more desirable, an exclusively federal or a federal-state-local employment service, it is commonly conceded that the former is not at present feasible, and with this we are in agreement. To think that Congress, either now or in the immediate future, would appropriate \$10,000,000 for an employment service, an amount estimated as necessary to provide an adequate basis is an idle dream. Expediency demands combined federal-state-local administration. We must begin with what we have.



New Type of All-Steel Interurban Cars, 50 of Which Were Delivered Recently to the Pacific Electric Railway

## Metal, Coal and Material Prices

Metals—New York		Nov. 4, 1924
Copper, electrolytic, cents per lb.	13.375	
Copper wire base, cents per lb.	15.125	
Lead, cents per lb.	8.65	
Zinc, cents per lb.	6.575	
Tin, Straits, cents per lb.	53.00	
Bituminous Coal f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$4.475	
Somerset mine run, Boston, net tons	2.05	
Pittsburgh mine run, Pittsburgh, net tons	1.875	
Franklin, Ill., screenings, Chicago, net tons	1.375	
Central, Ill., screenings, Chicago, net tons	1.125	
Kansas screenings, Kansas City, net tons	2.00	
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$6.25	
Weatherproof wire base, N. Y., cents per lb.	17.75	
Cement, Chicago net prices, without bags	2.20	
Linseed oil (5-lb. lots), N. Y., per gal.	\$1.115	
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	0.152	
Turpentine (bbl. lots), N. Y., per gal.	0.875	

## Rolling Stock

Long Island Railroad, New York, has placed an order for 40 electric cars, to cost approximately \$1,200,000. This represented the 1925 allotment for new equipment. The Westinghouse Electric & Manufacturing Company has received the contract for the electrical equipment in the new cars, which will cost about \$450,000.

Toledo & Indiana Railroad, Toledo, Ohio, has placed seven new cars built by the Cincinnati Car Company in service between Toledo and Bryan. The cars are 45 ft. long, weigh 30,000 lb., seat 50 passengers, and have a maximum speed of 55 m.p.h. The new equipment includes white dome lights, electric foot warmers, and standard green plush automobile type cushion seats.

International Railway, Buffalo, N. Y., through its subsidiary, the International Bus Corporation, has ordered 16 double-deck buses for the Delaware Avenue line and 12 single-deck buses for the Delaware Avenue line. The double-deck buses will cost \$176,000 and the single-deck buses \$106,000.

Wisconsin Public Service Corporation, Green Bay, Wis., plans to replace the present four 25-hp. motors and trucks on its four interurban cars on the Green Bay-Kaukauna line with new trucks and 35-hp. motors.

Philadelphia & Western Railway, Norristown, Pa., has put in service a new light-weight interurban car built by the J. G. Brill Company with Brill light-weight trucks. The car weighs 57,000 lb. It is 50 ft. long by 9 ft. 6 in. wide and seats 65 passengers. The equipment consists of four Westinghouse 535-B1 motors, each of 60 hp. capacity. The control equipment is Westinghouse panelboard type with modifications so that this equipment will operate in trains with two other types of equipment now used by the Philadelphia & Western road. Westinghouse air brakes are used.

## Track and Line

Boston, Mass.—The Boston Transit Department announces that bids will be open on Nov. 25 for the first section of trackage and incline 1,300 ft. long to connect the Boston Railway tunnel line at Andrew Square with the New Haven

track grade. This is in line with the Shawmut branch electrification.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., plans to build an electric freight line from its Lakeside power plant to connect with the Chicago & Northwestern Railway.

Philadelphia Rapid Transit Company, Philadelphia, Pa., has announced its readiness to build an extension of its tracks from Fifth Street and Olney Avenue to Fifth Street and Green Lawn, with a loop at the latter point.

Inter-City Terminal Railway, North Little Rock, Ark., has been given the right to extend its lines along East Second Street to the city limits and along East Seventh and East Eighth Streets to B Street, according to an ordinance passed recently by the City Council by a vote of 7 to 2. The ordinance requires the company to pave between the rails and for 18 in. on each side of the track.

United Railways, St. Louis, Mo., has just completed the double tracking of Franklin Avenue for a distance of more than a mile at a cost of \$230,000. When Easton Avenue between Twenty-eighth and Thirtieth Streets is widened it will be made a double-track street.

Southern Public Utilities Company, Charlotte, N. C., has started work at Winston-Salem on the rehabilitation of the line to Southside. The work, including a large amount of paving, will cost approximately \$6,000.

## Trade Notes

Combustion Engineering Corporation, Detroit, Mich., announces that James Cleary, formerly manager of its Philadelphia office, will assume management of the Detroit and Cleveland territories, with headquarters in Detroit. Frank Henderson will continue in charge of the Cleveland office. Joseph Lappin, formerly in charge of the Detroit office, has been assigned to New York for special work. The Detroit office has moved from the Penobscot Building to the Book Building.

Cameron & Barkley Company, Charleston, S. C., have been appointed district representatives for the Central Iron & Steel Company's Charleston district.

Hubbard & Company, Pittsburgh, Pa., manufacturers of pole line hardware, will erect a plant at Emeryville, Cal., to supply better the Western trade. It is expected that this plant will be completed and in operation by the middle of October. R. M. Kerschner, formerly sales manager of the electrical department, has been made Pacific Coast manager and has taken up his new duties.

Frank A. Wilch, who has been associated with the Cleveland office of the Triumph Electric Company of Cincinnati, has been placed in charge of that territory. He succeeds Edward S. Ford.

Economy Electric Devices Company, Chicago, Ill., announces that it has been appointed Central Western sales representative for the Chausse Oil Burner Company's kerosene burning torches and burners. These burners are used in connection with Babbit melters, enameling ovens and baking ovens.

Electric Service Supplies Company, Philadelphia, Pa., is now occupying new and larger offices in the Hudson Terminal Building, 50 Church Street, New York. The room number is now 17.

