

# ELECTRIC RAILWAY JOURNAL

Graw-Hill Publishing Company, Inc.

JULY, 1929

Thirty-five Cents Per Copy

## HOUSTON PUBLIC LIBRARY

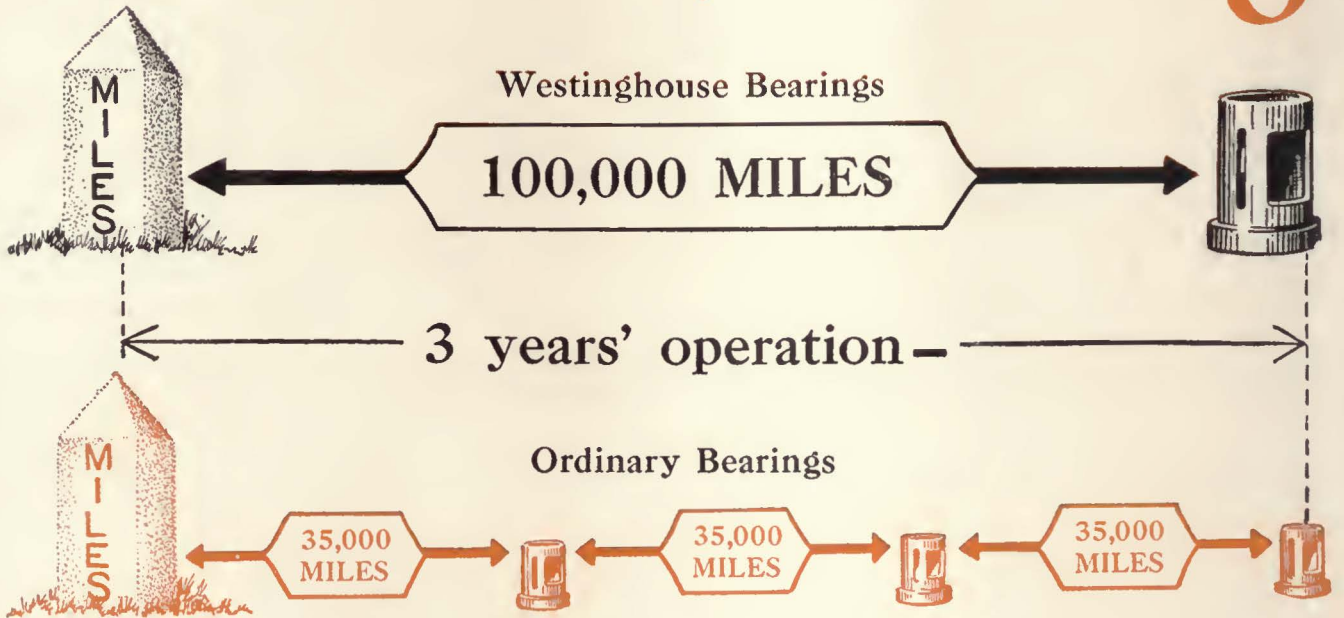
On the one hundred and fifty-third anniversary of our country, we pause to consider its remarkable growth. Electric Railway Service has been an indispensable factor. Advertising, too, has contributed much. For decades these two have been closely associated through Collier Service.

*Car Card Advertising  
Almost Everywhere*

JULY 4<sup>TH</sup>  
1776

**Barron G. Collier, Inc.**  
NEW YORK CITY

# - Bearing Miles *or* Miles of Bearings



- are your bearing replacements  
in the

*Red*

*or*

*Black?*



**YOUR** ultimate armature bearing cost involves more than the original price of the part. Labor required to replace a bearing constitutes a large percentage of the total.



WESTINGHOUSE ELECTRIC & MFG. COMPANY  
EAST PITTSBURGH PENNSYLVANIA  
SALES OFFICES IN ALL PRINCIPAL CITIES OF  
THE UNITED STATES AND FOREIGN COUNTRIES



# Westinghouse

# Electric Railway Journal

JOHN A. MILLER, JR.  
Acting Managing Editor  
MORRIS BUCK  
Engineering Editor  
GEORGE J. MACMURRAY  
CLIFFORD A. FAUST  
J. W. McCLOY

CHARLES GORDON, Editor

PAUL WOOTON  
Washington  
ALEX MCCALLUM  
London, England

LOUIS F. STOLL  
Publishing Director

## In This Issue

Vol. 73, No. 16

JULY, 1929

Pages 693-754

### Editorials .....693

*An Outstanding Contribution Toward Orderly Civic Development*  
*Car Survey Provides Striking Evidence*  
*A Worthy Rival of the Automobile*  
*Far West Leads in Pick-up and Delivery*  
*A New Outlook in Toledo*  
*San Francisco Needs a Transit Policy*  
*Subsidy by General Taxation Is Unsound*

### Transportation Facilities Planned for 20,000,000 People.....696

Regional Plan of New York offers city co-ordinated network of rapid transit, freight lines and highways.

### Modernized Toledo System Making Real Progress .....701

Change to friendly public feeling and increased revenue are results of company's effort to give maximum service.

### Trackless Trolley Questions Answered From Experience .....705

BY EDWARD A. WEST

Solutions of difficulties arising in Salt Lake City operation are outlined. Costs are lower than for buses or street cars.

### Acceleration Rates Compared for Gas-Electric and Mechanical Drive Buses .....699

### Traffic Problems Topic of New York State Meeting .....700

### Monthly Financial Reports Show Improvement .....709

### Striped Painting Makes Locomotive Conspicuous .....710

### Midwest Association Expands Activities .....711

### Canadian Association Celebrates Silver Anniversary .....723

### Light Weight Attained in New Pittsburgh Car .....712

Experimental car of Pittsburgh Railways has aluminum frame, aluminum accessories and lightest possible construction.

### New Cars Pay for Themselves on Many Properties .....715

BY MORRIS BUCK

Wisdom of new car investment shown by faster, safer and more comfortable service at lower costs.

### Pacific Electric Expands Pick-Up and Delivery Service .....721

BY PAUL T. PORTER

Monthly increase in freight business follows inauguration of co-ordinated motor truck door-to-door service.

### Vision of Local Business Men Puts Oklahoma Railway on Paying Basis.....725

New equipment, terminal and shop improvements under competent management carry railway over depression and yield profit.

### The Readers' Forum .....729

### Improved Armature-Dipping Methods Developed .....730

### Some Essentials for Trolley Wheels .731

### Overhauling Cast Grid Resistors ...731

### Maintenance Contest Trophy .....732

### Devices and Practices Found Useful in Expediting Maintenance Work .733

### New Products for the Railways' Use 738

### News of the Industry .....740

## Coming!

*Making small city operation pay—the story of a management with vision.*

*How Montreal Tramways is meeting increased power demands.*

*An analysis of the relation between the length of traffic signal cycles and the efficiency of street use.*

McGraw-Hill Publishing Company, Inc.  
Tenth Ave. at 36th St., New York, N. Y.  
Cable Address "Machinist, N. Y."

Publishers of  
Electrical World  
American Machinist  
Bus Transportation  
Power  
Coal Age  
Radio Retailing

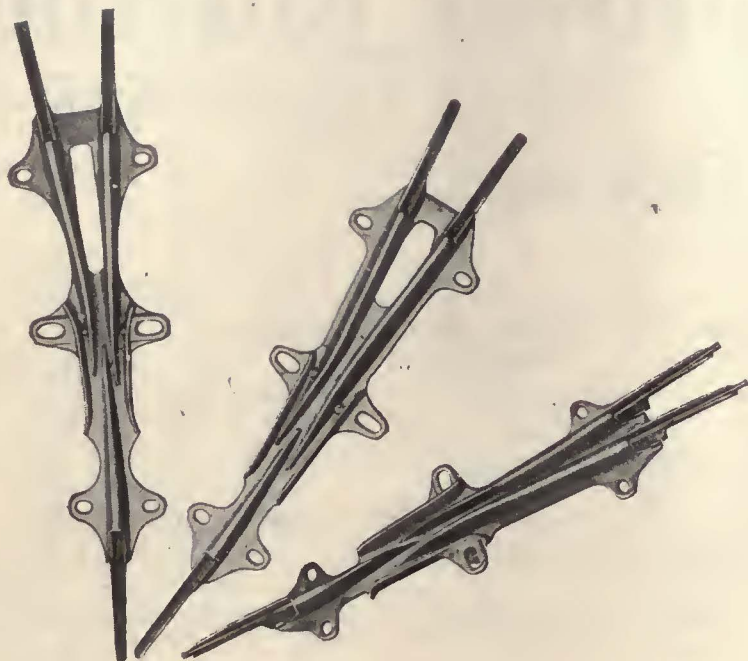


Engineering News-Record  
Ingenieria Internacional  
Construction Methods  
Food Industries  
Electrical West  
Industrial Engineering  
Textile World  
Ariston

1929  
Electrical Merchandising  
Engineering and Mining Journal  
Chemical and Metallurgical Engineering

JAMES H. MCGRAW, Chairman of the Board  
MALCOLM MUIR, President  
JAMES H. MCGRAW, Jr., Vice-President and Treasurer  
EDWARD J. MEHREN, Vice-President  
MASON BRITTON, Vice-President  
EDGAR KOBAK, Vice-President  
HAROLD W. MCGRAW, Vice-President  
C. H. THOMPSON, Secretary  
NEW YORK District Office, 285 Madison Ave.  
WASHINGTON, National Press Building  
CHICAGO, 520 N. Michigan Blvd.  
PHILADELPHIA, 1000 Arch St.  
CLEVELAND, Guardian Building  
ST. LOUIS, Bell Telephone Building  
SAN FRANCISCO, 883 Mission Street  
LONDON, 6 Boulevard Street, London, E. C. 4.

Subscription Prices: United States and its possessions, Canada, Mexico and other countries taking domestic postage rates, \$3 a year. All other foreign countries, \$5 a year. Published monthly. Single copies, 35 cents. Sold in combination with ELECTRIC RAILWAY JOURNAL News (published on 39 Saturdays during the year) for \$4 domestic and \$8 foreign. The separate subscription price of ELECTRIC RAILWAY JOURNAL News is \$2 a year domestic and \$4 a year foreign. Entered as second class matter June 23, 1908, at the Post Office, New York, N. Y., under the act of March 3, 1879. Printed in U.S.A.—Copyright, 1929, by the McGraw-Hill Publishing Company, Inc. Official correspondent in the United States for Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles. Member A.B.P. Member A.B.C. Number of Copies Printed, 8,280



# OVERLAPPING RUNNERS

## *An eminent feature of Westinghouse trolley frogs*

**T**HE long service obtained from Westinghouse trolley frogs results from a design in which the wheel travels smoothly through the frog. Overlapping the runners prevents the wheel flange from touching the pan. Properly curved runners keep the wheel riding true. Long bayonet approaches, easily removable, lead the wheel onto the frog without bumping or arcing.

The type LW frog has been designed

for use with narrow, small diameter trolley wheels.

The type CG frog has been designed for use with large trolley wheels having a width exceeding 1½ inches.

The type UF frog is a universal 10 degree frog for railway application. Different sizes of wheels can be operated successfully where this frog is used.

All frogs are made of malleable iron, galvanized, and equipped with bronze bayonet approaches.

WESTINGHOUSE ELECTRIC & MFG. COMPANY  
EAST PITTSBURGH PENNSYLVANIA  
SALES OFFICES AND SERVICE SHOPS IN ALL PRINCIPAL CITIES



# Westinghouse

T 30622

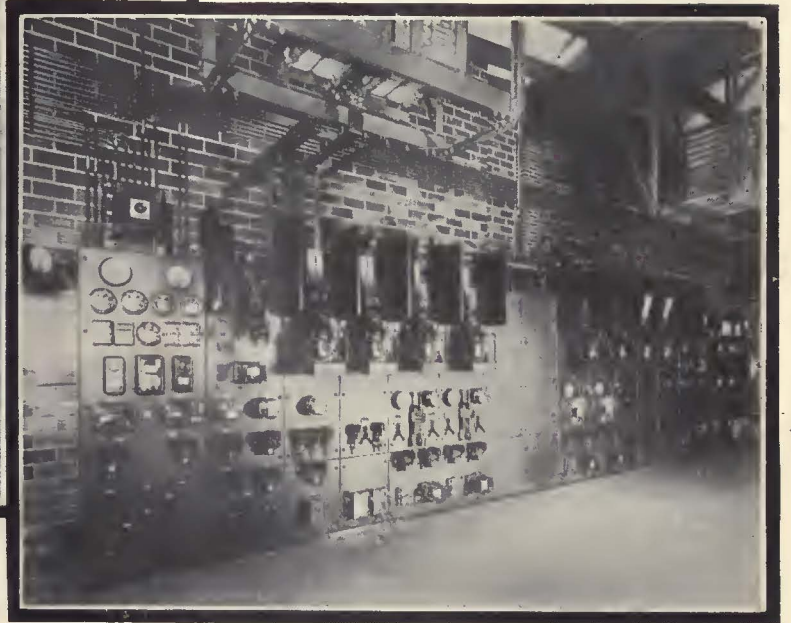


1929



Maple Substation, Pittsburgh Railways Co.

Switchboard for Maple Substation



## Two years—and a Third

**A** FEW months hence, and the Pittsburgh Street Railways Company will have a third Westinghouse automatic railway substation added to their ever-expanding system.

Two years ago this company specified Westinghouse automatic substation equipment for its Dormont and Maple stations. As a result of their successful operation, similar equipment has been specified for the Griffith substation which is now being constructed.

This new substation will be a complete Westinghouse installation, including such equipment as: one-1000 kv-a. outdoor type OISC transformer arranged for either 11 kv. or 22 kv. operation on the incoming side; one-1000 kw. synchronous converter; and a complete automatic switchboard.

The advantages derived from the installation of automatic railway substations are discussed in Circular 1793. Request your copy from our nearest office.



1929



WESTINGHOUSE ELECTRIC & MFG. COMPANY  
EAST PITTSBURGH PENNSYLVANIA  
SALES OFFICES AND SERVICE SHOPS IN ALL PRINCIPAL CITIES

*Automatize  
with*

# Westinghouse

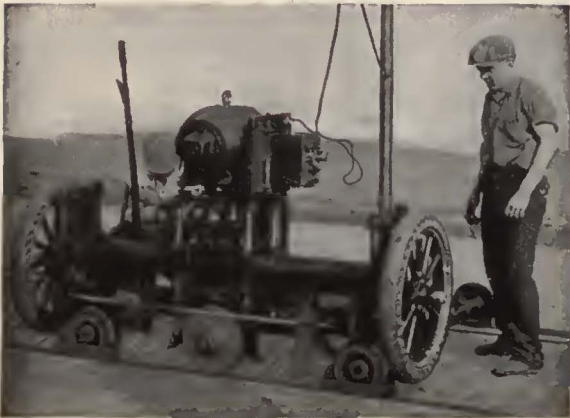
T 30615



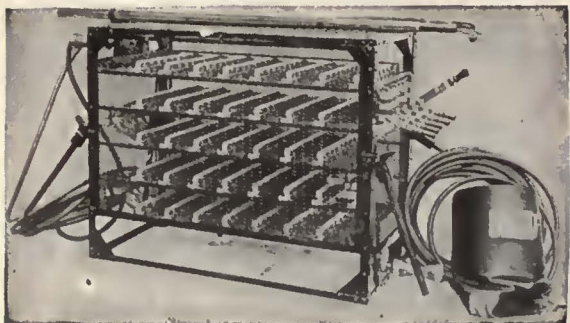
Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

# Take it from Mr. Kettering:

“A black bank balance is popular applause for your existence. A red balance is the hiss of the community.”

This Vice-President of General Motors knows transportation. He knows what the transportable public likes—and so do you.

You know that you may earn applause and not get it. You know also that unless you earn it you can't get it.

The only way to earn it is to provide comfortably swift, safe, silent street car rides.

The only way to do that is on smooth track.

*Weld and grind  
—and oil the curves*

## Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

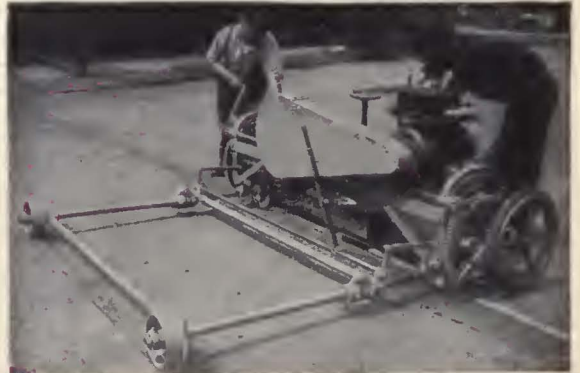
**AGENTS:**

Chester F. Gailor, 50 Church St., New York  
 Chas. N. Wood Co., Boston  
 Electrical Engineering & Mfg. Co., Pittsburgh  
 H. F. McDermott, 208 S. LaSalle St., Chicago  
 P. W. Wood Railway Supply Co., New Orleans, La.  
 Equipment & Engineering Co., London  
 F. F. Bodler, San Francisco, Cal.

Ⓔ 2798



Reciprocating Track Grinder



Vulcan Rail Grinder



Midget Rail Grinder



RTW Curve Oiler

# Strength and Much Plus O-B



In Kansas City, Missouri, the use of O-B feeder wire materials by the Kansas City Public Service Company helps maintain an efficient feeder system of attractive appearance. A few of the O-B feeder wire materials are listed below.



O-B Porcelain Insulator No. 9953, one of a number of such insulators designed for feeder wire service. Pages 20 to 27, O-B Catalog No. 20.



O-B Feeder Dead End Clamp Assembly for use with feeder cables of any size from 4-0 to 1,000,000 c.m. inclusive. Clamps and fittings are of Flecto iron. Insulators, O-B XH strain insulators. Page 2, Supplement No. 2 to Catalog No. 20.



O-B Marathon Feeder Ear, identical with the regular Marathon ears except for feeder lugs. Either horizontal lug with set screws or a soldering lug can be furnished. Page 525, O-B Catalog No. 20.



# Better Appearance Quality



LONG ago the need for greater utility and better appearance in feeder wire systems became apparent. With this viewpoint, the selection of materials for feeder wires became a subject for investigation and study. As a consequence, this important factor in the operation of electric railway properties has reached a higher degree of efficiency, and has, in practically every locality, ceased to be an eye sore. In fact, the appearance is generally far superior to other types of pole line construction.

Feeder wire materials manufactured by O-B have done their part in this improvement program. Obviously, materials bearing the O-B trade-mark, and designed for feeder system use, must be of a quality commensurate with that expected by the industry of trolley materials. Therefore, the same standards of excellence in design and manufacture which have always applied to O-B trolley materials are to be found in O-B feeder wire materials.

The use of wet ware electric porcelain, of Dirigo composition insulation, of O-B Bronze and Flecto Iron provide ample strength to insure efficient, continuous service.

Engineering study, by O-B Engineers and in conjunction with engineers of electric railway properties the country over, has developed materials designed to add greatly to the neat appearance of the feeder wire system, as well as the trolley system, and to provide for efficient connection with the trolley wire.

And on many properties these quality O-B materials are adding longer life, strength, greater reliability and improved appearance to the overhead. Complete information covering O-B feeder wire materials can be obtained from your O-B representative, or of the

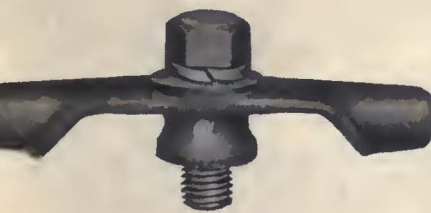
Ohio Brass Company, Mansfield, Ohio  
Canadian Ohio Brass Co., Limited  
Niagara Falls, Canada  
1095L

**Ohio Brass Co.**

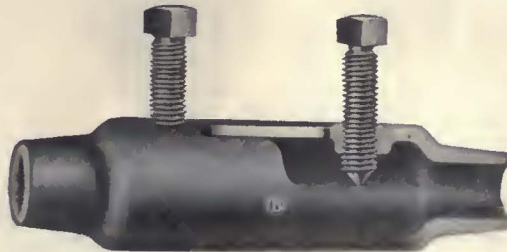
NEW YORK CHICAGO PHILADELPHIA BOSTON

PITTSBURGH ATLANTA CLEVELAND ST. LOUIS SAN FRANCISCO LOS ANGELES

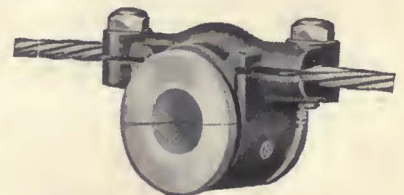
PORCELAIN INSULATORS  
LINE MATERIALS  
RAIL BONDS  
CAR EQUIPMENT  
MINING MATERIALS  
VALVES



Syracuse Feed-in Hanger for joining feeder system with trolley wire. Furnished in bronze and malleable iron. Page 461, O-B Catalog No. 20.



O-B Feeder Wire Splicer for stranded copper wire, from 4-0 to 1,000,000 c. m. Arrangement of set screws provides perfect splice electrically and mechanically. Page 552 O-B Catalog No. 20.



O-B Span Feeder Insulator for supporting and insulating feeder wires at span wires. Bronze casting attaches around split porcelain spool and clamps tightly to span.

# FLOODLIGHTING



*... for publicity*

*... for increased business*

*... for efficiency and safety*

## GOLDEN GLOW FLOODLIGHTS

and their famous mirror glass reflectors, that all Electric Railway men know, will transform amusement parks, points of historic interest, statues, etc., into things of greater beauty at night. Crowds will go miles to see them and they'll go on your cars.

Golden Glow Floodlighting will also increase night business in your outdoor parking places; it will lower the accident rate in your terminal yards and speed-up inspection and repair work; it also furnishes practical illumination for track repairs at night.

Floodlight your administrative buildings, too, for low cost publicity and safety.

1929 is the Golden Jubilee of Light! Make light work effectively for your profit!

Write for Bulletins Nos. 173 and 174.



Type L 1419—Golden Glow Lantern Floodlight with glass panels removed to show method of mounting reflector and lamp within the lantern.



Golden Glow Projector of all aluminum construction incorporate many novel features of efficiency and economy in operation and installation.

# ELECTRIC SERVICE SUPPLIES Co.

MANUFACTURER OF RAILWAY, POWER

AND INDUSTRIAL ELECTRICAL MATERIAL

Home office and manufacturing plant located at 17th and Cambria Streets, Philadelphia, Pa.; District offices are located at 111 North Canal Street, Chicago, Ill. and 50 Church Street, New York City.



Branches—Bessemer Bldg., Pittsburgh; 88 Broad Street, Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton. Canadian Agents—Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.



# Twin Times.



BEING IMPRESSIONS OF TWIN COACHES WRITTEN BY OTHERS

## \$250,000 Bus Fleet for Key Tunnel Line

(From Key System Commuter)

Purchase of \$250,000 worth of bus equipment to be used on the Oakland-Alameda line through the Estuary Tube has been announced by the Key System Transit Company. According to A. J. Lundberg, president of the transit company, the new buses are of the most modern type of equipment and are known as the "street car" type. The buses seat 40 persons and are the product of the Twin Six Coach plant in Kent, Ohio. The new buses, 20 in number, will be delivered in two lots.

"We are endeavoring to give Alameda the very latest type of bus equipment," President Lundberg says. "Our engineers have combed the markets and have made a complete survey of the many kinds of equipment available today. Our Vice-President, H. P. Bell, in charge of engineering, has just returned from the East and the purchase of this new equipment is the result of his studies. The buses are known as the street car type and resemble in general appearance and appointments a modern street car. Each bus is equipped with two complete power plants—two motors mounted in the center of the car. This center mounting of the motors effects a perfect balance and makes for easy riding."

### Bulletin

June business flashes:

Pattern Twin Coach shipped to London, marking advent of manufacturing overseas.

First of new 21-passenger Twins hauling 40 ready for July 1.

Detroit Motorbus Company adds 10 more jobs; 78 special charter trips in one day recently.

Twins sweep onward into Dixie with orders from Jacksonville, Savannah, Chattanooga, Nashville and New Orleans.

Steam railroads increasing use of Twin equipment. Orders from Southern Pacific and Union Pacific for parlor car Twins.

Northern Ohio Power & Light Company fleet of Twins now totals 82; United Electric Rwy., 55; Key System, 43.

Milwaukee Electric Railway and Light Company submits fifth repeat order; Boston sends sixth repeat order.

Twin Coach Corporation sales for the first six months of 1929 surpass same period last year when shipments placed it second in total coaches sold to electric railway industry and first in number of coaches sold of capacity greater than 33 seats.

29 New  
TWIN COACHES  
to better serve  
YOU



More Than \$300,000  
In New Equipment

These modern 40-passenger busses, now being built in Kent, go into service as rapidly as delivered.

(Twenty-five go into Akron City Service)

When this order is completed the company will have 82 of these 40-passenger busses in operation.

Steadily—day by day—month by month—year by year—your transportation system is becoming better and better.

And as more modern equipment is built it is purchased for your service.

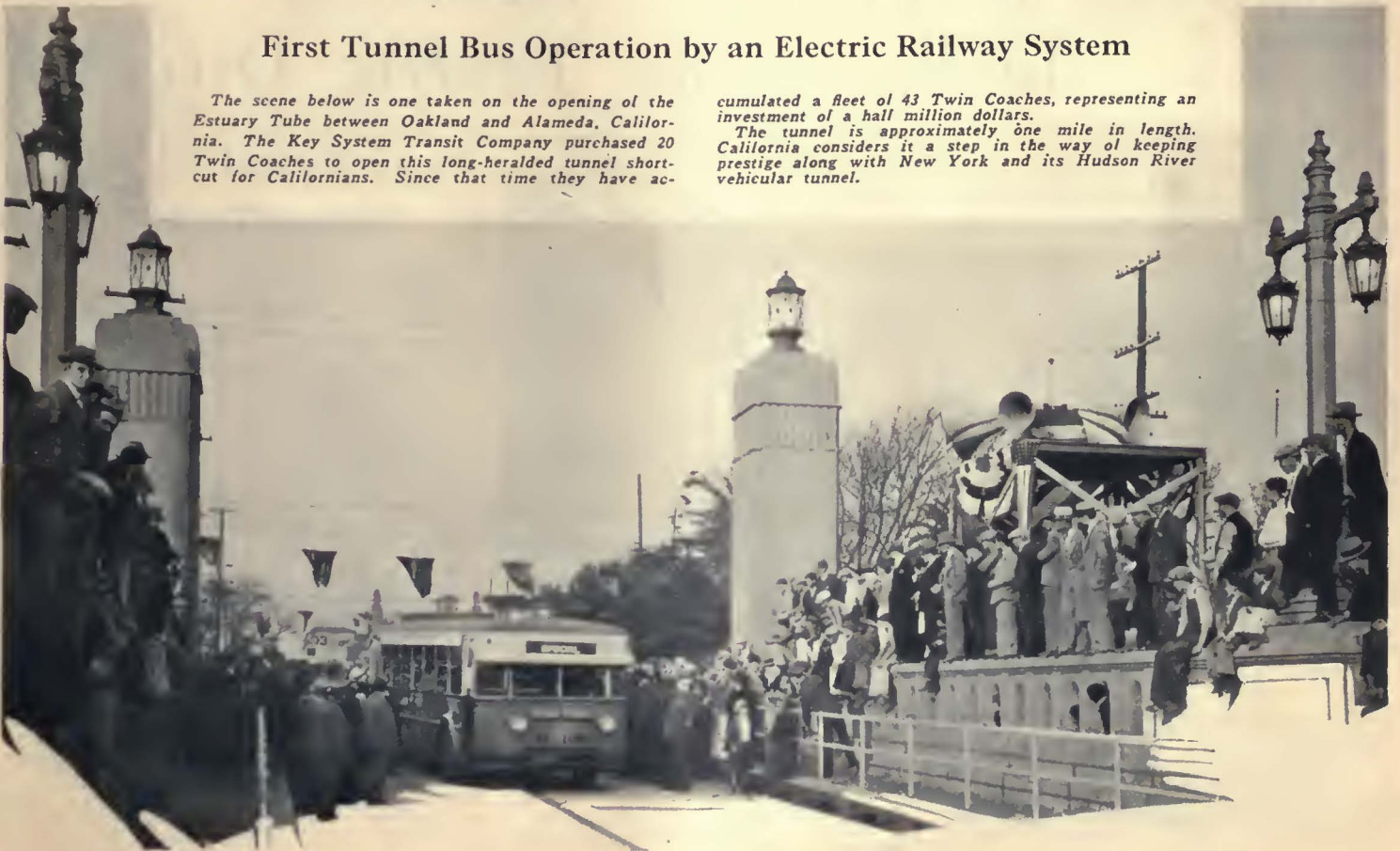
NORTHERN OHIO  
POWER & LIGHT CO.

### First Tunnel Bus Operation by an Electric Railway System

The scene below is one taken on the opening of the Estuary Tube between Oakland and Alameda, California. The Key System Transit Company purchased 20 Twin Coaches to open this long-heralded tunnel shortcut for Californians. Since that time they have ac-

cumulated a fleet of 43 Twin Coaches, representing an investment of a half million dollars.

The tunnel is approximately one mile in length. California considers it a step in the way of keeping prestige along with New York and its Hudson River vehicular tunnel.





# Twin Times.



THE TREND IS TO TWINS WITH THEIR RIDER APPEAL



## “Smooth as Velvet”—Declares Jacksonville Traffic Director

(From Florida Times Union).

City officials went bus riding today—and liked it. It was one of the Jacksonville Traction Company's new twin coach, 40-passenger, blue and cream buses.

“The 'new buses are all right,'” Mayor John T. Aslop, Jr., decided.

“Smooth as velvet,” said Police Chief A. J. Roberts, as he glided over the city.

“More comfortable and speedy than I anticipated,” remarked Alex Ray, city treasurer.

“They'll greatly reduce traffic congestion in the downtown district,” remarked Lieut. Francis Smith, head of the police traffic bureau.

While trying out one of the buses, John P. Ingle, manager of the street car company, instructed that it be stopped at the city hall so the city officials could see it.

A few minutes later the mayor and other city executives went for a ride through the business and residential sections on the bus.

Above is one of the four new buses just purchased for express service between the business district, Avondale and Murray Hill.

In the picture, left to right, are: E. T. Hollingsworth, Jr., secretary of Mayor John T. Aslop, Jr.; John P. Ingle, manager of the street car company; Lieut. Francis Smith, head of the police traffic bureau; Police Chief A. J. Roberts.

### SEE OUR NEW MOTOR BUSES

The newest addition to our transportation equipment is a wonderful product in motor coach construction. Four Twin Coaches have been bought. They will be on display again today and tomorrow in the business and residential districts, at convenient locations, for your inspection.

We believe you will appreciate the lines along which they are built. We want you to inspect the coaches—the general specifications—note the smart finish, both interior and exterior—the front and rear doors—the richly upholstered seats and generally efficient equipment—all the last word in motor coach transportation.

These buses will begin operating on an express schedule between Murray Hill, Avondale and the downtown business district Monday.

Jacksonville is one of the first cities in the Southeast to obtain some of these buses.



**Jacksonville Traction Company**

J. P. Ingle, Manager

### Not a Jolt in Carload Claims Wabash Patron

(From Terre Haute Tribune)

It was the inaugural tour of the new Twin Coach for the Wabash Valley Coach Company, which just arrived Saturday, and s-a-y, Boy!—riding in that luxurious coach is just like “going to heaven in a hanging basket.”

Anyway, this bus is the last “squeak” in comfortable travel. It sounds hardly dignified to “dub” this coach a bus, because it is the aristocracy of busdom. It seats forty, and there ain't no crowdin'. You just sit back resting against those squashy cushions, which fit into your back like a specially constructed pillow. No matter how many railroad crossings you go over or how much rough pavement there is to travel, you just rock away 'nd enjoy yerself.

This coach is the first unit in the fleet which will save the time of the busy man who can save four hours from Indianapolis to Louisville, Ky., via Terre Haute and to Vincennes, then over the Studebaker line to the city of the Kentucky derby.



# Twin Times.



WARNING! PLACED ON ONE ROUTE - THE OTHERS WANT THEM TOO

## “Street Cars on Rubber at Last” Comment of Norfolk Bus Riders

(From Norfolk Ledger Dispatch)

Norfolk's new "street cars on rubber" have more than lived up to expectations since their introduction to local bus passengers. Expressions from a score of local business men, bus drivers, passengers and traffic officers make the new system an overwhelming favorite.

To get first-hand conditions the writer took a 45-minute ride on one of the Gargantuan Utopians of Comfort via the Colonial Place line and learned a few of science's tricks to expedite elastic traffic in Norfolk's fast-growing city and suburbs. A head-on view of some prehistoric reptile emerging from a thousand-year slumber. It is radically different from any other bus design. You look for the customary radiator and it isn't there. You look for a fender and you have to look again, for there isn't any. From the driver's seat one might think he were coming to earth after a dirigible ride, and to use the expression of one driver, "I look for the engine and it ain't there, but she goes jus' the same."

One driver said, "I can make any turn with this that I could with the other bus. And I've never yet had to pass up a passenger; there is always room for one more." From six o'clock in the morning until three in the afternoon he had taken on a total of 890 passengers.

For riding comfort the writer has seen little to compare with them. The luxurious inter-

city coaches as used between New York City and outlying suburbs, boasting air seats and wicker chairs, have little to add to the riding comforts of Norfolk's newest transportation units.

Inside the bus is a palace of luxury, so far as suburban buses go. Brown leather seats, dome lights and an aisle that would do justice to the length of an entrance to a bank president's office in Wall Street feature the most composite requisites of these Twin Coaches.

? ? ? ? ? ? ? ? ? ? ? ? ? ?

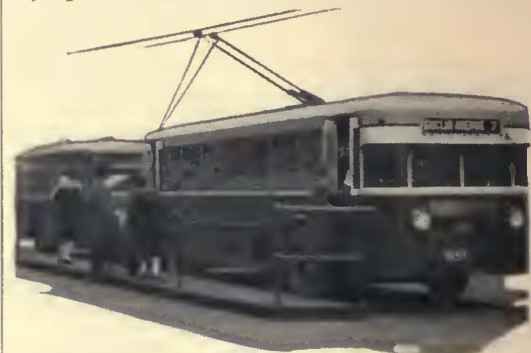
Just why anybody would ride in a bus or a stage when they could ride in a street car or on a train has always been a mystery to us, but men like Fageol are making marvelous strides in the development of highway transportation and unless the old time rail systems soon have something better to offer they are going to wake up some fine morning and find they are out of business.

Van Nuys Tribune,  
Van Nuys, Calif.

? ? ? ? ? ? ? ? ? ? ? ? ? ?

### New Orleans Buys Twin Trackless Trolley Unit

The New Orleans Public Service, Inc., has placed an order for one 42-passenger Trackless Trolley, equipped with 50 horsepower motors. This unit will be used in making studies of the possibilities of Trackless Trolley operation in New Orleans.



The advent of the 21-passenger Twin Coach will make possible its adaptation for Trackless Trolley operation. This will be the first development of the smaller capacity trackless unit so much discussed and looked for by many small city properties.

## When Detroit Fired Jitneys Off the Street

(From Correspondence)

This is what Del Smith, making an unusual record as Manager of the Detroit Street Railways, wrote:

"To say that we are pleased with this equipment is putting it mildly, but what I say of the bus also holds true for the organization that is responsible for its design and manufacture. The promptness with which you were able to make delivery of the fifteen buses recently furnished was sincerely appreciated, and was just another example of the resourcefulness and dependability of the Twin Coach Corporation.

"Our Twins are doing a splendid business on the Cadillac Coach Line, which now gives a direct service downtown from the East Harper and East Warren sections. The unique design and wonderful riding qualities of the Twin have drawn many favorable comments from our patrons, and one has only to see the bus in actual service to get an idea of its splendid riding appeal to the traveling public."

Del A. Smith,  
General Manager.

Department of  
Street Railways,  
Detroit.



Detroit operations now include 78 Twin Coaches.



# Twin Times.



COMING: EARLY NEWS OF 21 PASSENGER TWIN HAULING 40

## Women Insist Upon Twin Coaches

### Oberlin College Girls' Glee Club Makes Spring Trip of 700 Miles by Twin Parlor Coach

(From F. B. Miller, Manager, Cleveland-Akron-Canton Bus Company)

"It may interest you to know that we have just completed arrangements for transporting the Girls' Glee Club of Oberlin College from Oberlin, Ohio, to Ithaca, New York. These young ladies, with their chaperones, were very definite in specifying that our special party trip should be via Twin Coach.

"I am enclosing a photograph taken of the Glee Club en route, which I think indicates better than words may do the great comfort and convenience which they enjoyed on this trip, showing that they knew full well the merits of the Twin for long distance travel.

"In arranging special party trips for women, I found that once they have learned the capabilities of the Twin Coach in eliminating the usual inconvenience and discomfort caused women through improper chassis balance and by escaping gasoline odors, they invariably specify a Twin Coach for their services.

"This is an entirely new experience in my career as an operator of special charter service for women."



## 41-Passenger Coaches Replace 25-Seaters; Revenue Jumps 15%

(From Electric Railway Journal for June)

O. A. Smith, Traffic Manager, Pacific Electric Railway, states that they recently replaced some of the older 25-passenger buses with 41-passenger Twin Coaches on a coasttown line. Operating costs, including taxes and interest, were reduced from 25-26c per bus mile to 20-21c per bus mile, headway was increased from 8 to 10 minutes, with patronage increased more than 15% as a result of the new equipment. Average speed for the line is 11.2 m. p. h. and average revenue per passenger is 5 1/2 c.

"The private automobile is our chief competitor," says Mr. Smith, "and it behooves railway operating men to study the situation to provide more comfortable seats and equipment. Sales methods must be applied and the product must be of such a quality that it will compete with the market."

Below is a photograph of the streets of Los Angeles showing something of the competition which Manager Smith comments upon.

The Los Angeles Motor Coach Company, an affiliation of the Pacific Electric, is operating 14 Twin Coaches.



EVERY HOUR ON THE HOUR



## 14 Limited Trips every day from downtown Buffalo to the heart of Rochester!

EVERY Blue Bus out of Buffalo is now on a limited schedule—fourteen limited trips each day between Buffalo and Rochester—every hour on the hour. Those who have waited for express trips can forget old schedules, knowing every hour is a time-saving through trip over the short Bergen route. Direct, express lines service from downtown Buffalo to the heart of Rochester in two hours and fifty-five minutes.

The trip is so pleasant thousands of motorists leave their cars at home and ride the Blue Bus because they enjoy the comfortable, carfree ride at less cost than driving their own cars. Ride the Blue Bus and save taxi fares. Business men and salesmen prefer its restfulness and convenience, the saving of time-taking transfers. Women and children enjoy the beautiful country scenery, the clean, fresh air. Blue Bus operators are always careful, courteous and considerate. To accommodate the constantly increasing crowds who ride the Blue Bus (already enjoyed by over 4,000 in a single day), several new type twin-motored coaches with clear-vision observation windows on all four sides have been added to the Blue Bus safety fleet, each seating 40 passengers and carrying baggage racks inside the coach. Air-cushioned arm chairs, air shock-absorbers, air-brakes, balloon tires—smooth concrete highways all the way—insure absolute comfort for you, also safety and reliability.

**Ride the BLUE BUS**  
ROCHESTER, BATAVIA, BUFFALO

**TERMINAL** Clothes and Fibers, 1000 Lakeside Blvd  
Or board at any point on Your Street

For Timetables and Further Information Phone Seneca 1750

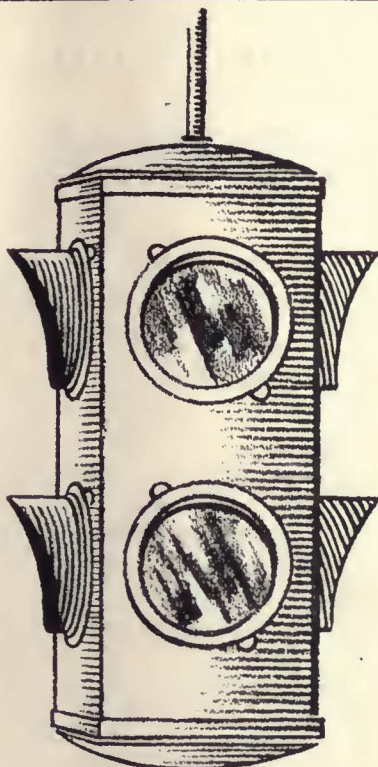
**ROCHESTER** For bus rates, Lightening service see road markers. Blue delivery in Rochester, Buffalo or Batavia.

**Batavia** Board 1st at Time **\$1.00**

**Rochester** Board 1st at Time **\$2.00**

EVERY HOUR ON THE HOUR

STUDY THIS: If there were a Coffin prize for transportation advertising, this specimen should win. Carefully prepared with time schedule and routes emphasized. Originated by L. H. Schultz and C. O. Frey of Western New York Motor Lines, Inc., at Batavia, N. Y.



## Don't Blame the Traffic Signals for all your Traffic Delays

In heavy traffic the unloading and loading of single-entrance one-man cars delays the movement of pedestrians and vehicles more than any other single factor. The loading time far exceeds the running time.

Treadle-ization so decreases loading time that all street traffic is speeded. The decrease in running time improves your schedules and brings more passengers to your road.



### NATIONAL PNEUMATIC COMPANY

*Executive Office: Graybar Building, New York*

*General Works: Rahway, New Jersey*

CHICAGO  
518 McCormick Building

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

PHILADELPHIA  
1010 Colonial Trust Building

# San Francisco is Buying Comfort

When George M. Pullman first operated his luxurious cars on the Michigan Central Railroad, the passenger traffic men of 1865 thought he was crazy to invest money in equipment which would increase the cost of travel.

When the Baltimore & Ohio Railroad installed Hale and Kilburn luxurious chairs in its day coaches, the passenger traffic men of 1926 were skeptical about investing money to make passengers comfortable. Traffic increases on the B & O have proved the wisdom of the investment. Now the Market Street Railway in San Francisco has equipped its street cars with Hale and Kilburn soft leather Walkover seats and is actively advertising the Comfort Feature. Traffic is increasing because of this policy.

The American public will always spend money for comfort and wise street railway managements can positively attract business by providing comfort in their cars.

Hale and Kilburn seats are the most important factor in making passengers comfortable.

## HALE & KILBURN SEATS

"A BETTER SEAT FOR EVERY TYPE OF  
MODERN TRANSPORTATION"

### HALE & KILBURN COMPANY

General Office and Works:

1800 Lehigh Avenue, Philadelphia

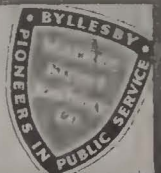
#### SALES OFFICES:

Hale & Kilburn Co., Graybar Bldg., New York	Frank F. Bodler, 903 Monadnock Bldg., San Francisco
Hale & Kilburn Co., McCormick Bldg., Chicago	E. A. Thornwell, Candler Bldg., Atlanta
	W. L. Jefferies, Jr., Mutual Bldg., Richmond
	W. D. Jenkins, Praetorian Bldg., Dallas, Texas
	H. M. Euler, 146 N. Sixth St., Portland, Oregon

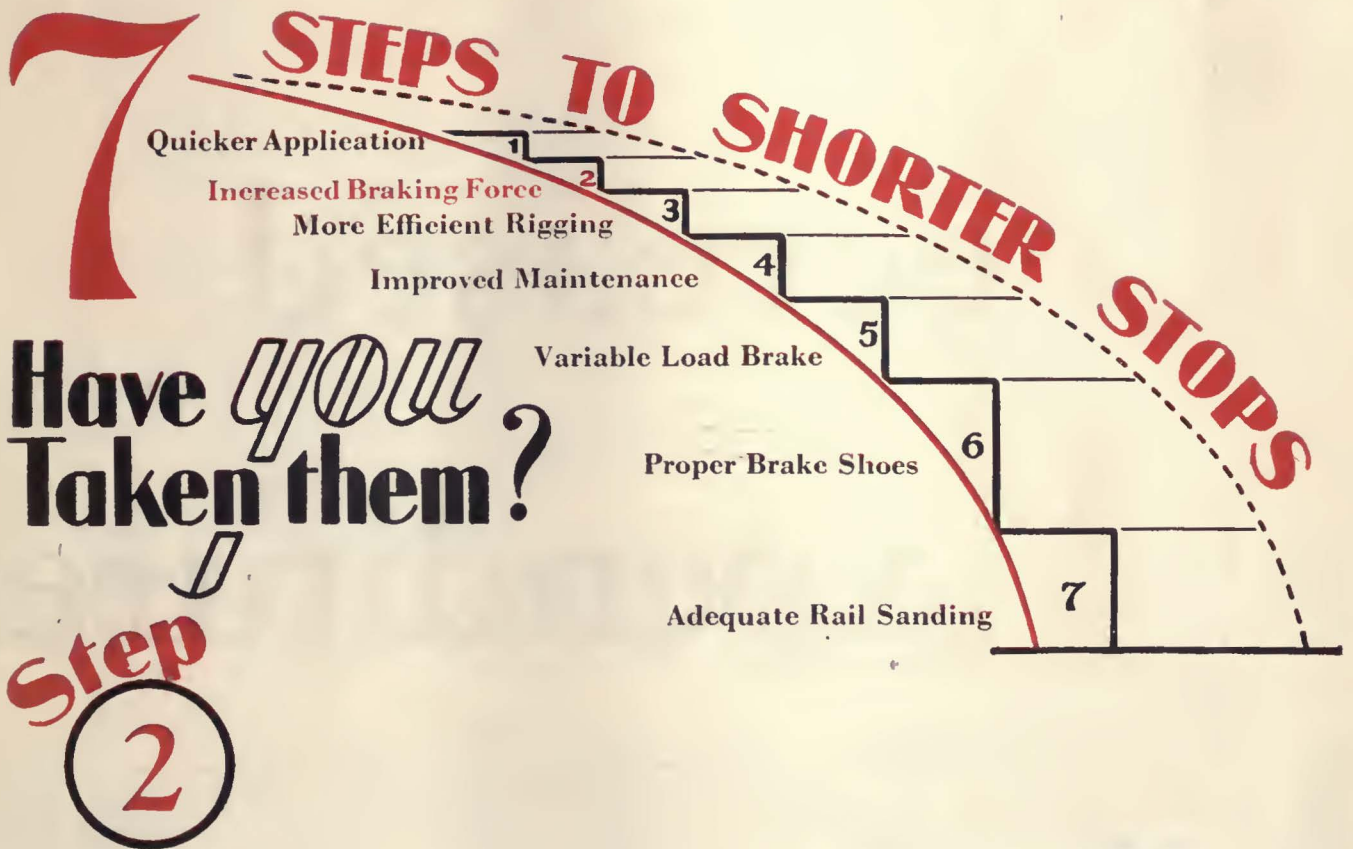


This Hale & Kilburn No. 392-A deep cushioned leather covered reversible seat is the one used by the Market Street Railway.

We are putting  
Comfort into Street Cars







A VERY important factor influencing length of car stop is the relation of calculated shoe pressure to car weight—commonly called braking ratio.

A braking ratio of 2% per pound cylinder pressure (with maximum governor setting held to 60 pounds) is needed to provide a comfortably fast rate of retardation for modern street cars. This is important for quickly controlling speed in congested traffic as well as for making short stops from higher speeds.

Do you know how quickly your cars can stop? How quickly they should stop? A stop meter will tell you the first—our engineers can tell you the second . . . Ask them!

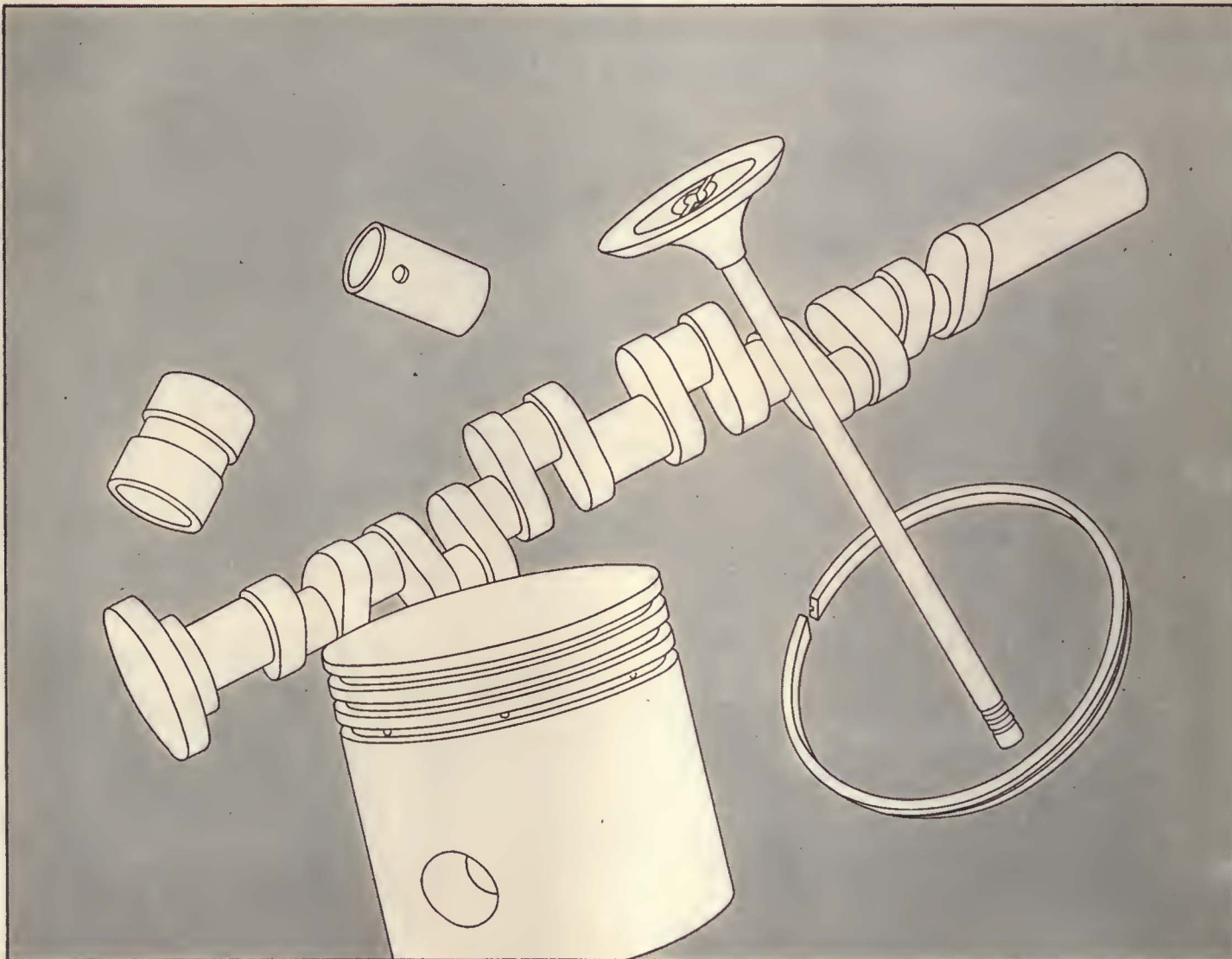


*The brake cylinder is the business end of your brake system and should be large enough to develop sufficient shoe pressure with a leverage ratio low enough to assure proper shoe clearance.*

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

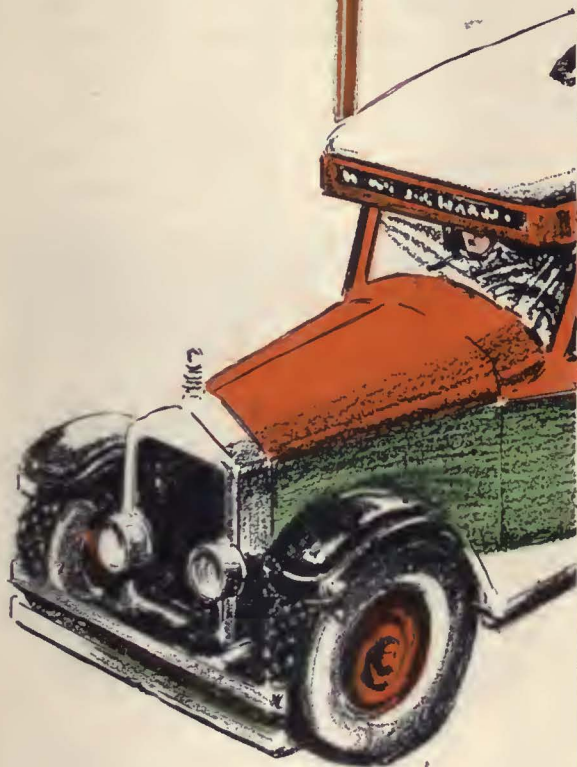
# WESTINGHOUSE TRACTION BRAKES

# D e c r e a s e d E x p e n d i t u r e s





# for replacement parts



Cities Service Company understands the problems of bus owners because it has had bus problems of its own. Several of its subsidiaries are transportation companies, operating fleets of buses. Cities Service brought its 67 years of experience in the oil business to the solution of their lubrication problems—and it offers you the benefit of this experience.

## Decreased Expenditures for Replacement Parts \$658.82

That was the average amount per bus spent for replacement parts in 1928—27% of the \$80,000,000 which was expended for bus supplies.

\$658.82 per bus. Every dollar cut from that cost is a dollar added to profits—and *proper lubrication* will help do the cutting.

Koolmotor products Bus Lubrication Service is scientifically planned for the efficient lubrication of each individual part, taking all factors into consideration.

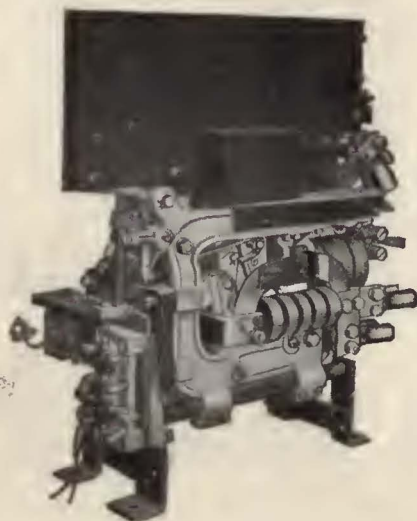
Koolmotor Bus Oils are refined from 100% Pennsylvania crude to meet the special requirements of heavy duty, high speed motor bus lubrication.

OIL DIVISION  
**CITIES SERVICE COMPANY**  
60 WALL STREET, NEW YORK, N. Y.

**KOOLMOTOR PRODUCTS**

# Equipment for

## Protect your substations



Type JR 600-volt High-speed Circuit Breaker

WHEN an overload or short circuit occurs on the line, the converters or motor-generator sets in your substations will be safe from flash over if the protective breakers interrupt the circuit in less time than that required for a commutator bar to move from one brush to the next.

The G-E Type JR circuit breaker *does* interrupt the circuit in less than the required time. With its extremely high opening speed and its powerful magnetic blowout and narrow slots in the arc chute, it is giving remarkable protection to substation equipment and feeders.

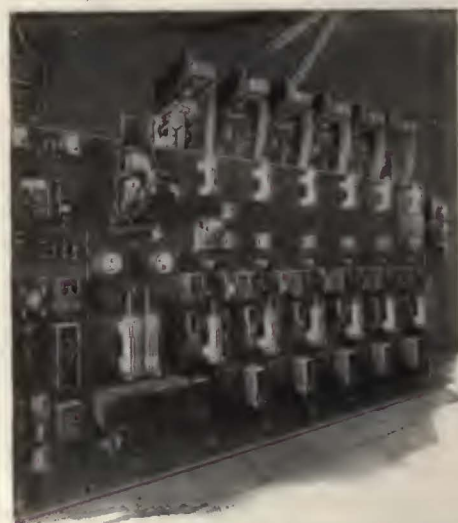
The G-E monogram on these high-speed breakers is your guarantee that they are mechanically and electrically right.

## Detroit sends back five buses

A short while ago, the Detroit Street Railways returned five mechanical buses to be equipped with electric drive. This Company's experience with both mechanical and gas-electric buses has shown that electric drive makes good buses better.

Passengers like gas-electrics because they are smoother and quieter and because the driver has more time for little courtesies. The drivers like gas-electrics because they are easier to handle and do not require a great expenditure of physical energy. The maintenance men like them, too, because the electric drive minimizes the number of pull-ins and makes the bus available for more revenue miles per year.

The bus operator who has not taken advantage of electric drive is burdening himself with needless worry and expense.



Type JR High-speed Circuit Breakers in Ashmont Automatic Substation, Boston Elevated Railway

# GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

# Better Service

## A new controller — the PCM — for a fast, smooth start

The usual acceleration of cars equipped with PCM control is 3 mi. per hr. per sec.; yet it is so smooth that passengers experience no discomfort.

The PCM control is automatic—it is impossible to slide over points. Its 18 points give an unusually small current variation, and hence a smoothness impossible with an ordinary controller at such a high rate of acceleration.

The Chicago Surface Lines, operating, as it does, under extremely difficult conditions, has specified PCM control on its 100 new cars.

## In Milwaukee

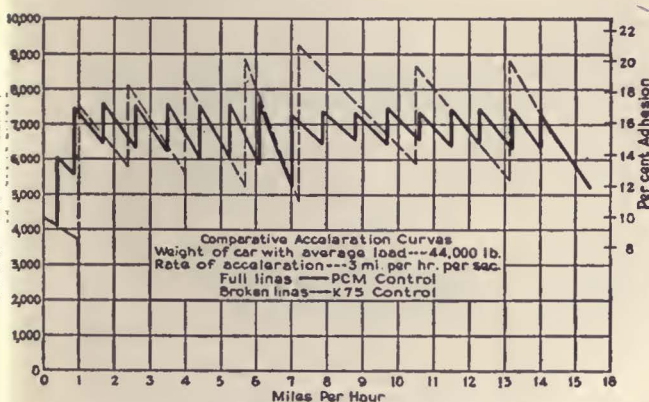
In December, 1928, the Milwaukee Electric Railway and Light Company placed



Chicago Surface Lines Car on Wacker Drive, Chicago

in service 10 cars with GE-265 motors and Type K control. Now, GE-265 and GE-301 50-hp., low-wheel motors and Type K control have been specified for its 40 new and rehabilitated cars.

More GE-265 motors have been sold to street railways than any other modern motor.



These curves show why the PCM control gives such fast, smooth, acceleration



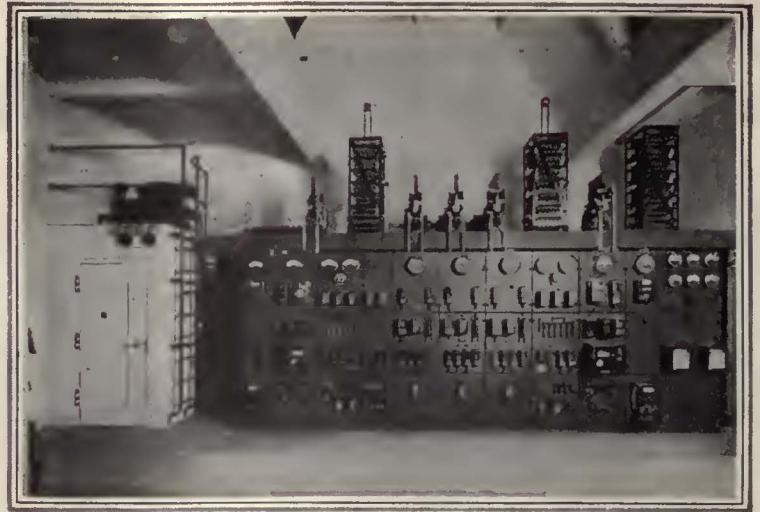
JOIN US IN THE GENERAL ELECTRIC HOUR,  
BROADCAST EVERY SATURDAY AT 8 P.M.,  
E.S.T. ON A NATION-WIDE N.B.C. NETWORK

330-130

**E L E C T R I C**  
SALES OFFICES IN PRINCIPAL CITIES

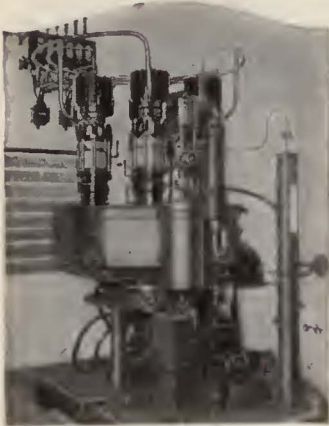


The substation building



The main switchboard of the Inglewood substation of the Los Angeles Railway Corp., equipped with two 500-kw. mercury-arc rectifiers

## Why Los Angeles Selected G-E Rectifiers



500-kw., 600-volt mercury-arc rectifier unit

The Los Angeles Railway Corporation selected two 500-kilowatt G-E mercury-arc rectifiers for its new station at Inglewood because—

1. A rectifier is the most efficient application of converting equipment for the existing operating conditions—low load factor with heavy momentary overloads.
2. It has an unusually high all-day efficiency, resulting in substantial economies in power.
3. Its quiet operation, which is obtained without noise-proof construction, is in keeping with the surrounding residential district.
4. It can deliver full power to the line in six seconds.
5. Economies in maintenance are demonstrated by units now in service.

These advantages are not peculiar to Los Angeles. You, too, can increase the efficiency of your substations, especially if the load factor is low, by installing G-E mercury-arc rectifiers.



G-E automatic substations have been reducing operating charges for the Los Angeles Railway for many years, but this, its first mercury-arc-rectifier installation, is its most efficient and economical unit.

130-13

# GENERAL ELECTRIC

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

# Electric Railway Journal

Consolidation of  
*Street Railway Journal and Electric Railway Review*

McGraw-Hill Publishing Company, Inc.  
James H. McGraw, Chairman of the Board  
Malcolm Muir, President  
H. C. Parmelee, Editorial Director

Charles Gordon, Editor

Louis F. Stoll,  
Publishing Director

Volume 73

New York, July, 1929

Number 16

## An Outstanding Contribution Toward Orderly Civic Development

WITH the presentation of the final report of the Regional Plan of New York and Its Environs a long forward step has been taken in American civic progress. This is the first time in history that so comprehensive a plan has been prepared to guide the future development of a large urban and suburban district. All previous city planning projects fade into insignificance beside the remarkable undertaking just completed. When Major L'Enfant prepared a plan more than 100 years ago for the future development of the city of Washington, he was thinking of a Capital District of 100 square miles, which he believed might some day have as many as 500,000 inhabitants. The area covered by the Regional Plan of New York embraces more than 5,500 square miles with an estimated population of 20,000,000 by 1965.

The significance of the Regional Plan, however, lies not in size alone, but rather in its broad conception of all phases of civic development. The provision of adequate public transportation facilities occupies a prominent place. In the past, surprisingly little consideration has been given to transit facilities by city planners. Highways, parks, playgrounds, water supply, etc., have been recognized as important factors, but transportation needs usually have been overlooked. This mistake has not been repeated by the Regional Plan of New York. In fact, the entire plan is built upon a network of rapid transit lines, electrified railroads and high-speed motor highways.

The projects outlined in the report are so colossal that their full magnitude is difficult to grasp. Tremendous obstacles lie in the path of some of these proposals. For example, it is planned to connect railroads entering the district, and operate through service over electrified distributing loops. The railroads which have already been electrified, however, have adopted different systems and installed them on hundreds of miles of track. To standardize their equipment for joint operation over common track would involve so many difficulties that the practicability of this feature of the plan seems extremely doubtful. Nothing could illustrate better than this the need for community planning. Had the Regional Plan of New York been adopted 25 years ago, the present confusion of systems probably would not have occurred.

With certain details of the proposed plan not everyone will agree. Modifications of various features probably will be found necessary in the future. The important point, however, is that a comprehensive program has been prepared for the development of the entire metropolitan area comprising many political subdivisions, but closely related socially and economically. Its execution will require the outlay of enormous sums, but by considering the problem in its entirety, it is estimated that

the cost will be considerably less than that of meeting one by one the needs of this growing region. Other communities might well follow the lead of New York in this endeavor to approach the problem of regional planning on a broad and comprehensive basis.

## Car Survey Provides Striking Evidence

SO many advantages may be found in the replacement of old cars with new ones that it seems remarkable that car purchases have not been more widespread. Wherever new cars of the modern, lightweight type have been substituted for old, heavy, slow, dilapidated rolling stock, the resulting economy, improvement of public relations, and effect upon earnings have in practically every instance more than justified the investment. The survey of new car experience, of which the third and concluding article is published in this issue, summarizes these results for many properties representing a wide range of local conditions.

Far too much emphasis has been placed on the savings possible with modern equipment, and too little attention has been given to the possibilities for providing an improved service to meet the competition of other forms of transportation. The new cars that have been built are in general equipped with greater motor capacity in proportion to their weight than those they replace, and should be able to make considerably higher schedule speeds than the average maintained by most properties. Yet few companies show any material increase in speed with their new equipment. In many instances the new cars are placed on the same lines with old ones that cannot maintain the pace. Where full advantage has been taken of the possibilities of the new equipment, better service and reduced labor cost have been added to the savings made in power and maintenance.

Perhaps the most surprising result of the survey is that, even with the limitations that have surrounded the use of new equipment purchased during the past several years, the results on most of these properties have been uniformly favorable. It is no mere chance that those companies which have been most prominently identified during recent years as purchasers of new cars have shown better results, both in revenue and in expenses, than comparable properties that are clinging to obsolete equipment. Nor can the financial improvement be laid to the size of the cities in which these railways operate, for the gains are well distributed among small, medium, and large properties. When it is shown on the basis of these returns that a new car will save \$1,268 in power and equipment maintenance alone, disregarding for the moment track and transportation savings, and greater attractiveness and earning power, it is apparent that the investment in new cars is not only justified, but is demanded as a matter of sound business policy.

## A Worthy Rival of the Automobile

LAST year the Pittsburgh Railways received from the Osgood-Bradley Car Company two experimental cars that were designed to appeal to the riders through better performance and greater attractiveness. Graceful lines and proportions, high acceleration and braking rates, smooth and quiet operation, comfortable seats, ample aisle room for rush-hour travel, low step heights and economical operation were the major objectives sought in these cars. The new cars were frankly experimental. They included practically every innovation in car design tried up to that time, with the possible exception of the substitution of aluminum in the body framing. The purpose was to study in actual operation those factors that were likely to appeal to the passengers and to determine the practicability of many equipment features proposed for the improvement of car performance.

Now, after a year's trial of the two cars the railway has secured a third experimental car. It differs from the two previous cars principally in that aluminum was used in place of steel for the car body framing and was substituted wherever possible in the various equipment items. It is also equipped with the latest development of worm-drive trucks and high-speed, spring-suspended motors. The floor plan was changed a little and a center exit door was used instead of a rear door exit. It is worthy of particular note that this third car is again equipped with electro-pneumatic control and dynamic brakes. The designers went further this time by providing foot operation of the control and dynamic brakes, a feature that is expected to prove helpful in one-man operation.

In the attempt to insure maximum operating speed, this unit seems to go the limit with four 50-hp. motors on a car which only weighs 27,000 lb. Aluminum was used to such an extent that the car body with its equipment is reported to weigh only 14,000 lb. The use of four 50-hp. motors on so light a car makes it a worthy rival of the automobile. With its pedal-operated control and brakes it is capable of getting away to a fast start in traffic, with brakes designed for quick and smooth retardation.

The question of first cost still remains as an important consideration in the design. The many automatic devices incorporated, and the aluminum construction must justify themselves economically before the trend of future cars can be predicted. To this fact the Pittsburgh management is keenly alert, and it is rendering a distinct contribution to the industry in its pioneering effort to work out in the laboratory of experience the type of equipment best adapted to meet the competition of the automobile.

---

## Far West Leads in Pick-up and Delivery

EVER since the advent of the motor truck the electric railways engaged in freight service have been struggling with the pick-up and delivery problem. Most executives have leaned toward the opinion that this service is a natural corollary of the business, but they have hesitated to embark upon the enterprise for fear that the shippers would not support the necessary extra charges. Others have maintained that this is a service outside of their province; that the larger shippers do not expect it and would not pay for it, and that where pick-up

and delivery are desired the function should be left to independent truckers.

Last year a committee of the Central Electric Railway Association went on record in favor of the establishment of pick-up and delivery throughout the territory served by the Central Electric properties. While some progress has been made, the suggestion has not been generally adopted as yet. Apparently, individual roads hesitate to adopt this innovation until a general program for all of the carriers in the territory is worked out and agreed upon. Taking the industry as a whole, comparatively little has been done in the way of providing pick-up and delivery, although the subject has been under active discussion for several years.

In contrast to the general situation, the Pacific Electric Railway, of Los Angeles, Cal., recently instituted extensive store-door collection and delivery service as part of its freight business. This was undertaken for the dual purpose of meeting competition and supplying better service to the shipper. The necessary arrangements were effected by the company through contracts with reliable truckmen in the various communities along its lines. The better class of truck operators have been quick to see the advantage of an arrangement which promised to broaden considerably their sources of revenue. So satisfactory has the arrangement proved that the privilege of becoming allied with the railway in this progressive enterprise is eagerly sought. Thus have the two agencies of transportation been drawn together in mutually satisfactory co-operation.

All doubt as to the reception that the new service would meet at the hands of the shippers and the public, was soon dissipated. The original list of 24 stations has been expanded to 44, with further expansion in prospect. It is also significant that some 200 industries not previously served by the Pacific Electric Railway have become shippers over the line due to the increased convenience of the new service. Announcement of its expansion to meet growing requirements indicates that this commendable initiative on the part of the Pacific Electric Railway is meeting with the measure of success which it deserves.

---

## A New Outlook in Toledo

TOLEDO has written into its history for the past two years some very interesting chapters. At the beginning of 1928 the transit situation in that community was a rather delicate one. The railway and the city had taken issue on a number of questions and it seemed as though events were leading from bad to worse. But this condition was suddenly reversed with the signing of an agreement which proved to be the turning point in the affairs of the Community Traction Company. Under the terms of this agreement, a supplemental ordinance to the Milner franchise of 1920, the city agreed to prohibit all competing transportation lines within a quarter mile of any of the company's street car or bus lines, giving the railway a virtual monopoly of all transportation service in the city. In return the company agreed to pay for a traffic survey, to set up a five-year reconstruction program amounting to \$560,000, to purchase new buses, to set up a replacement fund of \$230,000 and to re-route its existing lines and expand its service into new areas.

Further, the company agreed to advance \$900,000 without interest for ten years to cover the accrued debts in the stabilizing fund. It invested in a number of new



buses, abandoned superfluous routes, established new routes in districts previously unserved, increased the motor capacity on a number of its cars, re-spaced car stops to reduce the running time, re-scheduled its service for higher speeds, instituted a safety drive and in several other ways attempted to give better service to more people. None of these moves were particularly spectacular, but each contributed to the betterment of the whole system.

Results have been most encouraging. Up to the first part of 1928 the riding had been steadily falling off and earnings had been constantly decreasing. Soon after the improvements outlined had been well started, however, more people began to patronize the system. In the succeeding months a number of records were established, consistently showing more passengers than in the corresponding months of the previous years. Operating expenses were also reduced by substituting buses on unprofitable lines and effecting numerous economy measures, so that net earnings show large increases for the periods. Increases in riding are expected to continue. The company is not stopping with the improvements it has already made; in fact, it is only beginning its track rehabilitation and equipment replacement programs. In view of the results accomplished in so short a period, the outlook in Toledo is bright indeed.

---

### San Francisco Needs a Transit Policy

SAN FRANCISCO is squirming under the lash of the whip laid upon it by its own city engineer, M. M. O'Shaughnessy, in his report on the street railway requirements of the city with special consideration to the unification of existing facilities. Mr. O'Shaughnessy does not mince his words. He never has. He stands high in his profession, and San Francisco has confidence in him that almost amounts to veneration.

Mr. O'Shaughnessy has laid down many fundamentals for which electric railways have long been contending. He is for improved routing. He is against parking. He is against the jitney. He is against the imposition on the railway of paving requirements except those incidental to making track repairs, and any additional cost of street paving occasioned by the presence of tracks. He is for the skip stop.

Moreover, he declares that it is axiomatic that, from the standpoint of the riding public, the best service can be provided by a unified street railway system with universal transfers. He says without equivocation that a continuation of the operation on the 5-cent fare under private ownership means that both the quality of the service and the condition of the property will become poorer and poorer year by year. If Mr. O'Shaughnessy had set about writing the terms of Magna Charter for the electric railways, he could hardly have done better.

The report reviews the entire situation courageously and is fundamentally sound in demanding that the city adopt a policy and do something about it. The seriousness of the situation is reflected in comment by the *Chronicle* stressing the fact that the city does not yet know what it is going to do when the franchises of the private companies expire. That is both lamentable and inexcusable. The same commentator adds that Mr. O'Shaughnessy's report furnishes a mass of information useful in helping the city make up its mind. Certainly that is true. As the report says, the city should either carry out the charter mandate by taking over and operat-

ing the systems of the private companies, or adopt a plan whereby the private organizations can continue to render service of a character necessary for the progress and development of the community. In the light of that statement it is no wonder San Francisco squirms under the lash Mr. O'Shaughnessy has laid upon it.

---

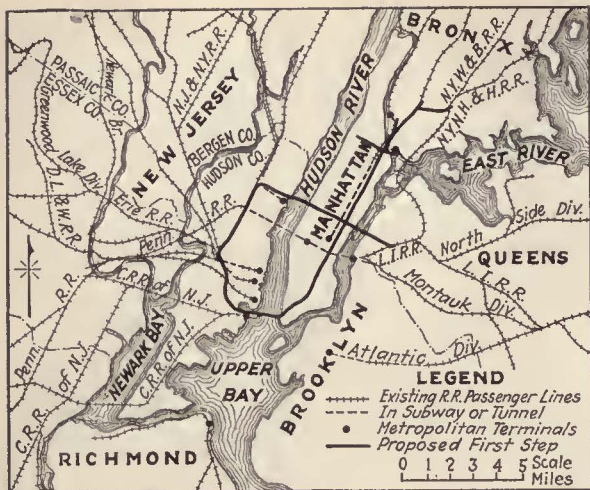
### Subsidy by General Taxation Is Unsound

IN THE REPORT on San Francisco's transportation problems by M. M. O'Shaughnessy, city engineer, he assumes that the city stands committed to the policy of municipal ownership and operation of its street railways and thereupon develops a proposal for the retention of a 5-cent fare, frankly recognizing the deficits that will accrue thereunder, and proposing to make up the deficiency from general tax funds.

There ELECTRIC RAILWAY JOURNAL differs with the report radically and emphatically. It is bad enough for San Francisco to stand committed to a policy of public ownership. The answer to that is to reverse the policy before the city gets further into that bottomless cesspool of constant financial and political turmoil. But above all things, it is a fundamental mistake to put an operating management—whoever it might be—into the dilemma of attempting to provide efficient transportation service that will keep pace with the city's growing requirements, handicapped with a 5-cent fare accompanied by a deficit to be made up from general taxation. That just can't be done, and it is flying in the face of public psychology to attempt it. Under such a plan, the whole weight of public opinion presses toward keeping the deficit and the tax rate at a minimum, with the inevitable result that service will seek the level of bare necessity with the maximum crowding and inconvenience that the public will tolerate.

Mr. O'Shaughnessy justifies this recommendation on the ground that a portion of the burden of maintaining a high grade transportation service should fall on the taxpayers whose properties and business are directly benefited, as well as on the rider who uses the service. The JOURNAL has little quarrel with that reasoning. In fact, the proposal to put a readiness-to-serve charge upon the benefited property is merely another step toward establishing an equitable distribution of the costs of transportation service between car riders and property owners that is so strongly advocated and clearly explained by the city's engineer in discussing the unfairness of present paving charges borne by the railways. But the report proposes that all property and business carry the burden of the operating deficit instead of the property specially benefited by the location of street railway lines. Rather than permit the deficit to recur year after year to plague the operating management, it should be wiped out through proper distribution of capital charges. The only available method of accomplishing the result sought would be to distribute a portion of the capital cost of the system as a benefit assessment against the property affected, in proportion to the benefits received, thereby wiping out a substantial portion of the fixed charges. This would represent application to a street railway system of the plan suggested for rapid transit in several cities. It would with one stroke distribute the costs of transportation service equitably and at the same time avoid that bothersome deficit that would be a constant bone of contention and a continual obstacle to good service—just as it has proved to be in New York.

# Transportation



Future requirements of this Metropolitan District analyzed in reports made by the Regional Plan of New York and Its Environs. Separate rapid transit system for commuters and co-ordination of trunk line railroad terminal operations proposed. Highways, parkways, bridges, tunnels and airports also included in comprehensive recommendations.



Interstate loop rapid transit system with extensions to the north and east is proposed as a first step in the solution of the commuter problem of the New York metropolitan district. The ultimate plan includes the utilization of a considerable mileage of trunk line railroads as well as the construction of numerous additions and connections, as shown on the lower map

WITH the object of securing better distribution of population, providing improved means of transportation, reducing congestion, and generally making the metropolitan district a more desirable place in which to live, an elaborate report has been prepared by the Regional Plan of New York and Its Environs. The proposed plan is the result of seven years work, carried out by engineers, economists and other experts at an expense of more than \$1,000,000. It covers not only New York City but all of Long Island, and territory in the states of New York, Connecticut and New Jersey lying within 40 to 50 miles of

the New York City Hall and dependent upon the metropolis for shopping, working and recreation. This area includes 421 separate communities and contains 5,528 square miles.

Over this vast region, which is so closely bound together by common interests that it must be treated as a unit, the new plan spreads a network of many miles of highways, parkways, trunk line extensions, and rapid transit lines, tying them together with new bridges and tunnels wherever necessary and interspersing them with new parks, playgrounds and aviation fields. These enterprises, it is proposed, shall be scheduled for completion prior to 1965. They are part of a program under which it is expected that 20,000,000 people will be able to live more comfortably in the region than 10,000,000 do at the present time.

The general appearance of the plan, as laid down on the map, is of a series of concentric circles, barred like a gridiron, but with the grids large enough so as not to impose a close rectangular system of layout. These

represent the highways, parkways, railways and rapid transit systems. They are laid out with the idea of enabling residents to go from one outlying section to another without passing through the congested portions of the city, as well as to give easy access to the central sections.

The plan assumes that Manhattan will remain the population center of the region, but that it will be closely rivaled by the western tip of Long Island and the communities on the west bank of the Hudson River. It is expected that New Jersey will grow with great rapidity when its transportation facilities are developed

# Facilities Planned

for

# 20,000,000

# People

and its waste lands, prominent among which are the Hackensack Meadows, are reclaimed.

Studies show that about two-thirds of the railroad passengers brought into the city are commuters. The remaining third, numbering at the present time nearly 100,000,000 annually, will have increased to about 270,000,000 by 1965. Suburban rapid transit facilities are now furnished entirely

by the trunk-line railroads in trains operated over the same tracks that are used for other types of railroad business. Commuter traffic has been increasing at a rapid rate and now presents so serious a problem for the railroads that it is generally admitted that special facilities for it must be created within the central part of the region. If the special suburban rapid transit facilities proposed within the central areas are carried out to tap the railroad lines beyond these terminals the latter would be enabled to deal adequately with the needs of long-distance travel, which was originally their primary function.

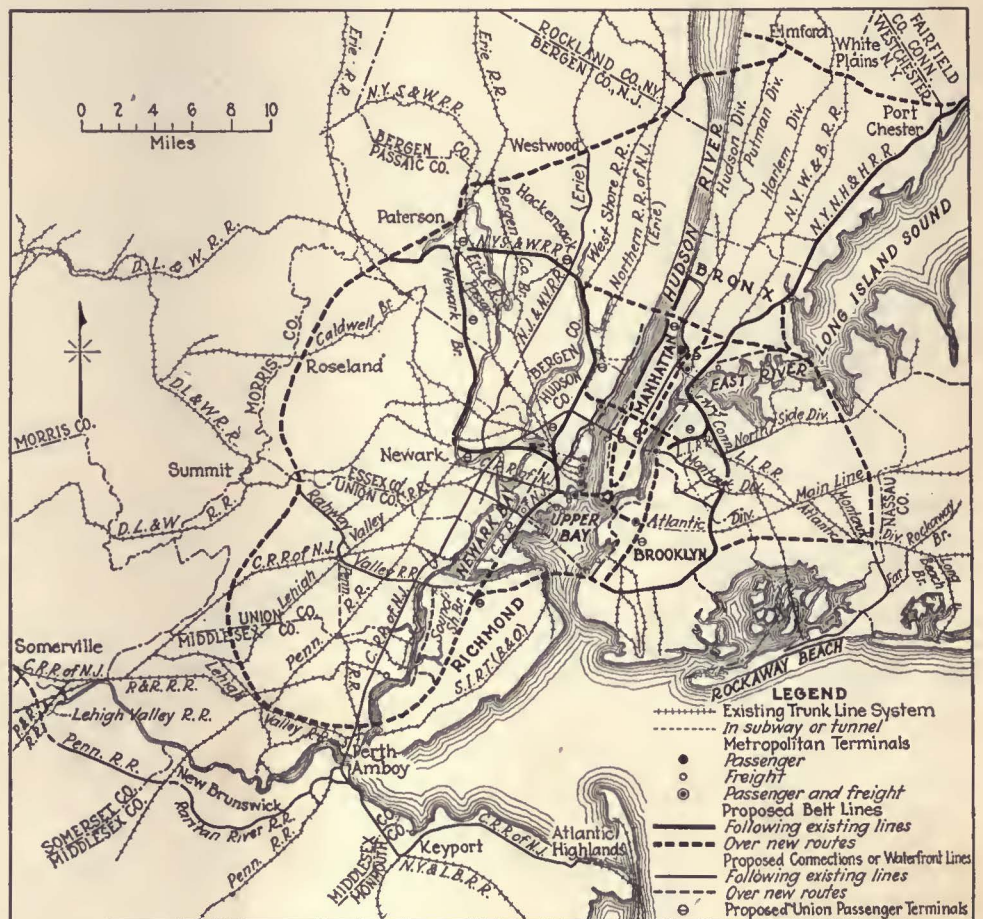
The proposed suburban rapid transit system has been developed with regard for its relationship to the other features of the Regional Plan, especially the existing and proposed trunk-line railroad and city rapid transit systems. The locations of existing and future sub-centers, the proposed highway system, and the

best utilization of land have all had an important influence on the selection of routes.

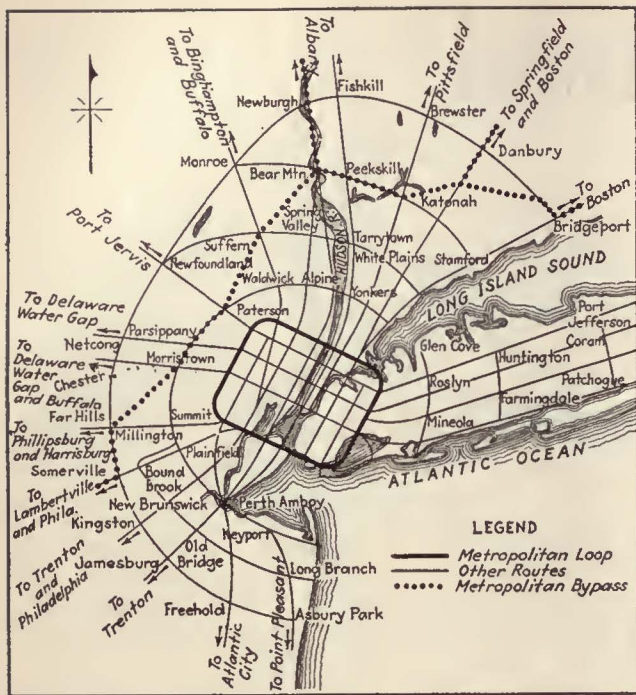
The first step proposed is a loop connecting Manhattan and New Jersey, hooked up on the east with the Long Island Railroad and on the north with the New Haven and the New York, Westchester & Boston, as shown on the map on page 696. This will require tunnels under the Hudson at 57th Street and at a point near the Battery, and other tunnels under the East and Harlem Rivers, as well as a deep level subway in Manhattan.

The ultimate plan presupposes the electrification of most of the railroads handling commuter traffic or the substitution of additional trackage for electrical operation, either under, over, or adjacent to the existing railroad rights-of-way. In New Jersey it would include an area within a radius of about 20 miles from the New York City Hall and in Westchester and Nassau Counties in New York an area within a 25-mile radius from the City Hall.

At the beginning commuters coming in from New Jersey on existing railroads not yet electrified will have to change cars in order to enter the main system, but as



A series of belt lines covering the entire area is proposed as a means of co-ordinating the terminal operations of the trunk line railroads



Diagrammatic scheme of highway routes. This plan includes a highway loop, a roughly rectangular system of routes within the loop, and circumferential, radial and connecting routes. The actual application of this scheme to the contours and present development of the land with the greatest feasible usage of existing highways is shown below

the railroads from the North and East are already electrified their trains can be shunted at once into the new tunnels. Under unified operations trains can be run through the entire system, from one end to the other, so that the switching and storing of empty cars will be reduced to a minimum. All the available rolling stock in the region can be mobilized at any time where it is most needed. These proposals coincide in general with plans previously advocated by the North Jersey Transit Commission and the Port of New York Authority.

To meet the growing needs of trunk-line railroad freight traffic the plan begins by laying down an outer belt line, passing around the heart of the region, through New Jersey, Long Island, Westchester County and a corner of Connecticut, at an average distance of about 20 miles from the City Hall. All railroads entering the region will be connected with this belt line, which will be partly new construction and partly along existing railway routes. By means of this belt line and its connections any car from any railway can be switched to any point along the outer rim of the region. Car ferries will become obsolete.

Three inner loops are proposed. One will circle the Jersey shore opposite Manhattan. A second will run down the west side of Manhattan to the Battery and

up the east side under the Bowery and Third Avenue. Practically all of it will be underground. The third loop will serve Brooklyn and Queens, connecting with the Long Island at Long Island City and reaching the New York Connecting Railroad at Woodside. Each of the inner loops will be linked up with the outer belt lines.

Passenger service will be provided for by great new terminals. New Jersey will have six on the inner belt line—at Paterson, Hackensack, North Bergen, Jersey City,



Newark, and a point in Clifton southwest of Passaic. Manhattan will have a new terminal in the neighborhood of 178th Street and Amsterdam Avenue and probably another at 60th Street and the Hudson River. The Bronx will have a terminal at 149th Street and Mott Avenue. Queens will have one near Queens Plaza, Brooklyn will have one near Prospect Park Plaza, and one is planned south of Port Richmond.

By the aid of these terminals and the lines which will serve them, a passenger coming into the region by trunk-line railroad will be taken directly without change of his means of conveyance, to any community in the 50-mile radius.

Like the railway and rapid transit systems, the proposed highway system for the region is based upon a loop, or series of loops. The principal one of these will run at an average distance of about 12 miles from the New York City Hall. Three inner routes will sup-

plement the loops. Nine north-and-south routes are indicated. Two of these will traverse Manhattan, following the lines of the west side elevated speedway, already authorized, and the proposed east side boulevard. Five will run through New Jersey. One, starting in Richmond Borough, will pass through Bayonne and run close to the west bank to the Fort Lee Bridge. Others will roughly parallel it further to the west, giving New Jersey cities convenient north-and-south connections. The remaining two routes will be on Long Island.

Twenty "radial routes," extending outward from the loop, will tap Long Island, Westchester County, parts of Connecticut, the upper Hudson along both banks, Western and Southern New Jersey, and the Interstate park and other recreation areas. The main routes will be devoted to express traffic, and taken as a whole will enable through travel to bypass the points of greatest congestion.

In addition to the new highways the report proposes a chain of parkways and boulevards encircles the entire region. Thirty-nine major routes are suggested, connecting the important outlying parks and swinging in a great circle around New York City from Long Branch, N. J., to the south shore of Long Island. These are so planned as to take advantage of the existing scenic

opportunities, following river and shore lines wherever possible and traversing the Watchung and Ramapo Mountain chains and the rolling country of Westchester and Long Island.

The proposals include an almost continuous ring of open spaces, encircling the region. The recommendations for the more congested centers of the region are limited by the prohibitive expense of the land in most cases. The report also suggests that the value of water reservations, private golf courses and even cemeteries as "lungs" for the city population be taken into consideration.

A further source of breathing space, as well as an adjunct to the transportation system, will be the airplane landing field. The report advocates the purchase, as soon as possible, of sufficient land for sixteen civil airports, in addition to the 22 airports of all kinds now existing in the region.

Though no figures were given out as to the cost of carrying out the plan, it is believed that they will run into the billions. The total expense, however, probably would not exceed the cost of emergency measures which would have to be taken to meet the needs of the growing city if no general plan existed, and in the long run the plan would undoubtedly result in large economies for the region as a whole and for every community affected.

## Acceleration Rates Compared for Gas-Electric and Mechanical Drive Buses

By W. H. McLAUGHLIN

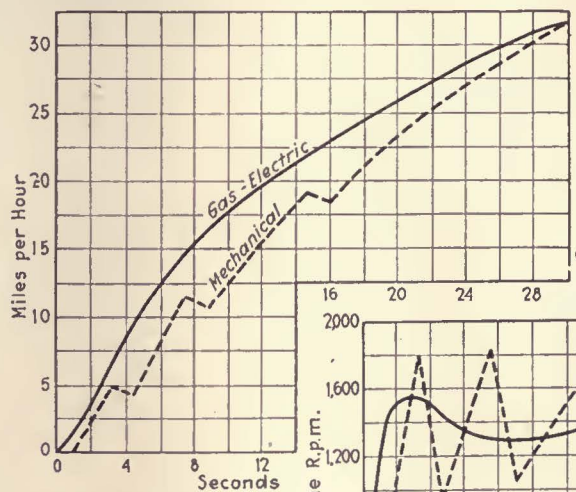
General Engineer Westinghouse Electric & Manufacturing Company

IN ORDER to compare the advantages of electrically driven and mechanically driven buses, tests were made by the Westinghouse Electric & Manufacturing Company on a chassis equipped first with one type of drive and later with the other. The results are thus entirely comparable because the same engine was used throughout and the difference in the total weight represents the fundamental difference between the conditions of the tests. A graphic picture of what occurred during the acceleration of the two buses, is given in accompanying curves, in which the results of the test have been summarized. These show the performance of the mechanical drive using the four speeds of a standard transmission and portray the average initial delay as actually measured. The various "steps" in the acceleration are due to the loss of bus speed while the operator is shifting gears. The curve clearly indicates the changes in the acceleration rate during the gear-shifting operations, and also the manner in which the engine speed varies during acceleration. The engine speed reaches a maximum of approximately 1,800 r.p.m. and falls to about 1,000 r.p.m. each time the gears are shifted. During this period the engine is disconnected from its load about 25 per

cent of the time in order to shift the gears. This loss of power causes a corresponding loss of bus speed.

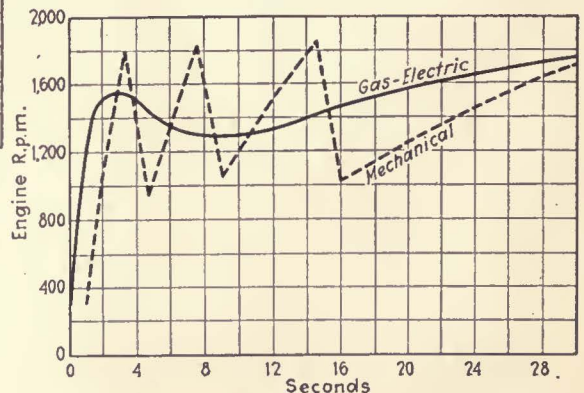
An average gas-electric test with this engine has also been plotted. The data were taken from comparable tests conducted by the same men over the same course

as for the mechanical drive. The acceleration is higher than for the mechanically driven bus and the rate is not changed suddenly. A rough or jerky acceleration frequently gives the impression of being rapid. The error of this impression is easily seen



Performance records of mechanical and gas-electric driven buses, as shown by tests

Gear ratio:  
Mechanical, 5.96 to 1  
Gas electric, 10.3 to 1  
Wheels, 36-in.



when a comparison is made of distance covered by the two drives at definite times after starting. This is shown by the following table:

Time in Seconds	Distance Traveled in Feet	
	Gas-Electric	Mechanical
10	144	93
20	468	365
25	671	552
30	900	772

The engine revolutions per unit of distance traveled are fewer for the gas-electric than for the mechanical bus. The data in the following table were taken from the curve:

Time in Seconds	Engine Revolutions for 100 Ft.	
	Gas-Electric	Mechanical
10	154	220
20	98	120
25	88	110
30	82	89

The difference in engine revolutions per mile increases as the stops per mile increase. This is due to two factors. The engine on the mechanical bus is usually raced while shifting gears. The engine in the gas-electric is idling during coasting and braking, while in the mechanical it operates at a speed proportional to bus speed, unless the clutch is released or the gear shifted to neutral.

A bus equipped with gas-electric drive will weigh from 10 to 15 per cent more, and cost from 15 to 20 per cent more, than a similar mechanical job. To offset this increase in cost and weight, however, the advantages previously mentioned are obtained.

## Traffic Problems Topic of New York State Meeting

LIVELY discussion of the problems of traffic and transportation in city streets occupied the greater part of the sessions of the 47th annual meeting of the New York Electric Railway Association held at the Hotel Champlain, Bluff Point, N. Y., June 21-22. This subject was introduced by the first speaker, Ernest Murphy, general manager, United Traction Company of Albany. After emphasizing the seriousness of the traffic problem as it exists today, he pointed out that the passengers in public transportation vehicles are not organized as are the majority of riders in private vehicles, the retail merchants, and other interests. Moreover, city officials ordinarily are not qualified by experience to act as representatives of the street car and bus riders. Hence, the railway manager must assume the duty of acting as representative of the riding public in the solution of traffic problems. Vehicular congestion, as it affects the street car rider, was discussed by E. K. Miles, superintendent of transportation, New York State Railways, Syracuse. He brought out the fact that parking and improperly arranged traffic signal lights are the greatest causes of congestion and delay. To secure relief, it is essential that the solutions proposed have the approval of both the general public and the city officials.

Advantages of the electric railway over other means

of transportation were emphasized by J. Rowland Bibbins, consulting engineer, Washington, D. C. He pointed out that the transportation problem is essentially a rush-hour problem. At present buses are handling only a comparatively small portion of the total traffic of the large cities in this country. In New York, Chicago, and Philadelphia, they carry about 5 per cent of the traffic, in Boston, 10 per cent; and in Detroit, 19 per cent. According to Mr. Bibbins, the reason for these small percentages is that the total volume of traffic is too large to be handled effectively except by rail. Roadway space is inadequate to handle rush-hour crowds of ten to fifteen thousand passengers per hour on a single route. More and wider streets would be required to handle this volume of traffic by bus. Speed is the most important element in transportation, and buses are slower loading than are street cars, according to Mr. Bibbins. Moreover, because of their greater power, street cars can accelerate faster than buses—another advantage in handling mass transportation. In conclusion, Mr. Bibbins pointed out that proper traffic signals are essential to speedy transportation, and outlined some of the principles to be followed in designing signal systems.

John McLean, attorney, United Traction Company of Albany, spoke on the subject of rights of street cars, and urged the railway men to make greater efforts to put their case before the public. Bus operation in Buffalo was described by J. C. McCollum, executive assistant, International Railway.

That the present condition of the local transportation industry is a challenge to private management was the opinion expressed by Miles B. Lambert, Westinghouse Electric & Manufacturing Company. He said that the problems of today are exceedingly complex in character and, in many instances, are not thoroughly understood. Further scientific research is needed to solve them satisfactorily. He advocated wider use of technical experts by the railways in meeting these problems.

Contributions made by the manufacturers to the efficiency of the street car were discussed by Cornell S. Hawley, president, Consolidated Car Heating Company, R. H. Sjoberg, General Electric Company, and Raymond Boisselle, Westinghouse Traction Brake Company. Passenger safety was the subject discussed by W. H. Hyland, claim agent, Fonda, Johnstown and Gloversville Railroad, the last speaker on the program.

Officers for the coming year were elected as follows: President, Ernest Murphy, general manager, United Traction Company of Albany; first vice-president, R. R. Hadsell, general manager, Schenectady Railway; second vice-president, G. W. Jones, vice-president, Brooklyn and Queens Transit Corporation; third vice-president, B. J. Youngbluth, president, International Railway; secretary and treasurer, W. S. Stanton, Rochester.

The meeting concluded with a banquet, Saturday evening, at which the speaker was James B. Rice, representing Mayor Houde of Montreal.

**Coming**—An interesting analysis of the relation between the length of traffic signal cycles and the efficiency of street use.