Thomas K. Scott has been appointed Mid-West sales manager of the Taylor Wharton Iron & Steel Company, Easton, Pa. He will be located in Denver, Col., in charge of the sales district of which Denver is headquarters. Mr. Scott has had a wide and profitable experience in mining. He entered the Columbia School of Mines in 1904, but left before completing his course in order to take up work for the Cumberland Ely Copper Company, Nevada. In 1908 he re-entered Columbia and completed his course, receiving the degree of engineer of mines. He has later been chief engineer of Miami Copper Company.

## New Advertising Literature

Ohio Brass Company, Mansfield, Ohio, has issued a new pamphlet giving information on the installation of arc weld bonds.

Ramsey Chain Company, Albany, N. Y., has issued an interesting treatise "Power Transmission with Ramsey Silent Chain."

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has recently issued Leaflet 20,190, including ten sheets, one each devoted to illustration and specific weights, dimensions and ratings on locomotives which have been built for the Pennsylvania Railroad, New York, New Haven & Hartford Railroad and Chicago, Milwaukee & St. Paul Railway.

Nichols-Lintern Company, Cleveland, Ohio, has issued a new catalogue, "List of Products by N-L." They give information and data on ventilators, indicating signals, stop-signals, lanterns and all other N-L products.

Shepard Electric Crane & Hoist Company, Montour Falls, N. Y., has issued a 60-page illustrated booklet entitled "Floor-Operated Electric Hoists." The pamphlet gives information regarding capacities, heights of lift and prices, as well as a description of each type of floor-operated hoist made by the Shepard Electric Crane & Hoist Company.

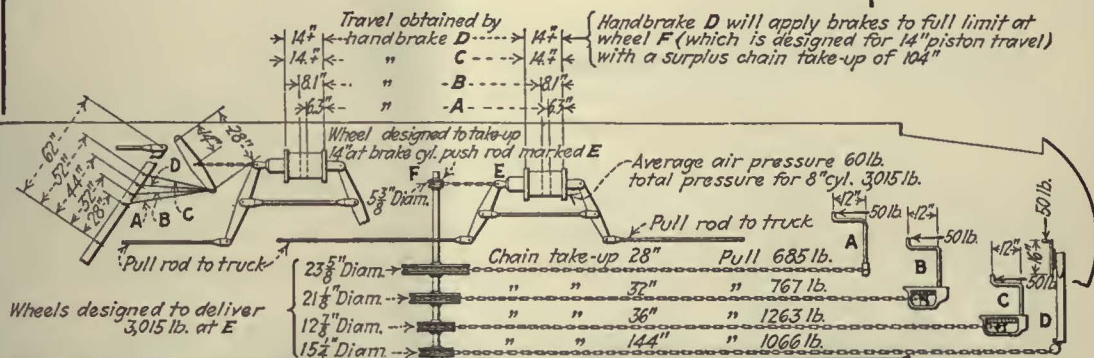
Griscom-Russell Company, New York, N. Y., has issued a new bulletin on Russell U-tube storage heaters. One of the features is the completeness of logical arrangement and legibility of the tables. These tables cover a large number of steam pressures as well as initial and final water temperatures and include complete details of tank sizes, capacities and dimensions for a wide range of storage capacities. Besides a complete description with details of construction and specification of the Russell U-tube storage heater the bulletin also contains a valuable table of data which has not hitherto been published on hot water requirements for various industrial and domestic uses.

Crouse-Hinds Company, Syracuse, N. Y., has issued Folder No. 17, on arktite circuit-breaking plugs and receptacles.



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Not what it costs! Not what somebody thinks! Not what it might be!

The actual engineering study of braking conditions and forces tells the story. Unless a hand brake will maintain the full braking power throughout the entire piston travel, it's not a safe brake!

Read the interesting article on this subject in your September 13th issue of Electric Railway Journal.

Think it over!

September 13, 1924

ELECTRIC RAILWAY JOURNAL

## Getting Full Value from Hand Brakes on Air-Brake Cars

As an Auxiliary to Air-Brake Equipments the Hand-Brake Parts Should be Designed and Maintained so that Full Braking Pressure, Equivalent to that Supplied by the Air-Brake Cylinder, Will Be Available Throughout the Entire Travel of the Piston

By J. S. McWhirter

Superintendent of Equipment Third Avenue Railway System, New York City

WHEN deciding on the proportion of levers and other brake-rigging parts in connection with the use of hand brakes on electric railway cars, the problem must be considered from one of two distinct

piston. In this respect hand air brakes in use on many of the cars throughout the country today are unsatisfactory. It is said with

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Canadian Representative: Lyman Tube & Supply Company, Limited, Montreal, Canada

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It is economically possible for the Weyerhaeuser mills to use especial care and extra high standards in the selection of pole material because of the mag-

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Check those classes of equipment parts which you have to renew most frequently.

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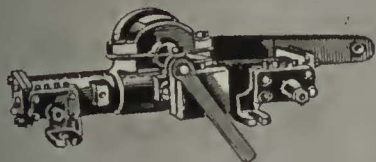
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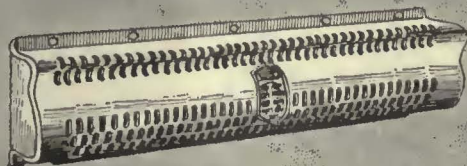
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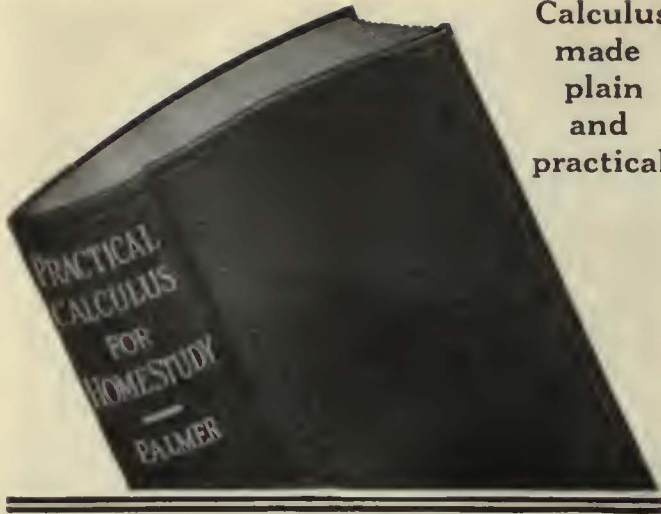