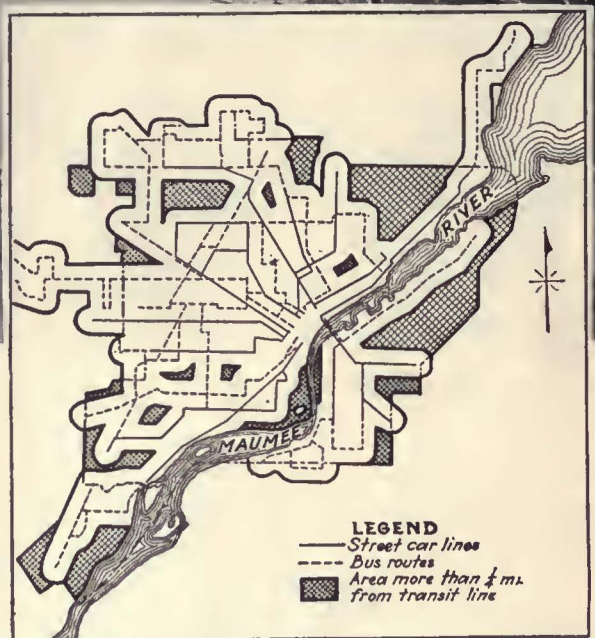
# Modernized Toledo System Making

## Real PROGRESS



Aerial view of Toledo's downtown business section and the north end residential district. The Maumee River, which divides the city, flows into Maumee Bay on the north, an inlet of Lake Erie

Co-ordination of street cars and buses, extensions of routes to parts of city previously unserved, improvement in railway equipment, acquisition of new buses, and elimination of competition responsible for large increases in revenue



By abandoning certain lines, rerouting others and extending the bus system, the Community Traction Company has covered all but a few areas within the city limits by its service

TOLEDO'S transportation outlook, rather gloomy for a long period of years, is now beginning to appear unusually bright. At least it must be assumed to be brightening when the figures month after month show large increases and continue to establish new records. And that is just what the figures of the Community Traction Company are doing.

The actual "proof of the pudding," of course, lies in

the figures as they are shown in the company's reports. Passenger revenue for 1928 was \$3,479,628, compared with \$3,251,198 for the previous year, and revenue passengers totaled 48,230,315, compared with 45,503,270 in 1927. Total revenue from all sources showed an increase of \$259,288 over the previous year. The most remarkable increase was in bus patronage which soared from 2,795,052 in 1927 to 6,150,851 in 1928. For the

twelve months ended April 30, 1929, the total passenger revenue was \$3,360,797, or 12.9 per cent higher than the year before, and the total revenue passengers carried was 50,685,350 or 11.8 per cent higher. These figures are the more encouraging when the percentages for the twelve months ended April 30, 1929, are compared with the per cent increases for the first four months of 1929. Passenger revenue for the four months combined shows an increase of 16.31 per cent over the corresponding period in 1928, while revenue passengers show a 15.01 per cent increase. The company has expanded its service steadily since the middle of 1928, but in spite of this has managed to keep its operating expenses down. In fact, during 1928, the operating costs were reduced from \$2,044,191, the 1927 figure, to \$2,018,119, while the company made an increase in service of 10 per cent.

As a result of the increased revenue and decreased operating expenses there has been an appreciable increase



Part of the new \$150,000 garage, where the bus maintenance and servicing activities for the company's large fleet are centralized

in earnings. The turning tide has changed the figures from red to black, and the company, with its financial set-up again adjusted, is getting back to a sound basis. A net surplus of \$64,234 was realized for the first quarter of 1929, after meeting all obligations, while for the similar period in 1928 the company was faced with a deficit of \$5,254. For the entire year of 1928, the surplus, after all operating expenses, taxes, and charges had been deducted, was \$125,150, which compares with a deficit of \$361,825 for the previous year. Present indications are that this progress is not temporary, but that it will continue in the future.

Perhaps the greatest accomplishment has been the restoration of the faith of the city officials and the public, and the conversion of a strongly antagonistic feeling into a friendly one toward the company. The public is now interested in its transportation system and is responding heartily to the railway's expansion and modernization program.

The upward trend in revenue passengers is the answer of the public of Toledo to the railway's endeavor to give better service. Of the many steps taken by the railway, the most important ones were the abandonment of superfluous routes, the establishment of new routes in districts previously unserved, the expansion of its bus system, a complete co-ordination of the entire rail and bus system, the installation of extra motors on the street cars, re-scheduling service, and the reconstruction of a large amount of track. Along with these major moves the company arranged for special bus service, established owl service with buses, repaired bridges, eliminated grades, built a large garage and centered its bus activities in it, lowered its accident claims and resulting charges by instituting a safety drive, reduced its operating expenses, designed new transfers, rearranged car stops, marked the new stops with bright orange bands, and provided safety zones. Every effort was made to offer the maximum of service to the greatest number of people in Toledo.

#### NEW AGREEMENT MADE WITH CITY

The general rehabilitation program, sponsored by the railway, followed the passage of an ordinance in June, 1928, supplementing the Milner service-at-cost franchise and giving the Community Traction Company a virtual monopoly of all local transportation facilities in the city. The new ordinance settled a number of issues which had been discussed without success for years. The original Milner service-at-cost ordinance, adopted by the electors on Nov. 2, 1920, proved unsatisfactory in several particulars. The city asserted that the company was not willing to do its share toward its comprehensive street rebuilding program, and the company asserted that the city had been remiss in permitting bus competition free from the limitation of service-at-cost regulations.

The company found itself in the anomalous position of operating superfluous routes while unable to start routes that were needed in new areas. Again, the city maintained that the company was paying too high a rate for power, while the company felt that its yearly reconstruction program was limited too much by the ordinance provision that replacements were to be financed from a depreciation fund, accrued from earnings, amounting to not less than one-half of 1 per cent nor more than 1½ per cent of the capital value. Other differences of viewpoint complicated the whole situation. Several attempts were made previous to 1928 to amend the Milner franchise which became effective in 1920. First came the Bartholomew report, then the Riggs report, and finally the supplemental Riggs report. Although there were earnest attempts to solve the transportation difficulties, no direct results were obtained from them.

By the end of 1927, however, bickering over the Milner ordinance had to come to an end in favor of constructive measures. During the first half of 1928, a number of conferences between the city and company officials were held, and the new ordinance was formulated. It was heartily endorsed by Mayor Jackson and when submitted to the City Council was passed by a vote of 17 to 1. It was approved by the Mayor on June 5 and became effective July 5.

The ordinance is, in effect, a 5-year modification of the original Milner ordinance. It gives the railway practically a monopoly of all local transportation service in Toledo by prohibiting any transportation line within one-fourth mile of a Community Traction Company car or



bus line, and also provides for a substantial reduction in the power rate to the railway. The power rate was reduced to 1¼ cents flat per kw.-hr. and a rebate for the past power bill amounting to \$150,000 was allowed. In exchange for these terms, the company agreed to pay an old pavement bill amounting to \$185,241 with interest at 6 per cent, to pay for a traffic survey which cost \$25,000, to set up a five-year reconstruction program amounting to \$560,000, to establish a special replacement fund of \$230,000 to be advanced against the depreciation fund and refunded after the third year, and to secure a loan of \$30,000 for a down payment on new buses.

The Community Traction Company also agreed to a loan of approximately \$900,000 for ten years without interest to cover the accrued deficit in the stabilizing fund, exclusive of the original \$400,000 in the fund. It also agreed to reroute the existing lines, to abandon non-

which is more than double the figure of July, 1926, of 61.43 miles.

The bus routes for the most part are feeders to the street car lines or lines which do not compete with the trolleys. The whole plan was to co-ordinate the two systems so that a maximum number of people could be served without unnecessary duplication of facilities. The accompanying map, showing the area in the city limits within a quarter of a mile of a transportation line, shows how successfully the rerouting and extensions were in covering the city. The hatched areas on the map, which are not within one-fourth mile of any line of the Community Traction Company, are for the most part parks, institutional grounds, cemeteries, etc.

In January, 1928, a total of 3,787,459 passengers were carried on the 54.1 miles of street car route, averaging 70,021 passengers per mile of route. In January of the following year the rail routes were only 46.9 miles,



Street scene in downtown section of Toledo. Many of the company's cars have been re-equipped with four motors, giving them ample power for rapid acceleration in traffic

essential lines and to expand its service into new areas, all at the standard fares of ten cents for a single ride, three tokens for 25 cents, and 1 cent for a transfer.

Realizing that its superfluous routes in certain districts and its lack of routes in other districts were causing an unnecessary operating expense and at the same time failing to secure the maximum of patronage, the company set as its major objective the rerouting of its lines, reaching into new territory with buses, and fully co-ordinating the two types of service.

In July, 1926, the rail routes totaled 57.43 miles while the bus lines were only 4 miles. In the ensuing twelve months the bus mileage was increased to 30.6 and the following year to 58.0 miles. Following the passage of the ordinance supplementing the Milner franchise, further extensions were made bringing the total bus mileage to 78.5. During the same period, the rail mileage was decreased 11.14 by reroutings and abandonments of lines that really could be better operated with buses. At the present time the total rail and bus mileage is 124.79

but 3,895,821 passengers were carried, making an average of 83,101 passengers per mile of route. The increase in passengers carried per mile of route was due to the new system of using street cars for the heavy routes of travel only and feeding them by bus with passengers from the outlying districts.

#### BUSES SHOW PASSENGER INCREASE

A corresponding increase in passengers per mile of route was obtained with the buses, even during the rapid period of expansion in 1928. In January of that year buses covered 32.4 miles of route and carried 373,306 passengers, or 11,522 passengers per mile. In January, 1929, the bus mileage was 68.3, but 1,149,233 passengers were carried, or 16,826 passengers per mile.

Prior to June 30, 1928, there were six independent bus lines competing with the Community Traction Company. Under the terms of the ordinance giving the railway a monopoly of the bus service, the independents were forced to sell out. The six lines were purchased

from the independents on a property valuation basis under the terms of the ordinance. A total of 40 buses were bought but only a few were serviceable.

To give the new service, the Community Traction Company purchased, during 1928, a total of 88 buses, of which 69 were new. The new buses included 3 Macks, 18 Whites, 38 Yellows and 10 Twin Coaches. These buses, which cost approximately \$900,000, brought the fleet to a total of 124 at the beginning of 1929. A new garage was built at a cost of \$125,000 for the purpose of centralizing maintenance and operation activities.

In addition to the numerous extensions made, the company established special services with some of its new buses. In a single month special buses operated for high school students carried 18,000 passengers and brought in a net profit of \$520. The revenue of 40.074 cents per mile was the highest in the entire bus system. The buses also were substituted for street cars for owl service on certain lines, resulting in lower operating costs.

#### HIGHER SPEED WITH EXTRA MOTORS

By adding two 35-hp. motors to 58 Peter Witt cars already equipped with two motors of the same size, the company was able to speed up its service on several lines. On the Cherry Street line the extra motors permitted the terminal schedule speeds to be raised as follows:

SCHEDULE SPEEDS IN MILES PER HOUR			
	Old	New	Per Cent Increase
Morning peak.....	9.84	10.53	7.02
Base.....	10.17	11.09	9.05
Afternoon peak.....	8.72	10.34	18.58
Night.....	10.17	11.09	9.05

Incidentally, with this increase in speed came an increase of 14.3 per cent in traffic for the period from April, 1928, to February, 1929, as compared with the same period of the year previous, and a 17.5 per cent decrease in platform expenses.

Another factor in raising the speed on several lines was the rearranging of stops to give longer runs between them. When the new stops were put into effect, the schedules were announced by pamphlets. As a further aid the new stops were marked with brilliant orange stripes around nearby poles at the curbs, the color conforming to that of the cars. Two more steps to help increase the speed were the establishment of safety zones in a business district of the city and the designing of a new system of transfers. In this system colors indicate groups of parallel routes while the hour is indicated by the length of the transfer. While the new transfers shorten the time of issuance appreciably, they also have been responsible for an 8 per cent increase in purchases of the regular token fares. This is the result of the elimination of a certain amount of return riding by means of transfers.

#### EXTENSIVE TRACK RECONSTRUCTION PROGRAM

One of the most important provisions of the ordinance which went into effect in July, 1928, was the setting up of a 5-year track rehabilitation program, involving a sum of \$560,000. The amounts available for this work were to be \$185,000 for the first year, \$181,000 for the second, \$57,000 for the third, \$119,000 for the fourth, and \$80,000 for the fifth. These sums were to be in addition to the \$230,000 appropriated for the replacement of worn out equipment in a period of

three years. A great amount of street improvement work has been completed and other projects are well under way. At the end of the 5-year period, the company will have most of its track in excellent condition. Aside from actual track reconstruction the company has also eliminated a few grades and repaired some bridges.

Among the numerous steps taken by the company to move forward was the institution of a safety drive which has resulted in a very substantial reduction in accident claims and resulting charges. In the maintenance department, too, every effort has been made to lower the cost and to improve the equipment. That the equipment has been improved is best evidenced by the fact that pull-ins in 1928 were 40 per cent less than those in 1927.

#### PUBLIC RESPONDS TO COMPANY'S EFFORT

The results of the many improvements made by the Community Traction Company to better its service, reviewed at the beginning of this article, indicate that the public is responding favorably to the modernized system. The company has enjoyed increases in passengers and revenue every month since the supplemental ordinance went into effect in July, 1928, and no doubt traffic will continue to build up in the succeeding months and years.

The increased earnings and the financial readjustment provisions of the supplemental ordinance have changed this aspect of the operation materially. Prior to 1928, the earnings were falling off, riding was steadily decreasing and the deficit in the stabilizing fund, established under the terms of the Milner ordinance of 1920, was growing larger each month. In March, 1928, the company made its last sinking fund payment, retiring 20 per cent of the capital value. This sinking fund was established by the Milner ordinance to retire \$1,800,000 of the 6 per cent bonds of the company and to issue an equivalent par amount of common stock to the city. The payments of 2½ per cent of the capital value amounted to approximately \$28,000 each month. Relieved of this obligation the company was able to show a surplus the following month.

At the time the supplemental ordinance was passed the deficit in the stabilizing fund was approximately \$1,300,000. To take care of this a provision was included for a loan to the railway amounting to approximately \$900,000, representing substantially the deficit in the stabilizing fund exclusive of the \$400,000 originally placed in it. Interest on this loan and payment of principal was suspended for a 10-year period subject to a shorter period should the agreement with the city be terminated. Because of the extensions of these payments it was agreed to place all surplus into a so-called "fare stabilizing fund," and to readjust the fares when this fund reaches \$500,000. At the first of the year the fare stabilizing fund had reached a total of \$65,032, making the actual deficit in the reserve fund \$1,147,217.

The first four months of the present year showed surpluses of \$18,789, \$25,767, \$17,634, and \$20,833, respectively, raising the fare stabilizing fund to \$148,055 and reducing the actual deficit in the reserve fund to \$1,064,194. The lower power rate, the rebate of \$150,000 for power, the lower accident charges, the lower operating expenses and steadily increasing revenue make the prospects for reducing the deficit in a comparatively short period and putting the company on a sound financial basis again, appear exceedingly bright.



Electric coaches have no difficulty in negotiating the 10 per cent grade of Capitol Hill in Salt Lake City at a speed of  $17\frac{1}{2}$  m.p.h.

# Trackless Trolley Questions

Riding has increased steadily on Salt Lake City line. Minor difficulties which were experienced have been overcome. Operating costs are lower than for motor buses or street cars of the same capacity

*Answered  
from Experience*

By

**EDWARD A. WEST**

General Manager  
Utah Light & Traction Company  
Salt Lake City, Utah

**M**ANY interesting developments have taken place since the inauguration of trackless trolley service in Salt Lake City on a 4.3-mile route on Sept. 9, 1928. It was recognized at the outset that there would be problems to meet in pioneering this new conception of the trackless trolley and a few difficulties actually did arise in connection with the operation of the ten original coaches. However, the troubles were all of a minor nature and were overcome one by one. No fundamental difficulties were encountered, so that no concern is felt regarding the ultimate outcome. The operation as a whole has been entirely successful and has met with favorable public and official sentiment; in fact, because of the public's attitude the company plans to operate a second line on Ninth East Street, in place of the present railway service. Permission has been granted by the City Commission of Salt Lake City and the line will be established as soon as the Public Utilities Commission of Utah approves the abandonment of the car line and the substitution of trackless trolleys.

In the Sept. 8, 1928, issue of *ELECTRIC RAILWAY JOURNAL* the underlying reasons for the adoption of the trackless trolley for service in Salt Lake City were discussed. In a later issue—Feb. 9, 1929—an article was published, reporting the progress of the new service and giving details of the overhead and the ten "electric coaches," manufactured by the Versare Corporation. In February, however, the company had not had sufficient experience with the coaches to discuss with certainty the many phases of operation and the results of the new service. With nine months of experience, it now feels in a position to answer the many questions which have been asked regarding the various phases. The more important of these questions with the answers follow:

*Q—Do you recommend trackless trolleys for use on unpaved streets?*

A.—This depends altogether on climatic conditions and the character of the roadbed. Experience in Salt Lake City indicates that operation on dirt streets is not satisfactory. During those seasons of the year when ruts are formed in the street surface from thawing and freezing, riding on the coaches is rough and vibrations are set up in the body which loosen electrical connections. A great deal of this difficulty doubtless would be eliminated by a more general method of insulating equipment from shocks, and steps taken along this line are proving effective. Of course, any

ing an intersection when an automobile approached it from the right at a high rate of speed. Had the coach been a street car confined to rails the automobile would have struck it head on in its midsection, with disastrous results. As it was the coach operator, because of the flexibility of the unit, was able to steer sufficiently from the path of the oncoming automobile to enable the driver to retard the speed of his car somewhat and to pull it to the right, with the result that only the front sides of the vehicles met. When it was found that the coach had been damaged slightly it was pushed over to the curb, where it did not interfere

ing in some patrons becoming timorous. The incidents were as follows: One morning a horse-drawn milk wagon was driven slowly from a side street right into the path of a coach coming down the hill. The street was covered with ice. The operator of the coach swerved to the right to avoid hitting the milk wagon and in so doing pulled away from the trolley wires and onto a street with a very severe downgrade. He steered the coach into the curb and a barn crew had to right it and let it down to a street at a lower grade, from where it was pulled into the barn. No personal injuries resulted and the only damage to the coach was a



Trolley wires for the electric coaches, installed along the sides, are less conspicuous than wires over the center of the street

type of road vehicle is subject to the same difficulties with unpaved streets.

*Q—How flexible in traffic are the electric coaches? Is this flexibility an advantage?*

A.—Coaches have a great amount of flexibility in traffic, giving them a decided advantage over the fixed-route vehicles. The following incidents show the desirability of flexibility in heavy traffic: At a busy intersection during the rush hour one evening an automobile became entangled with a street car, the front wheel of the automobile becoming wedged under the car. A coach was following the street car, and instead of waiting until the street car could be freed and proceed, the coach's trolley poles were pulled and it passed around the street car and continued on its way.

At another time a coach was cross-

with other traffic. Just recently it was necessary to replace the special work at an intersection, necessitating a temporary rerouting of all lines. To reroute the coaches three blocks of temporary overhead trolley construction was installed in a short time and at small expense. This rerouting would have been impossible with street cars.

*Q—Did you experience any difficulty negotiating Capitol Hill with its 10 to 11 per cent grade during the winter months?*

A.—At the beginning of the winter season electric coach operators were recruited from street car service, and those selecting coach runs were not experienced in handling rolling stock not confined to rails. On two different days incidents occurred which, on account of the newness of this type of vehicle, were given undue and unnecessary newspaper publicity, result-

broken corner post and a front window.

After a week of successful operation under similar street conditions, a second incident occurred. A new man, under instruction, who had driven gasoline buses in the suburbs of the city made a run for the grade but the rear wheels started spinning. To gain traction he backed up and tried it again. In each case he fed the motors too rapidly, with the result that the wheels spun. After these unsuccessful attempts to make the hill he decided to back the coach over to the curb and in so doing backed into an automobile, damaging it to the extent of \$300. Very little damage was sustained by the coach itself.

Local newspapers, however, played up the incident to such an extent that a number of people were frightened. Because of this the company took the coaches off the hill for a period of 60

days. At the end of this time operation over the same icy streets was resumed without further trouble. The experience last winter showed that a light sprinkling of cinders or sand and salt on an icy street effectively prevents slippage. The sprinkling can be quickly and economically done by special equipment for the purpose.

*Q—Of what value on grades are dynamic brakes if the trolleys leave the wires?*

A.—They are of no advantage. It would be necessary to rely in such cases on air and hand brakes, which in the case of gasoline vehicles are the only brakes available anyway. Thousands of heavy trucks and buses are running over streets of cities throughout the country today equipped with brakes that are no better, if as good, as the hand and air brakes on the electric coaches. The trolley poles leave the wires so infrequently, however, that it is not worth considering.

*Q—Do you prefer dynamic brakes to other forms of braking?*

A.—Inasmuch as dynamic braking requires but little additional equipment and has many advantages, no reason can be seen for eliminating this method of control. Among its advantages are the following:

First, dynamic brakes are effective on grades for holding the speed of the coach at practically any rate desired. This is decidedly advantageous when streets are slippery.

Second, the heat generated in accelerating and braking is utilized to heat the interior of the coaches, thus saving power in the winter.

Third, wear and tear on brake drums is minimized.

Fourth, a coach can be brought to a sudden stop in emergencies.

Fifth, rapid acceleration and retardation give to riders the effect of speed and "getting somewhere" that is necessary nowadays.

*Q—Have you experienced any equipment and operating difficulties?*

A.—For a new mode of mass transportation surprisingly few equipment difficulties have been experienced. Dynamic braking introduced some strains and stresses that are not present with ordinary braking and, being performed through the springs, caused some spring trouble at first. Supporting the springs in rubber permitted a reduction of the number of leaves, which improved riding and reduced vibration in the electrical and air equipment.

Operating difficulties were due largely to trolley dewirements at the

outset on account of running the coaches through overhead special work used by street cars. The trolley wheels of the coaches were of different diameter than those of the street cars, therefore it was necessary to change the grooves in the overhead special work to accommodate the coach trolleys. These difficulties cleared themselves rapidly, coach dewirements being no more frequent than with street cars at the end of two weeks. The use of mechanical and electrically-operated overhead switches permits coaches and street cars to take turnouts with equal facility, so that overhead problems, locally,

costs will be lower than at present. There is now reflected in the costs the expense of overcoming minor difficulties always accompanying pioneering. During the first few months more inspection and supervision were given than are found necessary today. During the winter the cost of keeping the ruts out of the dirt street portion of the route was rather high. This expense is in no way chargeable to the coach operation so far as the equipment is concerned, because it was done more to improve riding than for any other purpose.

Regarding fuel and energy costs, a gasoline bus of carrying capacity equal



Carhouse pits were readily adapted at small cost to meet the needs of electric coach inspection and maintenance

are solved. At one end of the route an overhead wye is installed which is negotiated without difficulty; at the other end a loop is used. As in street car operation loops are more desirable and are favored wherever possible. Each application of trolley coaches, however, will bring up its own set of problems. In Salt Lake City, nevertheless, it is felt that operating coaches along with street cars through the busiest traffic of the city with turnouts at every corner has overcome the majority of the overhead difficulties likely to be encountered.

*Q—How do coach operating costs compare with those of gasoline buses of equal seating capacity?*

A.—Based on carrying capacity the operating cost of electric coaches is 63 per cent of gasoline equipment. It is felt that by the end of the first year

to that of the electric coach averages about 3 miles per gallon, while the coach consumes slightly more than 2.2 kw.-hr. per mile on an average.

*Q—How do electric coach costs compare with those of street cars of equal seating capacity?*

A.—It is felt that electric coach operation over a period of time will show a substantial saving over street car costs. During the first six months the electric coach costs were 80 per cent those of street cars. There are a great many hidden costs in connection with street car operation not always reflected in the figures. For example, there is the periodic rehabilitation of track and paving which is usually accomplished by retiring the original investment and charging it to depreciation reserve and capitalizing the new work. As a result of this accounting

procedure, operating accounts do not reflect the full cost of street car operation. Those companies that provide adequately for depreciation in their operating accounts are best situated to make a direct comparison between street car and electric coach operating costs. Electric coaches were introduced in Salt Lake City to avoid rehabilitating a long section of track and pavement that needed replacing. Tire expense of coaches takes the place of wheel and track and roadway street car costs. If tire expense is

less conspicuous today than they were in the middle of the streets. The foliage of the trees hides the wires and the appearance of the roadway is so much improved that this, together with the quietness of the coaches, has made this type of operation very pleasing to the property owners. It has been stated that building activity in the residential section of the city served by the coaches has been stimulated.

With respect to overhead construction in the downtown district, it has

One of the tracks in the carhouse was assigned to the electric coaches and converted for their repair. The pits were partly bridged with platforms to permit inspection of coaches, and double trolley wire was extended over the pits and track. Limiting equipment and lines for greasing the coaches also were installed adjacent to these pits. Later on, when the number of coaches was increased, a second track was converted. The coaches enter the carhouse at the west end and leave by the east end. There is sufficient room in the building for one coach to by-pass another, to go over the pits or to leave the barn at the east end.

*Q—Are electric coaches speedier on grades than street cars and gasoline buses?*

A.—Yes. On the 10 to 11 per cent grade on Capitol Hill, with load of 40 or more passengers, coaches average better than 17½ m.p.h.

*Q—Do electric coach accidents show an increase over street car accidents?*

A.—The flexibility of the coaches permits them to deviate from a fixed path to avoid serious collisions. Their ability to stop quickly also is a safety factor of inestimable value.

*Q—Who licenses trolley coaches for operation on the streets of Salt Lake City?*

A.—The tax for this operation, other than that based on property value, amounts to \$25 per year per vehicle, the same as for street cars, and is payable to the city. No state license tax or vehicle registration number is required because the coaches are not self-propelled. They are confined to definite routes and obtain their energy for propulsion from an outside source, so they are classified with street cars.

*Q—Has patronage on this line been affected by the introduction of electric coaches?*

A.—From the outset riding on this line showed an increase over the former patronage. At first it was thought this was due to the novelty of the vehicles, but after more than nine months of operation with riding still continuing it is believed that the quiet, speedy operation of the electric coaches has brought new patrons. This is particularly interesting in view of the fact that parallel street car lines are almost a half mile distant on each side. The system as a whole shows a decrease in riding, but the electric coach route has had a substantial gain in patronage.



Ten electric coaches of this type, manufactured by the Versare Corporation and equipped with Westinghouse motors and control, are operated on the Salt Lake City route

less than the sum of these, then there is no question that electric coach operation is cheaper.

*Q—What is the actual electric coach kilowatt-hour consumption per car-mile as compared with that of street cars?*

A.—Energy consumption of coaches averages slightly more than 2.2 kw.-hr. as compared with approximately 4.3 kw.-hr. for street cars. This coach average is for winter operation through snow, ice and mud, and should decrease somewhat during the months of more favorable weather.

*Q—Have tire troubles interfered with service?*

A.—Delays on account of tire trouble have been so few as to be almost negligible.

*Q—What objections, if any, were made by property owners to stringing double trolley wires on the streets in residence districts?*

A. There were no difficulties connected with this installation as far as the residents on the streets were concerned; in fact, the trolley wires are

added weight to the installations already in place at intersections but is no more noticeable than the single trolley wire construction. In fact, a stranger going along the main street of the city after coming from a city having no trolley coaches would not know the difference. It requires an experienced eye to note the double overhead. At the outset there was some question by the fire department as to its ability to use tower wagons and other fire apparatus on account of two trolley wires. To overcome this an actual test was made by the line department of the street railway in company with the fire chief and his assistants. Following the test the chief withdrew all objections to the presence of two trolley wires.

*Q—Can the vehicles be maneuvered about the carhouses and shops without difficulty?*

A.—Fortunately it was possible to work out an overhead system in the yards which will permit increasing the number of trolley coaches to the full capacity of the carhouse without any particular overhead complications.

# Monthly Financial Reports Show Improvement

Operating statistics of 31 electric railways in the United States and Canada indicate a trend toward higher gross revenue and reduced expenses

BETTER operating conditions on the electric railways of the United States and Canada are indicated by the monthly reports which are being received. While some properties, particularly in the smaller communities, still show a decline in gross revenue, many increases are seen on properties all over the country. The trend toward higher gross which has been particularly noticeable in Canada for the past year or more continues, except on some of the smaller systems.

Operating expenses, on the contrary, show a reduction on many of the properties. Even where the gross busi-

Table I—Monthly Reports of Electric Railway Companies

	Operating Revenue \$	Operating Expenses \$	Taxes \$	Gross Income \$	Net Income \$
<b>Key System Transit Co., Oakland, Cal.</b>					
Dec., 1928	621,774	485,206	37,126	111,143	121,990
Dec., 1927	635,085	491,215	38,212	119,214	28,470
12 mo., Dec. 1928	7,227,958	5,647,612	464,684	1,239,065	808,385
12 mo., Dec. 1927	7,452,821	5,852,550	432,335	1,314,389	579,017
<b>Market Street Railway, San Francisco, Cal.</b>					
May, 1929	819,405	.....	.....	135,906	77,100
12 mo., May, 1929	9,610,060	.....	.....	1,380,522	646,735
<b>Jacksonville Traction Co., Jacksonville, Fla.</b>					
April, 1929	97,395	77,495	9,153	10,269	.....
April, 1928	101,486	81,361	9,641	9,955	.....
12 mo., Mar. 1929	1,183,310	955,396	106,735	114,759	46,707
12 mo., Mar. 1928	1,284,114	1,054,393	108,222	114,173	51,880
<b>Honolulu Rapid Transit Co., Honolulu, Hawaii.</b>					
April, 1929	87,658	51,783	10,616	26,278	13,054
April, 1928	85,494	52,759	11,514	22,119	13,315
4 mo., Apr. 1929	354,598	203,715	42,464	113,007	60,114
4 mo., Apr. 1928	338,083	207,840	42,375	92,062	60,971
<b>Chicago Surface Lines, Chicago, Ill.</b>					
May, 1929	5,354,248	4,157,362a	.....	1,196,885	902,826c
May, 1928	5,304,553	4,102,297a	.....	1,202,255	903,346c
<b>United Railways &amp; Electric Co. of Baltimore, Md.</b>					
May, 1929	1,463,365	998,615	132,666	346,656	64,753
May, 1928	1,430,428	958,151	140,134	343,945	61,738
5 mo., May, 1929	7,022,217	4,826,449	685,703	1,580,251	161,976
5 mo., May, 1928	6,869,965	4,644,864	660,418	1,622,998	199,665
<b>Boston Elevated Railway, Boston, Mass.</b>					
April, 1929	2,916,473	1,946,699	147,017	.....	.....
April, 1928	2,909,354	2,044,740	164,418	.....	.....
<b>Eastern Massachusetts Street Railway, Boston, Mass.</b>					
April, 1929	716,162	427,669	32,766	280,222	100,085
April, 1928	727,390	453,255	26,955	270,917	89,171
4 mo., Apr. 1929	3,031,473	1,805,468	137,665	1,160,612	387,889
4 mo., Apr. 1928	3,188,174	1,878,548	133,869	1,254,169	414,960
<b>Detroit Municipal Railway, Detroit, Mich.</b>					
May, 1929	2,355,752	1,894,549	62,505	407,659	272,651
May, 1928	2,067,253	1,604,558	66,965	418,505	257,140
12 mo., May, 1929	26,133,685	20,751,617	759,288	4,815,579	3,065,729
12 mo., May, 1928	23,532,257	18,172,257	779,021	4,824,245	2,917,134
<b>Kansas City Public Service Co., Kansas City, Mo.</b>					
May, 1929	757,768	.....	.....	76,578f	.....
May, 1928	783,876	.....	.....	76,874f	.....
5 mo., May, 1929	3,804,758	.....	.....	363,301f	.....
5 mo., May, 1928	3,864,934	.....	.....	363,611f	.....
<b>International Railway, Buffalo, N. Y.</b>					
3 mo., Mar. 1929	2,727,179	2,283,962a	.....	459,885	133,826
3 mo., Mar. 1928	2,804,291	2,327,658a	.....	486,580	129,754
<b>Fonda, Johnstown &amp; Gloversville R.R., Gloversville, N. Y.</b>					
April, 1929	82,255	61,939	7,840	13,981	17,833
April, 1928	94,199	64,152	7,840	24,967	6,701
4 mo., Apr. 1929	345,804	250,936	31,360	72,455	54,288
4 mo., Apr. 1928	379,561	263,638	31,360	95,180	30,977

	Operating Revenue \$	Operating Expense \$	Taxes \$	Gross Income \$	Net Income \$
<b>Brooklyn City Railroad, New York, N. Y.</b>					
May, 1929	1,015,769	823,769a	.....	192,000	152,464
May, 1928	1,022,716	847,514a	.....	175,202	133,836
11 mo., May, 1929	10,563,854	9,066,845a	.....	1,497,009	1,048,681
11 mo., May, 1928	10,696,238	9,168,526a	.....	1,528,712	1,054,723
<b>Brooklyn-Manhattan Transit System, New York, N. Y.</b>					
May, 1929	4,298,360	2,649,404	290,064	1,427,548	686,447
May, 1928	4,122,595	2,523,788	303,302	1,372,975	714,858
11 mo., May, 1929	44,418,548	28,515,519	3,091,000	13,726,948	5,914,849
11 mo., May, 1928	43,411,307	27,969,142	3,151,368	13,243,040	5,938,321
<b>Hudson &amp; Manhattan R. R., New York, N. Y.</b>					
May, 1929	1,069,375	.....	.....	543,612	206,781
May, 1928	1,046,026	.....	.....	506,692	171,133
5 mo., May, 1929	5,279,986	.....	.....	2,626,334	946,164
5 mo., May, 1928	5,251,026	.....	.....	2,284,651	906,621
<b>Interborough Rapid Transit Co., New York, N. Y.</b>					
May, 1929	6,261,572	3,556,701	192,693	2,512,177	645,130d
May, 1928	5,917,170	3,405,545	233,392	2,278,232	477,644d
11 mo., May, 1929	64,009,736	38,891,861	2,204,008	22,913,866	3,056,661d
11 mo., May, 1928	61,886,727	36,121,959	2,992,043	22,772,723	2,949,612d
<b>New York, Westchester &amp; Boston Ry., New York, N. Y.</b>					
April, 1929	203,585	127,360	23,350	53,558	160,516
April, 1928	193,028	117,361	20,120	57,039	140,963
4 mo., Apr. 1929	767,041	505,413	81,655	182,707	660,234
4 mo., Apr. 1928	729,196	486,688	77,506	170,537	625,141
<b>Third Avenue Railway, New York, N. Y.</b>					
April, 1929	1,317,641	993,551	83,031	260,524	811
April, 1928	1,277,044	969,053	90,325	234,249	1,955
10 mo., Apr. 1929	12,888,649	9,929,938	899,763	2,247,246	313,177
10 mo., Apr. 1928	12,864,564	9,887,155	922,194	2,223,601	117,065
<b>Philadelphia &amp; Western Railway, Norristown, Pa.</b>					
May, 1929	69,139	39,151	.....	29,988e	14,048
May, 1928	70,768	41,740	.....	29,028e	13,101
<b>United Electric Railways, Providence, R. I.</b>					
May, 1929	613,995	486,615	34,907	98,816	47,895
May, 1928	623,455	504,577	32,021	95,465	42,602
5 mo., May, 1929	3,086,850	2,494,899	174,534	446,311	191,582
5 mo., May, 1928	3,195,505	2,532,002	175,704	517,337	252,275
<b>Galveston-Houston Electric Railway, Houston, Tex.</b>					
April, 1929	47,074	27,891	2,569	16,613b	.....
April, 1928	54,285	32,334	2,590	19,360b	.....
12 mo., Apr. 1929	622,577	350,151	31,684	240,741b	29,998
12 mo., Apr. 1928	690,517	400,124	30,461	259,931b	7,447
<b>Houston Electric Company, Houston, Tex.</b>					
Feb., 1929	264,573	168,729	25,233	70,610b	.....
Feb., 1928	265,174	160,646	26,031	78,496b	.....
12 mo., Feb. 1929	3,355,195	2,081,378	290,707	983,109b	571,573
12 mo., Feb. 1928	3,127,074	1,974,179	277,386	875,508b	488,020
<b>Pacific Northwest Traction Co., Seattle, Wash.</b>					
March, 1929	72,952	60,404	4,366	8,180b	.....
March, 1928	67,395	60,201	4,221	2,960b	.....
12 mo., Mar. 1929	883,769	746,647	51,456	85,744b	51,829
12 mo., Mar. 1928	885,842	692,589	48,005	145,256b	30,286
<b>Calgary Municipal Railway, Calgary, Alta.</b>					
April, 1929	83,972	45,641	.....	38,331	8,140
April, 1928	75,303	41,395	.....	33,368	8,348
4 mo., Apr. 1929	349,810	190,541	.....	159,268	37,669
4 mo., Apr. 1928	313,273	183,074	.....	130,198	29,395
<b>Edmonton Radial Railway, Edmonton, Alta.</b>					
April, 1929	72,173	45,227	.....	29,646	1,098
April, 1928	67,088	42,710	.....	11,789	36,532
4 mo., Apr. 1929	306,282	180,370	.....	125,853	14,961
4 mo., Apr. 1928	286,787	177,700	.....	109,087	8,114
<b>Lethbridge Municipal Railway, Lethbridge, Alta.</b>					
March, 1929	5,155	4,278	.....	877	1,708
March, 1928	5,299	4,236	.....	1,063	2,238
3 mo., Mar. 1929	15,949	12,357	.....	3,592	4,764
3 mo., Mar. 1928	15,701	12,942	.....	2,759	7,144
<b>British Columbia Electric Railway, Vancouver, B. C.</b>					
March, 1929	1,247,795	795,927	.....	451,868b	.....
March, 1928	1,178,175	820,523	.....	357,652b	.....
9 mo., Mar. 1929	10,532,764	7,051,875	.....	3,480,889b	.....
9 mo., Mar. 1928	10,164,687	7,163,946	.....	3,000,741b	.....
<b>Guelp Radial Railway, Guelp, Ont.</b>					
5 mo., Mar. 1929	40,348	33,181	1,152	6,015	9,264
5 mo., Mar. 1928	42,153	33,270	1,125	7,757	7,781
<b>Ontario Hydro-Electric Railways, Essex District</b>					
5 mo., Mar. 1929	542,290	384,144	1,946	156,200	9,321
5 mo., Mar. 1928	444,836	345,759	1,998	77,078	29,635
<b>Regina Municipal Railway, Regina, Sask.</b>					
April, 1929	33,947	21,492	.....	12,455	1,012
April, 1928	28,472	19,409	.....	9,063	922
4 mo., Apr. 1929	156,048	90,623	.....	65,426	19,653
4 mo., Apr. 1928	130,675	82,780	.....	47,896	7,957
<b>Saskatoon Municipal Railway, Saskatoon, Sask.</b>					
March, 1929	37,019	21,717	1,463	13,839	4,696
March, 1928	32,401	20,256	1,330	10,815	3,636
3 mo., Mar. 1929	120,181	69,748	4,742	45,692	20,458
3 mo., Mar. 1928	102,282	61,402	4,091	36,789	15,109

Italic figures indicate deficits.  
a Includes taxes. b Net operating revenue. c Balance for return on investment  
d Subject to readjustment. e Before taxes. f Before depreciation.

Table II—Condensed Financial Reports of Electric Railway Properties, 1927-1928

	Sacramento Northern Ry. Sacramento, Cal.		Georgia Power Co., Railway Division, Atlanta, Ga.		New Orleans Public Service, Inc. New Orleans, La.		United Rys. & Electric Co. Baltimore, Md.		Kansas City Public Service Co. Kansas City, Mo.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue.....	\$1,477,452	\$1,541,605	\$5,695,086	\$5,367,510	\$7,080,679	\$7,440,211	\$16,273,826	\$16,188,669	\$9,030,316	\$9,369,315
Railway operating expenses....	1,185,104	1,190,080	3,891,726	.....	5,030,732	5,128,997	10,885,708	10,796,439	6,903,306	7,223,811
Net revenue, railway oper....	\$292,348	\$351,525	\$1,803,360	.....	\$2,049,947	\$2,311,214	\$5,388,118	\$5,392,230	\$2,127,010	\$2,145,504
Net revenue, auxiliary oper....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes.....	90,570	101,619	393,871	.....	756,954	814,405	1,579,061	1,575,938	505,530	532,790
Operating income.....	\$201,778	\$249,906	\$1,409,489	.....	\$1,292,993	\$1,496,809	\$3,809,056	\$3,816,291	\$1,621,481	\$1,612,714
Non-operating income.....	61,728	59,502	.....	.....	6,320	64,231	175,041	165,656	.....	.....
Gross income.....	\$263,506	\$309,408	.....	.....	\$1,299,313	\$1,561,040	\$3,984,097	\$3,981,947	\$1,621,481	\$1,612,714
Deductions from gross income..	278,859	237,268	.....	.....	.....	.....	.....	.....	875,974	758,175
Net income.....	\$15,353	\$72,140	.....	.....	.....	.....	\$573,142	\$553,365	\$745,507	\$854,539
Operating ratio, per cent.....	80.2	77.2	68.5	.....	71.5	68.9	66.9	66.7	76.4	00.0
	Interborough Rapid Transit Co. New York, N. Y.		Seloto Valley Ry. & Pwr. Co. Columbus, Ohio		York Railways York, Pa.		Memphis Street Railway Memphis, Tenn.		Houston Electric Co. Houston, Tex.	
	1928c	1927c	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue.....	\$67,205,294	\$63,316,088	\$676,891	\$763,140	\$2,688,423	.....	\$2,922,428	\$2,900,471	\$3,343,294	\$3,069,597
Railway operating expenses....	37,712,712	35,575,666	488,941	557,452	1,510,298b	.....	1,943,520b	1,969,329b	2,059,958	1,971,540
Net revenue, railway oper....	\$29,492,582	\$27,740,422	\$187,950	\$205,688	.....	.....	.....	.....	\$1,283,336	\$1,098,057
Net revenue, auxiliary oper....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes.....	3,200,615	3,506,823	37,113	38,840	.....	.....	.....	.....	291,672	268,942
Operating income.....	\$26,291,967	\$24,233,600	\$150,837	\$166,848	\$1,178,125	.....	\$978,908	\$931,142	\$991,664	\$829,115
Non-operating income.....	297,026	257,175	.....	.....	76,519	.....	3,331	2,680	.....	.....
Gross income.....	\$26,588,993	\$24,490,775	\$150,837	\$166,848	\$1,254,643	.....	\$982,239	\$933,822	\$991,664	\$829,115
Deductions from gross income..	21,622,777	21,540,066	108,875	97,974	530,132	.....	517,551	513,293	410,701	384,951
Net income.....	\$9,362,346	\$4,968,769	\$41,962	\$68,874	\$724,511	.....	\$464,688	\$420,529	\$580,963	\$444,164
Operating ratio, per cent.....	56.1	56.2	72.2	73.4	.....	.....	.....	.....	61.6	64.2

a Final revised figures. b Includes taxes. c Years ended June 30.

ness done has increased, the expenses have gone down on some of the systems. In general this is due to greater economy in operation, since in only a few instances has the increase in revenue been due to a rise in fares.

As a result of the changes in revenues and expenses, the net revenue is higher on many of the systems. In order to save space in the tables this item is not shown, but it can be obtained by subtracting the expenses from the operating revenue. Since taxes have shown only a small change, the gross income, which is the residue after deducting taxes and adding non-operating income, is up in many instances. Out of the 31 properties for which figures are given, 25 permit a comparison of the two years. Out of these 25 the gross income for the 1929 month is higher than for the 1928 in 17 companies.

Apparently there has been an increase in fixed charges and other deductions from gross income, since in only 12 reports has there been an increase in net corporate income out of 21 companies for which comparable figures are shown.

Supplementing the annual reports published in the JOURNAL for June, page 641, reports of ten companies are given herewith. These include final figures for the United Railways & Electric Company of Baltimore, and the Kansas City Public Service Company. The complete report of the Interborough Rapid Transit Company

for the year ended June 30, 1928, which has just been released, is also abstracted. Additional reports will be published as they are received.

## Striped Painting Makes Locomotive Conspicuous

BY FARREN TIPTON  
San Diego Electric Railway  
San Diego, Cal.



Visibility of San Diego locomotive has been increased by unusual painting

## What Happens When Steel Gets Tired?

Prof. D. D. Ewing of Purdue University will tell in an interesting article appearing in the August Issue of ELECTRIC RAILWAY JOURNAL.

AFTER the passenger cars have been pulled in for the night, freight traffic is handled over the lines of the San Diego Electric Railway. For this service a Baldwin electric locomotive is used. In order to prevent accidents, the company has painted black and white stripes on the motor car, giving it a zebra-like effect. Two series of three lamps each are mounted around the cab at intervals and connected alternately to assure illumination from all sides in case one series fails. The combination of stripes and lighting make the locomotive very conspicuous.



# Midwest Association Expands Activities

Southern and central Illinois and all Iowa were taken in at St. Louis meeting. Mechanical committee formed. Papers of interest read

**E**NLARGEMENT of the territory of the Midwest Electric Railway Association to include southern and central Illinois and all of Iowa was voted at its convention held at the Chase Hotel in St. Louis on June 13-15. Among the more important systems that become members under this change are the East St. Louis & Suburban Railway and its affiliated companies and the Illinois Terminal Railroad. It also was voted to form a mechanical committee that will gather and disseminate data of interest to the mechanical departments of the member companies. A proposed merger of the association and the Midwest Claims Association has been deferred to determine what changes, if any, should be made in the constitution and by-laws if such a reorganization is effected.

Approximately 275 delegates attended the meeting, which in many particulars was the best ever held by the organization. The retiring president, F. G. Buffe, was highly complimented on his administration, as was the committee on arrangements, headed by B. W. Frauenthal.

Powell C. Groner, president of the Kansas City Public Service Company, in his address on "The Trend of Utility Regulation," ventured the prediction that eventually the theory of "prudent investment" will be adopted as the basis for determining the rate-base valuation of public utilities. "And I am not so sure that it wouldn't be best for us in the long run," he continued.

Still not definitely advocating the theory of "prudent investment" as the proper basis for fixing valuations, he then pointed out that it is almost impossible to obtain an up-to-date valuation on the reproduction-cost-new basis, since much time is consumed in arriving at costs, depreciation, etc., so that very often valuations are from six months to a year or more behind the date of the final decision. With the actual investment definitely known it is possible to fix a valuation for the present, he said.

Stanley Clarke, president of the St. Louis Public Service Company, who spoke on the subject, "Future of Urban Transportation in the Metropolitan Areas," would not venture a guess as to the actual future of transportation. However, he contended that in the future mass transportation will prove more and more necessary, and that if air transport comes into general use it will tend to centralize rather than decentralize metropolitan areas. This will mean more mass transportation. He expressed the belief that the street railway car is still far more economical in operation than is the bus. The cost of bus operation is 9.8 cents per passenger and would be 10.5 cents if the bus were handicapped with the same burdens of taxes, wages, etc., as is the street railway, according to Mr. Clarke.

Regarding the future treatment of street railways he said that apparently there are two schools of thought—one which seems to hold the view that the utility should be so harassed and handicapped as to make economical and profitable operation impossible, thus forcing public ownership of the utility, and the other holding that the utility should be permitted to go ahead earning a fair

return on its investment until such time as it shall no longer prove necessary to the public, when it shall be forced off the job.

Touching on the possibility of public ownership being forced through the process of starvation of the private company, he said, that the period of years necessary to bring about this change would witness great losses to investors in utilities and also to merchants, other industries and real estate values.

Eugene S. Hight, chief engineer of the Illinois Terminal Railroad System, in an address on "Building for the Future" touched on the proposed subway and elevated system his company plans to construct in St. Louis. The actual building of this \$5,000,000 project will get under way in the near future.

## MEANS OF INCREASING CAR SPEED

A. J. Fink, director of transportation St. Louis Public Service Company, in his talk on "Transportation Efficiency" told how more rigid mechanical care and inspection of the St. Louis street cars has within the past year increased the number of miles each car runs before being turned in for repairs about 1,100 per cent. In June of last year pull-ins were one in every 10,342 car-miles, while in April of this year the average was one in 114,872 car-miles, he said.

"Frequent and reliable service, speed and comfort are what the general public demands of street cars," he continued, and he then pointed out that in St. Louis the average speed of the cars had been increased from 9.87 m.p.h. in January, 1928, to 10.30 in May, 1929. This was accomplished by a tightening up of schedules, fewer stops and a campaign designed to educate motorists as to the street car's traffic rights. Prior to the installation of the designated stop plan on the University-Olive line the average speed was 10.4 m.p.h., including layover, and the present average is 11.34 m.p.h. Excluding the layover, the average terminal-to-terminal run is made at the rate of 12.13 m.p.h.

He also reviewed the results obtained during a period when parking of automobiles was prohibited on important thoroughfares in the city's downtown congested district. It was found the no-parking rule had speeded up the movement of street cars as much as 47 per cent in the district east of Twelfth Boulevard.

Labert St. Clair, advertising director American Electric Railway Association, spoke on the subject, "Pack Up Your Troubles." At the annual banquet, Leslie Vickers, economist of the American Electric Railway Association, was the principal speaker. Round-table conferences at which matters of mutual interest were informally discussed featured the luncheons on Wednesday and Thursday.

At the closing session the following officers were elected: President, R. J. Lockwood, assistant general manager St. Louis Public Service Company; first vice-president, C. A. Semrad, vice-president St. Joseph Railway, Light, Heat & Power Company; secretary-treasurer, J. A. Weimer, superintendent of transportation Kansas City, Clay County & St. Joseph Railway.

Executive committee: For two-year terms—J. N. Shannahan, Omaha; S. W. Greenland, St. Louis; E. A. Roehry, St. Louis; G. W. Welsh, East St. Louis; E. B. Meissner, St. Louis, and F. O. Grayson, St. Louis. For one-year terms—O. E. Turner, St. Louis and B. W. Stemmerich, St. Louis. Under a change in the by-laws all former presidents of the association become ex-officio members of the executive committee.

# Light Weight Attained



While the new Pittsburgh car resembles those built last year it weighs 27,000 lb. as compared with 36,500 lb. for the earlier model and the exit is at the center instead of the rear

**E**XTREMELY light in weight, equipped with electro-pneumatic control with pedal-operated accelerator and dynamic brakes, powered with four 50-hp. motors and designed to appeal to the riders, the latest experimental car of the Pittsburgh Railways, recently delivered by the Osgood-Bradley Car Company, represents another forward step in the development of modern cars to meet present-day needs. The car is in general similar to the two Pittsburgh experimental cars supplied by the same builder last year and described in detail in the June 2, 1928 issue of the *ELECTRIC RAILWAY JOURNAL*. The principal differences are the use of aluminum in the framing, the locating of double cross seats on one side of the rear half of the car instead of a single row of bucket seats at an angle, the substitution of a center exit door for a rear door, and modifications of the control and braking equipment. The step and floor heights, and the inside and over-all height dimensions also have been modified.

The car was built with the lightest possible car body framing construction consistent with the necessary strength and regard for manufacturing considerations. All metallic parts of the body construction and the various items of equipment have been made of aluminum wherever possible. Special aluminum alloy was used throughout the structure where special strength requirements are important, while commercial aluminum was used for the various items of interior

finish such as wainscoting, cabinets, headlining, etc., where lightness only is the desirable consideration. The Aluminum Company of America manufactured the various aluminum alloy items and standard rolled sections such as I-beams, channels, tees, etc. The company also produced numerous special sections. The floor of the car is made up of aluminum Chanarch covered with Flexolith, the safety treads at the steps being of "Alumalun."

The weight of the entire body structure including the aluminum Chanarch floor plates and the complete roof with roof canvas, but exclusive of Flexolith flooring, doors, windows, window regulators, furrings, inside finish, and all items of equipment and trimmings, is 3,900 lb. The balance of 10,100 lb. entering into the weight of the complete car body is made up principally of items of miscellaneous equipment and specialties. The trucks weigh 13,000 lb., so that the car completely equipped weighs only 27,000 lb.

The trucks at present under the car are the standard Timken No. 52 trucks of steel construction. Special trucks of the same type embodying aluminum wherever possible in their construction are now being developed by the Timken-Detroit Axle Company. With these the weight of the car will be still further reduced.

The exterior and interior of the car throughout are finished with Duco pyroxlin lacquer, a unique color scheme having been developed. The exterior of the car including side



All control equipment is encased in a cabinet



Cleveland fare box.  
 Nichols-Lintern sand traps.  
 Nichols-Lintern stop light equipment.  
 Pittsburgh Railways standard Hunter illuminated sign.  
 J. L. Howard & Company ball bearing hinges.  
 Osgood-Bradley life guard.

Four Westinghouse type 1426 motors, rated at 50 hp., are installed on the car. They are geared 4.4:1 to 26-in. wheels. The free running speed of the car on level tangent track is approximately 45 m.p.h.

The control is Westinghouse electro-pneumatic, actuated with line current, with variable automatic acceleration and dynamic braking. Air brakes also are included in the equipment. The main control is through fourteen unit switches. Twelve of these are type UM and are mounted in the platform cabinet. The other two, type



This pedal control for power and brake is mounted in a recess on the cabinet

806, are mounted beneath the car. One is the line switch and the other is the main switch in the braking circuit. The use of 300-volt motors reduces the number of switches necessary, since the fields and armatures are interconnected during dynamic braking with fewer connections than would be possible with 600-volt motors. The type M resistor is mounted beneath the car. It is divided into three parts, one for the main circuit, one permanently in the braking circuit, and the third in the braking field circuit. All of the control apparatus in the cabinet was mounted on a panel and the connections were made before it was inserted in place.

The master controls, both for acceleration and braking, are foot-actuated through two pedals. They have been designed to resemble the controls of an automobile. Variable rates of acceleration and braking may be obtained, and are approximately proportional to the distance the proper pedal is depressed, the maximum being obtained with full depression. The range is between the minimum practical values and the adhesion limit. If the braking pedal is depressed as far as possible, not only is the maximum dynamic braking rate obtained, but the air brakes are applied by means of a mechanical connection with the pedal. This permits the use of the air brake should the trolley pole come off the wire and the dynamic brakes become inoperative temporarily because the emergency switch had not been set. A latch which holds the braking pedal in the fully depressed position permits the operator to leave the car with the air brakes set. If for any reason the operator should remove his feet from both pedals suddenly the power supply would be cut off and the dynamic and air brakes

applied to bring the car to a stop. In ordinary service either pedal may be depressed alone and its motion arrested at any desired point. There is a holding position so that either acceleration or braking may be arrested at any point desired. In order to permit track switches to be thrown the brake pedal may be depressed past the dynamic to the air braking position while the car is drawing power.

The proper action of the control energy on the various switches is obtained by an air-operated sequence drum which gives twelve accelerating notches and eight dynamic braking notches. It also automatically applies the air brakes when the dynamic braking has reduced the car speed to approximately 3 m.p.h. To prevent any lag in dynamic braking while the motors are building up their fields, the braking connections place two of the fields across the line in series with a resistance. Since the fields and armatures are interconnected this excites the entire circuit and permits the braking action to start without any lag.

The reverser is of the drum type and is hand operated, being placed with its handle convenient to the operator. It has an emergency position in which dynamic braking will be obtained regardless of the direction of motion of the car or absence of power. This gives a quick and reliable means of stopping the car under practically any conditions. The ordinary control switch is omitted, since moving the reverser handle from either of the operating positions opens the control circuit.

The air brake equipment was specially designed by the Westinghouse Traction Brake Company to operate in connection with the pedal electric control.

The car body is mounted on Timken-Detroit Axle Company No. 52 worm-drive trucks with disk brakes operating directly on the armature shafts. The disk brake for each motor is provided with two sets of shoes operated by special air brake cylinders mounted directly on the trucks. One set of shoes is operated by suitable mechanism through a hand lever adjacent to the motorman.

### *The Most Complete*

## Analysis of New Car Economics

*Ever Published*

**B**ACK in 1922 the management of a comparatively small interurban property comprising 70 miles of track divided into four lines, made a complete replacement of equipment with twelve light-weight cars. The following year, all of the cars on a small city system comprising 17 miles of track in a city of approximately 60,000 population were replaced with 27 light-weight one-man cars. Automobile competition has made serious inroads on the traffic of the interurban. The city system has held its own. Under these conditions the new cars on both properties have been operated long enough so that the *complete* record of the results is available. Was the investment in new cars justified? Look for this article by the management of these properties, in the August number of *ELECTRIC RAILWAY JOURNAL*. It presents the most interesting, complete and authoritative analysis of new car economics ever published.

## New Cars



# PAY FOR THEMSELVES

## on Many Properties

By

**MORRIS BUCK**  
Engineering Editor  
*Electric Railway Journal*

**P**RACTICALLY every new car that has been purchased in the past few years is capable of making faster schedules than the older ones on the same property. The motors are more powerful in proportion to the weight and, taking less power from the line, the loss of voltage in the distribution system is less. Brakes are better designed. The new cars can be brought up to speed more quickly and can be stopped more quickly. Moreover, attention to design of doors, steps, and aisles has made it possible to reduce the time for passenger interchange. Unfortunately, the roads using the new cars have not obtained the full advantage in schedules. Those which have given actual figures in the new car survey by *ELECTRIC RAILWAY JOURNAL* have shown increases in speed up to 6 per cent, which can be credited directly to the new equipment. Depending on conditions such as length of line, headway, number of stops and length of run in the congested section, modern cars, when segregated on definite routes, should make possible increases in schedule speed of 10 to 20 per cent above those common on the average city road. This in itself will make a material reduction in the cost of service, both in the total and on a car-mile basis. The majority of the expenses vary but little as the speed is increased, so that the additional car mileage that can be obtained will require less investment in equipment and in the facilities needed to care for it.

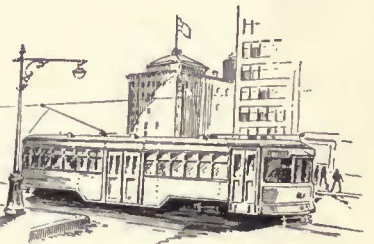
As to the maintenance expenses, few properties keep separate records for the various classes of cars. Some companies that have made an accurate separation show remarkable savings in the maintenance of new cars as against the other rolling stock. The five-year average

**Definite savings of \$1,268 in equipment maintenance and power can be made with new cars. Additional savings are certain in maintenance of way and in transportation. Speeding up the service not only reduces costs but makes the ride more attractive and so increases revenue.**

of equipment costs in Birmingham, Ala., for new cars is 1.15 cents per car-mile less than the system average, even though the average age of all cars is fairly low. In Detroit, the Department of Street Railways shows that maintenance of new 52-seat Peter Witt cars is 1.04 cents less than for equivalent seating capacity in older double-truck cars that they replace. Over a period of five years the Brooklyn City Railroad finds the cost of maintaining new cars is 2.5 cents less than for the old ones. Chattanooga

shows a reduction of 1 cent per car-mile as compared with the general system average. Grand Rapids has found that over a three-year period, an average reduction in maintenance cost for new cars of 2.49 cents. From the figures analyzed in this study, it is quite conservative to state that on many properties that still are operating heavy equipment of ancient vintage—patching, repairing and rebuilding as best they can, a saving of 2 cents per car-mile in equipment maintenance alone may be expected to result from the purchase of new cars. Consequently, if the new equipment is used for the base schedules, operating approximately 40,000 miles per year, the saving in maintenance alone amounts to \$800 per car per year.

Replacement of a car weighing 40,000 lb. with one weighing 24,000 lb. will reduce the total load, including 40 passengers, from 46,000 lb. to 31,000 lb., or one-third. Tests made at various times have shown that the propulsion energy used is practically in proportion to weight, other things being equal. Without making allowance for higher efficiency of the new equipment,



this energy saving is reflected directly in power costs. In 1928, the average cost in the power account was 4.38 cents per car-mile for all the companies reporting to the American Electric Railway Association. Deducting 20 per cent for car heating and lighting and for shop and miscellaneous uses, the industry average cost for propulsion was 3.5 cents per car-mile. A saving of one-third of this, or in proportion to the weight alone, is 1.17 cents. For an annual mileage of 40,000 the saving is \$468 per car.

Without making allowance for other savings which are bound to come in connection with the replacement of old cars with new, the definite savings of \$800 for equipment maintenance and \$468 for power can be credited to new equipment. The total of \$1,268 represents 8.5 per cent on an investment of \$15,000 in a new car. While this is in itself sufficient to justify the replacement of an old car, no account has been taken of the ability of the new equipment to make a greater daily mileage, which will be obtainable both on account of the higher speed possible and the greater reliability and smaller shop time needed. Neither does it make any allowance for the lower transportation cost due to the higher schedule speed possible. The reduction in the number of cars which are needed to give a specified service causes a decrease in the capital invested, reducing the interest and depreciation charges, although these items do not lower the operating expense.

When the opportunities for speeding up the system, saving in track maintenance, and stimulation of riding are considered, no management can afford to overlook the possibilities of new equipment.

Although the properties included in the survey were selected solely on the basis of the record for purchases of new cars during the past few years, without regard to location or management, it is significant that every winner of the Charles A. Coffin award since it was first offered in 1923 is included in the list. On all of these properties the financial results have been good. All but one of them, which was the winner in one of the early years of the contest, have reduced the operating ratio. The one company has been able to maintain an operating ratio between 60.5 and 64 per cent throughout the six years, or more than 12 points below the average for the country.

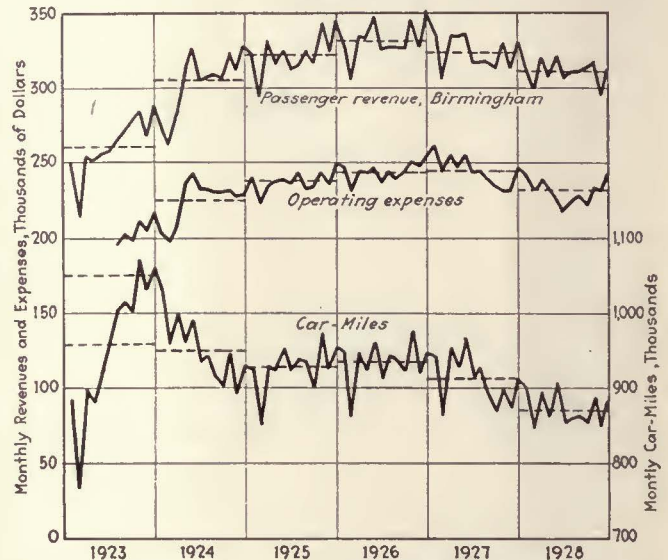
#### MORE RESULTS FROM INDIVIDUAL PROPERTIES SHOW DEFINITE BENEFITS

The summaries of information published in this and the preceding articles on the subject of new cars give briefly the results that have been obtained by the properties included in this survey. They all report definite benefits from the new equipment, greater or less according to the proportion of new cars and the effectiveness with which they have been placed. Numerous other properties have obtained advantages from the use of new equipment equal in magnitude, although on many of them it has not been possible to segregate the figures to show the relative revenues and expenses of the various classes of equipment.

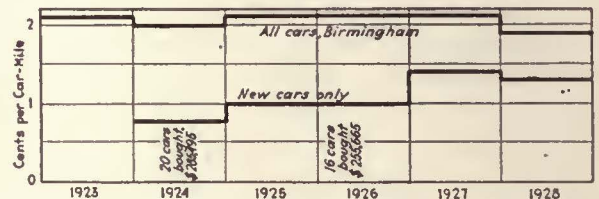
*Twin City Rapid Transit Company, Minneapolis-St. Paul, Minn.*—This company has built 35 cars of an entirely new design, and has modernized more than half of the 1,000 cars already on the system. There has been a good psychological effect in aiding public relationship, although it has not been possible to see any effect on the gross revenue. It is the belief of this company that good riding qualities and pleasing appear-

ance are of value, but that it is even more important to have sufficient motive power and an adequate braking system to insure a material increase in schedule speeds. This will bring substantial reduction in labor costs and the total number of cars operated, and will minimize as well the ever-present criticism by patrons of a "dragging ride."

*Birmingham Electric Company, Birmingham, Ala.*—This company purchased twenty cars in 1924 and sixteen more in 1926. Although a rerouting of the system in 1927 made possible a considerable reduction in system car-miles, the new cars were maintained at lower costs



Passenger revenues have held up well in Birmingham in the face of a severe industrial depression, while operating expenses have been reduced.



Maintenance costs in Birmingham have been consistently less with the new cars as compared with the average of all equipment

than other equipment. The following maintenance expenditures for bodies, trucks and electrical equipment from 1923 to 1928, inclusive, show the advantages of the new cars:

#### MAINTENANCE COSTS OF CAR BODIES, TRUCKS AND ELECTRICAL EQUIPMENT, BIRMINGHAM ELECTRIC COMPANY

	Cents Per Car-Mile					
	1923	1924	1925	1926	1927	1928
New cars.....	1.9	1.7	1.5	1.4	1.3	1.3
All cars.....	2.1	2.0	2.1	2.1	2.1	1.9

The maintenance cost per car-mile for the system in 1928 was reduced in part because of the influence of the materially lower cost for repairing the new cars.

Improved financial results were obtained in Birmingham despite a severe industrial depression which caused a falling off in traffic. Increased operation of one-man cars has tended to counteract an increase in wages.

*Greenfield & Montague Transportation Area, Greenfield, Mass.*—Under public ownership this street railway serves the communities of Greenfield, Montague City

and Turners Falls, all in the northern part of the state. Of eight cars on the property two were bought in 1927 at a cost of \$27,834. These new cars have given 65 per cent of the service on the main line since May 1, 1927. They replaced older and much heavier cars without any change in schedule speed, rates of fare or routing. In November, 1927, the flood which overwhelmed large areas in the Connecticut Valley made it necessary to co-ordinate the car service with a bus for fifteen days, which reduced the passenger revenue and increased expenses. In 1928 the discontinuance of a local freight yard caused the loss of considerable business. However, the passenger receipts in 1926 were 10.01 per cent more than in 1925, in 1927 were 8.56 per cent more, and in 1928 were 1.82 per cent more. The management cannot say that the new cars have brought any new revenue, but they may have checked a decline in revenues. The patrons are very much pleased with them.

The new cars show a decided decrease in maintenance cost from the old cars. The costs of car maintenance, not including depreciation, were 4.61 cents per car-mile in 1925, 4.84 cents in 1926, 3.94 cents in 1927 and 3.27 per cent in 1928. A 6-ton difference in weights of the new cars as compared with the old cars under test showed a 15 per cent saving in energy at the car. At the substation the alternating current input was 4.45 kw.-hr. per car-mile in 1926, the last full year with the old cars and 3.97 kw.-hr. per car-mile in 1928, the first full year with the new cars.

#### MODERNIZATION BRINGS GAINS IN TENNESSEE

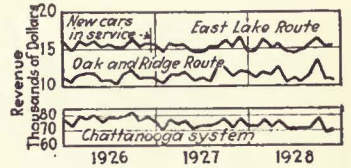
Four Tennessee properties have shown remarkable results from modernization in the past few years. These are the systems at Chattanooga, Knoxville, Memphis and Nashville. Each has purchased new cars in the past few years, although all have been consistent purchasers of equipment over a long period. In 1926 new cars were delivered in Chattanooga, Memphis, and Nashville, while the new cars were received in Knoxville in the following year. The latter property, however, had purchased 44 cars in 1923-1925. In order to make a comparison of the operating results on these four systems, the revenues and expenses have been combined for the years 1926-1928 as against 1923-1925, both inclusive. While there was a slight recession in gross revenue, amounting in the aggregate to \$582,350, or 2.7 per cent, on the four properties for a period of three years, there was a reduction of \$1,064,845, or 7.3 per cent, in operating expenses in the same period. This was accomplished despite an increase in car-miles operated of almost 7 per cent and an increase in platform wages of 2 cents per hour on all the properties. In fact, the net revenue was 0.3 cent per car-mile more in the latter period, even with the extra car mileage run. The gross

#### SUMMARY OF RESULTS ON FOUR TENNESSEE PROPERTIES

City	Cars Bought	Year	Total Cost
Chattanooga.....	10	1926	\$146,350
Knoxville.....	12	1927	175,000
Memphis.....	32	1926	500,000
Nashville.....	10	1926	146,350
A total of.....	64 cars		\$967,700
<b>Operating results:</b>			
Railway operating revenue.....	1926-7-8	1923-4-5	Difference
	\$20,793,837	\$21,376,187	\$582,350 less
Railway operating expenses.....	13,490,384	14,555,229	1,064,845 less
Net revenue from railway operation	\$7,303,453	\$6,820,958	\$482,495 more
Car-miles operated.....	56,391,990	52,752,989	3,639,001 more
<b>Cents per car-mile:</b>			
Railway operating revenue.....	37.6	40.5	2.9 less
Railway operating expenses.....	24.4	27.6	3.2 less
Net revenue from railway operation	13.2	12.9	0.3 more

saving of \$1,064,845 in three years is more than the amount spent for the cars, which was approximately \$967,700 for the four properties. While not all of the saving can be credited to the new cars, the managements are agreed that they have been a material factor in improving conditions, and that without them the saving would not have been possible.

*Tennessee Electric Power Company, Chattanooga, Tenn.*—In October, 1926, this company purchased ten modern cars at a cost of \$146,350. At the beginning of 1927 they were placed in service on two lines, the East Lake and the Oak and Ridge, without changes in head ways, schedule speeds, rates of fare or method of operation. While revenues in Chattanooga have fallen off in the past few years the lines with new cars showed up much better than the remainder of the system, as may be seen from the following comparison:



Two lines in Chattanooga with new cars show better earnings than the rest of the system.

#### REVENUES ON CHATTANOOGA RAILWAY LINES, TENNESSEE ELECTRIC POWER COMPANY

Year	System	East Lake Route	Oak and Ridge Route	Remainder of System
		Per Cent	Per Cent	Per Cent
1926	\$934,136	\$188,381 20.2	\$135,060 14.4	\$610,695 65.4
1927	890,561	185,981 20.9	136,521 15.3	568,059 63.8
1928	866,578	183,609 21.2	138,166 15.9	544,803 62.6

The car-miles operated on these two lines, as well as on the remainder of the system, have changed less than 1 per cent during the three-year period. The difference in revenue is, therefore, attributable almost entirely to the new cars.

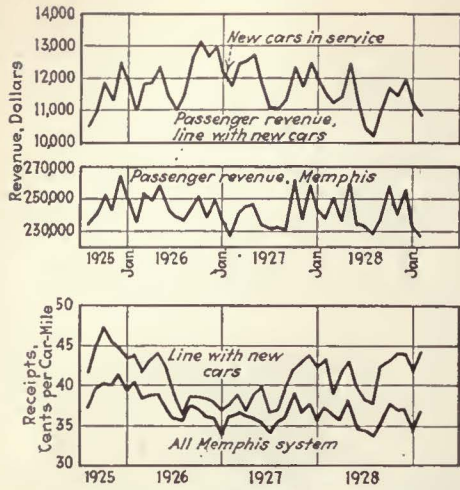
Operating expenses have taken a sharp drop from \$587,757 in 1926 to \$571,165 in 1927, and again to \$558,244 in 1928. A considerable portion of this is due to the saving in maintenance expense with the new cars, which for the two years have averaged 1.22 cents per car-mile, while the costs for all cars were 3.12 cents per car-mile in 1926, 3.19 cents in 1927 and 3.25 cents in 1928. The ten cars, naturally, are not a great enough proportion of the 74 cars in daily service to make a material difference, since the cost of maintaining the old cars is increasing each year.

According to the company the new cars have stimulated riding and have improved public relations.

*Nashville Railway & Light Company, Nashville, Tenn.*—In October, 1927, new cars of an improved type were put in service on one of the heaviest two-man lines. While there was no increase in revenue, the improved feature of the new cars as to comfort and convenience enabled the company to change to one-man operation, making a considerable saving. At the time the substitution was made the company staged a "Pageant of Street Railway Progress." More people viewed this parade than any previous event of the kind in Nashville.

The company believes that the new cars have improved public relations materially.

*Memphis Street Railway, Memphis, Tenn.*—This company purchased 32 new cars in 1926 at a cost of approximately \$500,000, adding them to 199 already in service and retiring eleven, leaving 220 active cars on the system. The new cars were placed on the Peabody



One Memphis line that has been equipped with new cars is doing better than the average, both in total and on a car-mile basis

Records of maintenance costs are not kept separately for the various types of cars. They were 1.66 cents in 1925, 1.55 cents in 1926, 1.61 cents in 1927 and 1.80 cents in 1928. The low cost in 1926 was due to rebuilding 40 of the older cars into one-man cars.

Public relations unquestionably improved with the installation of the new equipment. There have been no franchise or fare changes during the period since the new cars have been in service, so no test has been made of their value in this respect.

#### LARGE SAVINGS IN MASSACHUSETTS

*Springfield Street Railway, Springfield, Mass.*—Fifty new cars were purchased at a cost of \$786,227 and placed in service in 1927 on four lines, with only minor changes in headways and speeds. Routing and fares have remained unaltered. The revenues on these lines held up better if anything than those for the remainder of the system during the general depression which has existed in the city during the past two years. From 1926 to 1928 there was a reduction of \$595,205 in the cost of operation. While accounts are not kept separately, the cost of maintaining equipment dropped from 4.41 cents to 3.66 cents per car-mile. Part of this reduction of 0.75 cent is due to the use of new cars for one-fifth of the total service.

The company feels that much of the improvement of public relations in the community is due to the expenditure for new equipment.

#### RESULTS WITH NEW CARS, SPRINGFIELD STREET RAILWAY

Year	System Total	Annual Passenger Revenue		Lines without New Cars	
		Lines with New Cars Amount	Per Cent	Amount	Per Cent
1926.....	\$2,885,631*	\$607,674*	21.07	\$2,277,957	78.93
1927.....	2,585,359	551,846	21.34	2,033,513	78.66
1928.....	2,398,270	551,126	23.0	1,847,144	77.0
Annual Car-Miles					
1926.....	6,488,453*	1,184,689*	18.26	5,303,764	81.74
1927.....	6,064,766	1,172,645	19.33	4,892,121	80.67
1928.....	5,668,353	1,195,410	21.08	4,472,943	78.92
Cents per Car-Mile					
1926.....	44.7*	51.21*	.....	42.94	.....
1927.....	42.7	47.07	.....	41.57	.....
1928.....	42.2	46.10	.....	41.29	.....
System Operating Expenses					
1926.....	\$2,475,889*	.....	.....	.....	.....
1927.....	2,190,511	.....	.....	.....	.....
1928.....	1,880,684	.....	.....	.....	.....

\*Before new cars were installed.

line in August, 1926, and the revenue showed an immediate increase, which continued during 1927. In 1928, when the revenue for the entire system was off, the line with new cars showed comparatively less loss. The car mileage has been varied from time to time to meet the demands, but there has been no radical adjustment.

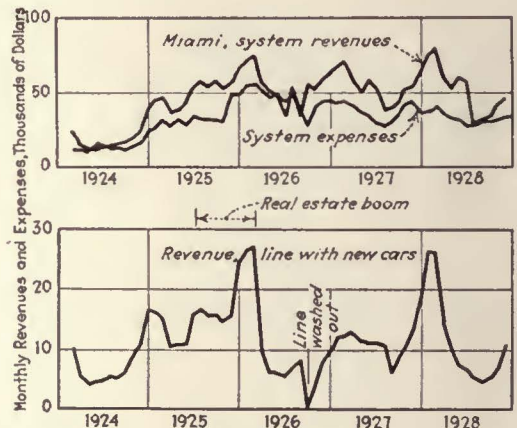
*Worcester Consolidated Street Railway, Worcester, Mass.*—As in Springfield, 50 cars were bought in 1927 at a cost of \$787,679 and placed on four routes. Schedules were unchanged. The revenue has remained practically constant, having a reduction in 1928 of 5.6 per cent from 1926, whereas the lines without new equipment have dropped off 17.1 per cent, or more than three times as much. While costs are not segregated, there has been a reduction of \$816,913 in the total from 1926 to 1928. Equipment costs have gone down from 5.75 cents per car-mile to 3.75 cents in the two years with the modern equipment, making about 22 per cent of the total. As in Springfield, the new cars, representing a very vital part of the rehabilitation program which the company is putting through, have improved public relations.

#### RESULTS WITH NEW CARS, WORCESTER CONSOLIDATED STREET RAILWAY

Year	Annual Passenger Revenue			Lines without New Cars	
	System Total	Lines with New Cars Amount	Per Cent	Amount	Per Cent
1926.....	\$2,922,099*	\$781,651*	26.74	\$2,140,448	73.26
1927.....	2,685,857	763,476	28.42	1,922,381	71.58
1928.....	2,512,280	737,944	29.37	1,774,336	70.63
Annual Car-Miles					
1926.....	6,072,892*	1,300,754*	21.42	4,772,138	78.68
1927.....	5,446,097	1,282,179	23.54	4,163,918	76.46
1928.....	4,953,359	1,282,500	25.89	3,670,859	74.11
Cents per Car-Mile					
1926.....	48.11*	60.09*	.....	44.86	.....
1927.....	49.31	59.54	.....	46.17	.....
1928.....	50.72	57.54	.....	48.34	.....
System Operating Expenses					
1926.....	\$2,729,220*	.....	.....	.....	.....
1927.....	2,353,880	.....	.....	.....	.....
1928.....	1,912,307	.....	.....	.....	.....

\*Before new cars were installed.

*Miami Beach Railway, Miami Beach, Fla.*—This property has been affected in the last few years by the land boom in the city. The great increase in business in the winter of 1925-1926 prompted the purchase of twelve new cars, which were placed on one route. In addition twenty new cars were taken over from the Coral Gables Corporation.



In Miami, Fla., one route with new cars is doing as well now as it did during the real-estate boom in 1925-1926

The new cars began service in January, 1926. The revenues went up immediately from \$16,900 in December to \$24,600 in January, with further increases in February and March. With the collapse of the boom the riding fell off sharply. There was a further setback in October, 1926, when the hurricane washed the line off the causeway into Biscayne Bay. Hence the receipts for October and November were far below normal. In



order to handle the traffic the line was double-tracked in July, 1927, and the headway was changed from ten and twenty minutes to five and ten minutes, the schedule speed being increased from 9.8 to 16.6 m.p.h.

The cost of car maintenance in 1924 and 1925 was 2 cents per car-mile. In 1926, when it was necessary to use all available equipment on account of the boom, and when repairs were abnormal as a result of the hurricane, the cost went up to 4.1 cents. In 1927, however, it fell to 2.6 cents and in 1928 remained at 2.8 cents. The new cars, of course, are of greater capacity than many of the single-truck cars in former use on the property.

Public relations have improved on the whole as the new cars are large and roomy, with ample motor equipment. The new cars have been so popular that the patrons of some of the other lines on which there is less riding have requested the new type cars.

**Wheeling Traction Company, Wheeling, W. Va.**—This road purchased a total of 23 new cars in 1924, at a cost of \$322,432. These have been in service ever since, carrying about one-third of the total traffic. There has been a marked improvement in public relations, notably evidenced by the passage of many better new franchises. The progressive attitude of the management in the rehabilitation of the property has been largely responsible for this result.

**Wheeling Public Service Company, Wheeling, W. Va.**—Fifteen new cars were placed in service on this system in January, 1927. For approximately six months the gross revenue showed an increase of 2.5 per cent. Afterward, owing to industrial conditions, the revenue fell off and is not yet up to normal. The new cars were designed for one-man service, making a saving of about 30 per cent in conducting transportation. The maintenance of equipment cost compared with that of cars which had been in service for fifteen to twenty years is estimated by the management at about 25 per cent less. Taken as a whole, the costs for the year show a decrease of about 27 per cent. Not all of this can be attributed to the new cars, as considerable construction work in the way and structures department is now resulting in a saving.

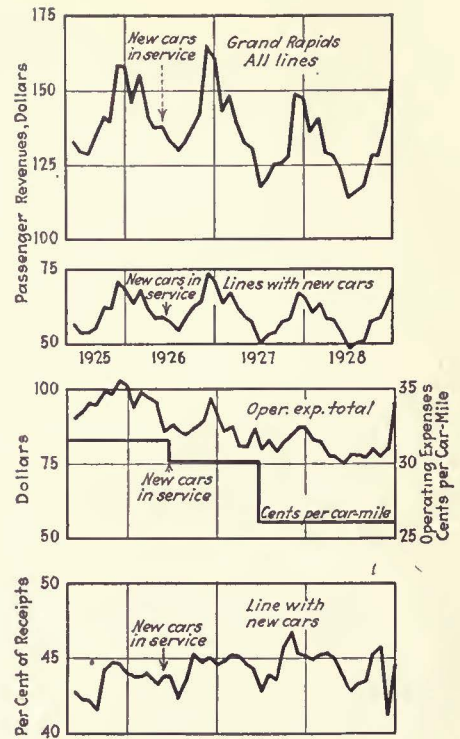
The public relations have improved with the new equipment. It is possible to give better service with fewer delays, and this naturally creates a better feeling on the part of the riding public.

**Brooklyn City Railroad, Brooklyn, N. Y.**—New cars have permitted this company to speed up its schedules on all lines where they have been installed, reducing the duration of the stop from an average of 8.2 seconds to an average of 6 seconds, and have done their part in reducing accidents of all kinds. On lines where other conditions such as the opening of subways have not complicated the situation they have materially reduced the cost of maintenance. Over a period of approximately five years this reduction has been 2.5 cents per car-mile.

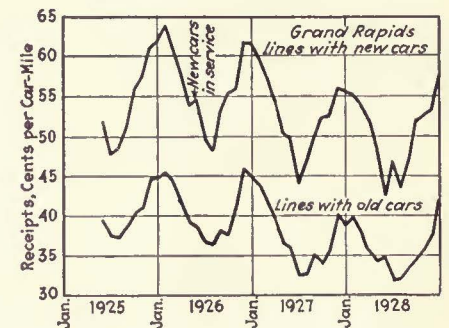
Revision of some surface lines on account of the opening of new subway routes and the addition of express service to others has resulted in a reduction in gross revenue. The net, however, has been about the same since the installation of the new cars, despite the increases of wages of trainmen and shopmen. The economies are attributed to the new cars. In the opinion of the management they have had a great deal to do with creating more favorable relations, both with the public and with the employees. On the whole there is no question but that their purchase has been a wise investment.

**Grand Rapids Railroad, Grand Rapids, Mich.**—Fol-

lowing the experimental installation of three cars in 1925 in an effort to determine what features were of greatest benefit, this company bought 27 new cars in 1926 at a cost of \$359,544. These cars were placed in service on two lines. There were no material changes in headways, speed, fare or routing, although two-man operation was replaced by one-man operation. The immediate effect of the new cars was an increase of revenue as compared with the year before. For the first twelve months the lines with the new cars showed an increase of \$15,448, while the lines using the old cars showed a decrease of \$15,956. The new cars thus were able to keep the system revenue practically up to the level of the year before, although they only produced 36.8 per cent of the car-miles. Although in the last two years revenue has fallen off, principally on



Two Grand Rapids lines with new cars are bringing in a higher proportion of the gross revenue than they did in the old days, while the operating expenses, both total and in cents per car-mile, are much less. Receipts per car-mile are shown below in comparison with the rest of the system



RESULTS WITH NEW CARS, GRAND RAPIDS RAILROAD

	Before	—After Installation of New Cars—		
	New Cars June-May 1925-1926	June-May 1926-1927	June-May 1927-1928	June-January 1928-1929*
Passenger receipts:				
Routes with new cars...	\$743,418	\$758,865	\$709,426	\$453,857
Routes without new cars	967,215	951,261	873,428	569,403
Sys' m total.....	\$1,710,633	\$1,710,126	\$1,582,854	\$1,023,260
Per cent of total receipts, routes with new cars...	43.3	44.3	44.9	44.3
Car-miles run:				
Routes with new cars...	1,327,147	1,373,577	1,378,239	916,270
Routes without new cars	2,350,385	2,373,454	2,415,452	1,613,066
System total.....	3,677,532	3,747,031	3,793,691	2,529,336
Per cent of car-miles, routes with new cars..	36.1	36.8	36.4	36.2
Earnings, cents per car-mile:				
Routes with new cars...	56.0	55.1	51.4	49.5
Routes without new cars	41.1	40.2	36.2	35.1
System average.....	46.6	45.7	41.7	40.5
Operating expenses:				
Total.....	\$1,163,691	\$1,048,740	\$986,430	\$663,406
Per car-mile, cents.....	31.7	30.2	26.1	26.1

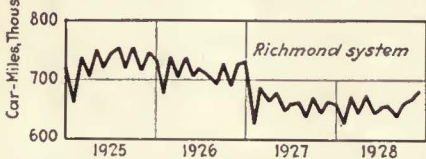
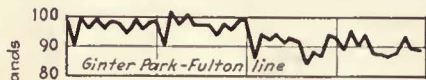
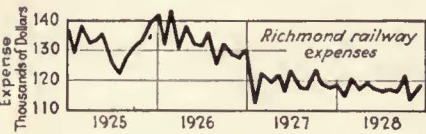
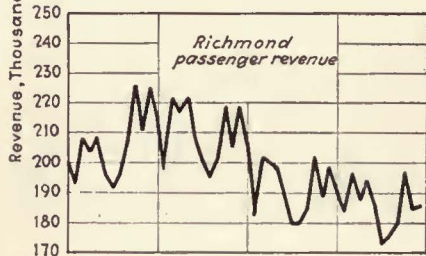
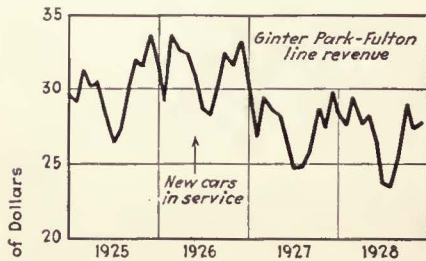
\*Eight months only.

account of unfavorable industrial conditions in the city, the management contends the decrease would have been even greater had it not been for the modern equipment.

Maintenance costs of the new cars have been very low, as may be seen from the following table:

ANNUAL COSTS OF CAR MAINTENANCE IN GRAND RAPIDS

	Cents Per Car-Mile	
	New Cars	All Cars
1925.....	0.75	4.79
1926.....	0.75	4.24
1927.....	0.99	3.16
1928.....	0.95	2.80



The Ginter Park-Fulton lines in Richmond, Va., with its new cars, has done much better than the average of the system in revenue. The expenses of the system have been reduced sharply in the past two years

than for the system as a whole. While the headways, routing and fares have remained substantially the same there has been a slight saving in car-miles during 1928 on the line. There also has been an increase in speed, from 9.21 m.p.h. to 9.31 m.p.h. While exact data are not available for maintenance cost on the new equipment the company estimates a saving of 1 cent per car-mile with the light-weight double-truck cars as compared with heavy equipment. The total car maintenance for the system has been reduced year by year as follows: In 1925 it was 4.47 cents, in 1926, 4.12 cents, in 1927, 4.0 cents and in 1928, 3.87 cents.

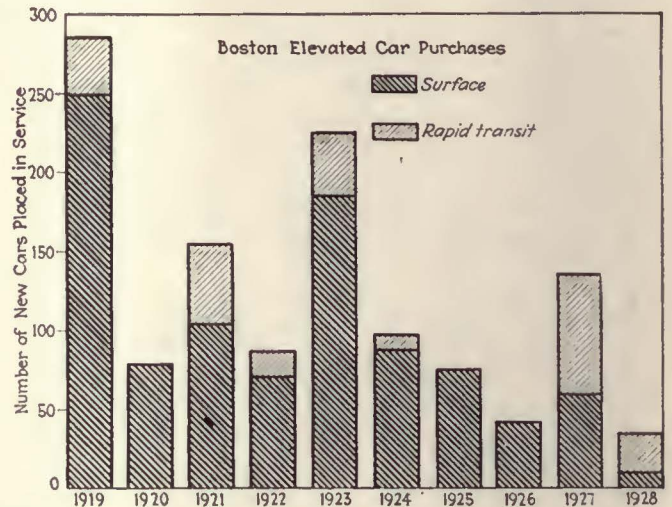
The new cars have been of considerable value in fostering good public relations in that section of the city served by them.

*Virginia Electric & Power Company, Richmond, Va.*—In June, 1926, fifteen new cars were purchased at an approximate cost of \$216,000 and placed in service on the Ginter Park - Fulton line. It is rather difficult to determine the effect of the cars on revenues, since there was a rather complete rerouting and co-ordination of rail and bus service in January, 1927. The line also was paralleled for approximately 0.9 mile by a bus line which was started in January, 1927. This took away considerable revenue.

The earnings on this line have held up proportionately higher

*Arkansas Power & Light Company, Little Rock.*—Thirty new one-man cars were purchased in 1926 as part of a modernization program. Immediately afterward the company changed over all of its cars for one-man service. It was found possible not only to hold the schedule speed, but to increase it slightly with the advent of the one-man service, while the accidents were reduced materially.

*Boston Elevated Railway, Boston, Mass.*—There is no comparison between the modern equipment on this system today and that in 1918. During the past ten years this company has spent \$19,000,000 for new cars and buses. In this time there have been placed in service 906 new surface cars of modern type, 165 steel elevated and tunnel cars, 95 Cambridge Subway-Dorchester Tunnel cars, 48 East Boston Tunnel cars and about 300 buses. The company has retired 1,476 out-of-date cars, and 72 of the new cars have been sold or destroyed by fire. With fewer cars in service, the number of seats furnished has been increased due to the larger capacity of the modern cars and to more frequent headways, in part made possible by the use of one-man cars. The new cars have wider doors and lower steps, thus serving convenience and reducing accidents.



Consistent purchases of cars, both for surface and for rapid transit lines, have marked the program of the Boston Elevated Railway during the past ten years

Of course the substitution of modern cars for old has resulted in substantial economies. Their use is, however, only one of many changes made during the ten-year period, and it is not possible to allocate economies in dollars to the modern equipment.

Purchases of new cars by years are shown in the accompanying diagram. A consistent program has called for additions every year. With the adoption of public control an adequate depreciation fund has been set aside, amounting to between \$2,000,000 and \$3,000,000 per year. This makes it possible to provide for future re-

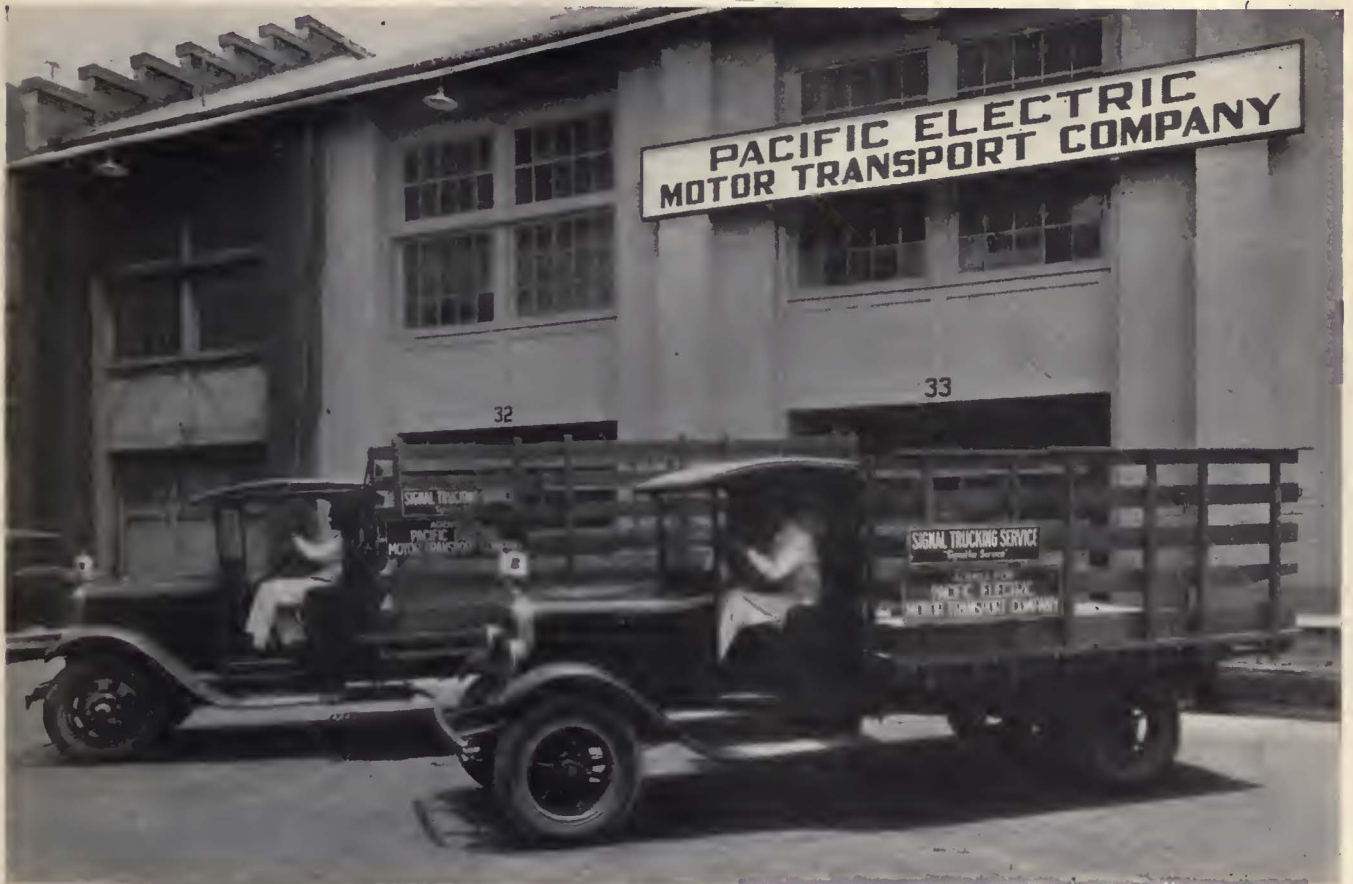
newals. An accompanying table shows how the new cars have been put to good use. The box cars, articulated and earlier types of semi-convertible cars which previously made up the surface rolling stock have virtually been retired except for emergency duty.

SERVICE WITH VARIOUS EQUIPMENT, 1918 AND 1928, BOSTON ELEVATED RAILWAY		
	Per Cent of Total	
	1918	1928
Modern cars.....	7.1	49.4
Semi-modern cars....	19.4	10.1
Obsolete cars.....	46.2	29.1
Rapid transit.....	25.0	1.0
Foreign cars.....	2.3	1.0
Buses.....	.....	10.4

# Pacific Electric Expands

## Pick-Up and Delivery Service

Co-ordinated rail and truck freight service, established by means of contract arrangement with independent truckmen, meets demands in satisfactory manner



Independent truck owners are glad to accept contracts with Pacific Electric Motor Transport Company

**T**O GIVE better service to the shipper and at the same time meet the inroads of motor truck competition, the Pacific Electric Railway, through a separately organized and operated subsidiary, the Pacific Electric Motor Transport Company, last March inaugurated a store door, freight pick-up and delivery service. The Transport Company publishes rates from store door at point of origin to store door at point of destination. It issues a single through billing from and to both points and undertakes the performance of the entire service. At originating points the Transport Company's trucks pick

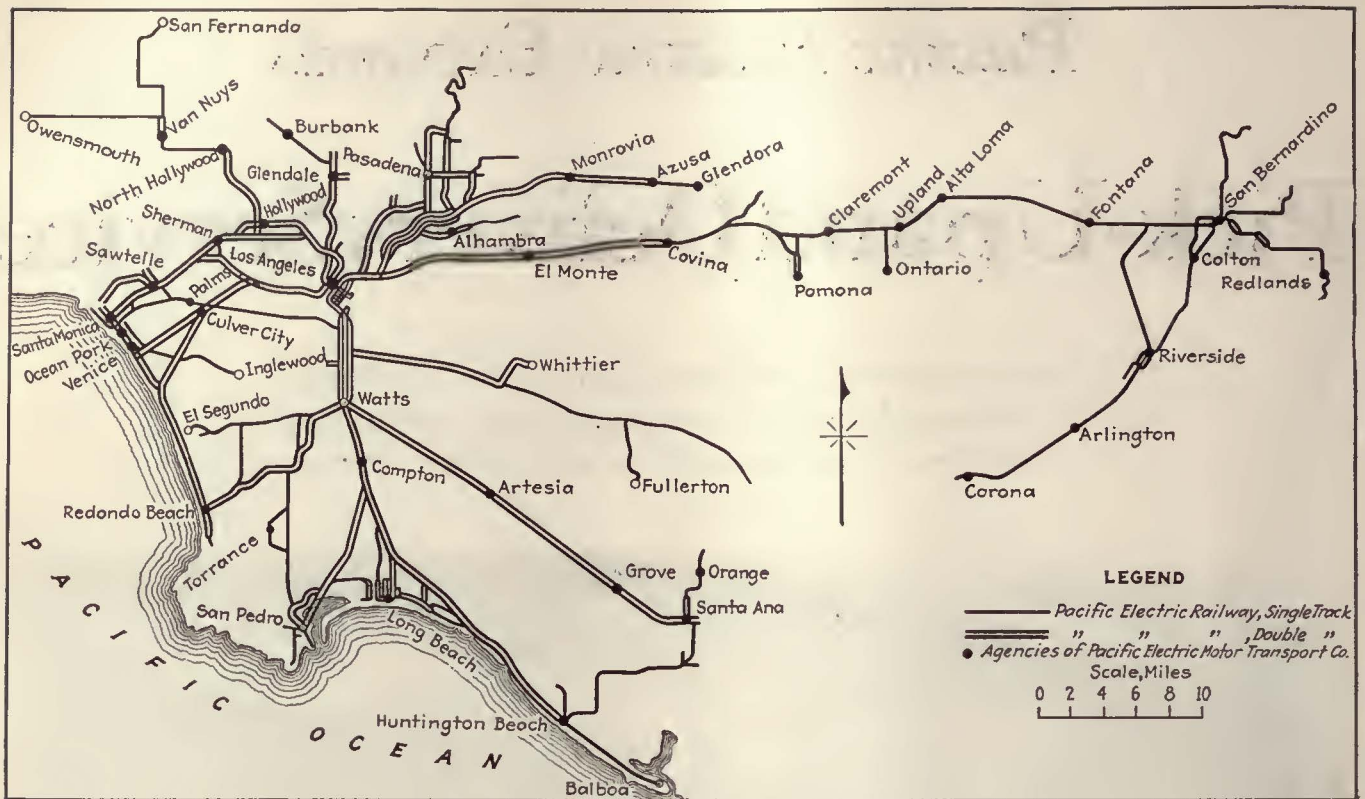
By

**PAUL T. PORTER**

Editor Bureau of News, Pacific Electric Railway  
Los Angeles, Cal.

up shipments at the merchant's store door and haul them to the station where they are loaded on cars of the Pacific Electric Railway and hauled by rail to the station of destination. At such destination station the shipments are transferred again from the rail cars to the motor trucks and delivery is made to the store door of the consignee.