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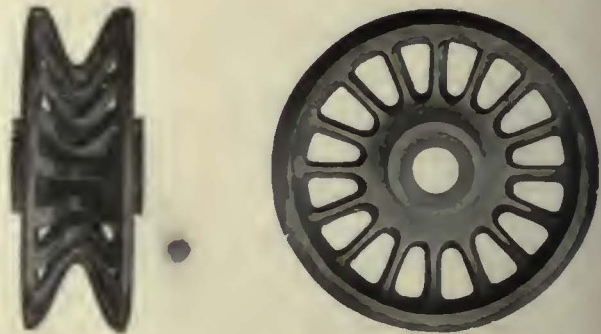
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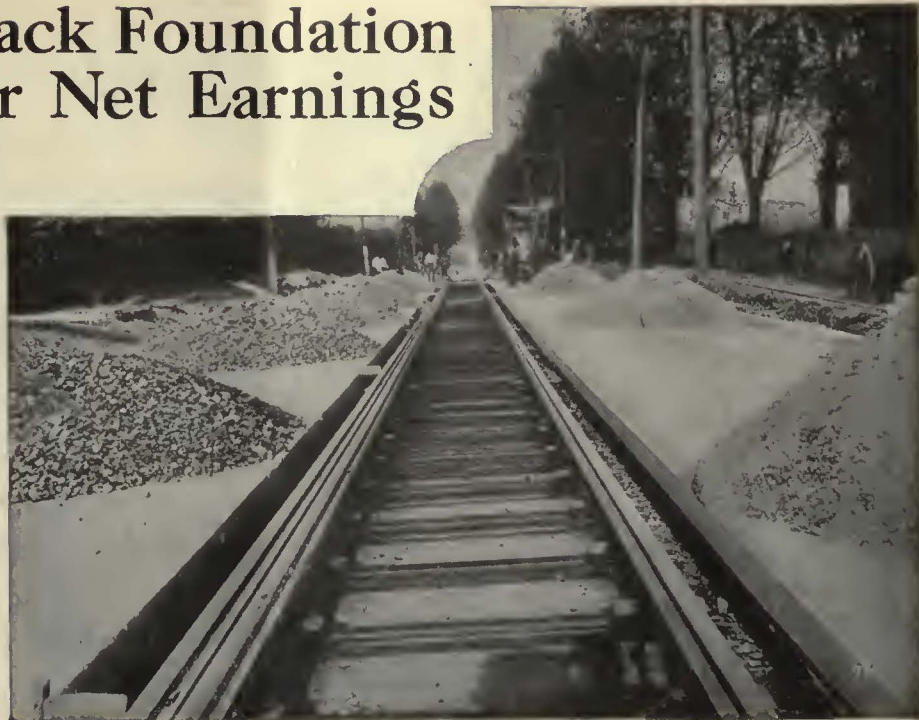
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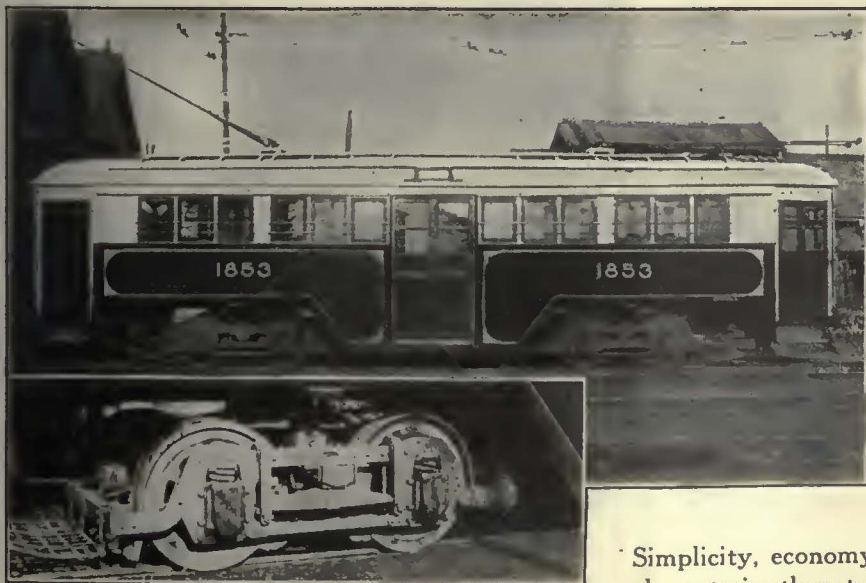
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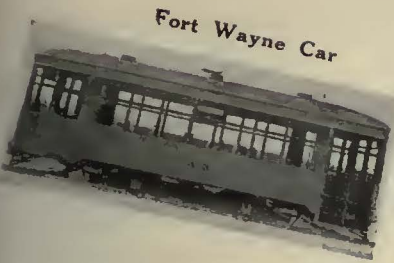
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		DORR	DORR	5	10	20	30	40	50
		E. BWAY	E. BWAY	6	10	20	30	40	50
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		INDIANA	INDIANA	8	10	20	30	40	50
		LAGRANGE	LAGRANGE	9	10	20	30	40	50
		LONG B.	LONG B.	10	10	20	30	40	50
	MICH.	MICH.	11	10	20	30	40	50	
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	N. ERIE	N. ERIE							
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	O.C. DEPT	O.C. DEPT							
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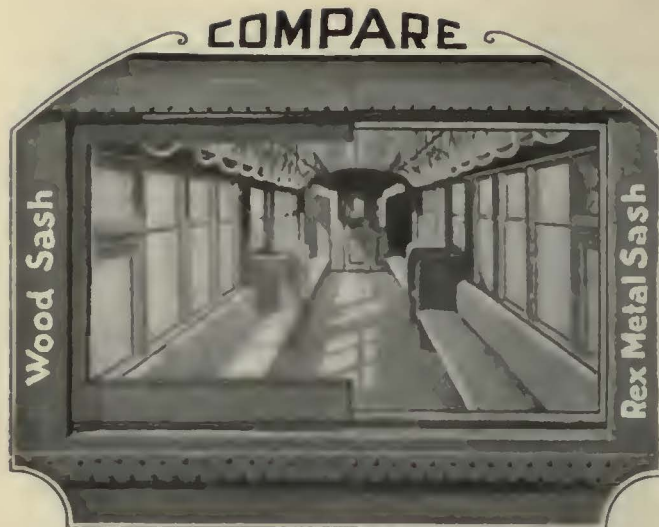
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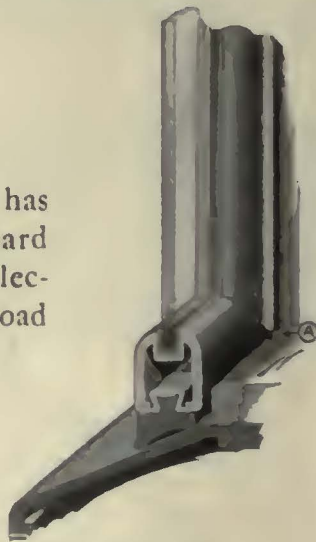
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**Rex METAL Sash**  
AND WEATHERSTRIP