In addition to store-door to store-door delivery, the tariff of the Transport Company in some instances includes rates from or to the station; that is, from the station at originating point to store door at point of destination; or from store door at point of origin to



Map of territory served by Pacific Electric Motor Transport Company

station at point of destination. The object of these alternative rates is to enable the Transport Company to render service similar to that supplied by private truck carriers. In no instance does the Transport Company publish station-to-station rates. The contract of the latter company with the Pacific Electric Railway provides for the new company to make joint use of the railway's freight stations and station employees, the Transport Company participating in payment of salaries to such employees and paying rent for the use of facilities employed.

A combination waybill and expense bill is used, the complete document being made out by the agent at the forwarding point. An outstanding advantage of this practice is that the expense bill is ready to go with the truck driver who makes delivery at door of consignee. The plan of operation also provides a c.o.d. service for the shipper, the truck driver making the collection. In the case of regular customers, whose financial status is unquestioned, the Transport Company's agent makes collection for services rendered.

In recognition of the fact that the C.O.D. shipper is pleased with the quick return of collections for merchandise so shipped, the Transport Company management conceived and perfected a plan whereby such collections are paid over to the shipper within from 24 to 36 hours after pick-up of the shipment. This feature of the service has been commended most highly by many of the shippers.

Use of the rail car for the line haul between origin and destination points is simply an operating convenience, and so far as the shipper and receiver are concerned, the railroad does not enter into the performance of the service contract. The rail service is carried out by the railroad for the Transport Company under a private contract. Under the plan of operation now in effect the Pacific Electric Motor Transport Company has not found it expedient to purchase its own motor trucks,

contracts to date having been made with local truck operators within the towns or districts being served. Sensing the possibilities for increased business, truck operators have been quick to enter into contracts. The large tonnage which promises to develop has also been an incentive to truck owners to seek a contract arrangement with the new company. Rates of the new company are not gaged or based upon existing rail rates between the same points. Necessarily, they are designed to meet on common ground motor truck carriers operating in the same territory, and while the Transport Company's rates are in some instances the same as station-to-station rail rates, in most cases they are higher.

The large number of freight trains operated by the Pacific Electric Railway makes possible a one-day delivery. Shippers are urged to notify of pick-up not later than 3 p.m. and when this is done guarantee of delivery is made for early the following morning. Failure to notify of pick-up by 3 p.m. does not necessarily imply that a truck will not call the same afternoon and accomplish delivery the next morning, and arrangements have been made whereby shipments, picked up as late as 5:30 p.m., have been delivered early the following morning. Many shippers find it necessary to keep their floor space clear and insist that shipments be taken as soon as they are ready. To meet this condition contracts with truck operators stipulate that they shall make pick-up within two hours after being notified to call.

Operators of the truck fleets have shown both a willingness and even desire to obtain contracts in the various cities where the pick-up and delivery service has been put into operation. For the most part they look upon a tie-up with the new Transport Company as a medium for increasing their tonnage and providing business that will permit the maximum use of their equipment. In not a single instance to date has a truck owner abrogated his contract. What effect the new concern will have upon long-distance hauling has not yet

been determined, but the truck fleet owners evidently feel no alarm, due to the fact that much of their business is of a character that cannot be duplicated or performed by the Transport Company.

The ultimate success of the undertaking cannot be gaged until the operation shall have been continued for a number of months. However, since the service was inaugurated on March 11, each month has witnessed a gratifying increase in the tonnage handled, and the Transport Company's management has expressed itself as being enthusiastic over the reception accorded the service of the new organization.

While tonnage increases have not been made public, evidence that the service has met a receptive welcome among shippers is reflected in the fact that on June 1 twenty additional southern California cities were added to the original list of 24—there now being 44 cities

within a 70-mile radius from Los Angeles to which the service is available. The business already being handled is said to compare favorably with many of the larger transportation agencies which have been in business for many years. It is also stated that in the short time since the service was begun 245 industries have been served, of which 210 were not previously users of the rail service of the Pacific Electric Railway. It is estimated that a business of 500,000 tons per year will be developed.

The service was inaugurated without any special advertising nor were additional solicitors put out to introduce it. Freight solicitors of the railway are lending their assistance during the routine of their calls upon industrial firms, and agents in many of the cities aided to some extent in acquainting the shippers of the districts with the new type of service.

---

## Canadian Association Celebrates Silver Anniversary

Program of Montreal convention reflects progress  
in the dominion's transportation and growth  
of electric railway service

**M**ONTREAL, the scene of the formation of the Canadian Electric Railway Association 25 years ago, witnessed the 25th anniversary convention held June 4-7. The meetings were held in the newly-completed stadium, while most of the social events took place at the Windsor Hotel. In the absence of the president, D. W. Harvey, the meetings were presided over by Vice-President C. H. Dahl.

The annual address of Mr. Harvey, read by the secretary, pointed out the growth of the electric railway business in Canada in the 25 years during which the association has been in existence. That this growth is continuing is shown, according to the speaker, by the increase in gross revenues of the member companies of \$3,000,000 in 1928 as compared with 1927. Further, there were no abandonments of city service last year. Faith in the future growth and development of the electric railway, he said, has been shown during the year in cases where suburban single-track lines have been changed to double-track. There has been a steady increase in route-miles operated by the Canadian companies by the extension of permanent track and motor bus routes. Nevertheless, the speaker feels that the companies must be at least one step ahead of any conditions which might adversely affect the upward trend in the matter of revenue passengers carried. The plants—the only ones of their kind in each community—are surely adapted to earn revenues other than those from carrying passengers. An increase in the profitable use of the transportation plant will make it possible to produce better transportation.

Four committees presented reports. These covered motor buses and trucks, rail corrugation, publicity and merchandising of transportation, and safety and accident prevention. The committee on rail corrugation recommended that an intermediate manganese alloy, preferably sorbitized, offers the most hopeful solution from the standpoint of the rail. In the discussion it was pointed out that this recommendation, made independently, confirms that of the similar committee of the International Association.

New sources of revenue and further uses of equipment were investigated by the motor bus and truck committee. It was stated that the most outstanding ways of getting more business are interline operation, night operation of coaches, and package express. It was pointed out that the latter business can be handled on early and late trips when the passenger load is light, so that the service is interfered with but little.

Two formal papers were read during the meetings. The first was on the subject of developments in track design, construction and maintenance, by A. T. Spencer, general superintendent construction and maintenance, Montreal Tramways, and O. C. Reh fuss, chief engineer Canadian Steel Foundries. Experience with various types of track structure, both in Montreal and elsewhere, was given. In the discussion which followed considerable difference of opinion developed as to the merits of various kinds of ties. Experience in thermit welding of joints under traffic was given by E. M. T. Ryder of the Third Avenue Railway, New York City. A method has been developed in which a maximum of three minutes is needed for pouring the weld. Others said that pre-cast rail filler has been valuable in reducing noise, but that in some instances it has had a tendency to break down and leave an opening alongside the rail.

### THREE DISTINCT CLASSES OF TRANSPORT

R. N. Graham, manager of railways Penn-Ohio System, Youngstown, Ohio, read a paper on the relation of urban transportation to suburban and interurban traffic. In a territory with a central city surrounded with suburban communities and smaller cities with independent business and trade activities three classes of transportation must be given. While the cities themselves are vitally dependent on mass transportation, and in them the effect of the private automobile is least, it is a more serious factor in suburban transportation and is most serious of all in its effect on interurban traffic, according to the speaker. The urban resident saves the least in time and money with his automobile. The suburban resident saves more in car fare to offset the high price of running,

his automobile, and the interurban passenger can so time his infrequent shopping and entertainment trips as to use his automobile to the best advantage. As a direct result the greatest mileage of abandoned street railway lines is in the interurban classification.

Suburban lines should not be cut off at the end of the city system, said Mr. Graham, but the cars should be run through to the center. The city cars should be speeded up so that the suburban cars will not be delayed unduly, and the headways should be so chosen that the suburban cars, making infrequent stops, can gain the space between city cars. Loading platforms, shelters and illumination all help to popularize the service. If one-man cars are used, signals, switches and fare collection should all be designed to require a minimum of time on the part of the operator. Buses have been found useful in suburban transportation, and the speaker held that their use is not an alternative but is supplementary. Buses can be run express through city streets and so can make superior speeds. Since buses cannot be operated economically on long lines at a flat rate of fare, the suburban bus must charge a higher fare, not as an equivalent service to the street car but as a supplementary service. Interurban service is not supported by regular, every-day riders, being merely a convenience to the casual rider. Nothing can be gained by commutation fares or other reduced rates. Fares must depend on mileage, and so the bus, from the standpoint of riding capacity, is as fitted to produce a profit as the street car.

A feature of the Canadian Association's meetings is the discussion of "Timely Topics." Much interest developed on the subject of follow-up training and grading of car men. D. E. Blair, Montreal, brought out that the early training of the man is likely to crop out in after years, so that a close follow-up is needed. Since some men are more prone to accidents than others, they should be watched and have their occupations changed if necessary.

Records of the Montreal Tramways show that a relatively small proportion of the men have a large share of the accidents. H. O. Allison, Pittsburgh, Pa., corroborated this statement. He has found many men of ten to twenty years' service who have needed reinstruction.

On the subject of systematic maintenance of rolling stock, A. M. Lindsay, Montreal, pointed out that adequate records, standardized methods and practices, regular inspection and periodic overhaul are all needed to prevent failures. W. R. McRae, Toronto, feels that it should be unnecessary to point out the need for systematic maintenance when there is no argument whatever to be made against it.

#### INCREASE OF SCHEDULE SPEED HELD A VITAL NEED

G. E. Waller, Hamilton, and W. F. Irvin, Toronto, discussed ways and means for increasing schedule speed. It was pointed out that many factors are within the control of the company, such as the track, cars and power. Other conditions that are beyond the direct control of the company are traffic, parking, etc. The principal means of improving schedule speed are increases in rate of acceleration and braking, reduction of time of passenger interchange, elimination of stops, installation of electric switches, substitution of loops for wyes, etc. In Toronto the standard spacing of stopping places is now six per mile in the residential areas and seven per mile in the business districts. The public is becoming appreciative of the improvement in schedules afforded by the changes.

Installation of automatic synchronized signals caused a reduction of 10 per cent in speed from the manual system. Replacement of this with the co-ordinated system caused an increase of 9 per cent in speed, but did not bring it back to what it was with the manual system. Long signal cycles have been found very bad, causing added congestion and reducing the speed.

#### TROLLEY MAINTENANCE SAVES DELAYS

Preventing delays to traffic by the use of modern methods in the overhead department were discussed by G. H. Cartwright, Quebec, and J. F. Neild, Toronto. According to Mr. Neild, the control of the system comes down to the keeping of accurate records. The location of wire is important. Use of a plumb-bob has not been sufficient, since there are sections of track where the rails are not parallel horizontally. A better method is to inspect the side wear on the wire and adjust the position to equalize this. It was considered better to remove trolley wire with a reduction of 35 per cent in area in congested districts rather than to risk breaks, as the cost due to loss of service may easily outweigh the value of the wire.

W. E. Massie, St. Catharines, and W. R. Robertson, Toronto, spoke of the comparison between cost of steel and cast-iron car wheels. In Canada the cost, including all factors, does not differ greatly. Experiments on a one-wear heat-treated rolled-steel car wheel on the Niagara, St. Catharines & Toronto Railway, have proved satisfactory. It is expected to get 100,000 miles with one wear at a cost comparable with that of the other types of wheel.

As is customary, three formal luncheons were held on the three days of the convention. The first was devoted to short talks by those of the founders who were able to be present. They included J. E. Hutcheson, Acton Burrows, E. A. Evans, R. M. Hannaford and D. E. Blair. The second day the audience was addressed by Leslie Vickers, economist of the American Electric Railway Association, who discussed trends in local transportation. On the third day the address was by J. F. Saint-Cyr, chairman of the Montreal Tramways Commission.

Officers were elected at the closing meeting to serve for the ensuing year, as follows:

Honorary president, J. F. Saint-Cyr, chairman Montreal Tramways Commission.

Honorary vice-president, Acton Burrows, president Acton Burrows, Ltd., Toronto.

Honorary advisory council, Hon. T. Ahearn, Ottawa; Edward Anderson, Winnipeg; Lt.-Col. J. E. Hutcheson, Montreal; C. A. Magrath, Ontario; W. G. Murrin, Vancouver; J. C. Smith, Montreal.

President, C. H. Dahl, assistant general manager Winnipeg Electric Company.

Vice-president, G. E. Waller, vice-president Dominion Power & Transmission Company, Ltd., Hamilton.

Treasurer, H. C. Patton, comptroller Toronto Transportation Commission, Toronto.

Auditor, J. E. Richards, manager and treasurer London & Port Stanley Railway, London, Ont.

Executive committee: The president, the vice-president, the treasurer, the immediate past-president (D. W. Harvey, Toronto), and D. E. Blair, Montreal; T. W. Brackinreid, Port Arthur; F. D. Burpee, Ottawa; W. S. Hart, Three Rivers; D. W. Houston, Regina; W. B. Powell, Montreal; W. R. Robertson, Toronto; L. Tait, London; K. B. Thornton, Montreal, and H. E. Weyman, Leeds.

In connection with the convention an exhibit of electric railway materials and supplies was held. The leading manufacturers of this class of equipment in Canada were represented, as were several of the principal American bus builders. The Montreal Tramways also showed typical examples of its latest rolling stock.

## Vision of Local Business Men

### Puts Oklahoma Railway on

# PAYING BASIS



Passenger traffic has increased 25 per cent in three years on the co-ordinated street car and bus system operated by the Oklahoma Railway in this rapidly growing southwestern city.

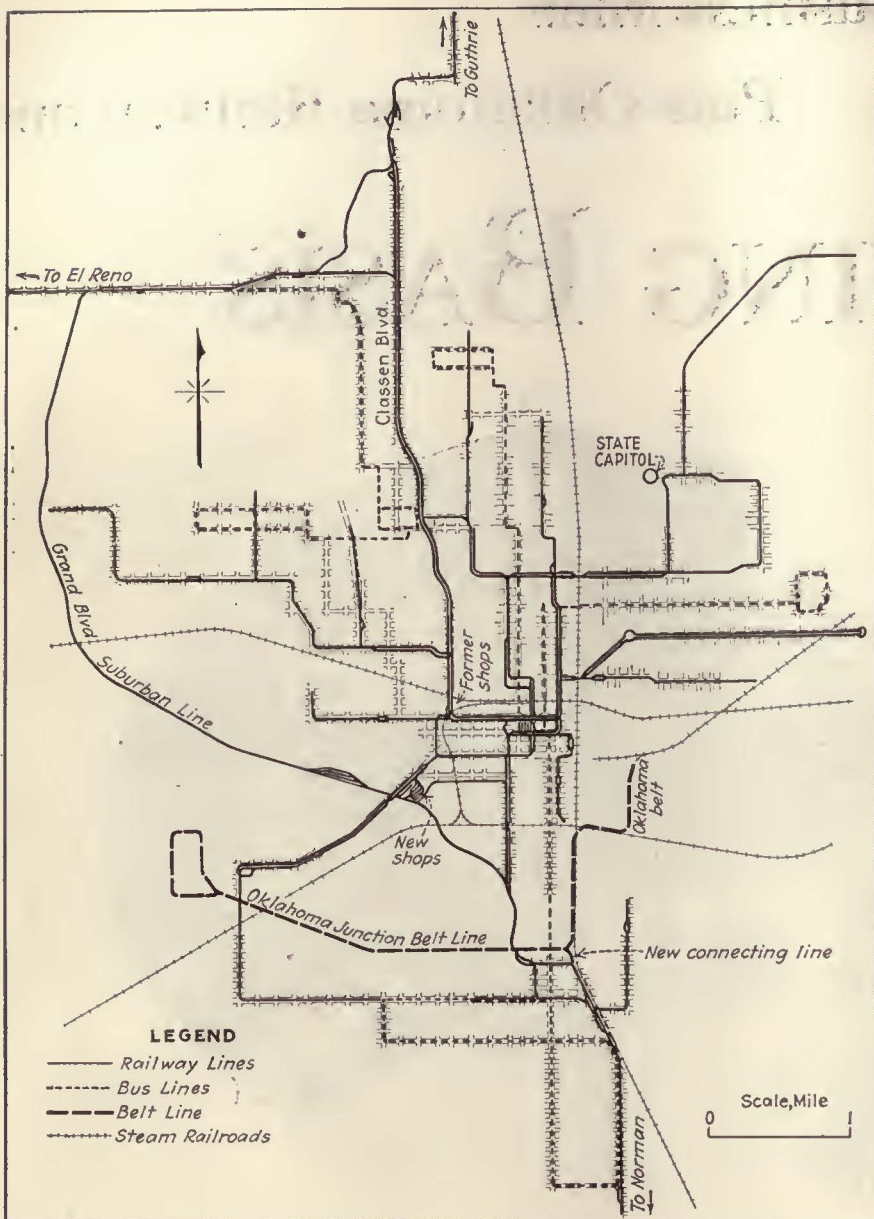
**E**MERGING from its financial difficulties, the Oklahoma Railway is now able to meet all fixed charges and earn a small net revenue. During the past three years there has been a steady increase in patronage and it appears that the company has successfully passed through the period of depression which has been generally felt by electric railways throughout the country. The company was first organized in 1903 as the Metropolitan Railway, with only 6 miles of track. Today it has more than 150 miles of track and is the largest electric railway in Oklahoma. Since 1926 the number of passengers carried on its lines has increased 25 per cent. Although the company has steadily increased the number of buses in service, the proportionate increase in the number of street car passengers has been more rapid than in the number of bus passengers. In 1926 bus passengers constituted 25.4 per cent of the total traffic, while last year the bus passengers were only 24.4 per cent of the total.

**Improvements costing \$2,000,000 have been made during the past three years. New equipment has been purchased and new carhouse and shops built. Number of passengers carried has increased 25 per cent. Facilities for freight handling have been greatly improved**

These results have been achieved under the management of Oklahoma City business men. In 1927 the Oklahoma Railway was purchased by Hubert R. Hudson and his associates, William Mee, banker; Dr. G. A. Nichols, real estate man; T. C. Thatcher, miller; A. E. Monroney, merchant and A. O. Campbell, contractor and builder. Prior to that the company had been in the hands of receivers for about three

years. The new owners have expended nearly \$2,000,000 in the purchase of new cars and buses, making extensions to city lines, enlarging and remodeling the terminal station and building a new carhouse and shops.

The latest step in the company's program of equipment improvement was the purchase early in the present year of six new buses and ten new street cars for city service. The cars are being built by the St. Louis Car Company at a cost of \$110,000. They are double-truck, four-motor, one-man cars with a seating capacity of 36 and weight of 24,000 lb.



Oklahoma City is served by some 75 miles of street railway track, besides the new Grand Boulevard electric freight line, the recently electrified belt lines and numerous motor bus routes

During 1928 the company remodeled its downtown terminal station at an expenditure of approximately \$25,000. The roof of the station was extended, a number of ticket and concession stands constructed, additional entrances and exits provided and other minor improvements made to permit more rapid handling of car and bus traffic. This station has been a feature of the company's service for many years. A majority of the 125 street cars and 40 buses operated by the company are routed through the terminal, which is located in the business center of the city. During the early days of the receivership an effort was made to partially dispense with the terminal by through routing certain cars. This was done in the hope of speeding up crosstown service and eliminating as far as possible transfer of passengers. The plan was later abandoned and the terminal station is again being used as before.

Approximately \$250,000 has been spent on new car-houses and shops located in the southwestern part of the city. These stand on property which once was the most

widely patronized amusement park in Oklahoma City. The buildings consist of a main structure, including paint shop, carpenter shop and garage. The old location of its shops near the center of the city, will be made available for industrial sites.

The new owners recently abandoned the operation of the railway power station at Belle Isle on the Guthrie-Oklahoma City interurban line just north of Oklahoma City. This plant has been owned and operated by the company for many years, together with high-voltage lines extending to the towns of Yukon, Cashion and Edmond. The Belle Isle property also included 90 acres of lakes and small streams which for nearly three decades served as one of Oklahoma's chief playgrounds. This land, including the site of the amusement park, the lakes and streams, the generating plant and the high-tension lines, was sold recently to the Oklahoma Gas & Electric Company.

#### FREIGHT BRINGS ADDED REVENUE

Under the receivership various steps had been taken to cut operating expenses and increase revenue. The new owners realized, however, that a large amount of additional business must be created in order really to put the property on a paying basis. The most promising means of securing the necessary additional revenue was thought to be by expansion of freight business. The company owns and operates interurban lines centering in Oklahoma City, extending to Norman, El Reno and Guthrie and intermediate points over which passengers, express and freight have been carried for years. These three lines, constituting a total of about 85 miles of track and radiating to the

southward, westward and northward, respectively, are connected with the city transportation system, which includes about 75 miles of track.

Shortly after the Hudson interests took over the property a plan was devised for increasing freight revenues by constructing a freight line around the northwestern, western and southwestern suburbs to tie together the three interurban lines and enable the company to carry freight more rapidly and with less interference to and from city traffic than was possible with existing facilities. At that time all freight originating on or consigned to the three interurban lines was being carried over the Classen Boulevard city line, which also served for carrying city and interurban passenger traffic. Classen Boulevard is one of the main outlets from the business district to the northern environs of the city, and for most of its length is lined with fine residences. One of the reasons for building the new line was the opposition of a number of Classen Boulevard property owners to the operation of freight trains through this district.



PASSENGERS CARRIED BY YEARS

Year	Number of Passengers		Total
	Street Car	Bus	
1926.....	13,000,000	3,300,000	16,300,000
1927.....	14,682,000	3,900,000	18,582,000
1928.....	16,424,000	4,000,000	20,424,000

Many difficulties were encountered in negotiating an agreement satisfactory to the City Council, Classen Boulevard residents and to the company. Several months expired before a final agreement was reached in March, 1928, providing for construction of the new Grand Boulevard line. Officials of the railway, however, showed their good faith by beginning construction before this agreement was finally signed, and in rushing the work to early completion with a large force of men as soon as all difficulties were out of the way. This line was completed and put into operation in December of last year, at a cost of approximately \$1,250,000, including relocation and construction of new shops, terminal yards, switching facilities, and purchase of new equipment.

For several reasons the Grand Boulevard line was located for the most part outside of Oklahoma City. The company desired to locate the line where it would not interfere with future growth of the city, and also where land values were relatively low and industrial sites and switching facilities could be acquired at reasonable prices by individuals, firms and corporations. While the company is not sponsoring any industrial real estate developments along this line, it is encouraging the sale of manufacturing and other industrial sites.

BELT LINES LEASED AND ELECTRIFIED

About a year ago the new owners secured a ten-year lease on the Oklahoma Belt Line Railway, approximately 5 miles in length, at that time steam operated and connected to the principal trunk line railroads entering Oklahoma City. This belt line connects with the Oklahoma Junction Railway, which has about 5 miles of switching and side tracks in the packing-house district. The Oklahoma Railway acquired a 99-year lease on this property also. The principal reason for acquiring these roads was to secure freight terminal facilities to handle business from the packing-house district and also other business originating on or consigned to steam railroads connecting with the belt lines. Oklahoma City has an extensive packing-house industry and stock yard facilities, and a great deal of business is handled to and from the packing-house district. The volume of traffic resulting from acquiring the belt lines and constructing the new freight line is steadily increasing, and the management believes



Right-of-way of the new Grand Boulevard freight line which partially encircles the city through its outskirts

that these various acquisitions will prove to be a profitable investment.

In addition to the packing-house business, the Oklahoma Railway handles much freight and express traffic of many kinds that originates at points along the inter-urban lines. The company also serves several sand pits which have a large output, located northwest of the city near its El Reno and Grand Boulevard lines.

In addition to the connections between the two belt lines, the Grand Boulevard line and steam railroads already mentioned, the other city and interurban lines connect with the new line at many points. At some of these points freight is diverted over city lines to its place of destination or delivered to outlying lines from points of origin in the city. The company is still permitted to carry freight over some of the city lines in the southern section of the city, a district which is largely industrial and where there are comparatively few residences of the better class. The belt lines and the Grand Boulevard line are so connected with the city system that they may be used for passenger traffic if that should be desired.



New car and bus shops of the Oklahoma Railway recently built in the suburbs to replace the old shops in the center of the city



One of the new 600-hp. electric freight locomotives equipped for either pantograph or trolley operation

When the company assumed operation of the two belt lines on May 1, 1929, it immediately put into service two 600-hp. electric locomotives. Three more of these locomotives have been built in the shops of the company. Each engine has four 150-hp. motors and weighs about 75 tons. The motors were manufactured by the Westinghouse Electric & Manufacturing Company and the trucks by the Standard Motor Truck Company. All other construction was done in the railway shops. The company also has several older 400-hp. electric locomotives, making a total of eight. Pantographs are used on the freight and belt lines and ordinary trolley equipment on other lines.

The general situation in the territory, in which the company operates, is extremely favorable. Oklahoma is enjoying a rapid commercial development along all lines. This is particularly true of Oklahoma City and surround-

ing territory. Building permits have exceeded \$1,000,000 per month for more than 2 years. Industrial development is moving forward, as is truck farming, poultry raising, dairying and other industries which create new freight and passenger business for transportation lines. A new oil and gas field has been opened almost in the southeastern suburbs of the city.

The Oklahoma Railway has adopted an aggressive policy in securing new freight business. It has also secured a permit from the Oklahoma Corporation Commission to operate interurban passenger motor buses along the highway paralleling its interurban line between Oklahoma City and Norman and has applied for bus permits to carry passengers parallel to its other interurban lines. Judging by the results so far accomplished, prospects are bright for a continued increase in both passenger and freight business.



Terminal station in the central business district of Oklahoma City serves both car and bus passengers. The building at the right houses the offices of the Oklahoma Railway

# The READERS' FORUM

## Requirements of Materials for Car Flooring

JOHNS-MANVILLE CORPORATION  
NEW YORK, N. Y., May 7, 1929.

To the Editor:

An article appeared on page 687 in the Oct. 13, 1928, issue of *ELECTRIC RAILWAY JOURNAL* telling of the use of car flooring material, one of the constituents of which was a bituminous material.

In the March 23, 1929, issue of *ELECTRIC RAILWAY JOURNAL* in The Readers' Forum section, there appear some comments by R. C. Brett, research engineer of the Trundle Engineering Company, Cleveland, Ohio, under the title "Asphaltum Not Advantageous for Car Floors." The author of these comments makes a sweeping condemnation of car floors using asphaltum, on the basis of tests presumably conducted as part of his research engineering work. The unfortunate part of the author's comments is that by making his conclusions so specific and positive, he indicates very clearly that his tests have not been sufficiently comprehensive to include some of the more refined compositions of flooring, and show lack of familiarity with the subject of car flooring in general.

Simply by way of rebuttal, it might be well to state that it is not only possible but entirely feasible to furnish composition flooring composed of filler ingredients such as coke breeze, held together with a bituminous binder which will not exceed a unit weight of 0.9 lb. per square foot per  $\frac{1}{8}$  in. thickness. "The type of flooring now commonly used by railroads," as expressed by the author, rarely has a lighter weight than the figure mentioned, and if it does, this lighter weight can be secured only through the introduction of sawdust, wood fiber or other deleterious ingredients, which not only weaken the structure of the floor itself but increase its porosity to such an extent that water will readily pass through the floor.

With regard to the thickness of composition floorings now in general use, one would hardly be so optimistic as to expect a  $\frac{3}{8}$ -in. thick composition flooring to give satisfactory service over a period of years, unless this composition flooring had sufficient mechanical strength to withstand in itself the stresses placed upon it, or else was sufficiently flexible to accommodate itself to these stresses without fracture.

To condemn a flooring material because it will soften under the heat produced by the combustion of the car is hardly justified by a consideration of contingent factors. It should be significant that composition flooring will not burn unless its temperature has been raised above 550 or 600 deg. F. To produce this temperature other combustible materials would have to be present. In modern steel car construction this is barely possible. In old wooden construction the car would be consumed by fire beyond the point of further usefulness before the flooring would be seriously affected. Thus the composition flooring does not constitute a fire hazard, but, rather, it is a fire retardant, as you may learn from the Chicago Board of Underwriters.

The test results and scientific deductions or conclusions of research engineers are extremely valuable contributions to engineering literature and trade publications.

Obviously, such information is of value only if it reflects an unbiased or uninfluenced consideration of facts.

P. D. MALLAY,  
Chief Engineer General Railroad Department.

## Maintenance Contest Teaches Better Methods

VIRGINIA ELECTRIC & POWER COMPANY  
NORFOLK, VA., May 15, 1929.

To the Editor:

Every subscriber to *ELECTRIC RAILWAY JOURNAL* is introduced to solutions of the other fellow's problems that not only teach him better and more efficient methods, but actually make for better maintenance all over the industry, in that each and every subscriber has before him a periodical review of such improvements throughout the electric railway field. The present maintenance contest, designed specifically for that purpose, is proving one of the most interesting and far-reaching ventures of



T. W. Sanderlin, carpenter shop foreman in Norfolk, Va., studying the practicability of a special clamp for preventing theft of rear-vision mirrors

its kind known of by the writer since his connection with the industry. In Oct. 27, 1927, issue the *JOURNAL* said editorially of a similar contest:

The many articles submitted show an earnest desire on the part of the men who submitted them to lower maintenance costs, to provide more efficient and better methods, to eliminate fatiguing operations and manual labor, to overcome troubles experienced in the various operations and to provide improved equipment to do the work.

That is just what the present maintenance contest is doing. For instance, the Virginia Electric & Power Company at Norfolk for some months past was troubled with the theft of rear-vision mirrors from the cars. In the Oct. 20, 1928, issue a contest item described a special clamp designed to stop such losses which had been tried out successfully on another property. Its adoption in Norfolk stopped the thefts.

This particular instance is but one that shows how a free interchange of ideas surely will bring to light methods that can be adopted with good results on any property.

C. B. HALL,  
Chief Clerk, Mechanical Department.

# Improved Armature-Dipping Methods Developed

By F. V. SKELLEY

Superintendent of Equipment Des Moines City Railway  
Des Moines, Iowa

**D**IFFICULTY in obtaining proper penetration of varnish when armatures were dipped led the Des Moines City Railway about two years ago to undertake a series of experiments from which the methods now used have been developed.

At first armatures were dipped in a tank of varnish for twenty minutes and after draining were baked for 48 hours. It was found that the varnish did not penetrate to the bottom of the slots although the coils were known to be loose. This condition was verified by tearing out the coils of several armatures after they had been dipped and baked. Other experiments were then made to improve conditions. A steel tank was built large enough to hold an armature. With the vat filled to the proper level with baking varnish of a standard make



Rectangular varnish vat in shop of Des Moines City Railway will accommodate six G.E.247-I armatures at one time. Circular tank in rear is used for larger armatures. Between rectangular vat and the wall is a 17-in. diameter pressure tank, 45 in. deep, for storage of surplus varnish

and the armature under test sealed in the tank, a vacuum of 25-in. gage measure was applied, followed by a pressure of 110 lb. per sq.in. After ten minutes of this treatment the armature was removed and the coils torn out. The results obtained were little better than with the twenty-minute dipping at atmospheric pressure.

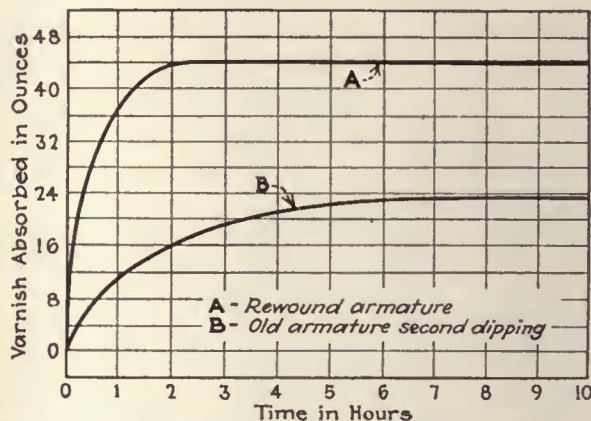
Soaking the armature in varnish was then tried, start-

ing with 24 hours' duration and decreasing the time to 18, 16, 12, and finally 6 hours, tearing the coils out each time to determine the amount of varnish in and around the bottom coil in the slot. As the penetration of the varnish was satisfactory for armatures soaked six hours or more, it was decided to test the rate of penetration up to six hours, so that the time might be reduced to as short a period as possible for performing a satisfactory job.

A rewound G.E. 247-I armature was preheated as usual and submerged up to the commutator in a tank of varnish placed in a room where a constant temperature of 104 deg. F. could be maintained. The result as shown by curve A on the accompanying chart indicates that 2 lb. 12½ oz. of varnish was absorbed in two hours and that practically no further absorption took place up to ten hours. Next an old G.E. 247-I armature, that had



Armature shaft clamps of various sizes are neatly stored on a rack located directly above varnish vats



The rate of absorption of varnish declines rapidly after first 60 minutes as shown by armature test curves

received a previous dipping of twenty minutes, was soaked for ten hours. The rate of penetration was found to be much slower and the varnish continued to be absorbed for six hours. The temperature in this test was held constant at 112 deg. F. Only 1 lb. 3 oz. of varnish was absorbed by the armature during its second dipping period. The thickness of varnish adhering to a clean metal plate was one mill. The second soaking of the armature added two and one-half mills, or gave a total of three and one-half mills thickness of varnish on all metal surfaces.

As a result of these experiments, the armature-dipping equipment now in use consists of a rectangular metal tank 48x32 in., and 40 in. deep, in which six G.E. 247-I

armatures can be soaked at one time; a circular tank of 6 ft. depth and 30 in. diameter, in which all large armatures are soaked; and a pressure tank of 45 in. depth and 17 in. diameter, for the storage of surplus varnish. Air under pressure is admitted to this latter tank and varnish forced through a connecting pipe and valve into the rectangular vat. When the valve is opened and air pressure removed, the varnish flows back by gravity. It is thus possible to maintain 30 in. of varnish in the large vat irrespective of the number of armatures being dipped at one time. Hinged brackets along each side of the vat slip over the end of the armature shafts to hold them in a vertical position. The method of operation with this equipment is to take an armature that has been in service 80,000 miles, tighten the bands if necessary, and soak in varnish for six hours or more; then bake until the insulation resistance is satisfactory.

## Some Essentials for Trolley Wheels

By DR. JAMES SILBESTEIN  
*Metallurgical Engineer, Chicago, Ill.*

INVESTIGATION of service obtained from trolley wheels shows that the mileages obtained vary from 1,400 to 17,000 and that the cost per 1,000 car-miles varies from 2 cents to 33 cents. This wide variation indicates that more knowledge is needed regarding desirable characteristics for making trolley wheel castings and that their purchase should be subject to rigid inspection.

There are a number of factors which influence the life obtained from trolley wheels. Among these are electric conductivity, arcing properties, hardness, wear resistance and soundness of castings. Trolley wheels are made of copper-basic alloys. Their electric conductivity ranges between 10 and 70 per cent, the International Annealed Copper Standard being 100 per cent. While a high electrical conductivity naturally is desirable, this property is not as essential for long life as some other factors, and an electric conductivity of 10 to 20 per cent may be considered satisfactory.

The destructive action of arcing should be as small as possible. Alloys high in zinc result in more arcing and so are not suitable. A small percentage of zinc, up to 5 per cent, is beneficial since it has a deoxidizing and cleansing effect upon the metal. It has been found that the service performance of alloys containing 5 per cent of zinc is just as satisfactory as the phosphor bronze alloys. Lead which is added to bronzes to improve their wearing qualities is undesirable in trolley wheel alloys. Extensive tests have shown that the destructive action of arcing is greater for alloys containing lead than for lead-free and that the life of the wheels is less in the former case.

Hardness is not an essential quality of a trolley wheel alloy and a greater hardness is no indication of better wearing resistance or longer life. In general, the Brinell hardness of trolley wheel alloys ranges from 40 to 55. Service tests have been conducted with alloys having a Brinell hardness as high as 75 and the results of these tests indicate that the harder alloys were no better than the softer ones. The fact that hardness is not a measure of wear-resisting qualities has led to extensive investigations on methods of testing abrasion resistance of metals. Finality in methods of testing for this purpose has not yet been attained and different types of abrasion testing

still yield results which are not comparable. In view of the great importance which the rate of wear has for parts such as trolley wheels, trolley wires, rails, treads of wheels, axles and bearings, a satisfactory abrasion test would be highly desirable, but so far it is necessary to resort to the slower method of testing in service.

## Overhauling Cast Grid Resistors

By R. S. BEERS

*Railway Engineering Department General Electric Company  
Schenectady, N. Y.*

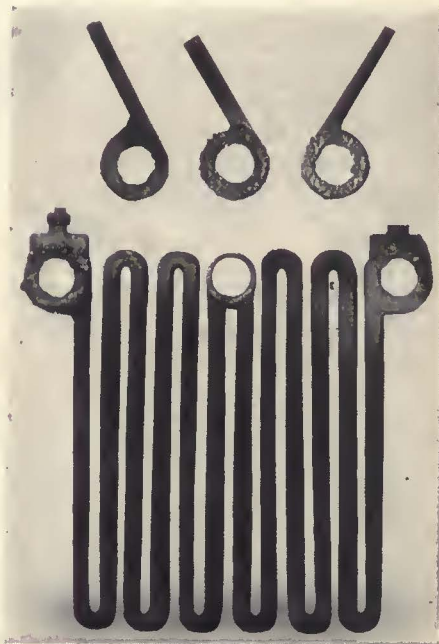
WHEN car equipments are overhauled the motor resistors should receive the same attention that is given the remainder of the equipment. They should be put in shape so that they will operate without further attention until the next overhauling period. Whether it is necessary to dismantle and rebuild the resistors may often be told by a visual inspection of them.

This inspection should be followed by an insulation test, a bank of lamps and trolley voltage between the grids and the resistor frame being used for this purpose. After this the resistance of the resistors should be measured. A simple means of checking the accuracy of the resistance measurements is to measure the total resistance and also the individual steps. If the individual steps do not add up to the total, some error has been made.

If the resistance is a good deal higher (30 per cent or more) than called for by the manufacturer's connection diagram, it is desirable that the resistors be torn down and the grids restacked. The grid bosses, if they are rusty or if they have tiny pieces of

mica sticking to them, should be thoroughly cleaned. The easiest, quickest and most successful means of cleaning them is with a sand blast. If the sand used is not too coarse, this method cleans off rust and any foreign matter, leaving the contact surfaces of the grid boss just as clean and parallel with one another as they are on new grids. Filing or grinding cleans the contact surfaces of the grid boss, although it usually reduces the conductivity because the surfaces are no longer parallel.

Grids with badly burned contact surfaces should be discarded. Where trouble from this cause is excessive it can be reduced by using a thin copper (about 0.01 in. thick) washer between the contact surfaces.



Burned contact surfaces—Systematic overhaul of grid resistors discloses conditions of this kind when they exist

# Design of Maintenance Contest Trophy

## Completed



**I**N KEEPING with the purposes and spirit of ELECTRIC RAILWAY JOURNAL'S maintenance contest, the design has been completed of the trophy to be awarded to the company rendering the most outstanding contribution, through participation in the contest, to the improvement of maintenance practice of local transportation companies. The final design is the beautiful example of the silversmith's art illustrated on this page.

The trophy takes the form of a wall plaque of bronze, mounted on polished wood. In relief across the upper part of the shield is an emblematic representation of the various phases of transportation maintenance work. The heroic size of the figures is symbolic of the importance of the human element in maintenance performance. This design, together with the lettering and the decorative border, are worked in sterling silver on the bronze shield.

After the final meeting of the judges, following the close of this year's contest on July 15, the name of the winning company will be inserted on the trophy in the space provided. The actual presentation will be made at the coming convention of the American Electric Railway Association at Atlantic City this fall, and the trophy will be on display in ELECTRIC RAILWAY JOURNAL'S booth in the new Atlantic City Auditorium.

In addition to the company trophy, there will also be awarded at the convention the individual cash prize of \$200 to the electric railway man submitting the best single item in the contest. Departmental certificates of merit will go to each of the four departments—equipment, way and structures, electrical, and bus—which re-

ceive the highest rating from the judges under the same terms as those used for selection of the company winner. At their coming meeting the judges will also select the winners of individual departmental prizes of \$25 each for the final period of the contest which closes on July 15. Winners of these cash awards will be announced in the August number of ELECTRIC RAILWAY JOURNAL.

ENTRIES ELIGIBLE TO JULY 15

**I**TEMS submitted in this contest up to midnight July 15 are eligible for all of the prizes listed above. These entries are now coming in at a rapid rate as the closing date approaches. There is no limit on the number of items that can be submitted by any individual, department or company, and the total number of items entered by a department or company is one of the factors to be considered by the judges in awarding the departmental certificates of merit and the beautiful company trophy. The JOURNAL will pay \$5 for every item published which does not win a prize.

Full details of the contest were published in the Oct. 20,

1928, issue of ELECTRIC RAILWAY JOURNAL. There are also available for the asking printed folders giving the conditions of the contest and suggestions for preparing entries. There is still time available for individuals, departments and companies to make a bid for these prizes. But the time is getting short, and this is the last announcement in the JOURNAL before the close of the contest on July 15.

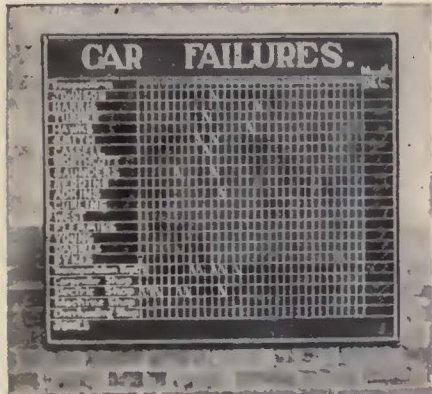
Mailed items must bear a postmark up to midnight of that date. Be sure to mark entries "Maintenance Contest."

### Present Standing of Companies and Departments in Maintenance Contest

Company	Department Prizes	Winners
Cleveland Ry. ....	Track ....	2 { F. E. Davidson Joseph Croyle
	Line.....	
	Bus.....	1 L. Rose
	Total... 4	
San Diego Electric Ry. ....	Bus.....	1 Charles Herms Arthur C. Clegg
	Equipment	
	Total... 2	
Toronto Transportation Commission ...	Line.....	1 L. H. McAdam
New York Central R.R. (electrified section) .....	Equipment	1 Harvey L. Bullock

# Devices and Practices Found Useful in Expediting

# MAINTENANCE WORK



Blackboard used to classify car failures and to charge them against the employee responsible

## Pull-Ins Charged to Men Responsible\*

BY C. B. HALL  
Chief Clerk Mechanical Department  
Virginia Electric & Power Company,  
Norfolk, Va.

AN ENERGETIC campaign against car pull-ins is being carried on by the Virginia Electric & Power Company, Norfolk, Va. One means which has proved successful in reducing car failures on the road is the use of a blackboard\* upon which pull-ins are charged against the particular inspection employee responsible. The blackboard is 43x49 in. in size and is placed at a conspicuous point on the wall of the inspection shop.

This has caused a feeling of personal responsibility for the failures when they occur, and as a result pull-ins have been reduced 46 per cent during a period of three months. This reduction reflects the extent to which better maintenance is carried out, and the more careful work done toward eliminating sources of trouble that would cause failure on the road.

Use of a special inspection form together with the inauguration of a system of classifying pull-ins has re-

Many maintenance ideas have been received which have proved of great value to men in the railway industry. What can you contribute?

INSPECTION		
Car No.	Date Due	Date Inspected
ITEM	WORK DONE	SIGNATURE
Trolley		
Light and Heater Circuits		
Cables		
Lighting Arresters		
Circuit Breakers		
Controllers		
Relays and Contactors		
Rheostats		
Electric Bells		
Motors		
Armature & Axle Bearings		
Air Brakes		
Hand Brakes		
Brake Rigging		
Drift Rigging		
Sand Boxes		
Foot Gangs		
Fenders		
Gates, Screens, Etc.		
Doors		
Grab Handles		
Regulators and Fittings		
Car Body and Fittings		
Treads		
Journal Boxes		

Inspection form used by the Virginia Electric & Power Company

duced car failures considerably. The inspection form provides for signatures of the entire inspection force. In another column the work done is listed. Use of this has played a large part in bringing about the good performance figures.

The average miles per pull-in during the last six months of 1928 were as follows:

Month	Average Miles Per Pull-In.
July	10,019
August	11,134
September	15,088
October	16,510
November	16,889
December	18,432

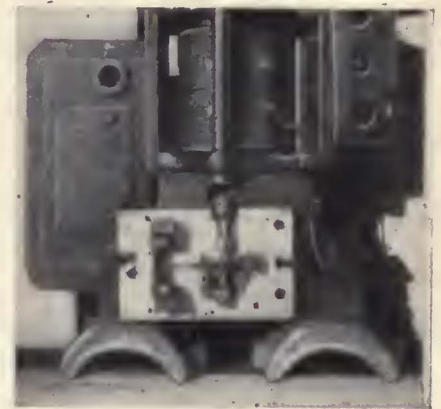
With one exception, the December figure is the best showing made on

the property during the past ten years, certainly a convincing argument for close supervision.

## Delayed Break Interlock for Circuit Breakers\*

BY HARVEY L. BULLOCK  
Superintendent of Electrical Equipment  
Cleveland Union Terminal, Cleveland, Ohio

A DELAYED break interlock has been found of particular advantage on multiple-unit control equipment of the New York Central Railroad for preventing the burning out of operating coils by opening the circuit automatically. Its use also guards against broken operating switches and improper handling by the operator. It prevents burning of operating switches in the cab by distributing the arc over each individual unit of car equipment in long trains.



Type of delayed break interlock for remote control automatic circuit breakers and overload coils

The interlock is mounted on the side frame of the circuit breaker and is operated by connecting to a special main solenoid hinge pin with an insulated operating rod. This latter is connected to a contact lever under which is located a cushion spring.

\*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

\*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

The action of the interlock is delayed by the use of a toggle latch on the contact lever and is timed to unlatch at the moment of locking the circuit breaker in the closed position. The cushion spring, being compressed, then throws the lever to the unlatching or trip position if the operator desires to use the hand control in emergency. Two contacts are provided—an upper and a lower one. These are used for set and trip circuits. Magnetic blow-out coils to extinguish the arc have also been provided.

This device is now standard on New York Central cars with DB-102 circuit breakers and is also embodied in the late type of PC-10 controllers. It has practically eliminated circuit breaker troubles of this nature and consequent delays to trains.

### Group Form for Testing Equipment\*

BY WILLIAM J. HANKEY  
Substation Division, Power Department  
Cleveland Railway, Cleveland, Ohio

ROUTINE work of testing and calibrating equipment in automatic and manual substations of the

\*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

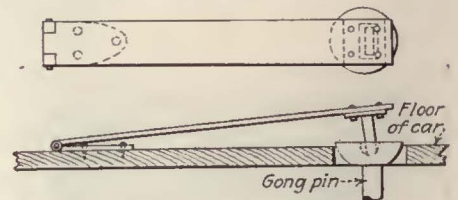
Cleveland Railway has recently been arranged in group form. Use of the form not only enables the chief inspector to tell at a glance what particular piece of apparatus or mechanism is to be tested, but it also enables the test crews to prepare for the next test period or next apparatus to be tested. In the arrangement of the form, consideration was given to minimizing the transportation of test equipment from one plant to another. If several operations are necessary on some one piece of equipment, provision is made on the form to do this while the equipment is out of service. A schedule of testing and calibrating equipment in ten automatic and five manual plants is carried out by two men working but three days each week on this type of work. The remainder of their time is devoted to bi-weekly and detailed inspection, testing experimental hookups, graphic clocks and meter maintenance.