For the same reason, has been adopted as Standard Equipment by many Electric Traction and Railroad Companies.



Write us for information regarding  
**COMPLETE WINDOW EQUIPMENT**

All Metal Rollers  
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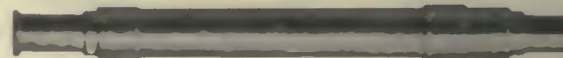
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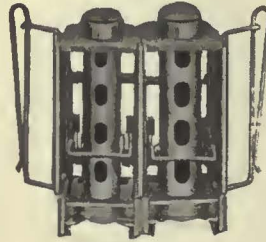
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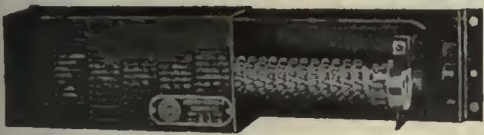
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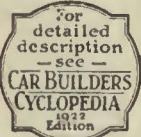
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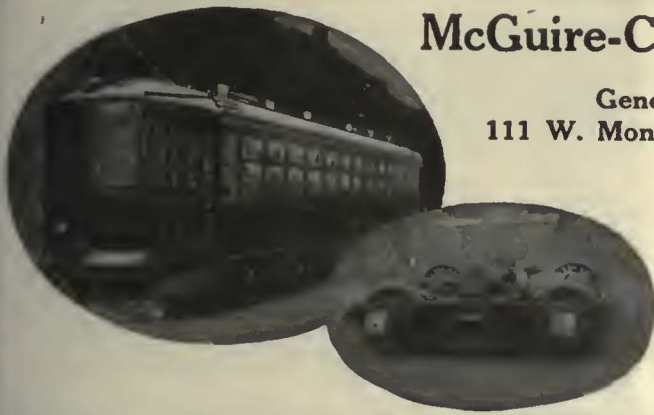


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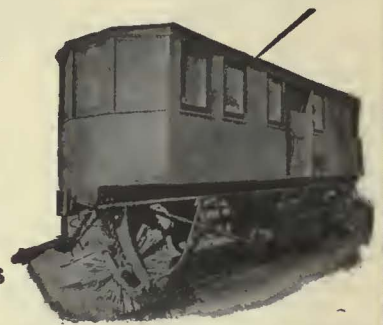
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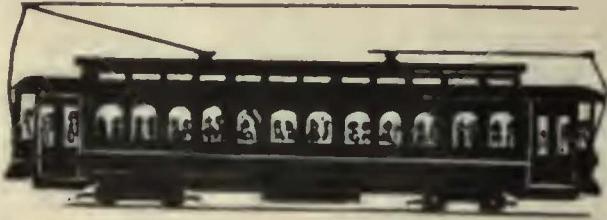
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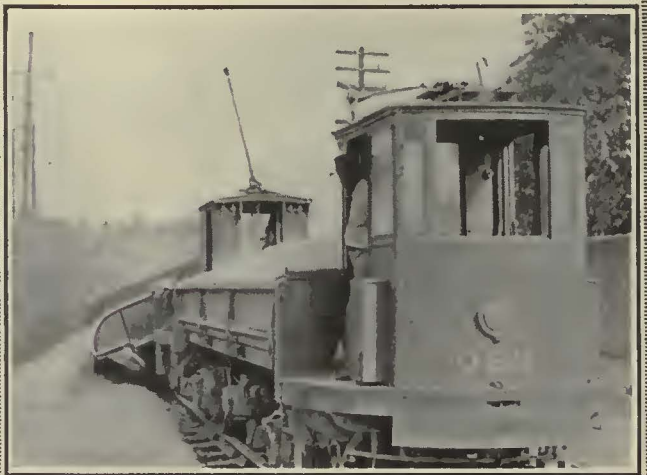
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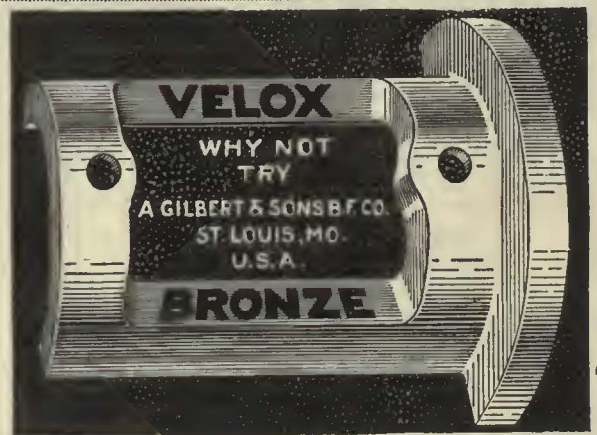
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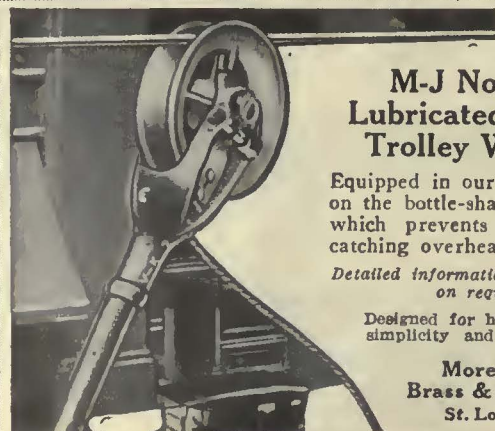