The group form sheet lists the various apparatus in their respective groups, the necessary testing equipment required for the work, the next date the apparatus is to be tested, the station involved, and the date the work is completed. In this way a complete yearly record of all testing and calibrating activities is recorded on one sheet.

### Pedal Gong Ringer\*

BY FELIX E. REIFSCHEIDER  
Engineer Ithaca Traction Corporation,  
Ithaca, N. Y.

THE forward location of the gong pin on one type of car of the Ithaca Traction Corporation was such that the motorman could only use his toe. If the pin were turned halfway it was locked to prevent ringing on the rear platform. Various circumstances caused the pin to be locked when it should have been available for



Pedal used to ring warning gong on cars of Ithaca Traction Corporation

operation by the motorman. To eliminate this serious trouble, a pedal was devised as shown in the accompanying drawing. A 6-in. hinge was screwed to the floor with the staple bolted to the underside at one end, which fitted a depression in the top of the pin, preventing accidental turning.

The increased leverage has two advantages.

\*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

GROUP FORM FOR TESTING EQUIPMENT

Group #1	Date Due	Equip. Required	Sta. Completed	Group #4	Date Due	Equip. Required	Completed
Manual Overspeed				Automatic Relay #25			
" Reverse Current				" " #28			
Automatic Relay #18				" " #62			
" " #24				Current Limit Resistance			
" " #29							
" " #32							
				Group #5			
Group #2				Manual AC Breaker Setting			
Automatic Relay #1				Automatic Relay #1			
" " #2				" " #2			
" " #5				" " #9			
" " #13				" " #11			
" " #14 & #15A				" " #14 & #15A			
" " #23				" " #27			
" " #27				" " #32			
" " #42				" " #50			
" " #50				" " #65			
" " #65							
Inspection automatic current limiting resistance				Group #6			
Manual DC Breaker Setting				Manual AC Overload and Reverse Power			
Group #3				Group #7			
Automatic & Manual Pole Piece Clearance				Automatic Relay "S" 2-3 & 4			
Armature Wedges				" " #13			
Automatic Relay S-2-3 & 4				" " #14 & #15A			
" " #13				" " #27			
" " #14 & #15A				" " #34			
" " #24				" " #32			
" " #42				" " #35			
" " #50				" " #36			
" " #55				" " #39			
" " #65				" " #50			
Graphic Meters				" " #53			
Megger Rotaries				" " #55			
Sequence Drum #33				Graphic Meters			
Calibration of rotary Flashover Relays				Megger Rotaries			
				Sequence Drum #33			
				Calibration of Rotary Flashover Relays			

Type of group form used for testing substation equipment of the Cleveland Railway



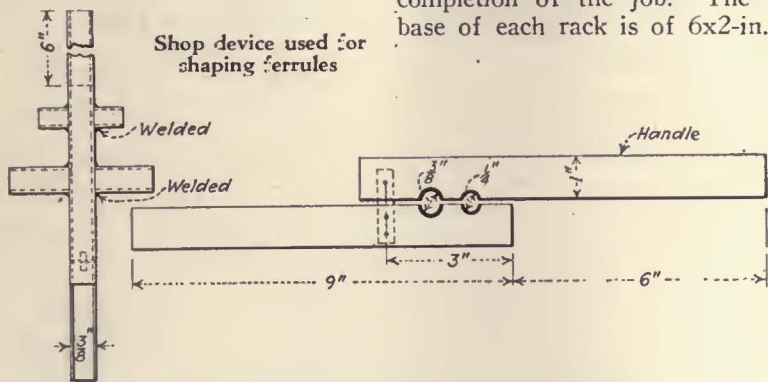
vantages, it produces a more intensive ring and the motorman also is able to locate the pedal sooner without looking for it, thus greatly reducing the chance for accident. The cost of placing this pedal on each car is \$1, which includes labor and material.

### Form for Shaping Ferrules\*

By H. J. BEADLE

Engineer of Equipment Dallas Railway & Terminal Company, Dallas, Tex.

IT IS THE practice of the Dallas Railway & Terminal Company to use ferrules over the ends of leads where they go into terminals. The ferrule is cut from tin and is pushed under the rubber covering of the wire



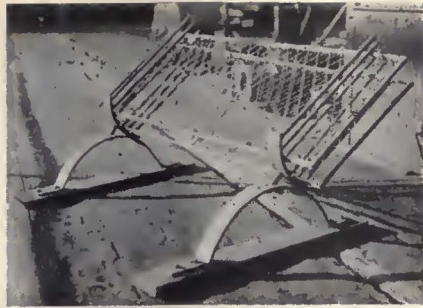
for a distance of about 1/2 in. Instead of using a pair of pliers to shape the ferrule on the lead, so that an accurate fit will result when the lead is placed in the round terminal hole, a form for shaping the ferrules is employed. This consists of two blocks 1 in. square and 9 in. long, the upper one being hinged to the lower so that the ferrules can be inserted and removed quickly. An extended section is welded to the two blocks so that pressure for shaping can be applied the full length of the ferrule. This forming tool makes the ferrules round and results in a close fit and satisfactorily soldered job.

### Reversible Screen Holders

By D. L. PATISON

Foreman Paint Shop  
Omaha & Council Bluffs Street Railway  
Omaha, Neb.

RACKS have been designed to facilitate the painting of street car window guards by the Omaha & Council Bluffs Street Railway. These racks hold the screens in such a position that after one side has been



Reversible holder which permits painting of both sides of window screens with a minimum of handling of wet surfaces. Five screens at a time can be accommodated

Painted the whole frame can be turned over approximately 90 deg. to bring the other side uppermost for completion of the job. The wood base of each rack is of 6x2-in. tim-

ber, 30 in. in length. Six 5/8-in. rods, 24 in. long, project from a curved metal base, made of 1/2-in. stock, 3 in. wide. Details of the loose-pin coupling between upper and lower "rocker" iron sections are shown in the accompanying pictures.

### New Test Rack for Air Equipment

By J. A. DUFFY

Superintendent of Equipment  
Monongahela West Penn Public Service Company, Fairmount, W. Va.

AIR equipment of the cars of the Monongahela West Penn Public Service Company is subjected to rigorous tests after overhauling before it is allowed to pass for installation. A test rack has been designed to duplicate all the brake operations of every piece of apparatus of the automatic air equipment. This rack is used also for detail tests of safety car equipment and triple valves. The arrangement of the apparatus for these tests is shown in the accompanying diagram.

Among the various valves which can be tested on this rack are: brake valves, brake valves with selector valve, emergency valves, combined foot and cutout valves, pilot valves, and main reservoir cutoff valves. Other tests which may be made are the friction tests, the opening tests, the capacity tests, the test for ball check valve leakage, closing tests and porosity tests. In testing triple valves for railway service, an application and a release test will indicate roughly whether or not the triple valve should be removed for closer inspection or repaired on account of packing ring leakage, resistance, opening through ports, etc. The tests are made with 70 lb. in the supply line and with the test apparatus shown on the Westing-

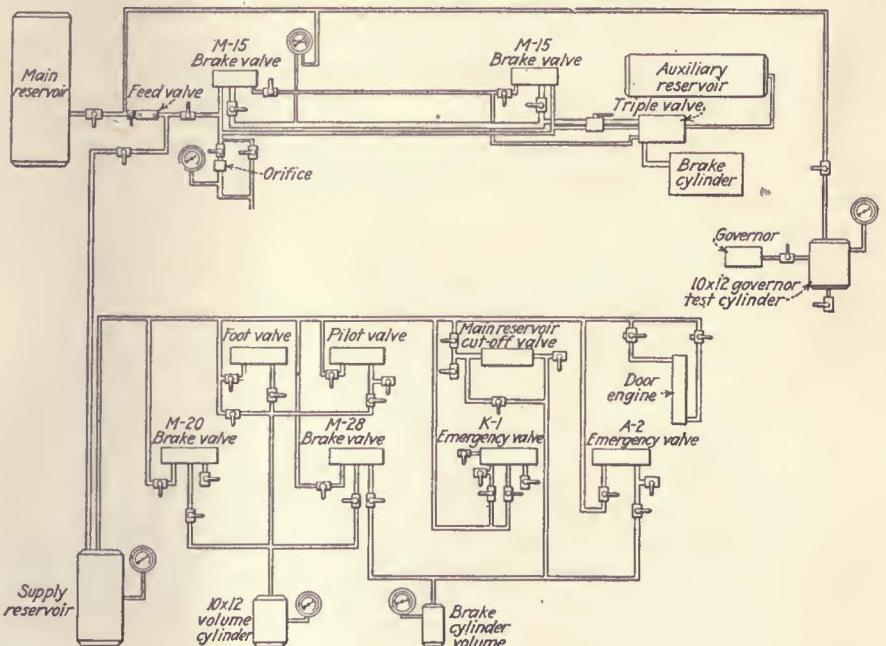


Diagram showing arrangements of valves, gages and reservoirs and the piping of a test rack for air equipment of the Public Service Company at Fairmount, W. Va.

\*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

house Air Brake Company's drawing F-31968.

In the event that a valve is removed from a car for test without first being overhauled, it should be taken down and inspected to make certain that the working parts are in good condition.

Particular attention should be given to the clearance of the lower valve stem and its bushings. Door engines and air compressors may also be tested satisfactorily with this test rack.

### Reservoir Drain Valve Operating Rod

**D**RAINING of air reservoirs on the cars of the Richmond Railways, Inc., Staten Island, N. Y., is on a definite time basis so as to prevent brake trouble. Still greater care is exercised during the winter months



Since this operating rod has been in use all tanks are kept drained

to guard against freezing. The reservoirs are installed in the center of the cars and it has been found very inconvenient to reach the drain valves unless the car is over a pit. When pit storage was impossible there was a tendency for the men to neglect the draining. As a result freezing troubles were encountered.

A special operating mechanism was installed, as shown in the accompanying illustration to make the valve accessible and to assure drainage. It will be noticed that a  $\frac{3}{8}$  in. round rod with an eye in one end is attached to the drain valve handle and extends outward toward the side of the car. This rod is supported by a  $\frac{1}{4}$  x 1-in. eye bracket 12 in. long fastened to the compressor supporting bracket. With this arrangement the reservoirs can be drained without the car being over a pit.

The possibility of accident has been reduced with this arrangement, as a man does not have to crawl beneath the car.

### Testing Friction Tape

By G. H. MCKELWAY  
Distribution Engineer Brooklyn-Manhattan  
Transit Corporation,  
Brooklyn, N. Y.

**W**HEN it is desired to compare samples of rubber friction tape, or to obtain an approximate idea of their value, the usual method is to rub together pieces of the tape and then to pull them apart. It is a popular belief that the value of the tape can be determined by noting its stickiness or "tackiness." This is a mistaken theory, however, as the stickiness of a tape is not proof of its quality but, on the other hand, may be an indication of its worthlessness. The best tapes are those that have been compounded with a large percentage of new, high-quality rubber, and such tapes are seldom so "tacky" as those made up with less crude rubber and more rubber substitutes.

Another mistaken assumption is that tape of a light color is not as good as black tape. The color of rubber is gray, while the color of most of the cheaper substitutes is dark brown or black. Sometimes coloring matter is added purposely to the rubber compound to make it darker but, unless that has been done, the lighter colored tape is likely to be the better.

Still a third mistake in regard to tape is the belief that, when two pieces are pulled apart, the fibers of the compound should be long. The fiber of good quality rubber compound, on the contrary, is quite short.

To decide upon a good make of friction tape, there are three things that must be decided: (1) The strength of the fabric; (2) the holding power, not the mere stickiness, of the compound; (3) the insulating properties of the tape. There are standard laboratory tests which will determine accurately all of these qualities and, if possible, such tests should be made before purchasing large quantities. However, when only a small amount of tape is wanted, it is desirable to have some easy test which can be made by anyone and which will give approximate results.

For deciding on the strength of the fabric, a comparatively narrow strip of tape, say  $\frac{3}{4}$  in. wide, should be taken in the hands and the two ends pulled apart until the tape breaks. By noting how much pull must be exerted to break it, an approximate idea of its strength can be gained. This is a very rough test, but

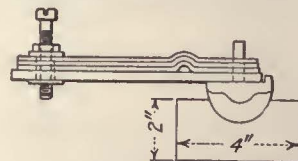
any tape that breaks easily should be rejected.

For the second test, another strip of the tape should be bent back on itself and then forward again, so as to make a "Z" about 1 in. in length and made up of three thicknesses of tape. These three layers should be squeezed together firmly and the pressure maintained for three minutes. Then take hold of the ends of the tape and attempt to pull out the "Z" lap. It will be found that with a good quality of tape the fabric will break before the lap will open. The purpose of the "Z" lap is to insure that the compound on both sides of the tape is tested. Occasionally, a tape will be found with a better grade of compound or with it applied better on one side than on the other. A single lap will test only one side of the tape, whereas with the "Z" lap both sides come into contact with each other.

The voltage of railway circuits is so low that any well impregnated fabric will withstand it. Therefore, unless a higher voltage is available and can be used easily and safely, there is not much reason for making a voltage test; especially, since the tape might be good at the point tested and much poorer at a point an inch or two away. To make sure that the tape is impregnated well and uniformly, it should be held up to the light and any "pin holes" in it counted. There should be none, or, at the most, only one or two in a strip a foot long.

### Form for Riveting Controller Finger Tips

**R**IVETING new tips to controller finger springs used to be a troublesome job in the shop of the New York & Queens County Rail-

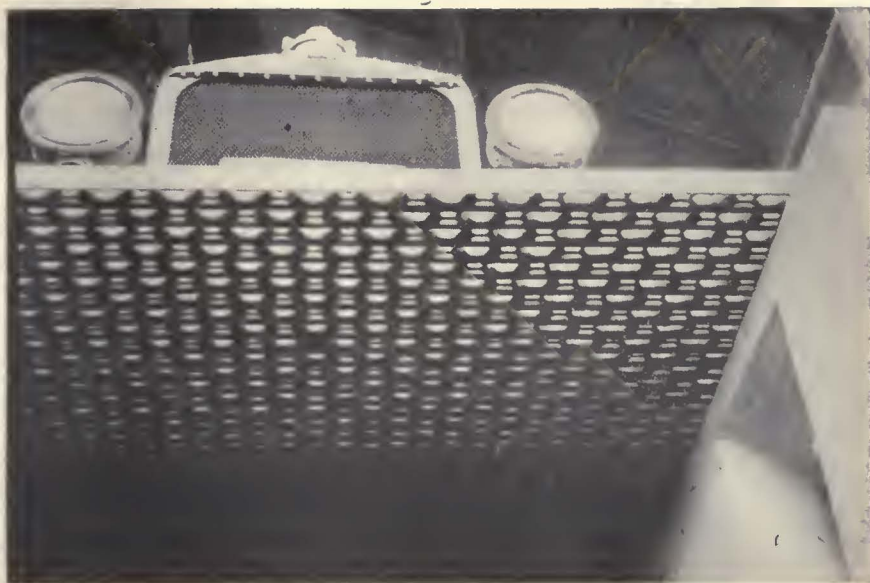


This fixture for riveting tips on controlling fingers has speeded up the riveting process and eliminated arcing failures

way, Woodside, N. Y. The new tips often caused heavy arcing after they were installed in the controller. Careful analysis of the cause of this arcing disclosed the fact that it was due to improper contact. This was brought about by the existence of abrasions on the tip contact surfaces,

which were made by the vise jaws during the riveting process, a condition which needed to be eliminated.

The riveting form shown in the accompanying sketch was developed for riveting the tips to the fingers and to prevent damage to the tip surface. It is made of steel and is 2 in. square and 4 in. long. The top surface is provided with a groove of such width, depth and contour as to conform exactly to the surface of the tip to be riveted. The tip is placed in the groove and the finger spring and shunt are placed over the rivet. The force exerted on the riveting process is distributed evenly over the tip surface and thereby prevents the formation of any abrasion.



Removable gratings used to cover pits

## Labor and Time Saving Pole Racks\*

By C. B. HALL

Chief Clerk Virginia Electric & Power Company, Norfolk, Va.

A NEW type of pole rack recently adopted by the Line Department of the Virginia Electric & Power Company at Norfolk, Va., has resulted in a saving of approximately 50 per cent in time and labor. Poles, needed by linemen, can now be rolled off the racks onto pole wagons or line cars, instead of being hauled from a pile in the yard. Five of these special racks have been erected along the company's yard siding.

Poles 15 ft. long, or less, are placed in the ground at a depth of 6 ft. resting on a base of concrete. These supports are braced with 12 x 12 in. obsolete bridge timbers and old T-rail, and hold an assorted stock of poles ranging from 30 to 50 ft., each rack accommodating about 100 poles. The project, built entirely of discarded materials and by company employees at odd times, was completed at a cost of \$200.

\*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

## Overhaul Pits Covered by Grating

ALL pits in the shop of the Surface Transportation Company, New York City, bus subsidiary of the Third Avenue Railway, are covered by means of removable iron grating. This grating is made in sections 24 in. wide and 63½ in. long. Each section is composed of nineteen strips of 1½ x 1¼-in. flat iron spaced 1½ in. centers and braced by strips of 1/8 x 1¼-in. flat iron zigzagged through the space and riveted to each 1/8-in. strip. These sections can be removed readily to provide access to any part of the bus desired. This arrangement has been found very satisfactory and has prevented the men from accidentally falling into the pits.

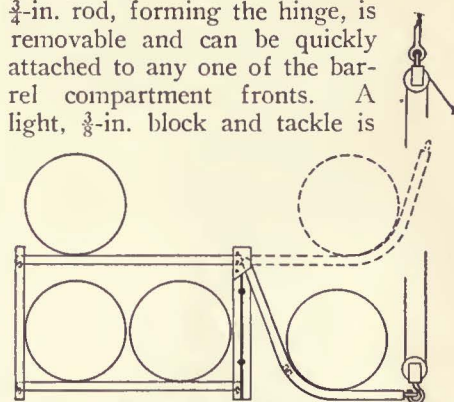
## Portable Barrel Hoist\*

By F. W. BRAUND

Superintendent of Power Conversion Cleveland Railway, Cleveland, Ohio

A ONE-MAN barrel hoist has been installed by the Cleveland Railway for use in an oil room where transformer oil is stored on a double-

deck rack, and where head room is insufficient to accommodate a portable crane. Eye bolts of ample size are anchored in the ceiling, mounted forward of the oil rack and directly over the eye of the barrel-hoist cradle. A ¾-in. rod, forming the hinge, is removable and can be quickly attached to any one of the barrel compartment fronts. A light, 3/8-in. block and tackle is



Barrel hoist designed by the Cleveland Railway for use in store room where space is lacking for the operation of cranes

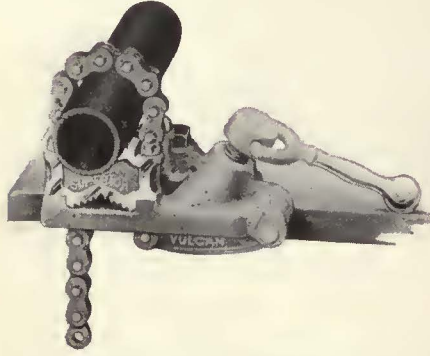
used as the hoisting medium, swinging the barrel cradle slightly above center, thus allowing the barrel to roll without the help or guidance of workmen. With this equipment, full barrels of material can be hoisted and placed several tiers high on a rack.



Improved appearance of the pole storage yard of the Virginia Electric & Power Company was obtained by the erection of racks

## Convenient Chain Pipe Vice

THE new Vulcan Superior vise, recently placed on the market by J. H. Williamson Company, Buffalo, N. Y., has two outstanding advantages over previous models. The handle for adjustment is on top of the vise where it is easy to operate, while the jaws are reversible; i.e., when the teeth are worn the bolts



Chain pipe vise with reversible jaws has many advantages over previous models

have to be unscrewed and the jaws turned over. This feature prolongs the life of the vise considerably. In addition, the vise accommodates pipes which are  $\frac{1}{2}$  in. larger than previous models could take care of. The vise is made from tough wrought steel, drop forged base, jaw, handle and chain arm. It is finished in chrome plate and furnished in two sizes for  $\frac{3}{8}$  and  $4\frac{1}{2}$ -in. pipe.

## White Designs 18-21- Passenger Bus

EXCEPTIONAL flexibility and safety under all operating conditions are claimed for a new bus recently put out by the White Company. The bus has four-wheel hydraulic brakes with Westinghouse vacuum servo to insure positive contact. The seating capacity in this six-cylinder bus, known as model 65,



Medium size bus for intercity service recently put on the market by the White Company

# New Products

varies from 18 to 21 passengers. From the standpoint of the operator it meets the popular demand for a medium-sized vehicle. Much attention has been given to accessibility of parts, making inspection and maintenance unusually convenient and economical.

Numerous orders have already been received for the new model, including an order for five from the Union Pacific Railroad for carrying tourists to the National Park of southern Utah.

## Buzzer for Electric Railway Cars and Buses

IN A NEW buzzer recently put on the market by the Consolidated Car Heating Company, the sound is transmitted to the moulded base which acts as a sound box, thus permitting the use of a totally enclosed cover which protects the mechanism from dust and moisture. Aside from its neat appearance, the construction is simple and rugged, and consists of a steel frame with a grounded coil, an armature and contact strip, Swedish blued spring steel, and tungsten contacts which are provided with a solid locking adjustment. The terminals are arranged for leads

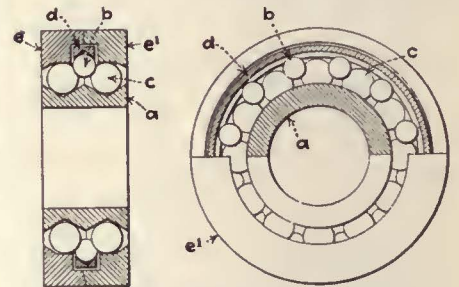


Compact car buzzer recently brought out by the Consolidated Car Heating Company, Inc.

to enter from the back or from below, which reduces to a minimum the possibility of damage. The cover screws, terminals, and adjusting screw are all accessible from the front. The finish is in dull black. The buzzer is mounted vertically and is only  $4\frac{1}{4}$  in. long,  $2\frac{3}{8}$  in. wide and  $1\frac{7}{8}$  in. high, with rounded ends. Usually one or two are installed in series with the standard fuse and resistance box for trolley voltage, or direct from any battery voltage, in which latter case the resistance box might be omitted.

## Bearing Has Three Rows of Balls

IN GERMANY a new type of ball bearing with three rows of balls has been put on the market recently. The main feature in this new bearing is that a third row of small balls is used instead of a ring between the two rows of bearing balls, serving solely to keep the larger balls in the



Recently developed ball bearing of German design

two main rows from touching each other. The small balls, which are called distancing balls, are held in place by a grooved ring which revolves freely inside the body of the bearing. The construction of the bearing is shown in the accompanying illustration: "a" is the inner race having two grooves, one each for each row of bearing balls "c" and "c'."

The distancing balls are indicated by "b" while "d" is the ring holding them, and the outside race consists of two halves, "e" and "e'." The illustration shows that sliding friction is replaced by rolling friction.

# for the Railways' Use

## Bob-tailed Shovel Has Reduced Clearance

TWO electric shovels recently purchased by the Cleveland Railway are unusual because they have been "bobtailed" to reduce the clearance required. The standard tail-swing of 10 ft. 10 in. of the Lorain 75 has been reduced to 8 ft. 9½ in. Further reduction in clearance has been obtained by cutting off the left rear corner of the cab and rotating the platform on a diagonal, thus enabling the unit to swing further without fouling the adjacent track. In making these modifications, nothing has been radically changed on the crawler or superstructure, each of these retaining the Thew "center drive."

The new electric shovel is equipped with a 12-ft. or 14-ft. boom and a 10-ft. or 12-ft. stick, giving reduced swing and height clearances desirable for street railway work. The electric motor used is a 50-h.p. a.c. or d.c. unit furnished in a range of types suitable for any ordinary current. Control of the motor is by means of an automatic push button just to the right of the operator. Power for the motor is taken through the truck and delivered to substantial brass contact rings bolted to the steel crawler frame and thoroughly insulated from it. Power is then transmitted up to the turntable by means of brushes sus-

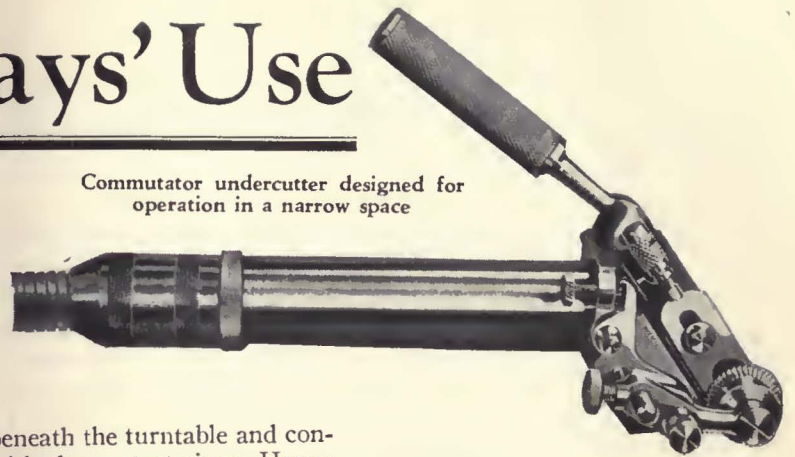
pending beneath the turntable and contacting with the contact rings. Heavy leads in conduit carry the power from the brushes to the electric motor.

## Compact Commutator Mica Drill for Heavy-Duty

A NEW undercutter manufactured by the Ideal Commutator Dresser Company, can operate in a space only 3½ in. wide, and, therefore, offers an advantage over the previous model, because its use does not necessitate dismantling brushes, brush boxes, brush rigging, etc., and because no time is lost in reassembling them before putting the motor back in service. This saves from one to three hours on every job, and this time can be spent in undercutting, instead of getting ready to undercut and to reassemble.

It is claimed that this new cutter will not heat, jump, or chatter. A set screw is available to lock the depth gage, while a micrometer adjusting screw will raise and lower this gage.

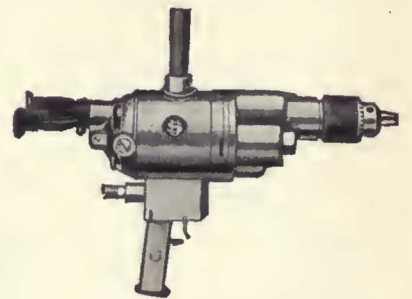
Commutator undercutter designed for operation in a narrow space



The roller guide can also be raised or lowered by a micrometer screw to conform to size of cutter used. The distance from the saw to the roller guide is less than the width of the average small copper bar, and thus permits the guide to be used on the next slot, requiring but one slot to be cut by hand. Another feature of this undercutter is the depth gage adjacent to the saw so that the actual depth can be easily measured. It will not mar the copper but will give a bearing support.

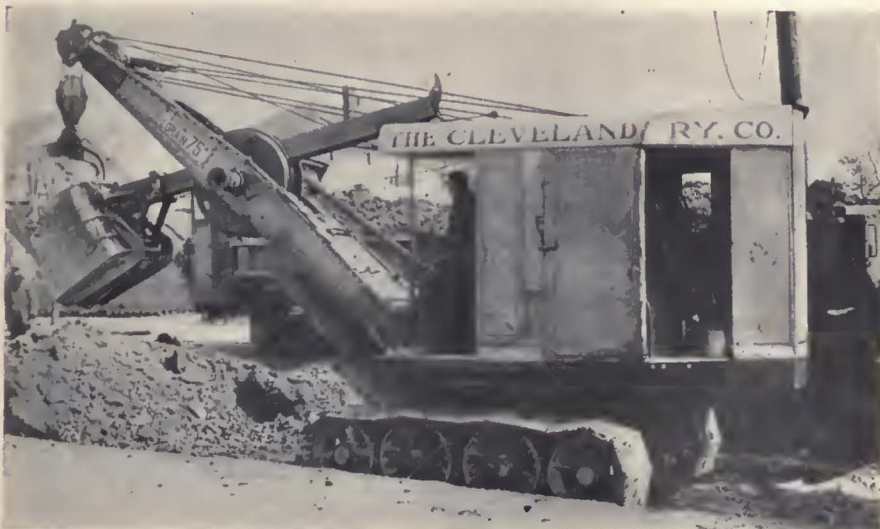
## Drill for Heavy Duty

FOR heavy duty a low speed, ¾-in. drill has been developed by the United States Electrical Tool Company, Cincinnati, Ohio. An alternat-



Heavy-duty drill has a two-pole trigger switch and a three-jaw screw back chuck which can hold straight shank drill bits

ing-current or direct-current universal motor of 60 cycles or less operates the drill at 400 r.p.m., load speed. It has S.K.F. ball bearings, special thrust bearings in chuck spindle, and extra heavy chrome nickel steel gears which run in a grease-tight case. The armature is double silk insulated and enameled. The body frame and commutator head are made in one piece of aluminum.



This "bobtailed" shovel gives additional clearance between shovel and passing street car when excavation is continued during regular operating hours

# NEWS of the Industry

## Governor Vetoes Missouri Enabling Act

Governor Caulfield of Missouri on June 25 vetoed the terminable permit bill passed by the recent Assembly and applicable only in St. Louis, Mo. The measure was recommended by the St. Louis Transportation Survey Commission, Mayor Miller, other city officials and leading civic and business organizations. It was supported by the St. Louis Public Service Company and the People's Motorbus Company. The opposition was led by the St. Louis *Post Dispatch*.

Governor Caulfield held that the measure was an evasion of the St. Louis charter, which restricts public utility franchises to a period of 50 years, and that it did not confer any additional powers on St. Louis, but authorized the Missouri Public Service Commission to grant permits or franchises for an indefinite length of time. The Governor said:

"I would sign this bill were I not convinced that it is an unnecessary and unwise evasion of the charter-making power of St. Louis. All other cities, and even St. Louis County, are excluded from its provisions. It confers upon the State Public Service Commission powers that it can only exercise as to St. Louis.

"It would seem that the bill was not passed upon its merits but upon assurance to the Legislature that St. Louis, and St. Louis only, wanted it. It is called an enabling act, but I do not find that it confers upon the city of St. Louis any power which it does not now have, except the power to enable the Public Service Commission to grant such utilities a 'terminable permit' or 'indeterminate franchise' for a longer period than fifty years. The city may include in a franchise granted by itself all of the features contemplated by the proposed law for contract ordinance precedent to the issue of the terminable permit."

The Governor also stated that the people of St. Louis alone should decide whether the city charter should be amended to grant the issuance of terminable permits or indeterminate franchises for a period in excess of 50 years. He pointed out that it is important the friendly relations between the people and public utilities be maintained.

## Committee Awaits Seattle Mayor's Efforts

Plans of the Traffic Research Committee at Seattle, Wash., engaged in maturing a program for rapid transit, will be held in abeyance pending the result of Mayor Frank Edwards' effort to re-finance the municipal railway system. The committee is in sympathy with the Mayor's plan, and it does not wish to embarrass him by the injection of other plans while negotiations are pending looking toward the improvement of the present system. The committee found the physical and financial conditions of the system to be serious, and

agreed that rehabilitation of the railway is the first necessary step. It is not enthusiastic over railway extensions unless the matter of what is to be done about them is first studied in connection with rapid transit needs.

## Chicago to Hasten Draft of Settlement Franchise

According to the present plans, the Council's committee will lay out the fundamentals upon which the new ordinance looking toward unification in Chicago

should be drawn. This plan will then be submitted to the attorneys for the companies, the citizens' committee and Attorney Fisher, who will be asked to work with lawyers representing the City Council in the actual writing of the draft under the authorization contained in the enabling legislation passed by the Legislature and signed by the Governor. When a skeleton draft has been completed the lawyers will be asked to submit it to the Council's committee. Then it is planned to hold extended public hearings on this draft, at which those who desire to present views on the ordinance will have an opportunity to do so.

## Unification Recommended

### San Francisco city engineer would bring private and municipal lines together under a five-cent fare with deficit met by taxpayers

CITY ENGINEER M. M. O'Shaughnessy of San Francisco, Cal., on June 5 submitted to the Board of Supervisors, through the Board of Public Works, his "Report on the Street Railway Requirements of San Francisco, with Special Consideration to the Unification of Existing Facilities," together with his valuation of the Market Street Railway properties. His report on the California Street Railway system was filed in December, 1928. The report on the transportation requirements is in a single volume of 400 pages, while the valuation of the Market Street Railway system occupies 7 volumes, approximating 3,500 pages, and the volume on the California Street system covers some 300 pages.

The preparation of the report required nine months' work on the part of a staff of experts and assistants under the direction of the city engineer. In a foreword to the report, Mr. O'Shaughnessy says: "It is almost axiomatic that, from the standpoint of the riding public, the best service can be provided by a unified street railway system with universal transfers; also that, on a given wage scale, such a unified system, under a single management, can provide a given standard of service most economically.

"San Francisco, under mandate of the people, as expressed in our charter, is committed to the proposition of municipal ownership of its public utilities.

"The municipality, in the operation of its own railway, after due consideration and by proper legal procedure, has adopted a standard of wages for its railway employees. In this report, in the endeavor to evolve an operating plan, looking toward the continued maintenance of the 5-cent fare, no consideration has been given to the obvious possibility of a reduction of the wage scale, which has been considered as a fixed quantity.

"As a result of the studies made, it is obvious that even the unified system cannot be operated on the municipal wage scale on a 5-cent fare, nor can the private company maintain its tracks and equipment

in a satisfactory operating condition and render a proper standard of service on a 5-cent fare.

"The recommendation to cover any deficit, in the operation of a combined municipal system, by a subsidy from taxes, is considered to be sound in principle, and not without precedent, as witness New York. A plan of this kind is believed to be far more desirable than an increase in the rate of fare."

The following recommendations are made in this report:

#### RECOMMENDATIONS TO PURCHASE

1. That a Public Utilities Commission be established for the purpose of administering the utilities of San Francisco, as is now being done in New York and Detroit.

2. That the city acquire by purchase the properties of the California Street Cable Railroad and the Market Street Railway at the most advantageous figure possible to be arrived at through the negotiations authorized by Ordinance No. 8125.

3. That the negotiations with the California Street Cable Railroad be on the basis of purchasing it on its earning value, namely, \$604,463, as set up in my report on that company, and that negotiations with the Market Street Railway be held with a view to securing their property for \$17,500,000.

4. That the properties of the Market Street Railway and the California Street Cable Railroad, if and when secured, be combined and operated with the Municipal Railway.

5. That the fare be retained at 5 cents with a universal transfer privilege.

6. That deficits resulting from the unified operation and retention of the 5-cent fare be met by additions to the tax rate.

Mr. O'Shaughnessy says that to carry out these recommendations, it will be necessary to reach an agreed price with the two companies and to submit to the electors a proposal to issue bonds to cover the cost of purchase of the two private systems, and provide sufficient money to cover all deferred maintenance and the additional facilities which have been recommended. Further bonds should be authorized to be sold from time to time, as the necessity arises, to meet the increased capital cost incident to rehabilitating the tracks of the

company. The amount of these bonds should be sufficient to allow an expenditure of approximately \$500,000 annually for several years.

#### OPERATING RECOMMENDATIONS

The following additional recommendations are made, contingent on the acquisition and unification of the three roads, with the idea of securing the most economical, efficient, and satisfactory operation of the combined system.

1. That the rerouting plan set up in this report, with such modifications as developments may show to be necessary, be placed in effect.

2. That, in order to speed up the transportation in the downtown district during the rush hours, all parking of vehicles be prohibited between 7 a.m. and 10 a.m., and between 3 p.m. and 6 p.m., on the streets north of Howard Street, south of Bush Street, and east of Larkin Street, with extensions on Mission Street to 12th Street, Market Street to Valencia Street, McAllister Street, O'Farrell Street, Geary Street and Sutter Street to Van Ness Avenue.

3. That all licenses to operate jitney buses be withdrawn and their operation be prohibited.

4. That the practice of exchange of transfers between buses and street cars be discontinued.

5. That the railroad system be relieved of all costs of paving except those incidental to making track repairs and any additional cost of street paving occasioned by the presence of track.

6. That the skip-stop method of operation be placed in effect where street spacing permits.

7. That the United States Post Office Department be required to pay the transportation of its employees on duty now carried free.

In making his recommendations, the city engineer has given careful consideration to the possibility of acquiring the private roads piecemeal as their franchises expire, but has determined that such a procedure would be contrary to the best public interest, as it would inevitably lead to poor service and further deterioration of the properties remaining in the hands of the companies. Without the consent of the companies to a universal transfer system, many patrons would be forced to pay double fare.

In discussing the situation at hand, due to the expiring franchises of the Market Street Railway and the California Street Railroad, the city engineer points out that the time has now arrived when, through the expiration of these franchises, it becomes necessary for the city to make a definite decision and plan of action. The city should either carry out the charter mandate by taking over and operating the systems of the private companies or adopt a plan whereby the private organizations can continue to render the character of service necessary, keeping in mind the ultimate acquisition by the city. The city engineer's studies show that the Market Street Railway has already been compelled to defer track reconstruction to such an extent that \$550,000 should be expended at this time to catch up this deferred maintenance. In addition a definite program of reconstruction should be carried out over a period of years.

The study of the Market Street Railway finances and its track condition makes it evident that on the basis of a 5-cent fare the private company cannot indefinitely maintain its tracks and equipment in condition to render satisfactory service, and that a continuation of the operation on the 5-cent fare under private ownership means that both the quality of the service and the condition of the property will deteriorate year by year.

A high standard of street railway service is essential to the continued growth and prosperity of San Francisco, and the city engineer points out that this high standard of service can best be rendered under a unified system, with universal transfers,

and if the 5-cent fare is to be maintained, with the high standard of wages paid by the municipality, this can only be done through a contribution from taxes. This follows, of course, only if the present trend in street railway traffic continues, as it has for several years, distinctly downward.

The city engineer justifies this recommendation for contribution from taxes as being sound, in that it puts a portion of the burden of maintaining this high standard of service on the taxpayers whose properties and business are directly benefited by such service, instead of leaving the entire burden on the riding public.

#### VALUATION OF THE MARKET STREET RAILWAY PROPERTIES

The city engineer finds the value of the Market Street properties as of June 30, 1928, on the reproduction cost basis, as \$46,625,506, which, after making allowance for the depreciated condition of the properties, reduces it to \$29,369,331. Certain of the company's properties would be eliminated if the city were to take them over. The value of the properties to be taken over on the reproduction cost less depreciation basis would be \$27,997,344.

The market value of the outstanding securities of the Market Street Railway, based on the high price for the first three months of 1929, was \$16,273,496, and the low price for the same period, \$13,206,769.

The city engineer suggests that in his opinion a figure of \$17,500,000 would be a fair price for the city to pay for the properties which it would desire to take over. In his report on the California Street Cable Railroad's properties, the city engineer found the reproduction cost of the entire properties to be \$2,252,458, and after allowance for depreciation this figure was reduced to \$1,097,404. After eliminating property which the city would not require, the reproduction cost less depreciation was reduced to \$903,704. In this report the city engineer recommended a purchase price not to exceed \$604,463 for the properties which the city desired to secure.

The city engineer has made a comprehensive survey and study of the traffic of the Market Street Railway lines. On the basis of the data secured, he has worked out a plan combining the Municipal Railway system, the Market Street Railway system, and the California Street Cable Railroad system into a single unified system involving a complete re-arrangement of routes and designed to give an excellent and improved service to all sections of the city. Such a plan will materially improve traffic conditions on Market Street and effect economies of operation, while improving the service. The number of lines operating on Market Street east of Sutter Street under this plan would be reduced from 20 to 13, and between 4th Street and Geary Street from 13 to 9, with corresponding reductions in other sections. The city engineer also points out additional necessary changes in routings which will further improve Market Street conditions if the transbay bridge is built.

Details of 53 proposed new routes are presented which show that it will be possible to operate service equivalent to or better than that now operated, with a reduction of between 3,500,000 and 4,000,000 car-miles per annum—approximately 10 per cent of the total car mileage now operated by the three systems. On the basis of the operating cost of the Municipal Railway system, \$750,000 to \$1,000,000 a year would be saved on this particular item on the unified system.

Tables show estimates of the financial results of municipal operation of the combined systems on the basis of continuing

the 5-cent fare, and making allowance for the estimated loss of revenue occasioned by universal transfers. On the basis of these estimates, under the present municipal wage schedule, the unified system, with the proposed rerouting of cars, after providing adequately for depreciation of the properties, would indicate an operating deficit of \$869,667 annually, as compared with an operating deficit of \$1,623,648, if the present service were to be continued under the municipal wage scale. These deficits do not take into account interests and ultimate fixed charges. When the interest and fixed charges are added to the operating deficit, on the basis of the purchase price suggested by the city engineer, the gross deficit would be \$2,741,867 annually. This figure would be reduced to \$2,346,867 as the result of certain increases in revenue and decreased operating costs which would result if certain other of the city engineer's recommendations were put in effect. On the basis of an assessed valuation of \$850,000,000, this latter figure would amount to 27.6 cents on the tax rate.

#### Changes in Southwestern Association's Plans

At a recent meeting, the governing body of the Southwestern Public Service Association, Dallas, Tex., made several changes in the constitution, so as to permit and encourage even greater cooperation in the future, than in the past, with the other associations with which the Southwestern is affiliated. Most important of these were provisions to waive separate Southwestern conventions and encourage attendance by the membership at suitable regional conventions of their craft; especially the Southwestern division, Natural Gas department, American Gas Association, Southwest Geographic division, and National Electric Light Association. Provision will be made, however, to have group or sectional meetings at such times and places as will be profitable for any of the groups or sections which constitute the association.

As for the past 35 years the Southwestern will represent the interests of the gas, the electric, the railway, and the telephone companies, in Texas and Louisiana. An advisory council, to consist of one representative from each of the member companies, is to convene from time to time to consider the general affairs and policies of the association, and elect an executive committee.

The officers and executive committee selected for 1929-1930 are:

President, Knox Lee, Southwestern Gas & Electric Company, Marshall, Tex.

First vice-president, chairman gas section, Frank L. Chase, Vice-president, Lone Star Gas Company, Dallas, Tex.

Second vice-president, chairman electric section, J. W. Carpenter, president, Texas Power & Light Company, Dallas.

Third vice-president, chairman railway section, W. B. Tuttle, president, San Antonio Public Service Company, San Antonio, Texas.

Other members of the Executive Committee are: George H. Carter, vice-president, Texas Utilities Company, Marlin, Texas; J. G. Holtzclaw, vice-president, Gulf States Utility Company, Beaumont, Texas; W. L. Prehn, general manager, Southwestern Bell Telephone Company, Dallas, Texas; treasurer, R. G. Soper, vice-president, Dallas Gas Company, Dallas, Texas; secretary, E. N. Willis, Dallas, Texas.

## New Youngstown Grant

Service-at-cost continued under an arrangement designed to secure a liberal flow of capital for investment

JUNE 21 marked the date of operation by the Youngstown Municipal Railway, Youngstown, Ohio, under its new 25-year franchise passed by Council on May 22 and signed by the Mayor on May 25. Among the outstanding features of the grant are the following:

1. Continuance of service-at-cost arrangement in effect during past ten years.
2. A new provision regarding repairs in paved streets, under which the company is required to repair only such paving as may be damaged or disturbed on account of operation of cars or damaged or disturbed on account of necessary repairs to tracks, rails, or joints in the rails.
3. A provision regarding new paving or reconstruction of paving by which the company shall be assessed only that amount which represents the increased cost of paving foundation under its tracks in excess of what the cost would be to the city in paving in case there were no car tracks.
4. A provision that all expense of change in tracks, pole lines and paving necessitated by public improvements shall be borne by the city and paid by city.
5. The company is authorized to operate over all bridges and grade separation viaducts now owned or controlled by the city of Youngstown. In case of the construction or reconstruction of bridges over which the tracks of the company exist or may hereafter be laid, the company is to pay only for the tracks and appurtenances thereto and only such part of the cost of the bridge or viaduct as shall actually be occasioned by the construction of the track or tracks.
6. A provision that on and after Jan. 1, 1930, all expense in connection with the office of the Street Railroad Commissioner including salary of the commissioner and any employees of his office, shall be borne and paid by the city.
7. A provision that should the city suffer, aid, permit or foster competition in transportation except by such companies as are now operating under franchises heretofore granted by the city to such companies, individuals or partnerships as are now operating or may operate under present existing city ordinance, the city shall then lose control of the service and rate of fare provided for in this franchise and such loss of control shall continue so long as competition is permitted by the city.
8. Provision is made that the company shall be allowed to earn (after taxes and depreciation) 6 per cent on its present capital value, 7 per cent on all additions to capital, and one-half of any excess above such permitted return after \$100,000 is accumulated in the surplus fund of the company.

The new franchise was prepared by a committee of fifteen of the most prominent citizens of Youngstown, appointed for the purpose by the City Council in May, 1928. The chairman of this committee was the president of the largest financial institution of the city and other members of the committee represented in an executive capacity other financial institutions, other large industrial concerns and other business interests of the city. The committee commenced to function actively in September, 1928. Public hearings were held.

## Against Hasty Action on Pittsburgh Subway

George S. Davison, chairman of the City Transit Commission, at Pittsburgh, Pa., has asked delay on any action in the nature of a commitment on any subway plan at this time. It is pointed out that on June 25 the special election will take place on the metropolitan city question and that in the new charter plan consideration has been given to the district assessment plan of financing such improvements.

Mr. Davison regards it as desirable that

the city get the proper start in the financing of subway construction, "by utilizing the special assessment method to help pay for its initial subway construction and thereby make less difficult the application of this plan to later subway projects."

## Specifications Out for Lackawanna Electrification

Equipment specifications for the multiple-unit cars for use on the Lackawanna Railroad electrification out of Hoboken, N. J., are now in the hands of the manufacturers, and it is anticipated that bids will be received in the near future. Bids already are in for the catenary structure and the contracts may be awarded within the next month.

As noted previously, power contracts have been signed with the Public Service Electric & Gas Company, the Jersey Central Power & Light Company and the New Jersey Power & Light Company for supplying power for the entire electrification. The contact line will carry 3,000 volts direct current.

## \$10,000,000 Annual Parking Loss in St. Louis

Elimination of all parking in the downtown sections of St. Louis, Mo., is being considered by the Traffic Committee of the St. Louis Safety Council. Oliver T. Remmers, chairman of the committee, personally favors the elimination of parking, saying that the Council's contention is right that the streets were designed for the movement of traffic rather than for the storage of unused automobiles. It has been estimated that the parking of automobiles in downtown streets costs the city \$10,000,000 annually through loss of business that otherwise could be obtained from tourists and other visitors.

## Exhibition No. 12

### First Come, First Served

Will be the rule  
for

### A.E.R.A. Exhibitors

in the

New Atlantic City Auditorium  
next September.

### IF

you have not entered your order for Electrical, Compressed Air, Furniture, Rug, Floral and Drinking Water requirements,

### Don't Delay

Fill out the regular order forms sent you and return them to

### Exhibit Committee

American Electric Railway  
Association  
292 Madison Avenue,  
New York City

### Promptly

## Governor Comments on New Chicago Bills

Governor Emmerson of Illinois has signed the Chicago traction bills passed by both branches of the General Assembly. In going over the bills before they were signed by the Governor, attorneys discovered that House Bill 513, amending the cities and villages act, was faulty and so a Senate bill was substituted. The attorneys declared that the change in no way affected the group of bills approved.

The Governor issued a statement in part as follows:

On Dec. 6, last, Judge Wilkerson, before whom receivership proceedings are pending involving one of the surface lines companies, appointed a committee of prominent citizens to work out a definite plan of settlement upon which the city and the companies could agree. The bills now before me, with the exception of House Bills 515 and 737, are the result of the efforts of this committee.

The six agreed bills were submitted to the City Council for approval and were endorsed by practically a unanimous vote. They were agreed to by the companies and were brought to Springfield by the citizens' committee and the local transportation committee of the City Council.

The fullest opportunity was given in both branches for thorough consideration of all of these bills. They were passed in the House by upwards of 110 votes and in the Senate by 41 votes.

The measures are properly safeguarded by provisions that any ordinances drafted under them must be submitted to a vote of the people before becoming effective. The bills do not in themselves settle the traction question, and no settlement can be effected until the City Council has agreed upon the terms of settlement and the people, at a referendum, have approved the action of the Council.

For many years the ideal of those who have studied local transportation in Chicago has been unification of surface and rapid transit facilities, with subways in the congested areas, all operated on the basis of a unit fare with transfer privileges.

The citizens' committee and members of the City Council believe these bills give the city all the authority it needs to work out an adequate unification plan.

Under their terms the city has the power not only to determine the details of the plan of settlement, but also to regulate operation, rates and service, and the right of purchase by the city, should that be desired, is protected. In the arguments of those who request the vetoing of the bills no good reason has been offered for setting aside the judgment of the City Council and the two Houses of the General Assembly.

The terminable permit measure, one of those approved, applies to the entire state. Bills will be enacted July 1.

## More Seven-Cent Schedules Rejected in New York

The New York Transit Commission on June 18 rejected as illegal the 7-cent fare schedules filed by the Eighth & Ninth Avenue Railways on July 16, 1928. The ground for the decision was the same as that given in rejecting the higher fare plea of the Drydock, East Broadway & Battery Company three weeks ago, namely, that the company had proceeded under the wrong section of the Public Service Commission law. The regulatory body made the point that the 5-cent fare under which the company operates in the city of New York was "contractual in nature" and could not, therefore, be altered by the commission. The opinion added that it was doubtful whether the company, even if granted a 7-cent rate, could meet the competition of the rapid transit lines and other surface lines along its routes.



## Late News Briefs

**Tulsa, Okla.** — After crippling transportation facilities for two days, employees of the Oklahoma Union Railway returned to their positions on June 18. The differences between the company and employees were submitted to the State Board of Arbitration and Conciliation. The strike was the second transportation tie-up in the history of Tulsa. It resulted from a request for a 3-cent hourly wage increase by members of the local union, and for a seven-day vacation each year on full time. Wages now range from 45 to 55 cents an hour. The company has not earned operating expenses at any time since the present owners took over the property in 1923.

**St. Louis, Mo.**—The St. Louis Electric Terminal Railway has asked the Board of Public Service to secure the vacation of a 127-ft. section of Brooklyn Street in connection with the construction of its proposed elevated and subway line which will connect the McKinley Bridge with a new passenger-and-freight terminal at Twelfth Boulevard and Washington and Lucas Avenues. Property owners have signed a waiver of damages.

**Seattle, Wash.** — G. B. Avery, in charge of the municipal street railway, has ruled that trainmen must stand an inspection every three months, under the critical eyes of station masters. Full length mirrors and shoe-shining stands are to be installed in each carhouse, and conductors and motormen are to be supplied with snappy new badges and new gilt cap bands to replace the cap insignias now worn.

**Louisville, Ky.**—Harland Bartholomew has explained to Mayor Harrison and members of the City Planning and Zoning Commission a preliminary major street plan which he has prepared as the first phase of a comprehensive plan for Louisville. Mr. Bartholomew said that Louisville has 597 miles of streets and the plan adds 9 miles to this total and makes 140 miles of the city streets major thoroughfares which will accommodate from four to eight lines of traffic. The commission arranged for a committee of its members to make revisions and suggestions before it is adopted as a layout of the principal traffic streets for the city until 1980. On this committee is Frank H. Miller, vice-president of the Louisville Railway.

**St. Louis, Mo.**—*Transit News*, published by the St. Louis Public Service Company, has come out for the elimination of parking in streets occupied by street cars, especially in the congested districts. The railway's research department estimates that each automobile parked in the downtown streets occupies space valued at \$5,000, and that the rental and tax value of this space is \$375 a year. This does not take into consideration the tremendous economic loss caused by the delay to patrons of the railway by the unwarranted congestion caused by parked automobiles.

**Canton, Ohio.**—The Canton Street Car & Bus Company has been incorporated by A. C. Blinn, president of the Northern Ohio Power & Light Company, J. B. Young, his secretary, and Windall L. Willkie, chief counsel for the company, to furnish Canton with trans-

portation by street car, all bus, or a combination of the two in accordance with plans matured previously, to which reference has been made before in the *ELECTRIC RAILWAY JOURNAL*.

**Cuyahoga Falls, Ohio.**—An agreement has been reached between the City Council and the Northern Ohio Power & Light Company whereby the street cars will be taken off Front Street and routed over Second Street, both north and south bound, for a period of 30 days beginning June 10. During the same period a crosstown bus service will be established from Cleveland Boulevard on Northampton Road over Northampton, Portage, Newberry, Tallmadge, High, and back over Portage to Northampton and Cleveland. The experiment is to be tried without committing either the city or company to any definite program as to the permanent discontinuance of car service on Front Street.

**Joplin, Mo.** — The Missouri Public Service Commission at Jefferson City on June 21 authorized the Southwest Missouri Railroad to charge in Joplin a cash adult street car fare of 8 cents with two tokens for 15 cents and 3 cents for children. This is an extension of the adult fares authorized by the commission in April, 1928, for a period of thirteen months.

**Ballston Spa, N. Y.**—The Public Service Commission on June 6 directed the Kaydeross Railroad to repair its railroad. The line is electrically operated, is 12 miles in length, extending from Ballston Spa to Nill Grove where it serves the two mills of the Kaydeross Paper Company and the Cotrell Paper Company. There are two passenger trains a day.

**Indianapolis, Ind.** — Public bequests of approximately \$160,000,000 to be available in 2129 are made in the will of the late Will A. Latta, attorney for the Indianapolis Street Railway, filed

for probate here on June 13. It provides for \$50,000 to be kept intact for 200 years at compound interest.

**Frankfort, Ky.**—The possibility of the State of Kentucky developing a State Utilities Commission appears slim. At the last session of the Legislature a special committee was named to investigate and report on the needs of state regulation of the various public utilities. The chairman says that as representatives invited to discuss the matter had failed to put in an appearance, it would seem that there was not much demand for a utility commission or any reason to recommend establishment of a commission.

**Flushing, N. Y.**—Edward A. Roberts, manager of the New York & Queens County Railway, convinced that the "Orange Trolley" is the quick, convenient way to New York, recently distributed a little folder containing a homily on the utility of the route, a map of the district served and last, but not least, a complimentary ticket in the form of a stub "good for one continuous passage on June 21, 22 and 23, 1929, on inbound cars to New York only."

**New York, N. Y.**—An independent Socialist attack on the transit policy of the present administration in New York City has been launched by Louis Waldman, former Socialist candidate for Governor, who has addressed a letter to Mayor Walker in which he asks sixteen questions intended to clear up a situation that is "full of talk about transit and new subways and no results."

**Dallas, Tex.**—Residents of East Dallas have asked the City Commission to require the Dallas Railway & Terminal Company to extend the Junius Heights line to Greenville Road and Llano Street in accordance with Everman Plan No. 5. Opposition was registered to the plan to continue the present shuttle bus service in lieu of the extension of the line.

**New York, N. Y.**—The New York Transit Commission has ordered the Brooklyn-Manhattan Transit Corporation to expend \$2,500,000 for new cars. Railway officials intimate they will comply with the order. The commission is considering the matter of seeking the appointment of a receiver to take charge of all revenues of the Interborough Rapid Transit Company in excess of the \$6,335,000 annual profit guaranteed by the city on the company's lease of the city-owned subways.

**Chicago, Ill.**—The Woods electrification bill providing that all steam railroad terminals in Chicago shall be electrified before 1933, the cost to be met by sale or lease of air rights, was killed in the Illinois Senate, as that body prepared to adjourn for the summer.

**Schenectady, N. Y.** — *Riders' Guide* has been started by the Schenectady Railway in the form of a four-page leaflet 6½ in. deep by 3¼ in. wide. The first issue is dated June 15. It is intended to print messages as to company policy, schedules, service, safety and any other topics that may be of an informative nature. Students of the Junior High and High Schools of Schenectady and Scotia were asked to suggest names for the new publication and the name decided upon by the committee was suggested by Miss Agnes Svolos, who received an award of \$10 from the company.

### COMING MEETINGS

July 1-2—National Motor Bus Division, American Automobile Association, annual meeting, Hotel Lafayette, Buffalo, N. Y.

July 10-11—Regional Conference of New England Electric Railway Executives, Copley Plaza Hotel, Boston, Mass.

July 11—New York Railroad Club, annual outing, Travers Island, N. Y.

July 17—Central Electric Traffic Association, Miami Hotel, Dayton, Ohio.

July 24-26—Electric Railway Association of Equipment Men, Southern Properties, Lafayette Hotel, Lexington, Ky.

July 26-27—Central Electric Railway Accountants' Association, Angola, Ind.

Aug. 15-16—Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.

Aug. 27—National Association of Railroad and Utilities Commissioners, Glacier National Park, Mont.

Sept. 28 - Oct. 4—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium.

Nov. 20-21—Association of Electric Railway Equipment Men, Middle Atlantic States, Richmond, Va.

Nov. 21-22—Public Utilities Association of Virginia, annual meeting, Chamberlain-Vanderbilt Hotel, Old Point Comfort, Va.

# Recent Bus Developments

## Uniform Specifications Discussed

Bus specifications as drawn up by the National Automobile Chamber of Commerce, *Bus Transportation*, the Connecticut Public Utilities Commission, the Society of Automotive Engineers, and the Motor Vehicle Conference Committee were discussed at the joint meeting held on June 20 and 21 in Washington, D. C. The purpose was to try to standardize the principal dimensions and equipment of buses. Although the desirability of this was recognized, several members of the code committee felt that standardization might impede the development of the bus.

The opinion was advanced that what might be considered a desirable feature today may easily prove to be old fashioned five years hence. At such time, a state commission inspecting a bus of improved design would not accept it because it would not conform to the regulations laid down five years previously. It was thought that enough leeway should be maintained in the specifications to allow the manufacturer to incorporate his new ideas in the bus, thus giving the operator the benefit of experience gained during past years and not retarding development by regulations.

One of the changes made in the proposed rules is that a maximum length of 40 ft. be allowed, but leaving a loop hole for state commissions to reduce this maximum length if considered desirable. This overall length is to be measured from bumper to bumper. Although a prolonged discussion took place concerning the desirability of including the sleeper buses in the code, it was thought that, due to insufficient experience, it would be inadvisable to do so.

## Railways Protest Queens Bus Service

Supreme Court Justice Strong in Brooklyn reserved decision on June 26 on the application by the New York & Queens County Railway and the Steinway Railway for an injunction to restrain the Long Island Transportation Company from maintaining a bus service between Astoria and Elmhurst. At one point, Justice Strong in interposing his own opinion said he thought transportation service "could be improved." Justice Dike suspended operation of the buses recently pending the outcome of the litigation. The petitioning companies, maintain trolley lines in Queens. They contend that the defendant company is engaged in unfair competition. A. T. Davison, counsel for the railways, argued that the bus company also was operating without franchise or certificate of convenience and necessity.

## Another Westchester Route Sanctioned

On June 25 the County Transportation Company, Inc., was granted a certificate of public convenience and necessity by the Public Service Commission to operate a bus line in the village of Mamaroneck, Westchester County, New York. The petition for the route was a result of the abandonment of the service of the New York & Stamford Railway in various cities and towns of Westchester County. Com-

missioner Van Namee pointed out that the granting of the certificate completes the chain necessary to allow continuous operation over routes in Westchester County formerly operated by the trolley line. It is a further move in the series referred to in *ELECTRIC RAILWAY JOURNAL NEWS* for June 22, page 82.

## Co-operation in "Save-a-Life" Campaign

The People's Motorbus Company and the St. Louis Public Service Company co-operated in the "Save-a-Life" campaign in Missouri during June. One of the things they did was to have all of their buses and other automotive equipment inspected by the authorized service stations. The bus companies have found that a very large percentage of all accidents between their buses and other motor cars is due to the defective brakes or steering mechanism of the other cars.

## Two Cases Before Illinois Commission

Two cases, both involving bus problems, are before the Illinois Commerce Commission. In one the Chicago Railways and the Chicago Motor Coach Company are involved, and in the other the Chicago & Joliet Electric Railway, the Illinois Traction System and the Tri-State Bus Company.

Some time ago the commission authorized the Chicago Railways to operate buses over certain streets, later rescinded the order, and then authorized the Chicago Motor Coach Company to operate buses. The railway filed suit in the Supreme Court, which holds that the commission arbitrarily exercised its authority when it granted the bus company a permit. It sent the case back to the commission with instructions that the railway be given a hearing.

A hearing in the other case was set for June 27. Some time ago, after 16 companies had been involved, the commission ordered the Chicago & Joliet to operate between Chicago and Joliet, the Alton Transportation Company, a bus line owned by the Chicago & Alton, from Joliet to Carlinville; and the Illinois Traction System between Carlinville and East St. Louis. When the Alton failed to operate, the commission issued an order to the Tri-State Bus Company to operate from Chicago to East St. Louis, whereupon the two electric railways again petitioned the commission.

## More Buses for Eastern Massachusetts

Buses will be substituted for cars by the Eastern Massachusetts Street Railway on the Wakefield, Stoneham-Winchester route on July 7. The change has been timed to coincide with the rebuilding of streets constituting the through route from Wakefield to Stoneham, so that the rails may be removed before the roadwork is started by the state. The Wakefield-Stoneham line was opened 37 years ago next August as the beginning of a net work that for many years made Wakefield the electric railway center of northern Greater Boston.

## Trucks Curbed That Bootleg Excursions

Competition of trucks insured to carry merchandise but which on Sundays and holidays run afoul the bus lines by carrying picnic and outing parties has been effectively stopped in Massachusetts under the compulsory automobile insurance law. Owners of trucks guilty of such violations face loss of registration and operators are arrested for driving trucks that are not properly insured. The extent of the use of trucks for service of this kind is surprising.

**Millbury, Mass.**—Town officials and officers of the Worcester Consolidated Street Railway are endeavoring to reach an agreement on the fare to be charged by the buses which are to supplant the trolleys early in July.

**Dayton, Ohio.**—The Dayton & Troy Electric Railway has asked the State Supreme Court to require the Utilities Commission to revoke the certificate of the Inter-City Coach Company on the ground of alleged improper practices.

**Troy, N. Y.**—Consent of the Public Service Commission to abandon certain portions of its lines in Troy was asked on June 20 by the United Traction Company. Officials of the company have voted to substitute buses, a certificate for the operation of which is also asked of the commission. A hearing on the petition will be held later.

**Fitchburg, Mass.**—The Fitchburg & Leominster Street Railway has asked the State Department of Public Utilities to restrict the Suburban Bus Lines Company, Inc., from operating in Fitchburg and Lunenburg. It is said that of late the bus line has been picking up and letting off passengers within the limits of Fitchburg and that it is running special trips to Whalom Park, operated by the railway, in direct competition with the railway. The bus company claims it has been serving Lunenburg more adequately than the railway did before it abandoned its route. The management said it would put a stop to the handling of local business in Fitchburg by its operators in contravention of the rights of the railway there.

**Dover, N. J.**—A portion of the Morris County bus line, route 72, operating between Newark, Morristown, Dover, and Netcong, has been extended by Public Service Co-ordinated Transport from Netcong to Budd Lake and Hacketts-town. Over the route between Newark and Dover the Morris County Traction Company formerly operated, but the service of that company was replaced by buses of the Public Service some time ago.

**St. Louis, Mo.**—Eight windows were broken and a parked automobile damaged when the fan-belt of a bus of the St. Louis Public Service Company broke and threw parts of the broken blades on both sides of the street on June 16. Recently a similar mishap occurred to a bus of the People's Motorbus Company. Richard W. Meade, president of the People's company, said that the two cases in St. Louis were the first of the kind to his knowledge, although buses in his charge have traveled many million miles.

# Financial and Corporate

## Key System to Reorganize

Two distinct corporations may result from plans under consideration. Committee working out details

**A**NNOUNCEMENT has been made by A. J. Lundberg, president, Key System Transit Company, Oakland, Cal., that the company will default interest payments due on July 1, on its first mortgage, general and refunding mortgage bonds, and on notes of the Key System Securities Company. Mr. Lundberg admitted this is the initial step in a program of reorganization in which the company's capital structure will be changed and a new plan of operation followed, but stated he could not discuss details at this time.

The company has been able to pay interest by rigid operating economies, sale of non-operating properties and use of funds from its depreciation account and could have continued to meet its obligations in this manner for some time to come. However, the directors felt that serious deterioration of the property eventually would result from this process and, as the day of reckoning inevitably would arrive, decided upon action at the present time.

At a conference held on June 22 with members of the California Railroad Commission it is understood that Key System officials submitted a plan to separate into two distinct corporations, the System's East Bay street car division and its transbay ferry and interurban division. It is also understood that the commission asked for additional data on the company's plans, but pointed out that it could render no decision without a public hearing.

The transbay division has shown a 4½ per cent return on the investment, but the deficit of the street car division annually has been so high that it more than offsets the profits from the ferry and interurban service. President Lundberg has stated that stockholders will not be asked to invest further capital in any branch of the company which is not able to show a return on the money invested, so it is thought probable that they will be asked to advance additional capital for the building up of the former division but will not be asked to sink any further capital in the latter.

With new money thus derived from stockholders and from the probable sale of valuable real estate which the company owns, together with advantages arising from changes in capital structure, it is pointed out that if the proposed segregation of the properties is permitted, the company taking over the transbay ferry division would be in a sound financial position. On the other hand, the condition of the street car division is so unsatisfactory that its ultimate fate is extremely doubtful. It is pointed out that on many occasions the railroad commission has urged that the Key System and Southern Pacific work out an agreement which would abolish present duplication of lines. This now may be accomplished. There are also rumors to the effect that the Southern Pacific or Western Pacific may buy the Ferry-Interurban system, and others

that the Key System may abandon the street car lines.

Details for perfecting the plans for changes are in the hands of a committee of which C. O. G. Miller, president of the Pacific Lighting Corporation and chairman of the board of the Key System, is chairman.

## Public Financing by Stone & Webster

Stone & Webster, Inc., will shortly add \$57,500,000 of capital funds through public financing. The business will continue under the same management with added advantages of a substantial public ownership.

The present Massachusetts corporation will be dissolved and a Delaware corporation formed with the same name. The authorized capitalization of the new corporation will consist of 1,500,000 no-par shares of capital stock, of which 400,000 shares will shortly be offered at \$100 a share. The present large stockholders are at the same time increasing their interest to the extent of \$17,500,000, or 175,000 new shares. There will be outstanding altogether approximately 1,300,000 shares of stock. The management expects to list its shares in New York.

The board of directors will be enlarged to include W. Cameron Forbes, former governor general of the Philippines; Joseph P. Grace, chairman of W. R. Grace & Company; Herbert L. Pratt, chairman of Standard Oil Company of New York; Eliot Wadsworth, former assistant secretary of the Treasury; Albert H. Wiggin, chairman of Chase National Bank.

## Wrongly Directed Municipal Ownership Efforts

Constant agitation for public ownership is a matter which receives substantial comment in the recent interim report of the committee on public service company securities of the Investment Bankers' Association approved by the board of governors at White Sulphur Springs. In the words of the report:

"There is never-ceasing propaganda for public ownership and operation and for the extension of the legal rights and jurisdiction of the municipal corporations. Many thoughtful people are lured by the idea of public ownership as a wise method of curbing disliked practices of private ownership."

The committee feels, however, that such efforts are wrongly directed, and despite examples of sporadic success, are based on misinformation and misconception of the inherent nature of the businesses attacked and of the nature of our government.

**Chicago, Ill.**—A committee consisting of George Woodruff, vice-chairman of the National Bank of the Republic, Joshua D'Esposito, chief engineer for the Union Station Company, and Col. A. A. Sprague, vice-chairman of the Citizens' Traction settlement committee, will be named by the city to pass on the valuation of the elevated lines under the proposed plan for unification.

## City Controller Scores P.R.T.

Questions many items of expense in preliminary report on affairs of railway. Full audit promised later

**C**ITY CONTROLLER HADLEY of Philadelphia on June 20 transmitted to City Council the preliminary report of the audit of the accounts of the Philadelphia Rapid Transit Company. The Controller demanded of Council a special investigating committee to look into the whole subject of P. R. T. expenses over the five-year period to June 30, 1928, covered by the audit. The Controller also transmitted a special report of Dr. Milo R. Maltbie, who is aiding him in the audit. The Controller promises a more definite and exhaustive report by Dr. Maltbie, but stated the audit could not be completed for at least three more months.

Fourteen leading points thus far developed by the audit demand special investigation, City Controller Hadley informed City Council, asking for a special councilmanic committee of inquiry to go into them. They have been summarized in part as follows:

1. Control of the majority of stock of the P. R. T. Company and how acquired by Mitten Management.
2. Payment of management fees of \$6,551,347 to Mitten Management in addition to \$19,108,538 paid to general officers of the P. R. T. Company for salaries and expenses of management as well as directors' fees amounting to \$96,540.
3. Commitment of the P. R. T. Company to a 30-year lease for offices in the Mitten Building at a rental of \$400,000 a year for the first ten years and \$500,000 a year for the next twenty years, in addition to the payment of taxes, assessments, repairs, etc., for the entire building by the P. R. T. Company. The P. R. T. sublets to Mitten Management a portion of the building for an amount less than the cost of the P. R. T.
4. Payment of \$25,000 for cancellation of lease covering a portion of the corner of the first floor of Mitten Building.
5. The purchase of the Yellow Cab Company at more than \$500 a share for no par value stock.
6. The operation by the P. R. T. Company of the Quaker City Cab Company, notwithstanding the fact that the Public Service Commission has failed to approve the acquisition of the cab company.
7. The borrowing by Mitten Management of P. R. T. funds to the extent of \$15,556,050, for which less than 3 per cent was paid to P. R. T. Company.
8. Payment to J. W. Braun of \$621,794 and the purposes for which this money was used.
9. The question of gratuities, donations, subscriptions, etc., amounting during the auditing period to \$53,125; expenses of the Co-operative Committeemen trip to Buffalo, \$18,009; show at Buffalo—"Little Nellie Kelly," \$13,411.
10. Loss resulting from sale of newspapers on street cars—\$25,992.
11. Expenditures for legal services, including two or more individual payments of \$50,000 each, which will appear in a subsequent report.
12. Damage claims settled with attorneys.
13. Services rendered by experts and fees paid for valuations made, and many other items of expenditure listed by Haskins & Sells.
14. The alleged practice of employing city officials and former city officials by the P. R. T. Company.

## Des Moines System Sold

Walter J. Cummings and associates of Chicago purchase road in Iowa city under foreclosure

A SYNDICATE headed by Walter J. Cummings, Chicago, was the only bidder for the property of the Des Moines City Railway at the public auction held on June 22, at Des Moines, Ia.

E. J. Kelly, special master, who conducted the sale, has recommended to the federal district court that Mr. Cummings' bid of \$1,855,000 be approved, and it is expected that Judge Martin J. Wade will give his approval just as soon as a sufficient time has elapsed to allow creditors to file possible objections.

Associated with Mr. Cummings in the purchase were Charles H. Wilcox, president of the General Steel Company, Chicago, and Charles G. Adsit, former vice-president of the Georgia Power Company, Atlanta, Ga.

The Des Moines City Railway had been in receivership since Nov. 12, 1926, when Federal District Judge Martin J. Wade granted the application of the Harris Trust & Savings Bank, Chicago, which filed a petition on Nov. 11, setting forth that the company was in default on the principal payment on \$700,000 of debenture bonds. Clyde E. Herring, Des Moines business man, and F. C. Chambers, former manager of the railway, were named receivers.

After the receivers filed a report announcing that they had on hand \$118,000 to pay indebtedness of \$1,759,152, Judge Wade ordered the property sold.

Prior to the sale, Mr. Cummings announced that he had purchased the debenture bonds and notes held by the Harris interests, constituting the principal indebtedness of the company, outside of first mortgage bonds totaling \$5,762,000.

The 103 miles of tracks, overhead, car-houses, automatic substations and rolling stock of the railway are valued at approximately \$10,000,000.

Mr. Cummings made public plans for the immediate shipment of ten late model street cars to Des Moines, and announced service betterments which include more cross-town buses, and more bus feeders for the railway system.

The car strike which threatened over the famous two-man car contract signed between the union and the company back in 1915 appeared rather remote when Mr. Cummings pointed out that he is using nothing but two-man cars on his lines around Chicago, and that the ten new cars promised to Des Moines all require two-man operation.

Mr. Cummings purchased the car system without the inclusion of the two-man car agreement which was to run till 1940, but gave no indication that he will attempt to institute one-man car service in Des Moines. He also indicated he did not intend to alter the 10-cent single fare or the weekly pass which sells for \$1.25 and is good for an unlimited number of rides for seven days.

Mr. Cummings is president of the Chicago & West Towns Railway, and president of the Cummings Car & Coach Company.

Summaries are almost completed on the growth of capital assets and capital liabilities, on issuance and purchase of securities and on service fees for six holding and service companies.

Field work has been started on relations between utility companies and service organizations in the offices of four management groups, while the preparation of all information available on intercorporate relationships in general, is nearing completion.

The foregoing material will be used in preparation for public hearings on the financial phase of the utilities investigation.

The total number of exhibits introduced is now 4,444.

On June 27 it was announced the inquiry had been adjourned till September.

**Detroit, Mich.**—The United States government will seek to collect \$300,000 from the Detroit United Railway, the predecessor of the present Eastern Michigan Railways, in respect of profit and income taxes for 1918 and 1920.

**Tacoma, Wash.**—According to Commissioner Ira S. Davison, gross receipts of the municipal belt line were \$10,453 in April and net profit \$2,063. This pulled the line out of the "red" for the year to date, and left a balance of \$341 to its credit.

**Indianapolis, Ind.**—Merger plans contemplate that all the interurban properties owned and leased by the Terre Haute, Indianapolis & Eastern Traction Company shall be put into a corporation to be known as the Indiana Rapid Transit Company, neither the securities nor earnings of which will be guaranteed by the Indiana Electric Corporation, which would own all common stock. It is entirely probable that the Central Indiana Power Company properties and the light and power business of the railway will be consolidated in the main corporation, while the railways will be left on their own revenue-earning ability.

**Oakland, Cal.**—The Key System Transit Company has applied to the Railroad Commission for permission to abandon its street car line now operating between East Fourteenth Street and the plant of the Pacific Tank & Pipe Company in East Oakland.

**St. Louis, Mo.**—During April the number of revenue passengers hauled by the People's Motorbus Company increased 8.45 per cent compared with April, 1928, while revenue street and bus passengers of the St. Louis Public Service Company dropped 5.24 per cent.

**Springfield, Mass.**—Recent reports of the Springfield Street Railway show an appreciable decline in the number of passengers carried. The report for April, 1929, shows 2,924,343 revenue passengers, as against 2,951,664 in April, 1928. Transfer passengers were 379,575, as against 379,172 in April of last year. The company recently reiterated its adherence to the policy of replacing trolleys by buses in suburban service where economic condition warrant the change.

**Denver, Colo.**—Group insurance aggregating \$1,250,000 recently was taken out for its employees by the Denver Tramway. No employee less than nine months with the company is eligible to the \$1,000 to \$1,200 coverage. The average monthly premium is 60 cents per individual, the company defraying the remaining cost. The contracts were signed by 95 per cent of the men who are eligible.

## 4,444 Exhibits in Trade Commission's Inquiry

Field accounting work has begun on two large operating subsidiaries of two important holding companies in connection with the investigation which the Federal Trade Commission is making of public utilities in pursuance of a Senate resolution.

## Conspectus of Indexes for June, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY  
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years	
				High	Low
<b>Street Railway Fares*</b> 1913 = 4.84	June 1929 7.76	May 1929 7.76	June 1928 7.62	June 1929 7.76	Jan. 1924 6.91
<b>Electric Railway Materiale*</b> 1913 = 100	June 1929 145.8	May 1929 145.5	June 1928 141.4	March 1924 163.9	Feb. 1928 139.5
<b>Electric Railway Wages*</b> 1913 = 100	June 1929 230.8	May 1929 230.1	June 1928 229.2	June 1929 230.8	Jan. 1924 217.4
<b>Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100</b>	June 1929 199.7	May 1929 199.5	June 1928 202.7	March 1924 206.8	Sept. 1927 193.4
<b>Eng. News-Record Construction Cost (General) 1913 = 100</b>	June 1929 205.6	May 1929 205.2	June 1928 206.2	March 1924 224.7	Nov. 1927 202.0
<b>U. S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100</b>	May 1929 95.8	April 1929 90.8	May 1928 98.6	Nov. 1925 104.5	April 1927 93.7
<b>Bradstreet Wholesale Commodities 1913 = 9.21</b>	June 1929 12.46	May 1929 12.68	June 1928 13.19	Dec. 1925 14.41	July 1924 12.23
<b>U. S. Bur. Lab. Stat. Retail Food 1913 = 100</b>	May 1929 153.3	April 1929 151.6	May 1928 153.8	Nov. 1925 167.1	May 1924 141.0
<b>Cost of Living Nat. Ind. Conf. Bd. 1914 = 100</b>	May 1929 159.4	April 1929 159.3	May 1928 161.5	Nov. 1925 171.8	April 1929 159.3
<b>Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100</b>	May 1929 136.9	April 1929 136.4	May 1928 119.0	Feb. 1929 149.4	July 1924 73.4
<b>Bank Clearings Outside N. Y. City 1926 = 100</b>	May 1929 102.5	April 1929 104.0	May 1928 108.4	Feb. 1929 110.1	May 1924 84.4
<b>Business Failures Number Liabilities (Millions)</b>	May 1929 733	April 1929 738	May 1928 723	Jan. 1924 2231	Sept. 1928 1348
	44.90	32.59	36.82	122.95	23.13

\*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

## Personal Items

### C. E. Morgan With West Penn

Executive of Brooklyn City Railroad joins vast railway system radiating from Connellsville as vice-president

**D**YNASTIES, whether political or industrial, to be successful, must be directed by men of action. It is, of course, always interesting to inquire into the economic consequences of countries and corporations, but to the great majority of us Mussolini means more at the moment than does Italy and John D. Rockefeller means more than does Standard Oil. In contrast of this kind in electric railroading Clinton E. Morgan means more at the moment than does the Brooklyn City Railroad. So this industry will pause at the news that Mr. Morgan, inseparately a part of the Brooklyn City Railroad since 1919,



C. E. Morgan

is to become vice-president of the West Penn Railways, Pittsburgh, Pa.

Mr. Morgan's work as doctor of the sick system of lines of the Brooklyn City Railroad has ended. He has done well with the job for which he was originally retained. He goes to Pittsburgh on the eve of the merger of the lines of the Brooklyn City with those of the surface lines of the Brooklyn-Manhattan Transit Corporation. Certainly, if he made no promises when he assumed the job in Brooklyn Mr. Morgan need make no excuses now.

Previous to October, 1919, the Brooklyn City Railroad was operated as part of the property of the Brooklyn Rapid Transit Company, the predecessor of the Brooklyn-Manhattan Transit Corporation. Mr. Morgan was placed in charge as assistant general manager, then served as general manager and latterly as vice-president and general manager. He came from the West with a long record of accomplishments and crowned his work with a record for rehabilitation and vigorous management in Brooklyn that has greatly enhanced his reputation.

Mr. Morgan began railroading as a clerk in the office of a steam railroad. For the next five years he acted as assistant to the president and other officers of the Indianapolis & Greenfield Electric Railway. In 1905 he had charge of the work of the rebuilding and operating the Indianapolis line, and was also superintendent

of the Danville line of the Terre Haute, Indianapolis & Eastern Traction Company. Four years later he accepted the position of general manager of the Indianapolis, Crawfordsville & Western Traction Company. He resigned in 1912 to become connected with the Michigan Railway.

To say that Mr. Morgan has been active in the affairs of the American Electric Railway Association hardly characterizes his work properly. He has been more than active. He is a charter member of the Central Electric Railway Association and in the past has served as a member of the standardization committee on equipment in both the Central Electric Railway and the American Association. Also he was a member, and later chairman of both the schedule and time tables and the rules committees of the Transportation and Traffic Association. He also served on the block signal committee. Mr. Morgan now is the chairman of the committee on publications of the American Association and is the third vice-president of that body.

### Ray P. Stevens Heads New Power Merger

Details of the merger offer by which J. P. Morgan & Company and F. L. Carlisle & Company hope to weld together a \$565,000,000 power combine in upper New York State have been made public. Niagara-Hudson Power Corporation is the name of the new concern, and it has offered, by exchange of its shares, to acquire the Buffalo, Niagara & Eastern Power Corporation, the Northeastern Power Corporation and the Mohawk-Hudson Power Corporation, together with their many subsidiaries.

Floyd L. Carlisle is chairman of the board of directors; George H. Howard, president of the United Corporation, is chairman of the executive committee; Ray P. Stevens, former president of the Allied Power & Light Company, will be president.

The vice-presidents are Alfred H. Schoellkopf, vice-president and general manager of Buffalo, Niagara & Eastern, and E. L. West, also of the same concern.

### H. L. Reichart Vice-President, New York State Railways

At the meeting of the directors of the New York State Railways following the recent change of control from E. L. Phillips and associates to that of the Associated Gas & Electric interests, Howard L. Reichart, secretary and treasurer of the New York State Railways, was elected a director and vice-president of the company.

Mr. Reichart has been connected with the New York State Railways since its incorporation, and was formerly associated with the late Horace D. Andrews when the latter was president of the New York State Railways and the Rochester Railway & Light Company with offices in New York City. Mr. Reichart went to Rochester when the general offices were moved there in 1918. He was appointed assistant secretary of the New York State Railways in 1913, and in April, 1925, he was elected secretary and treasurer of the company.

### C. H. Dahl Heads Canadians

Assistant general manager at Winnipeg was elected president at recent Montreal meeting

**C.** H. DAHL, assistant general manager of the Winnipeg Electric Company, Winnipeg, Man., in charge of operation, was elected president of the Canadian Electric Railway Association at the recent meeting in Montreal. His work at Winnipeg covers the responsibility for the operation of the transportation service, the electric and the gas utilities.

The new president of the Canadians was educated in the public and the high schools of Marinette, Wis., the Normal School at Oshkosh, Wis., and the University of Wisconsin. From the last named institution he holds a B.A. degree.

Mr. Dahl taught school for seven years previous to his collegiate training. He joined the Wisconsin Railroad Commission in 1917 as case investigator, and held that position until November, 1919, when he became connected with the



C. H. Dahl

Winnipeg Electric Company as statistician. A statistician is in a position to take in the full measure of the operations of a company if he will, and this is just what Mr. Dahl did.

During his four years of almost silent work in that capacity he made himself one of the best informed men in the company's service, so that when in May, 1923, he was appointed assistant to the vice-president, Mr. Dahl, if he didn't know all about the company, knew a great deal. Incidentally, he had learned much about other Canadian utilities since statistics are the measure by which one company is compared with another in the matter of performance. In November, 1923, Mr. Dahl was appointed assistant to the operating manager, and from that post was advanced to assistant general manager in charge of operations. This was in December, 1924.

### B. C. Cobb Heads Penn-Ohio Edison

B. C. Cobb has been elected president of the Penn-Ohio Edison Company to succeed R. P. Stevens, who resigned to become president of Niagara-Hudson Power Corporation. Other officers elected were T. A. Kenney, vice-president; H. G. Kessler, controller, and E. E. Nelson, secretary.

# F. A. Merrick Westinghouse President

E. M. Herr, president since 1911, elected vice-chairman. Plans vacation after long intensive service. New president was formerly vice-president and general manager

F. A. MERRICK was elected president of the Westinghouse Electric & Manufacturing Company by the directors on June 26. In announcing the election A. W. Robertson, chairman, stated that directors, while accepting the resignation of E. M. Herr, president since 1911, in order that he might go on an extended vacation, had elected Mr. Herr vice-chairman.

Mr. Merrick advances to president from the position of vice-president and general manager. He is a native of New Jersey and received his technical education at Lehigh University. Shortly after his graduation, he was employed by the Steel Motors Company, a subsidiary of the Lorain Steel Company, where he was responsible for many important electrical inventions and where he held the position of manager and chief engineer.

On the acquisition of the Steel Motors Company by the Westinghouse Company, Mr. Merrick entered the Westinghouse organization. He was immediately selected to prepare plans for a plant in Canada, and, in 1903, upon the formation of the Canadian Westinghouse Company, Ltd., was sent to the Dominion as superintendent of the company. In turn he became manager of works and later vice-president and general manager of Canadian Westinghouse Company, Ltd.

In the World War emergency, Mr. Merrick was assigned to organize the operations of the New England Westinghouse Company, to manufacture rifles for the Russian government. When the United States entered the war, further demands were made upon the plant for American war material.

FROM \$20,000,000 SALES TO \$200,000,000 UNDER MR. HERR

The achievements of Mr. Merrick before, during, and following the World War won for him in January, 1925, the position of vice-president and general manager of the Westinghouse Electric & Manufacturing Company, with headquarters in East Pittsburgh, Pa. In June, 1925, he was also elected a director of the company. Mr. Merrick will make his headquarters in Pittsburgh.

During Mr. Herr's management, the Westinghouse Company grew from a business with \$20,000,000 sales annually to one with an annual business of approximately \$200,000,000. The period of his connection with the company dates from 1905 when he resigned from the Westinghouse Air Brake Company to become first vice-president of the electric company. When the Westinghouse Electric was forced into a receivership in 1907, Mr. Herr was appointed one of the receivers and also general manager. The reorganization was successfully completed within a little more than a year and Mr. Herr resumed his former position with the company. In 1911 he was elected president.

After he was graduated from the Sheffield Scientific School at Yale University in 1884 with the degree of Ph.B. Mr. Herr entered the office of the mechanical engineer of the Chicago, Burlington &



F. A. Merrick

Quincy Railroad at Aurora, Ill., as a mechanical draftsman and through successive promotions became engineer of tests, superintendent of telegraphs, and finally division superintendent of that road. In 1891 he became division master mechanic of the Chicago, Milwaukee & St. Paul Railroad. Two years later he accepted the position of general superintendent of the Grant Locomotive Works in Chicago and in 1894 became general manager of the Gibbs Electric Company of Milwaukee.

In 1898 he was asked by George Westinghouse to accept the position of general manager of the Westinghouse Air Brake Company, located at Wilmerding, Pa. Mr. Herr remained with this company until 1905 when, as before mentioned, he was elected first vice-president of the Westinghouse Electric Company.

Despite the exacting demands made upon his time as an official of the Westinghouse Company, Mr. Herr retained his deep interest in educational matters. It was he, perhaps, who helped most to develop the educational system for the employees of the Westinghouse Company. In 1920 he was elected a member of Yale Corporation and later was appointed to the Prudential Committee, which is charged with all financial matters connected with that University. He was also made a member of the Corporation's committee on



E. M. Herr

educational policy, on which committee he has assisted in formulating the educational policy of the university and particularly that of the Sheffield Scientific School. If Mr. Herr has a hobby, it is etchings. Greatly interested in the graphic arts, he has one of the finest collections of Cameron prints in the United States. Mr. Herr was born at Lancaster, Pa., on May 3, 1860.

## William Orem, Promoted by Salt Lake & Utah

C. H. Simpson, district freight agent of the Salt Lake & Utah Railroad, Salt Lake City, Utah, has resigned to become affiliated with the Pacific Nash Motors Company, San Francisco. William Orem, general agent, will take over the duties of Mr. Simpson, who has been with the railroad for six years. H. J. Stagg, Provo, Utah, traveling freight and passenger agent, has been appointed commercial agent with headquarters at Salt Lake City, and J. J. Sutherland, agent at Provo, has been promoted to succeed Mr. Stagg.

## Commissioner McCardle Reappointed in Indiana

Reappointment of John W. McCardle and the appointment of Jere West, Crawfordsville, Ind., as members of the Indiana Public Service Commission have been announced by Governor Harry G. Leslie. Mr. West will succeed Harvey Harmon, Princeton, as a democratic member of the commission. At a reorganization meeting Mr. McCardle was elected chairman to succeed Frank T. Singleton of Martinsville. Mr. McCardle's appointment marks the beginning of his thirteenth year as a member of the commission. He was chairman from 1921 to 1926. Mr. West retired from the Circuit Court at Crawfordsville on Jan. 1.

## H. Hobart Porter Heads Music Publishing House

At the postponed annual meeting of the Oliver Ditson Company, music publishers, held in Boston, the directors elected H. Hobart Porter, well known in the utility field, president, to succeed Charles H. Ditson, recently deceased. Mr. Porter announced that he would continue the basic policies inaugurated by Oliver Ditson, when he founded the business in 1835.

W. S. Robertson has resigned from the post of president and general manager of the Minnesota Power & Light Company, Duluth, Minn., to become associated with the American & Foreign Power Company, a subsidiary of the Electric Bond & Share Company. He was president and general manager of the Duluth company for six years. It is expected that Mr. Robertson will go to China to take charge of the firm's interest in the Far East.

J. Fred Hull was sworn in June 4 as a member of the Missouri Public Service Commission. He has been appointed for a six-year term to end on April 15, 1935. He succeeds J. P. Painter. Until a few days ago Mr. Hull was postmaster for Maryville. Before that he was editor of a newspaper there.

## "For the Love of Mike!"

Pittsburgh honors J. M. Loftis, who has done so much there in the interest of safety

AMERICANS tell the Chinese that their custom of putting food on an ancestor's grave is absurd because dead men cannot eat. The Chinese, in turn, ask the Americans why they put flowers on the graves of their departed since dead men cannot smell.

There can be no doubt that it is a fine thing to give bouquets to living friends. And that is exactly what the Pittsburgh trainmen did when they set aside the week of May 26-June 1, 1929, as "Safety Week" as a testimonial of their respect and admiration for J. M. Loftis, superintendent of transportation of the Pittsburgh Railways.

Quite appropriately, the slogan adopted for the campaign was, "For the Love of 'Mike,' be careful." During the campaign, which was sponsored by the company's bureau of accident prevention, all of the trainmen, as well as many employees from other departments of the company, wore lapel but-



J. M. Loftis

tons bearing the photograph of Mr. Loftis, better known as "Mike."

Mr. Loftis went to Pittsburgh forty years ago from Randolph County, West Virginia, at the age of 21. Since he had had about a year's experience as motorman and conductor at Wheeling, his first thought upon arriving in Pittsburgh was to connect with one of the local railroads. Consequently, he applied for and secured a job with the Citizens' Traction Company, October 9, 1889, as laborer. A year later he was made night watchman and night receiver at the East Liberty Depot. After more than two years at this place, Mike asked for an outside job as gripman on the road so that he might work "on the outside." Several years later, when the Citizens' Traction Company was taken over by the Consolidated Traction Company, Mr. Loftis was made a motorman and for a period of one year operated out of the Homewood carhouse, as it was called at that time. Promotions followed in rapid succession for Mike after that.

In May, 1898, he was appointed inspector; in September, 1899, he was made division superintendent in charge of the Butler Street division; in May, 1904, he was again transferred to Homewood, this time as division superintendent;

and in 1910 he was appointed superintendent of the entire system between the Allegheny and Monongahela Rivers except the Second Avenue lines.

In January, 1913, Mr. Loftis was promoted to the office of assistant to M. J. Maxwell, superintendent of transportation of the Pittsburgh Railways, and in July of the same year, following the death of Mr. Maxwell, he was appointed superintendent. From that time until the present, 16 years, Mr. Loftis has successfully carried out the duties of this office, and through the conscientious and faithful performance of his work, holds the high esteem of all who know him.

He has been a tireless and active worker for safety in the company ever since concentrated efforts in this direction were started by C. G. Rice, head of the company's claim department, twenty years ago.

## C. J. Crampton Became Secretary of Dallas Commerce Chamber

C. J. Crampton, in charge of the public relations department of the Dallas Railway & Terminal Company, Dallas, Tex., has been elected executive secretary of the Dallas Chamber of Commerce. He assumed his new duties July 1. Mr. Crampton has been with the Dallas company for ten years. During this time he has done much to promote safety on the company's lines as well as to foster a closer personal relationship between the employees and the employers. In addition to being in charge of public relations he has been superintendent of the safety department of the railway, a department which he originated. He also founded *Partners*, the company weekly publication, an important organ which affords an outlet for opinions, suggestions and personal comment for the railway's employees. Mrs. Corita C. Owen, who has been secretary to Mr. Crampton, will continue as editor of *Partners*.

Dr. Philip Kremer, long connected with the street railway system in Berlin, Germany, latterly as assistant to the general manager, will on July 1 become manager of the street railway and bus system of Frankfort-on-Main. Dr. Kremer is known to many American electric railway men. He made an extended trip in this country last summer, so arranged that he attended the convention of the American Electric Railway Association in Cleveland.

Howard P. Savage, general manager of the Metropolitan Motor Coach Company (Marigold Lines) Chicago, Ill., has been appointed a colonel on the personal staff of Governor Louis L. Emmerson of Illinois. Mr. Savage is past national commander of the American Legion, and previous to becoming general manager of the Metropolitan system he was assistant general manager of the Chicago, North Shore & Milwaukee Railroad.

George I. Wright, engineer of electric traction of the Reading Railroad, with headquarters in the Reading Terminal, Philadelphia, Pa., has just returned from a six-weeks' trip to Europe. While abroad he visited nine countries, making a study of railroad electrifications in connection with the pending developments of the Reading.

## W. H. McCarty Heads Middle Atlantic Equipment Men

W. H. McCarty, elected president of the Middle Atlantic States Association of Railway Equipment Men recently, has been connected with the Capital Traction Company, Washington, D. C., and its predecessors since 1895. Since 1912 he has been master mechanic of the company and at present has charge of the maintenance of car, bus, and automotive equipment, in which work he has made a notable record.

Mr. McCarty went to the company at Washington unusually well-equipped in practical training since he had served a rigid apprenticeship with the American Bridge & Iron Company in the machine division. There he underwent the sturdy course of training in his profession which starts with a rat-tail file being placed in the hands of the apprentice and is concluded only after the novice has run the gamut of all the various kinds of work there is to do around the shop.

Not content, however, with this training, Mr. McCarty sought further experience and gained it as an employee of the locomotive shops of the Norfolk & Western



W. H. McCarty

Railroad at Roanoke, Va. Here again, this time for a period of two years, he had a hand in all the various classes of work that passed through the locomotive shops. It was from this service that he passed to the Washington & Georgetown Railroad and its successors, with which his career has carried him to eminence in the field of maintenance work and won respect for his opinion upon things mechanical not only in his own company but among his fellow craftsmen. This is well instanced, perhaps, by his notable association work as a member of the special committee No. 6 of the rolling stock division of the American Engineering Association, his many other association activities and in his very recent election to head the Middle Atlantic Association at the Wilmington meeting. Mr. McCarty is a native of Virginia.

William G. Marshall, since 1926 director of personnel for the Philadelphia Company and affiliated corporations, has been appointed assistant to Vice-president T. P. Gaylord of the Westinghouse Electric & Manufacturing Company. Mr. Marshall will be in charge of employees' relations, but no change is contemplated in the existing positions of director of personnel or manager of employees' service.

## Transportation Engineering Department for G. E.

**H. L. Andrews Named Engineer, W. B. Potter, Consulting Engineer, and A. H. Armstrong and W. J. Davis, Jr., Associate and Consulting Engineers**

**R**EORGANIZATION of the railway engineering department of the General Electric Company and its future designation as the transportation engineering department has been announced by E. W. Allen, vice-president of engineering. H. L. Andrews is named engineer of the department; W. B. Potter is appointed consulting engineer with A. H. Armstrong and W. J. Davis, Jr., as associates and consulting engineers. Included in and as divisions of the transportation engineering department will be the railway equipment, the air brake equipment, and the industrial locomotive engineering departments at the Erie, Pa., Works, and the automotive engineering department at the Lynn, Mass., River Works.

Mr. Andrews, engineer of the new de-

Among the projects which have engaged the attention of Mr. Potter were the Manhattan Elevated Railway, Baltimore & Ohio electrification, Paris-Orleans electrification, New York Central terminal electrification, West Jersey & Seashore Railroad and later, the Detroit Tunnel, Great Northern and Southern Pacific lines. Later, work such as that on the Butte, Anaconda & Pacific, Chicago, Milwaukee & St. Paul, and the Victorian Railways was carried out under his general supervision.

More than 130 patents have been issued to Mr. Potter for various inventions, including the series-parallel controller, the surface contact system, the three-wire system of railway operation, electro-pneumatically contact control system, and the otheograph. Other patents relate to electric switching, motors, generators, third rail, electric braking, air brakes, and various schemes of motor control.

Albert Horace Armstrong was graduated from Worcester Polytechnic Institute in the engineering course in 1891 and entered the employ of the Thomson-Houston Company at Lynn in the same year. In 1897, he entered the railway engineering department

## New Counsel for New York Board

Denis R. O'Brien has been named by the Board of Transportation of New York City as counsel to succeed William G. Fullen, who resigned in August and was later appointed to head the Transit Commission. Mr. O'Brien has been assistant corporation counsel, in charge of the contract bureau, since 1926. He has aided the Board of Transportation in the past few months in the preparation of city contracts for subway cars, power supply and signal equipment. As head of the contract bureau of the Corporation Counsel's office he has passed upon city construction contracts and handled contract litigation.