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 72 to 84 inches 2.10 an inch  
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 108 to 120 inches 1.80 an inch  
 120 to 144 inches 1.70 an inch  
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 168 to 192 inches 1.50 an inch  
 192 to 216 inches 1.40 an inch  
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 3180 to 3240 inches .05 an inch  
 3240 to 3300 inches .05 an inch  
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 8880 to 8940 inches .05 an inch  
 8940 to 9000 inches .05 an inch  
 9000 to 9060 inches .05 an inch  
 9060 to 9120 inches .05 an inch  
 9120 to 9180 inches .05 an inch  
 9180 to 9240 inches .05 an inch  
 9240 to 9300 inches .05 an inch  
 9300 to 9360 inches .05 an inch  
 9360 to 9420 inches .05 an inch  
 9420 to 9480 inches .05 an inch  
 9480 to 9540 inches .05 an inch  
 9540 to 9600 inches .05 an inch  
 9600 to 9660 inches .05 an inch  
 9660 to 9720 inches .05 an inch  
 9720 to 9780 inches .05 an inch  
 9780 to 9840 inches .05 an inch  
 9840 to 9900 inches .05 an inch  
 9900 to 9960 inches .05 an inch  
 9960 to 10000 inches .05 an inch

R. F. J.

## POSITIONS WANTED

**EXECUTIVE.** Urban and Interurban. Wide successful experience in all departments of construction and operation. PW-740, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

**EXPERIENCED** operating man, now employed, desires change. Technical graduate, forty-one years of age, sixteen years' experience covering all branches of electric railway operation, eight years in the transportation end, with large railway company in the east. Best of references from men high in electric railway field. Desire to connect with company where ability can be demonstrated and where there is opportunity for advancement. PW-747, Electric Railway Journal, 10th Ave. at 36th St., New York.

## WANTED SEVERAL RAILS

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 Lorain Steel Company's section 90, No. 317.  
 ROME RAILWAY & LIGHT COMPANY  
 Home, Georgia

For Sale—Built in 1920  
 2—Kuhlman Semi-Steel Interurban Cars, Passenger, Smoker and Baggage.  
 Length 54-ft. 7 1/2 in.; width 8-ft. 6 in.  
 Brill 27 MCB 2 Trucks.  
 4 G. E. 203 motors. Complete.  
**ELECTRIC EQUIPMENT CO.**  
 Commonwealth Bldg., Philadelphia, Pa.

**FOR SALE**  
 100 doz., No. 778; 75 doz., No. 788; 50 doz., No. 980 Headlight Globes, Macbeth brand. Absolutely new. Price \$2.50 per dozen.  
**C. F. BULOTTI MACHINERY CO.**  
 87-71 Main St., San Francisco, Cal.

**FOR SALE**  
**New Root Snow Scrapers**  
 16 Sets Air Operated.  
**TRANSIT EQUIPMENT CO.**  
 Cars—Motors  
 501 Fifth Ave., New York

**Relaying Rails**  
 NEW RAILS—ACCESSORIES

See our full page announcement on page 27.

1 Ton or 1000

**LB FOSTER CO.**  
 PITTSBURGH, PA. NEW YORK CITY  
 JERSEY CITY - PHILADELPHIA - HAMILTON

## FOR SALE Standard Gauge Electric Railway Equipment

- 1—Parlor Chair Car, built by American Car Company, length 48-ft.—seating capacity 40—fully equipped air brakes, electric heating system. Brill standard double trucks, 65-hp. motors. Type M Controller.
  - 1—Express Car built by American Car Company, length 50-ft., equipped with air brakes, stove heat. Brill standard double trucks. Electrical equipment 4 G.E.—47—40-hp. motor and K-28 controller.
  - 1—Line Car, 24-ft. long. Electrical equipment consists of 2 G.E.—1000—35-hp. motors and K-10 controller.
  - 6—Interurban Passenger Cars, built by American Car Company, length of cars 49-ft., seating capacity 50, fully equipped air brakes. Electrical equipment 4 G.E.—67—40-hp. motors and K-6 controllers. Smith heaters and Brill standard double trucks.
- Cars in splendid condition, finished in both rattan and plush. For quick sale, we offer these Cars at \$3000 each, f.o.b. cars. Write at once for detailed specifications. Located in Chicago District. Inspection invited.

## HYMAN-MICHAELS COMPANY

Rails, Locomotives and Cars  
 Main Office—CHICAGO—Peoples Gas Bldg.  
 District Offices: New York, Pittsburgh, St. Louis, San Francisco

**NEW GEARS, PINIONS AND GEAR CASES FOR SALE**  
 GE-1000 Motor:  
 173 15 tooth pinions  
 107 69 tooth gears  
 10 Sheet iron gear cases  
 GE-800 Motor:  
 4 malleable gear cases and 3 bottom halves  
 FS-749, Electric Railway Journal  
 10th Ave. at 30th St., New York City

**RAILS**  
 New or Relayers  
 We Buy or Sell  
**ZELNICKER IN ST. LOUIS**

## SOME ONE WANTS TO BUY

the equipment or machinery that you are not using.

This may be occupying valuable space, collecting dust, rust and hard knocks, in your shops and yards.

**SELL IT BEFORE DEPRECIATION SCRAPS IT**

THE SEARCHLIGHT SECTION IS HELPING OTHERS

—LET IT HELP YOU ALSO



FOR SALE

# One-Man Double End Safety Cars



*Selections may be made from a lot of two hundred.  
Cars are three years old and in first-class condition.*

The Department of Street Railways, City of Detroit, Mich., offers for sale any part of Two Hundred Single-Truck, Double-End Safety Cars, for Standard Gauge Track, equipped with air-operated Snow Scrapers, air-operated "R10" Registers, headlinings, center lighting with opal shades, electric heat, Utility Regulators, Nichols-Lintern tail lights, and Ohio Brass Trolley stands. Westinghouse 508 and General Electric 264 Motors. Westinghouse DH-16 and General Electric CP-27 Air Compressors. 26-in. Steel Wheels. Standard Safety Car Devices Co. equipment. Cars are of Standard Safety Car dimensions, and weigh approximately 17,000 pounds.

Bodies and Trucks were built by the J. G. Brill Car Co., St. Louis Car Co., Osgood-Bradley Car Co., and McGuire-Cummings Mfg. Co., and purchaser may select any of these type Cars.

Cars may be inspected by calling at the Department of Street Railways, Detroit, Michigan.

Bids are solicited for any part of the above offering, f.o.b. flat cars, Detroit, Michigan, and these may be directed to Frank Meyer, Jr., Purchasing Agent, Department of Street Railways, Administration Building, St. Jean & Shoemaker Aves., Detroit, Michigan.

**Bids will be opened on Monday, December 8th, at 11:00 A. M.,  
at which time same will be given consideration.**

If interested in the purchase of the above kindly get in touch with the Department of Street Railways before date that bids are to be opened, for information relative to submitting formal bid, etc.

# WHAT AND WHERE TO BUY

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

**Advertising, Street Car**  
Collier, Inc., Barron G.

**Air Receivers & Aftercoolers**  
Ingersoll-Rand Co.

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

**Armature Shop Taola**  
Elec. Service Supplies Co.

**Automatic Return Switch**  
Stands  
Ramapo Ajax Corp.

**Automatic Safety Switch**  
Stands  
Ramapo Ajax Corp.

**Axles**  
Bemis Car Truck Co.  
Bethlehem Steel Co.  
Brill Co., The J. G.  
Carnegie Steel Co.  
Johnson & Co., J. R.  
Laclede Steel Co.  
St. Louis Car Co.  
Westinghouse E. & M. Co.

**Babbitt Metal**  
Ajax Metal Company

**Badges and Buttons**  
Elec. Service Supplies Co.  
International Register Co.,  
The

**Barges Steel**  
American Bridge Co.

**Batteries, Dry**  
National Carbon Co.

**Bearings and Bearing Metals**  
Ajax Metal Company  
Bemis Car Truck Co.  
Brill Co., J. G., The  
General Electric Co.  
Gilbert & Sons B. F. Co.,  
A.  
More-Jones Brass & Metal Co.  
St. Louis Car Co.  
Westinghouse E. & M. Co.

**Bearings, Center and Roller**  
Slide  
Baldwin Locomotive Wks.  
Stuckl Co., A.

**Bells and Gongs**  
Brill Co., The J. G.  
Consolidated Car Heat. Co.  
Elec. Service Supplies Co.  
St. Louis Car Co.

**Bearings, Roller**  
Norma-Hoffman Bearings  
Corp.

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Babcock & Wilcox Co.

**Bonding Apparatus**  
Amer. Steel & Wire Co.  
Elec. Ry. Improvement Co.  
Elec. Service Supplies Co.  
Ohio Brass Co.  
Railway Track-work Co.

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Amer. Steel & Wire Co.  
Elec. Ry. Improvement Co.  
Elec. Service Supplies Co.  
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Railway Track-work Co.  
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Johns-Pratt Co.

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Elec. Service Supplies Co.  
Hubbard & Co.  
Ohio Brass Co.

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

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Amer. Br. Shoe & Fdy. Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
St. Louis Car Co.

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**Brake Parts**  
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Bemis Car Truck Co.  
Brill Co., The J. G.  
General Electric Co.  
National Brake Co.  
St. Louis Car Co.  
Westinghouse Tr. Br. Co.

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American Bridge Co.

**Brushes, Carbon**  
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Le Carbone Co.  
National Carbon Co.  
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U. S. Graphite Co.

**Brushes, Wire, Pneumatic**  
Ingersoll-Rand Co.

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Brill Co., The J. G.  
International Motor Co.  
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Co.  
Pierce Arrow Motor Car Co.  
St. Louis Car Co.

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Brill Co., The J. G.  
St. Louis Car Co.

**Cables, (See Wires and**  
**Cables)**

**Cable Tapes, Yellow and**  
**Black Varnish**  
Acme Wire Co.  
Irvington Varnish & Ins.  
Co.

**Carbon Brushes (See**  
**Brushes, Carbon)**

**Cars, Hump**  
Brill Co., J. G., The  
Differential Steel Car Co.  
St. Louis Car Co.

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Elec. Service Supplies Co.

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Consolidated Car Heat. Co.  
Westinghouse E. & M. Co.

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Brill Co., The J. G.  
Kuhlman Car Co., G. C.  
McGuire-Cummings Mfg. Co.  
National Ry. Appliance Co.  
St. Louis Car Co.  
Wason Mfg. Co.

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Brill Co., J. G., The  
St. Louis Car Co.

**Cars, Second Hand**  
Electric Equipment Co.  
Transit Equipment Co.

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

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Bethlehem Steel Co.

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**or Copper**  
Ajax Metal Company  
Anderson Mfg. Co., A. &  
J. M.  
More-Jones Brass & Metal  
Co.

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**Steel**  
Bemis Car Truck Co.  
Fort Pitt Steel Castings Co.  
St. Louis Car Co.

**Castings, Malleable and**  
**Brass**  
Amer. Br. Shoe & Fdy. Co.  
Bemis Car Truck Co.  
Fort Pitt Steel Castings Co.  
St. Louis Car Co.

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**Trolley**  
Elec. Service Supplies Co.  
Ohio Brass Co.  
Wood Co., Chas. N.

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Archbold-Brady Co.

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Pantasote Co., Inc.

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**Haskellite Mfg. Co.**

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Cleveland Fare Box Co.

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Anderson, A. & J. M. Mfg.  
Co.  
General Electric Co.  
Westinghouse E. & M. Co.

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**Wires and Cables**  
Elec. Ry. Equipment Co.  
Elec. Ry. Improvement Co.  
Elec. Service Supplies Co.  
General Electric Co.  
Hubbard & Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.

**Cleaners and Scrapers Track**  
**(See also Snow-Plows,**  
**Sweepers and Brooms)**  
Brill Co., The J. G.  
St. Louis Car Co.

**Clusters and Sockets**  
General Electric Co.

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**Conveying and Hoisting**  
**Machinery)**

**Coll Banding and Winding**  
**Machines**  
Elec. Service Supplies Co.

**Colls Armature and Field**  
General Electric Co.  
Westinghouse E. & M. Co.

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Elec. Service Supplies Co.  
General Electric Co.  
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Cleveland Fare Box Co.  
Intern'l Register Co.  
Johnson Fare Box Co.

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Cleveland Fare Box Co.

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Cleveland Fare Box Co.

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

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General Electric Co.

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General Electric Co.  
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Allis-Chalmers Mfg. Co.  
General Electric Co.  
Ingersoll-Rand Co.  
Westinghouse Tr. Br. Co.

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Ingersoll-Rand Co.

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Frankel Connector Co.  
Westinghouse E. & M. Co.

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Consolidated Car Heat. Co.  
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**Controllers or Parts**  
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General Electric Co.  
Westinghouse E. & M. Co.

**Controller Regulators**  
Elec. Service Supplies Co.

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

**Converters, Rotary**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse E. & M. Co.

**Conveying Machinery**  
American Bridge Co.

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Anacosta Copper Mines  
Co.

**Cord, Bell, Trolley, Register**  
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Elec. Service Supplies Co.  
Internatl Register Co.,  
The  
Roehling's Sons Co., John  
A.  
St. Louis Car Co.  
Samson Cordage Works  
Silver Lake Co.

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

**Coopers Car**  
Brill Co., The J. G.  
Ohio Brass Co.  
St. Louis Car Co.  
Westinghouse Tr. Br. Co.

**Cross Arms (See Brackets)**  
**Crossing Foundations**  
International Steel Tie Co.

**Crossing, Frog & Switch**  
Ramapo Ajax Corp.

**Crossing, Manganese**  
Bethlehem Steel Co.  
Ramapo Ajax Corp.

**Crossings**  
Ramapo Ajax Corp.

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

**Crossings, Trolley**  
Ohio Brass Co.

**Curtains and Curtain Fixtures**  
Brill Co., The J. G.  
Curtain Supply Co.  
Elec. Service Supplies Co.  
Morion Mfg. Co.  
Pantasote Co., Inc.  
St. Louis Car Co.

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Elec. Equipment Co.  
Hyman-Michaels Co.  
Transit Equipment Co.

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**Track Work)**

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Ramapo Ajax Corp.

**Destination Signs**  
Elec. Service Supplies Co.

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

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Consolidated Car Heat. Co.  
General Electric Co.  
Nat'l Pneumatic Co., Inc.  
St. Louis Car Co.

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Consolidated Car Heat. Co.  
General Electric Co.  
Morton Mfg. Co.

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Ingersoll-Rand Co.

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Elec. Service Supplies Co.

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Ohio Brass Co.

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Power Specialty Co.

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Amer. Electrical Works  
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Railway Track-work Co.  
Western Electric Co.

**Electric Transmission Towers**  
American Bridge Co.

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Railway Track-work Co.

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Railway Track-work Co.

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Beeler, John A.  
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Bureau of Commercial  
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Drum & Co., A. L.  
Ford, Bacon & Davis  
Hemphill & Wells  
Holst, Engelhardt W.  
Jackson, Walter  
Kelly-Cooke Co.  
Ong, Joe R.  
Railway Audit & Inspec-  
tion Co.  
Richey, Albert S.  
Robinson & Co., Dwight  
P.  
Sanderson & Porter  
Stevens & Wood  
Stone & Webster  
White Eng. Corp., The  
J. O.

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Equipment Engineering Co.

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Ohmer Fare Register Co.

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Frogs & Crossings, Tee Rail  
Bethlehem Steel Co.  
Ramapo Ajax Corp.

**Frogs, Track (See Track**  
**Work)**

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Ohio Brass Co.

**Furnaces, Electric Steel**  
Melting  
American Bridge Co.

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Consolidated Car Heat. Co.  
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Johns-Pratt Co.

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General Electric Co.  
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Johns-Pratt Co.

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Brill Co., J. G., The

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Ramapo Ajax Corp.

**Guard Rails, Tee Rail &**  
**Manganese**  
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Nuttall Co., R. D.  
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St. Louis Car Co.

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Gold Car Heat. & Lig. Co.  
Nat'l Ry. Appliance Co.  
Smith Heater Co., Peter

**Heaters, Car, Hot Air and**  
**Water**  
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*Ingersoll-Rand Paving Breakers tearing up track foundation operated from I-R Electric Driven Portable Air Compressor.*

## A dozen times faster

**The Compressed Air Way Saves Time and Money**

Ingersoll-Rand Portable Air Compressors and Tools finish up many jobs in a fraction of the time required by hand methods.

Pneumatic "Paving Breakers" save more than 50% in time and labor over hand methods, when breaking out pavement shoulders, heavy foundation, etc.

Pneumatic Tie Tampers enable four men to tamp more track and do it better than twelve to sixteen men using hand methods.

Other air tools are also used to save money on various jobs, making the portable compressor outfit a most important factor in reducing track costs. Ask for complete information on the savings made with portable air power units.

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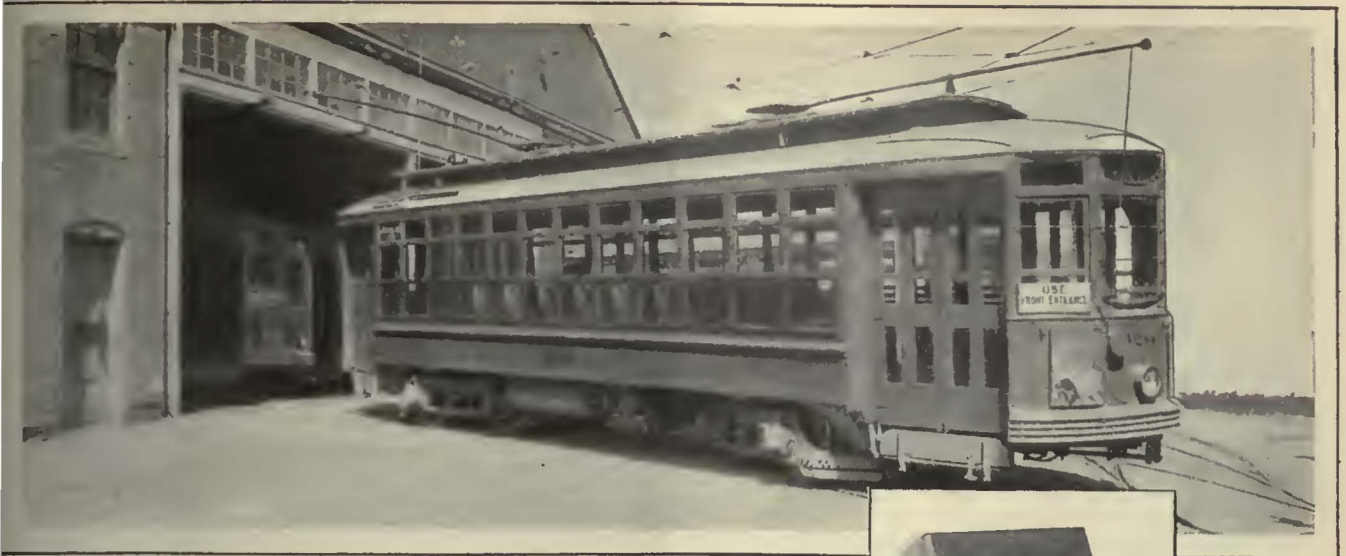
Insulating Cloth, Paper and Tapes  
 General Electric Co.  
 Irvington Varnish & Ins. Co.  
 Okonite Co.  
 Stand. Underground Cable Co.  
 Westinghouse E. & M. Co.  
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 Insulators (See also Line Materials)  
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 Lapp Insulator Co., Inc.  
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 Elec. Service Supplies Co.  
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 Bemis Car Truck Co.  
 Brill Co., J. G.  
 Fort Pitt Steel Castings Co.  
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 Lamps, Signal and Marker  
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 Ohio Brass Co.  
 Lanterns, Classification  
 Nichols-Lintern Co.  
 Lightning Protection  
 Elec. Service Sup. Co.  
 General Electric Co.  
 Ohio Brass Co.  
 Shaw, Henry M.  
 Westinghouse E. & M. Co.  
 Line Material (See also Brackets, Insulators, Wires, etc.)  
 Archbold-Brady Co.  
 Electric Ry. Equipment Co.  
 Elec. Service Sup. Co.  
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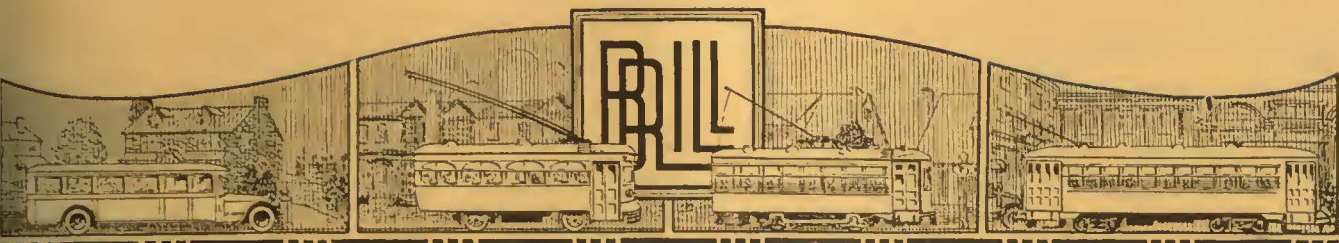


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