**Edward F. Kelley**, secretary of the Louisville Kiwanis Club and secretary to James P. Barnes, president of the Louisville Railway, Louisville, Ky., has been named chairman of the Secretaries' Conference of International Kiwanis Clubs. It is the first time in the history of the organization that the Kentucky-Tennessee Kiwanis district has received such



H. L. Andrews



W. B. Potter



A. H. Armstrong



W. J. Davis, Jr.

partment, was graduated from the University of Missouri in 1910 with the degree of B.S. in electrical engineering. In August of that year, he entered the testing department of the Schenectady Works of the General Electric Company and was made assistant head of the floor test the following year. In May, 1912, he was transferred to the railway motor department, and, in 1916, joined the railway engineering department. A year later he was placed in charge of car equipment. Late in 1925, he was appointed assistant engineer in administrative charge of the department.

W. B. Potter is a native of Connecticut. Upon leaving school he began service as a machinist apprentice with Sawtele & Judd, Hartford, Conn. Foreseeing the future of the electrical industry, he secured employment with the Thomson-Houston Company at Lynn, Mass., in June, 1887. He became interested in electric railways through reports of Frank J. Sprague's work and decided to follow electric rail-roading.

In connection with a study of electric railway equipment, in 1892, Mr. Potter conceived the series-parallel controller, since used almost universally in control for electric railway motors. Mr. Potter continued in the department with the absorption of the Thomson-Houston Company by General Electric and, in 1895, was made chief engineer.

and has since devoted most of his time to the study of railway problems. One of his most important earlier studies was that of train acceleration.

In addition to an extensive study of interurban and heavy traction work, Mr. Armstrong has taken part in the engineering study connected with various steam road electrifications. For many years he has held the position of assistant engineer of the railway engineering department, and chairman of the electrification committee of the company. He is the author of a section of the standard handbook on the subject of railways and also of numerous papers which have been delivered before various technical societies.

W. J. Davis, Jr., is a graduate of the Rose Polytechnic Institute. He began his work with the General Electric Company in the testing department upon graduation in 1892. After completing several of the regular tests, he was placed in charge of the calculating room of the testing department which was just then being organized. His next work was with W. B. Potter, who had then recently been made engineer of the railway department. In connection with his work on heavy electric traction, he introduced forced ventilation for railway motors and made an exhaustive pioneer study of the subject of train resistance. In February, 1921, he was transferred to railway engineering department in Schenectady.

an appointment. The post requires Mr. Kelley to preside over approximately 1,278 secretaries of Kiwanis Clubs.

**Frank S. Peters**, connected with the Kansas City Public Service Company, Kansas City, Mo., in various capacities since November, 1919, has become general superintendent of the Kansas City, Merriam & Shawnee Railroad. His first position with the Public Service Company was in the treasury department as a clerk. An experienced transportation man, Mr. Peters was soon transferred to that branch of the service. From the transportation department, Mr. Peters was transferred to the maintenance department and thence to the mechanical department, where he was advanced from a clerkship to the position of assistant to R. S. Neal, assistant superintendent of maintenance.

**Sir Thomas White**, elected to the board of directors of the Barcelona Traction, Light & Power Company, Ltd., at the annual meeting of shareholders, replaces E. R. Peacock, former president, who has retired from the board due to pressure of other business, brought about by the death of Lord Revelstoke, senior partner.

**C. F. Mitchell**, vice-president and controller of the Pittsburgh Railways, Pittsburgh, Pa., has been elected a director to fill a vacancy caused by the resignation of A. W. Robertson.



## Walter H. Burke in Power Field in Northwest

Walter H. Burke has been elected president and general manager of the Minnesota Power & Light Company, Duluth, Minn. Mr. Burke went to Duluth three months ago from Houston, Tex., as assistant general manager of the local company. Since 1927 until he came to Duluth, Mr. Burke was Southwest district manager of Stone & Webster, with headquarters at Houston. He had been with the company for sixteen years when he resigned to go to Duluth.

For the first time during all his experience in the utility business Mr. Burke will not be confronted by the solution of transportation problems. This, of course, is merely a coincidence. From such problems he has never shrunk as his record of accomplishment with Stone & Webster, successful Coffin award contestant both in the light and power and the railway fields, indicates.

In addition to his post as president of the Minnesota Power & Light Company it is expected that Mr. Burke will be elected executive vice-president of the Superior Water, Light & Power Company in Wisconsin. Both of these companies are included in the system of the American Power & Light Company, under Electric Bond & Share Company supervision.

Mr. Burke was graduated from the University of Maine in 1906 as an electrical engineer, and after several student courses with large power concerns he joined the Stone & Webster firm, going first to Dallas and thence to Milwaukee. In 1914 he was assigned as assistant to the vice-president of the Stone & Webster at the executive offices in Boston, remaining there until 1923. He then served successively as director of the utility operations in Keokuk, Iowa, Houghton, Mich., and Fort Worth, Tex., after which he was appointed as Southwest manager at Houston, in charge of the properties in several states and Mexico. He was born in Portland, Me., in 1884.

## J. H. McGraw Doctor of Commercial Science

The degree of Doctor of Commercial Science was bestowed upon James H. McGraw, chairman of the board of the McGraw-Hill Publishing Company, publisher of the *ELECTRIC RAILWAY JOURNAL*, by the New York University on June 12. Dr. George Alexander, president of the council of the university, in presenting Mr. McGraw, said:

"James Herbert McGraw, teacher, publisher of many technical periodicals, broad-minded and far-seeing man of business, is presented for the honorary degree of Doctor of Commercial Science."

William H. Nichols, acting chancellor of the university, in conferring the degree upon Mr. McGraw, said:

"Educator transformed into publisher, you have never ceased to be an educator. Your notable career accentuates that tendency in commercial life through which, however private its form, its operations have a public character and become an important element in public education.

"Wherefore, I welcome you to the degree of Doctor of Commercial Science, with all the rights and privileges thereunto appertaining, in evidence whereof you will receive this diploma, and be invested with the insignia appropriate to this degree."

Capt. Mark A. Smith, an engineering specialist in aerial and motor coach transportation, has joined the staff of

Ford, Bacon & Davis, Inc. Captain Smith has been identified with the motor coach industry almost from its beginning. He was one of the first to approach the problems of design, production and distribution from the engineering standpoint. He has served as advisory transportation counsel to various state governments and has held many offices and has headed many committees in the Society of Automotive Engineers.

Miss Ella D. Troughton has been appointed assistant treasurer of the New York State Railways. Miss Troughton is only twenty-six years old. She went with the New York State Railways in 1921 from West High School in Rochester where she was an honor student in the business course. In the post of secretary to the secretary and treasurer, her natural ability soon evidenced itself and she was placed in charge of the office force in the secretary's office. Besides being appointed assistant treasurer of the New York State Railways, Miss Troughton has also been appointed assistant treasurer of the United Traction Company and the Schenectady Railway.

R. K. Brown, formerly superintendent and chief engineer, Salt Lake & Utah Railroad, is now superintendent of construction for the Utah Building Commission, recently created by the state legislature.

## OBITUARY

### Will H. Latta

Will H. Latta, attorney for the Indianapolis Street Railway, Indianapolis, Ind., was killed on June 12, when the auto in which he was driving alone was struck by a southbound Monon train near Carmel at a side road crossing.

Mr. Latta was to have been married on June 17 to Miss Margaret Sander. Fort Wayne, at the Little Church Around the Corner in New York, and had booked passage for a honeymoon trip to Europe on June 19. The Rev. H. C. Stoup, uncle of Miss Sander, and pastor of the church, was to have performed the ceremony.

Mr. Latta had made his home at the Claypool Hotel, Indianapolis, for several years. He was born on a farm near Ligonier. After being graduated from DePauw University, he married Miss Carrie Hunt, Coatesville, a student in the university. Mrs. Latta died in February, 1927. Following his graduation, Mr. Latta taught several years in the university, later entering the law office of Augustus Mason in Indianapolis. About 29 years ago he became associated with the legal staff of the railway. He had served as a member of the board of trustees of DePauw University.

### Frederick R. Slater

Frederick R. Slater, vice-president in charge of public relations of the Queens Borough Gas & Electric Company, Far Rockaway, N. Y., died on May 4. At one time Mr. Slater served the Manhattan (Elevated) Railway, New York, as assistant engineer. This was during conversion of the lines from steam to electric operation. Later he became a member of the engineering staff constructing the New York subway and was made principal assistant engineer of the Interborough Rapid Transit Company. For about six years he was with the firm of Latey & Slater,

consulting engineers in the design and installation of electric railway equipment. He was born in Washington, D. C., in 1872.

### Charles Finigan

Charles Finigan, superintendent of the Westchester Electric Railroad, Mount Vernon and New Rochelle, N. Y., and the Westchester Street Transportation Company, Inc., died recently.

He began his railroad career in 1902 under his father, William Finigan, who was superintendent of the New York City Interurban Railroad, Mount Vernon. Shortly after his father's death, this company was operated by the Union Railway and later by the Westchester Electric Railroad. Mr. Finigan's first work was in the car shops; he also served as foreman in the overhead line department and as operator and starter in the transportation department. He was appointed superintendent of the Westchester Electric Railroad on Dec. 1, 1919, and of the Westchester Street Transportation Company, Inc., on Aug. 29, 1926, when that company became a part of the Third Avenue System.

### James P. Boyden

James P. Boyden, since 1905 superintendent of wires for the Boston Elevated Railway, is dead. He entered the employ of the West End Street Railway as a rodman. A short time later he resigned and entered the office of Alices H. French, civil engineer at Brookline then engaged in engineering work for the town as well as private practice. Subsequently he re-entered the employ of the West End Street Railway, later leased to the Boston Elevated. While in the employ of the Elevated, Mr. Boyden has been in direct touch with every foot of underground conduit constructed on the system, and as superintendent of wires was in direct charge of the transmission and distribution system of the company. He was born in Walpole, Mass., 61 years ago. He was educated in the public schools there and at the local high school.

### Henry M. Lane

Henry Marcus Lane, at one time head of the Lane & Bodley Company, Cincinnati, lost his life on May 15, in the Cleveland Clinic Hospital disaster. Among the achievements for which Mr. Lane was noted were the design and construction at Cincinnati, in 1885, of the Walnut Hills cable railroad, the first in Ohio, and the Vine Street cable railroad in that city in 1887. He also was noted as a designer of large Corliss engines, used in cable railway installations and in early electric generating stations. He also was consulting engineer for cable railroads in several other cities. Mr. Lane was 75 years old. He was graduated from the Massachusetts Institute of Technology in 1873.

John E. Eustis, a member of the Public Service Commission for the First District of New York, from 1907 to 1914, died on June 22. At the close of the Civil War he resumed his education, being graduated from Wesleyan University in 1874 with the degree of Bachelor of Science. In 1877 he received his law degree from the Dwight Law School, entering the legal profession as a member of the firm of Olin, Rives & Montgomery.

# Industry Market and Trade News

## Three Properties Order Standardized Cars

Recognition of the efforts of the car builders to produce standardized units is indicated by orders recently placed by three representative companies with the Osgood-Bradley Car Company, Worcester, Mass., for a total of 27 cars. Five cars will be delivered in August to the Altoona & Logan Valley Electric Railway, Altoona, Pa., while the Scranton Railway, Scranton, Pa., has ordered ten cars, and the Union Street Railway, New Bedford, Mass., has ordered twelve. The new cars, all of which are practically identical in design, differing only in certain minor features of trim and decorative effect, are of a type developed by the car builder's engineers with the view to combining pleasing appearance, balanced proportions, and easy riding qualities with rugged construction, light weight and features that would make for low operating and maintenance costs. A car of this type, built as a sample and distinguished by its designers with the trade name of "electromobile," was shown at the Cleveland convention last year, and was described in detail in *ELECTRIC RAILWAY JOURNAL*, issue of June 23, 1928.

The cars are built for double-end operation but with controls arranged for one-man operation if so desired. In general appearance they follow conventional lines with straight sides, rounded ends, and low-arch roof, but with the motorman's window of the sloping, automotive type. Standard structural shapes have been used in the framing, and, while an effort has been made to keep the weight at a minimum consistent with adequate strength and ruggedness, together with a liberal margin for safety, no attempt has been made to achieve extreme light weight. It is estimated, however, that each car will not exceed 34,000 lb. in weight, completely equipped. Perhaps the most unusual departure from the conventional is the elimination of the customary foundation brake rigging and the use of automotive type of brake diaphragms at each wheel, an arrangement which is expected to produce better equalization, simplified brake rig-

ging, and a reduction in weight. Otherwise the trucks, which are Osgood-Bradley type 45-46, present no unusual features.

All operating apparatus, including controller handle, brake valve handle, reset switch handle, sign box handle, windshield wiper and light switches are within easy reach of the seated operator. Equipment cabinets and switch and control devices are built into the vestibules and concealed, although readily accessible through doors and panels. An arrangement of signal lamps indicates to the operator whether doors are open or shut, and door control is interlocked with motor control, so that

adequate heating and ventilating devices. Sixteen reversible cross seats, eight on each side of the aisle, are of the full upholstered type of composition leather, with deep spring cushions and individual form-fitting backs. Stationary foot rests are provided and grab handles are built into the seat framing next to the aisles. A longitudinal seat is built into each corner, and the capacity can be further increased, so as to provide seats for a total of 54 passengers, by the use of folding seats for three passengers each, which are provided on each side of each vestibule.

Detail specifications of the five cars of this type supplied to the Altoona & Logan Valley Electric Railway are shown in the accompanying table.

Name of Railway	Altoona & Logan Valley Electric Railway	Finish	Enamel
City and state	Altoona, Pa.	Floor covering	Duralastic
Number of units	5	Gears and pinions	Tool steel
Type of unit	One-man, motor, passenger, city, double-end, double-truck	Glass (non-shatterable)	Front
Number of seats	54	Hand brakes	Peacock staffless
Builder of carbody	Osgood-Bradley Car Company	Hand straps	Elcon railing
City and state	Worcester, Mass.	Heaters	Consolidated Car Heating Company
Date of order	March, 1929	Headlights	Crouse-Hinds, Golden Glow
Date of delivery	August, 1929	Headlining	Agasote
Weight	34,000 lb.	Interior trim	Statuary finish
Bolster centers	21 ft.	Journal bearings	Hyatt
Length over all	42 ft. 6 in.	Journal boxes	Hyatt
Length over body posts	30 ft.	Lamp fixtures	Electric Service Supply
Truck wheelbase	5 ft. 6 in.	Motors	Westinghouse 510A, outside hung
Width over all	8 ft.	Painting scheme	Orange, Pratt & Lambert
Height, rail to trolley base	11 ft. 6 in.	Roof material	Canvas covered
Window post spacing	42 in.	Safety car devices	St. Louis Safety Devices
Body	All steel	Sash fixtures	O. M. Edwards Company
Roof	Arch	Seats	Heywood-Wakefield
Doors	End	Seat spacing	30 in.
Air brakes	Westinghouse Traction Brake Company	Seating material	"Cletan" leather
Armature bearings	Plain	Slack adjusters	Osgood-Bradley
Aisles	Heat-treated	Steps	Stationary
Car signal system	Faraday	Step treads	Kass
Compressors	D.H.-16	Trolley catchers	Earl
Conduit	Metal	Trolley base	OB, form 4
Control	Safety Car Type K75	Trolley wheels	Electric Materials Company
Destination signs	Hunter 226 RB	Trucks	Osgood-Bradley 45-66
Door mechanism	National Pneumatic	Ventilators	Garland C-1 Junior
Doors	Folding	Wheels, steel	26 in. diameter
		Wheelguards or fenders	H. B.
		Special devices	C. S. spring bumpers

the car cannot be started until all doors are closed.

Special attention is given in the new cars to passenger comfort. The floor in the car body is finished with a composition, aisle width is 22 in., and wide vision windows of plate glass are provided, as well as

## Track Improvements in Progress

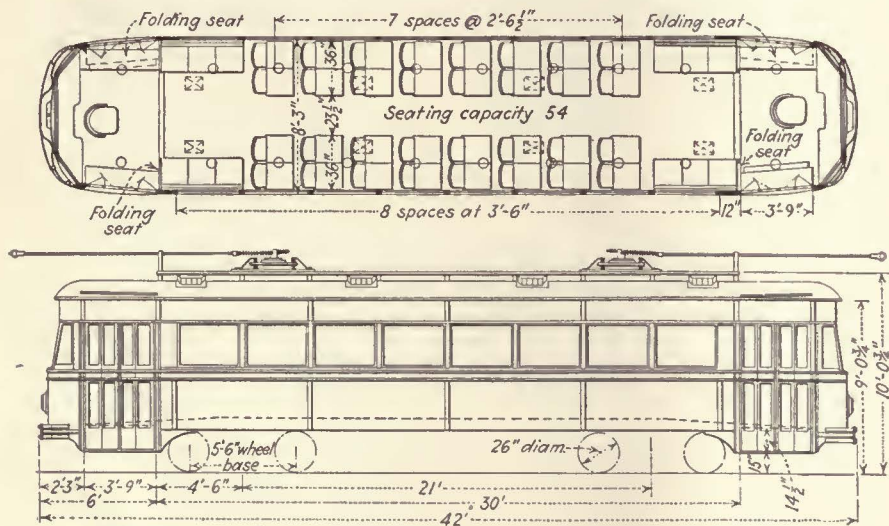
With the reconstruction of approximately 3,000 ft. of double track on Summer Ave. the Springfield Street Railway, Springfield, Mass., has just completed its biggest track job of the year. All-steel ties and 6 in. 100 lb. T-rail were used on this job, the total cost of which was about \$43,000.

To meet the demands of a \$500,000 roadway program now under way, the Memphis Street Railway, Memphis, Tenn., has purchased one differential motor car and trailer and one differential electric locomotive crane car. This equipment is to be manufactured by the Differential Steel Car Company.

More than 3,700 ft. of double track is being laid on Lincoln Way, Massillon, Ohio, by the Northern Ohio Power & Light Corporation. Specifications call for use of 100 lb. rail in concrete. The cost will exceed \$100,000.

The Scranton Railway Company, Scranton, Pa., will expend more than \$100,000 in a building and improvement program this year in the city and its suburbs. The work, which is mainly of a maintenance nature, calls for track and pavement reconstruction, new special work and the replacing of considerable 80 lb. rail with 100 lb. rail.

Illinois Terminal Railroad System will install some 20 miles of new 90 lb. rail at various points along its route.



Floor plan and elevation of new car for Altoona & Logan Valley Electric Railway

# Canadian Railways Buying Many New Cars

ORDERS for more than 260 new cars have recently been placed by electric railways in Canada, or are likely to be placed in the near future. One hundred and six street cars of the most modern type are being constructed by the Canadian Car & Foundry Company for the Montreal Tramways. The Toronto Transportation Commission has recommended to the board of control the purchase of 55 motor cars and 55 trailers. The Ottawa Car Manufacturing Company, Ltd., is building 21 cars for the Quebec Railway, Light & Power Company, seven for the Regina Municipal Railway, and five for the Saskatoon Municipal Railway, while the British Columbia Electric Railway of Vancouver, B. C., has announced that fifteen cars will be purchased as soon as certain franchise difficulties are adjusted.

Deliveries under the Montreal order are already under way and it is expected that practically all of the cars will be completed by the end of July. A few of the cars under the contract will be the one-man type, in order to provide additional equipment for lines on which cars of this type are now authorized, but the greater part of the order will be of the two-man type such as are now used on the most heavily traveled routes in that city. An unusual feature is the manner in which the new cars are to be heat insulated. Between roofs and ceilings and in wall panels hair felt is employed, while between the two wooden floors thick strips of cork are inserted. In addition to improving the heating facilities, this will lessen vibration and reduce noise. Thermostatic control of heating will be provided, to maintain an

even temperature and obviate the possibility of seats becoming overheated.

Details regarding the new Toronto cars are not available at this time as the order has not been placed, but it is estimated that the total cost, including motors, will be about \$1,750,000. Of the cars ordered by the Quebec Railway, Light & Power Company, six are of the interurban type of semi-steel construction, weighing complete about 85,000 lb., and fifteen are for city service, being of the single-end, two-man type, seating 35 passengers. The Regina and Saskatoon cars are also for city service, the former being of the one-man, single-end type, while the latter are of the one-man, double-end type. Like the Montreal cars they are to be heat insulated, with construction throughout incorporating many of the latest features making for passenger comfort and easy riding qualities. Details regarding the Regina, Quebec and Saskatoon cars, all of which are being built by the Ottawa Car Manufacturing Company, of Ottawa, Ont., are set forth in the accompanying tables.

## SPECIFICATIONS FOR CARS RECENTLY ORDERED BY CANADIAN PROPERTIES

Name of Railway	Regina Municipal Railway	Saskatoon Municipal Railway	Quebec Ry., Lt. & Power Co.	Quebec Ry., Lt. & Power Co.
City and state	Regina, Sask.	Saskatoon, Sask.	Quebec, Que.	Quebec, Que.
Number of units	7	5	15	6
Type of unit	One-man	One-man	Two-man	Two-man
	Motor	Motor	Motor	Motor
	Passenger	Passenger	Passenger	Passenger
	City	City	City	Interurban
	Single-end	Double-end	Single-end	Single-end
	Double-truck	Double-truck	Double-truck	Double-truck
Number of seats	40	41	35	37
Builder of car body	Ottawa Car Manufacturing Co.	Ottawa Car Manufacturing Co.	Ottawa Car Mfg. Co.	Ottawa Car Mfg. Co.
Date of order	Feb. 1929	June, 1929	Feb. 1929	May, 1929
Date of delivery	July, 1929	Nov., 1929	Aug., 1929	Jan., 1930
Weight, car body	17,400	14,365	19,050	45,000
Trucks	10,000	9,895	10,440	18,000
Equipment	6,600	6,240	9,220	22,000
Total	34,000	30,500	38,710	85,000
Bolster centers	17 ft. 7 in.	18 ft.	17 ft. 7 in.	40 ft.
Length over all	41 ft. 2 in.	39 ft. 3 in.	41 ft. 2 in.	65 ft.
Length over body posts	26 ft. 4 1/2 in.	25 ft. 8 in.	26 ft. 4 1/2 in.	53 ft. 1 in.
Truck wheelbase	5 ft. 4 in.	4 ft. 10 in.	5 ft. 4 in.	7 ft.
Width over all	8 ft. 3 in.	7 ft. 9 1/2 in.	7 ft. 1 1/2 in.	10 ft.
Height, rail to trolley base	10 ft. 10 1/2 in.	10 ft. 11 1/2 in.	11 ft.	12 ft. 8 in.
Window post spacing	30 in.	30 in.	30 in.	32 in.
Body	Semi-steel	Semi-steel	Semi-steel	Semi-steel
Roof	Arch	Arch	Arch	Arch
Doors	End, folding	End, folding	End, folding	End
Air brakes	General Electric Co.	General Electric Co.	Westinghouse 10x12 in. types "S"	Westinghouse
Armature bearings	Plain	Plain	Plain	Plain
Axles	Forged steel, 4 in. diameter	A. E. R. E. A. standard	A. E. R. E. A. standard	Forged steel, 6 1/2 in. dia.
Car signal system	Consolidated	Consolidated Type 233-Y	Consolidated Type 233-D	Consolidated
Compressors	General Electric CP-27-B	General Electric CP-27-B	Westinghouse Type DH-16	Westinghouse
Conduit	Metal	Galvanized steel	Galvanized steel	Metal
Control	K-35 III with LB-2 handle	K-35	Westinghouse K-35-HH	Westg. 15-B-2 master control
Couplers				Van Dorn No. 2374 M.C.B.
Curtain fixtures	National Lock Washer	National Lock Washer Co.		National Lock Washer Co.
Curtain material	Pantasote No. 86-K2	Pantasote		Pantasote No. 2577
Destination signs	Ottawa Car Mfg. Co.	Ottawa Car Mfg. Co.	Keystone	Keystone
Door mechanism	National Pneumatic Co.	National Pneumatic Co.	National Pneumatic Co.	National Pneumatic Co.
Doors				
Energy saving device	Economy Electric Devices Co.	National Pneumatic Co.	National Pneumatic Co.	
Fare boxes	Cleveland No. 5	Cleveland No. 5	Cleveland No. 5	
Finish	Duco	Duco	Duco	Duco
Floor covering	Wood slats, Kass treads	Wood treads	Wood slats, Kass safety treads	Nuttall
Gears and pinions	Steel 74:13	Tool steel	Tool steel	D.S.S. and Protex
Glass	D.S.S. and Protex	D.S.E. and Protex	D.S.A.A. and Protex	Peacock
Hand brakes	Peacock	Peacock staffless	Peacock staffless	None
Hand straps				None
Heat insulating material	Plastic cork	1-in. cork	Cork insulation, 1-in.	Plastic cork
Heaters	General Electric Co.	Consolidated and Peter Smith	G. E. Calrod, 400 w., 500 v.	General Electric Company
Headlights	Golden Glow R. M.-96	Golden Glow Type R. M. L.-96	Keystone Type DG	Golden Glow
Headlining	Haskelite	Haskelite, 3/16 in.	Haskelite, 3/16 in.	Agasote
Interior trim	Aluminium	3/16 in. Haskelite and birch	Birch	Bronze
Journal bearings	5 cars plain, 2 cars roller, S.K.F.	S.K.F. roller	A.R.A. standard	Plain
Journal boxes	Cast iron		3 1/2 x 7-in.	Malleable
Lamp fixtures	Electric Service Supply Co., Dome	Electric Service Supply Co.	Electric Service Supply Co.	Elec. Service Sup. Co., Dome
Motors	Four G.E. 264A, inside hung	Four G.E. 264, inside hung	Four Westghe. 40 hp. in. hg.	Westghe. 125 hp., ins'd hung
Painting scheme	Red and cream	Olive green and cream	Red and cream	Maroon
Registers				None
Roof material	Basswood, canvas covered	Haskelite covered with duck	7/16-in. basswood covered with No. 10 duck	Basswood and canvas
Safety car devices	National Pneumatic Co.	National Pneumatic Co.	National Pneumatic Co.	
Sash fixtures	Robert Mitchell Co., Ltd.	Robert Mitchell Co., Ltd.	Robert Mitchell Co., Ltd.	
Seats	Ottawa Car Mfg. Co.	Hale & Kilburn No. 300	brass sash	Braas
Seat spacing	30 in.	30 in.	O.C.M. Co. standard	O.C.M. Co.
Seating material	Rattan	Rattan	30 in.	32 in.
Slack adjusters	General Electric E-1	American Automatic, Form E-1	Spanish leather	Pantasote No. 707
Steps	Folding	Folding	American Auto., Form E-1	Westinghouse
Step treads	Honey-comb anti-slip	Kerlow "Honeycomb"	Folding	Stationary
Trolley	Ohio Brass Co. No. 8112-1	Ohio Brass Co. No. 13141	Kerlow "Honeycomb"	Kass
Trolley base	Ohio Brass Co. No. 4	U. S. 20-A	Ohio Brass Co. No. 13119	Ohio Brass Co.
Trolley wheels	Kalamazoo 4 1/2 in.	Ohio Brass Co.	Ohio Brass Co. No. 15238-15239	U. S. 20-A
Trucks	Canadian Car & Foundry Co.	National Steel Car Corp.	Canadian Car & Fdry. Co.	Baldwin Locomotive Works
Ventilators	Nichols-Lintern	Nichols-Lintern 6x8-in.	Nichols-Lintern 6x8-in.	Nichols-Lintern
Wheels, type	Carnegie rolled steel, 26 in.	Rolled steel, 26-in. diameter	Rolled steel, 27-in. diameter	U. S. Steel r'd steel, 33-in. dia
Wheelguards or fenders	Ottawa Car Mfg. Co.	Ottawa Car Mfg. Co. life guard	Ottawa Car Mfg. Co. life g'rd	

## Electric Railways Add to Bus Fleets

Electric railway properties in various sections of the country continued to add to their bus fleets during the month, the majority of buses purchased being of the large capacity type and for city service. The Boston Elevated Railway has ordered nine 40-passenger buses from the Twin Coach Corporation, of which several have been delivered within the past week. When deliveries are completed the company will have 35 Twin Coaches in service, in addition to a number of other large capacity buses of the Versare and ACF types. All of the recent order are of the straight mechanical type.

Twenty-nine buses each with a seating capacity of 40 passengers have been purchased within the last thirty days by the Northern Ohio Power & Light Company, Akron, Ohio, from the Twin Coach Corporation. Twenty-five of the new buses, including six of the express type, will go into service on the Akron city lines, two express type buses will be placed in service between Dover and New Philadelphia to take the place of the local car service formerly operated between these cities, but which was recently discontinued, and two express buses will be kept in reserve. The cost of the new coaches exceeds \$300,000, and when the order is completed the company will have 82 of these 40-passenger buses in operation, in addition to over 200 buses of other types and lesser capacity.

Twin Coach Corporation has delivered three buses of the parlor car type to the Southern Pacific Motor Transport Company for service out of Portland, Ore., four urban type buses to the Los Angeles Motor Coach Company, two urban type buses to the Tennessee Electric Power Company, at Chattanooga, and four of the urban type to the Detroit Motor Bus Company. The Detroit Company now has 24 buses of this type in its fleet.

The Wisconsin Power & Light Company, Janesville, Wis., has purchased seven 23-passenger Yellow Coaches for service on the Janesville city lines. The buses cost about \$6,000 apiece.

The Pacific Northwest Traction Company, Seattle, Wash., has purchased two White buses of the 30-passenger type and four ACF buses of slightly larger capacity, all for intercity service. The body design of the new buses incorporates the raised observation compartment in an improved form, a feature originated on this property.

During the later part of May the first of the new super-service buses being built by the Public Service Co-ordinated Transport was turned out of the Newark shops. The new type of bus accommodates 32 passengers in seats of green leather with arm rests and extra high backs and headrest. Other equipment includes balloon tires, specially designed springs with an extra long wheelbase, and a heating and ventilating system of the blower type controlled from the instrument panel. Ninety-four bodies of this type will be constructed in the Newark shops for mounting on chassis supplied by the General Motors Truck Corporation. The buses will be used for long hauls in interstate and suburban service.

Citizens Transit Company, a subsidiary of Citizens' Traction Company, Oil City, Pa., has taken delivery of one ACF urban type coach.

The Southern Michigan Transportation Company, controlled by the Michigan Electric Railway, Jackson, Mich., has purchased five metropolitan type coaches and three parlor coaches from the ACF Motors Company.

Logan Valley Bus Company, subsidiary of the Altoona & Logan Valley Electric Railway, has received one ACF 23-passenger urban coach.

The Fonda, Johnstown and Gloversville Railroad, of Gloversville, N. Y., has accepted delivery of four Mack model AB four cylinder 25-passenger city type buses.

The Connecticut Company, New Haven, Conn., has accepted delivery of two Mack model AB 29-passenger city type buses.

The Denver Tramway Company, Denver, Col., has received two White model 54 six cylinder buses and one model 53 bus.

The Alabama Power Company has purchased a White Model 50B bus for service in Birmingham, Ala.

Eight 21-passenger Fitzjohn pay-enter grand coach bodies mounted on Reo GB 179 in. wheelbase chassis have been delivered to the Montreal Tramways, Montreal, Can.

## Wheelguards to Replace Fenders on Seattle Cars

George B. Avery, superintendent of public utilities, Seattle, Wash., has obtained approval of the Board of Public Works for a plan to replace the present street car fenders with wheelguards. Six feet of space will be saved on every two cars in the crowded downtown business district at the peak of the day's rush hour, according to Mr. Avery.

Laconia Car Company, Laconia, N. H., through its directors, has decided to close the company's car building department and liquidate the assets incident to that part of its business. The closing of this department brings to an end a New England industry that has been in business for nearly 100 years.

American-LaFrance & Foamite Corporation, Utica, N. Y., has installed the fire fighting apparatus in the new municipal auditorium at Atlantic City.

Peter Smith Heater & Manufacturing Company, Detroit, Mich., has changed its name to Peter Smith Stamping Company, with the heating branch of the business operated under the name of Peter Smith Heater Company, a separate corporation.

General Electric Company, Schenectady, N. Y., has published bulletin GEA-991 descriptive of insulating material for railway and industrial-haulage apparatus.

Wagner Electric Corporation, St. Louis, Mo., has issued bulletin No. 162 on Wagner transformer oil, containing complete specifications as prepared for their own organization, but recently released for transformer buyers and users. The bulletin discusses the purposes of transformer oil, its properties, methods of testing, and precautions to take when handling and storing.

Perey Manufacturing Company, Inc., 101 Park Avenue, New York, has issued a folder describing the value of Perey turnstiles in preventing pilfering and "gate crashing" and in toning up the morale of an operating organization through removing the temptation to defraud.

International Steel Tie Company, Cleveland, Ohio, has published in pamphlet form the results of the recent Nielsen survey covering the use of steel twin ties on the property of the Kansas City Public Service Company.

Westinghouse Electric & Manufacturing Company has released circular No. 1834 entitled "Synchronous Visual Supervisory Control," describing the present types of Westinghouse supervisory control units, giving their application, advantages, and system of operation. The circular is illustrated with typical control equipment.

## ELECTRIC RAILWAY MATERIAL PRICES—JUNE 29, 1929

### Metals—New York

Copper, electrolytic, delivered, cents per lb.	18.
Lead, cents per lb.	7.00
Nickel, cents per lb., ingot.	35.
Zinc, cents per lb.	6.725
Tin, Straits, cents per lb.	44.583
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.: Commercial grade.	45.00
General service.	31.50

### Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons.	\$4.10
Somerset mine run, f.o.b. mines, net tons.	1.80
Pittsburgh mine run, Pittsburgh, net tons.	1.70
Franklin, Ill., screenings, Chicago.	1.70
Central, Ill., screenings, Chicago.	1.35
Kansas crushed mine run, Kansas City.	2.25

### Track Materials—Pittsburgh

Standard steel rails, gross ton.	\$43.00
Railroad spikes, drive, 1/2 in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.95
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	\$1.40

### Hardware—Pittsburgh

Wire nails, base per keg.	\$2.70
Sheet iron (24 gage), cents per lb.	2.90
Sheet iron, galvanized (24 gage), cents per lb.	3.65
Galvanized barbed wire, cents per lb.	3.35
Galvanized wire, ordinary, cents per lb.	3.15

### Waste—New York

Waste, wool, cents per lb.	13.
Waste, cotton (100 lb. bale), cents per lb.: White.	12.5
Colored.	9.5

### Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	11.1
White lead in oil (100 lb. keg), cents per lb.	13.2
Turpentine (bbl. lots), per gal.	\$0.56
Putty, 100 lb. tins, cents per lb.	5.725

### Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	6.85
Weatherproof wire base, cents per lb.	20.875

### Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand.	\$150
Wood block paving 3 1/2 in. x 1 1/2 in. x 1 1/2 in., N. Y., per sq. yd., f.o.b.	\$2.78
Paving brick 3 1/2 x 8 1/2 x 4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3 1/2 x 8 1/2 x 4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, 1/2-in., carload lots, N. Y., per cu. yd., delivered.	3.25
Cement, Chicago consumers' net prices, without bags, f.o.b.	2.05
Gravel, 1/2-in., cu. yd., delivered.	3.25
Sand, cu. yd., delivered.	2.00

### Old Metals—New York and Chicago

Heavy copper, cents per lb.	13.75
Light copper, cents per lb.	12.00
Heavy yellow brass, cents per lb.	8.25
Zinc, old scrap, cents per lb.	3.25
Lead, cents per lb. (heavy)	5.00
Steel car axles, Chicago, net ton.	\$16.75
Cast iron car wheels, Chicago, gross ton.	14.75
Rails (short), Chicago, gross ton.	18.75
Rails (relaying), Chicago, gross ton (65 lb. and heavier).	28.50
Machine turnings, Chicago, gross ton.	7.75



# SAFETY

Can Be Bought!

## PEACOCK STAFFLESS BRAKES

Because Peacock Staffless Brakes arrest the momentum of the car instantaneously—with a braking force on the wheel of 3000 lbs.

There is no chance of the chain binding or clogging—no limit of safety is countenanced, for Peacock Brakes can wind up 12 feet of chain.

And, too, worn brake shoes do not deter positive braking.

### NATIONAL BRAKE COMPANY, Inc.

890 Ellicott Square, Buffalo, N. Y.

General Sales Office: 50 Church St.,  
New York

*Canadian Representative:*

Lyman Tube & Supply Co., Ltd., Montreal, Can.



Recent photograph of a Bethlehem Grand Union installed over ten years at important intersection in an eastern city.

# Special Track Layouts

## ■ Bethlehem Track Specialties

Special Trackwork  
Tie and Girder Rails  
Special Splice Bars  
for Welding  
Abbot and Center Rib  
Base Plates  
Tie Rods and Tie Plates  
Hard Center Frogs and Mates  
Rolled Alloy Steel Crossings  
Silico-Manganese  
Special Trackwork

Before shipment every Bethlehem Special Track Layout is completely assembled—not in the open but under cover, in spacious, well-lighted shops where conditions favor accurate, painstaking workmanship.

Both by facilities and experience Bethlehem is thoroughly equipped to produce special trackwork for all requirements.

### BETHLEHEM STEEL COMPANY

General Offices: BETHLEHEM, PA.

DISTRICT OFFICES: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland, and Honolulu.

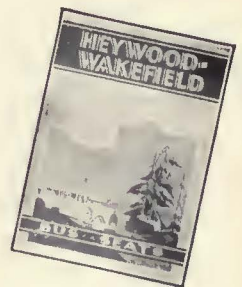
Bethlehem Steel Export Corporation, 25 Broadway, New York City.  
Sole Exporter of our Commercial Products.

# BETHLEHEM



## A Modern Seat in Every Way!

In every possible way this de luxe seat fulfills the requirements of modern bus travel. The 90 P is a smart looking, luxurious style that offers real comfort and relaxation on the long haul. Among its unusual features are the broad roll headrests; the deep, removable comfy spring cushions; and shaped, comfy spring back pads. This style is made with only one armrest to increase comfort and conserve space. This chair may be secured with fibre sides in any desired color. Write to the nearest Heywood-Wakefield sales office for complete details on the 90 P and other popular bus seats in our line.



If you have not received a copy of our new Bus Seat Catalogue, write for it.

**HEYWOOD - WAKEFIELD  
COMPANY**

**BOSTON, MASSACHUSETTS**

516 West 34th St., New York City  
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.  
H. G. Cook, Hobart Bldg., San Francisco, Calif.

439 Railway Exchange Bldg., Chicago, Ill.  
A. W. Arlin, Delta Bldg., Los Angeles, Calif.  
The G. F. Cotter Supply Co., Houston, Texas

The Railway and Power Engineering Corporation  
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

# 100

## **THOMAS-BUILT CARS** *now on the Streets of Detroit*

**A**LL produced on a single order, delivered at the rate of 8 cars a week. Everyone complete to the smallest detail, ready for immediate service.

It is not often that a builder of street cars is given such an opportunity to demonstrate so conclusively the qualities of his organization.

And to those responsible for awarding the Detroit contract, we owe a lasting debt of gratitude for their close study of our past record, our facilities and

our personnel, to the upbuilding of which we have devoted every effort for the entire period of our existence.

Street railway operators who contemplate adding to their rolling stock are invited to communicate with this youthful company which eagerly awaits the occasion to prove itself worthy of your confidence.

**PERLEY A. THOMAS CAR WORKS**  
*High Point, N. C.*

---

---

# THOMAS

---

---

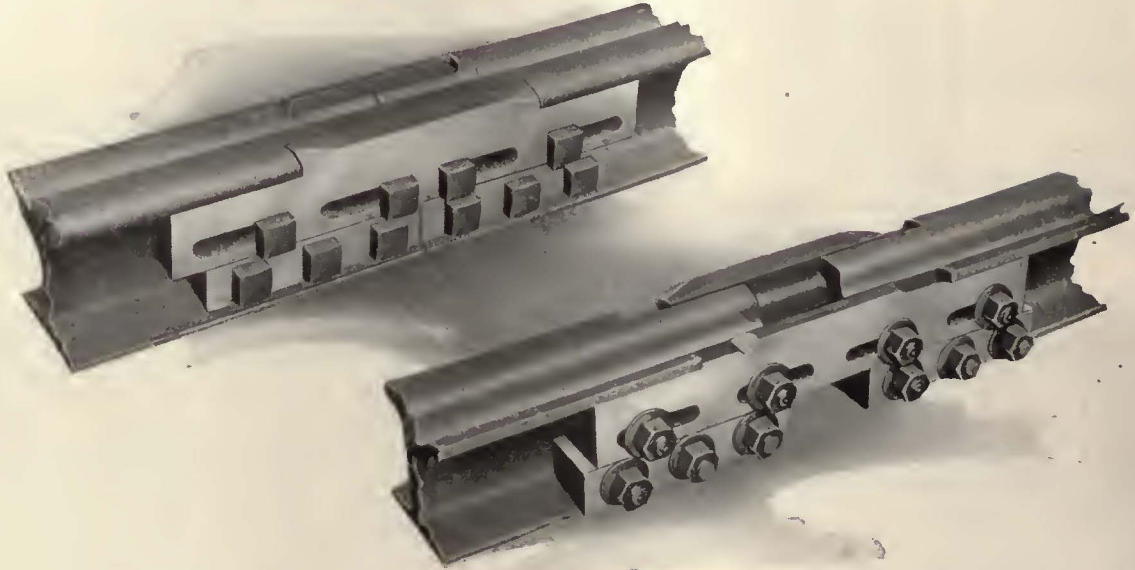


100 Thomas-Built cars of the Peter Witt type are now in service on the streets of Detroit.

Made in High Point, N. C., Furniture Capital of the South—for the automobile capital of the world, two leading cities thus join hands in the clasp of friendship based on the keen perception of the North for another example of the new South's progressive-ness.



# LORAIN



## Expansion Joint

Pittsburgh Railway Company's Standard

THIS type of joint is extensively used, particularly on bridges, and consists of an outside or head bar, which is made of manganese or other alloy steel, a tram side bar, which is cast steel, four steel flange blocks, two rails and necessary bolts.

This illustration shows short pieces of rail, but these rails are furnished in lengths as desired, usually 8 feet each. The extreme ends of the rails are drilled for standard joints and the expansion ends are specially machined, to accommodate the expansion bars and provided with round holes for the through bolts.

The four flange blocks are bolted permanently to the rail ends, and the head and tram bars are provided with slotted holes to take care of the expansion.

The upper illustration shows the joint practically closed while the lower shows it partly open. This joint takes care of expansion up to 3 1/2 inches.

- Girder Rails
- Girder Guard Rails
- Plain Girder Rails
- Rail Joints and Track Accessories
- Expansion Joints for Electrically Welded Track
- Special Trackwork
- Switches, Frogs and Crossings in
- Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail



## The Lorain Steel Company

General Offices: 545 Central Avenue, Johnstown, Pa.

SUBSIDIARY OF  
UNITED STATES STEEL CORPORATION



*Quality Products*      PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:      *Dependable Service*

AMERICAN BRIDGE COMPANY	CARNEGIE STEEL COMPANY	ILLINOIS STEEL COMPANY	THE LORAIN STEEL COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY	CYCLONE FENCE COMPANY	MINNESOTA STEEL COMPANY	TENNESSEE COAL, IRON & R. R. COMPANY
AMERICAN STEEL AND WIRE COMPANY	FEDERAL SHIPBUILDING AND DRY DOCK COMPANY	NATIONAL TUBE COMPANY	UNIVERSAL PORTLAND CEMENT COMPANY

*Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. Export Distributors—United States Steel Products Company, New York City*

Sales Offices: ATLANTA      CHICAGO      CLEVELAND      DALLAS      NEW YORK      PHILADELPHIA      PITTSBURGH



# Urban coach transportation — years ahead of its time !

**THE A. C. F.  
METROPOLITAN 40  
PASSENGER COACH**





## **SAFE, COMFORTABLE, PROFITABLE URBAN COACH TRANSPORTATION**

Especially designed for congested city traffic, the new Q. C. F. Metropolitan is the highest development of mechanical and economic efficiency yet attained in this type of bus transportation.

The Q. C. F. Metropolitan is an achievement that only the vast resources of Q. C. F. and its years of experience in the production of mass-transportation units could make possible.

### **PERFECT WEIGHT DISTRIBUTION**

There is no overhang beyond the front axle. The front end *cannot* strike the road . . . And there is perfect control at all speeds. The driver can gauge his clearances within a fraction of an inch. Front tire failure or bad road conditions cannot affect safe steering control.

Normal tire sizes are used both front and rear. And because of their location the front tires *cannot* become overloaded.

### **SAFETY AND LONG LIFE**

The body of the Q. C. F. Metropolitan is *all* steel. Steel frame . . . steel pillars . . . steel panels . . . all riveted together . . . steel to steel. Even the *panels* are 16 gauge steel; for the panels, too, bear part of the load. Steel, properly painted does not deteriorate, and when that steel is riveted wear *cannot* begin because no movement occurs.

*Because of this construction the Q. C. F. Metropolitan will give more years of continuous, operating, revenue-producing life than any other urban coach.*

### **CAPACITY**

Although the Q. C. F. Metropolitan uses a normal wheelbase of 230 inches and a normal width, it seats—comfortably—40 passengers, with an overload standee capacity of 100% to 150%.



### DRIVER POSITION

The driver has perfect vision on three sides; and he has to *turn slightly* to give attention to incoming and outgoing passengers. *This is a strong safety asset.* Because he is *compelled* to come to a full stop before taking on or letting off passengers, careless accidents are almost impossible.

### PERFORMANCE

The C. C. F. Metropolitan will accelerate faster than any other 40-passenger unit. It will turn in smaller space and around sharper corners than any other 40-passenger unit, and many 29-passenger units.

Definite records indicate a brake lining life of between 30,000 and 40,000 miles. The drum wear at 50,000 miles is imperceptible, assuring brake drum life of 50,000 to 300,000 miles. Original tires still in service after 40,000 miles look good for at least 15,000 more.

### MAINTENANCE

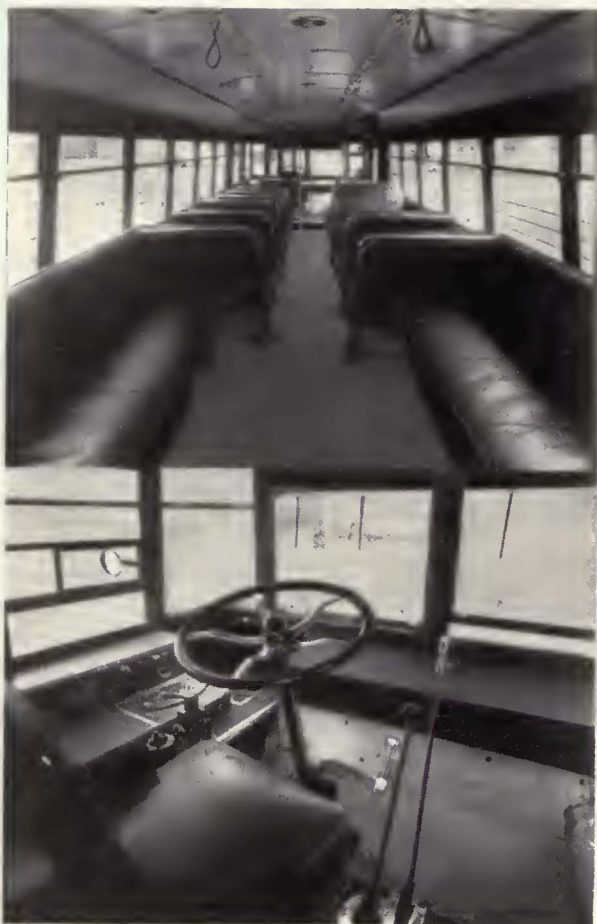
All steel construction practically eliminates body maintenance. The Hall-Scott engine has long since proved its merits in heavy duty transportation. The short drive shaft (only 26") reduces the heavy maintenance expense and loss of power of the usual long drive line.

And there is only one engine, one clutch, one transmission, one drive line, and one set of engine accessories to care for.

### APPEARANCE

The C. C. F. Metropolitan is modern and unusual, but not radical. Its distinctive design, startling beauty and luxurious comfort are the *result* of the application of correct engineering principles rather than artificial distortions . . . Beauty to attract capacity loads . . . comfort, luxury and fine performance to *hold* them.

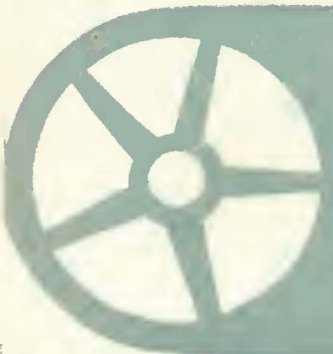




**THE METROPOLITAN IS  
READY NOW FOR LARGE  
SCALE PRODUCTION**

With the Metropolitan, the vision of Q. C. F. engineers, and the vast Q. C. F. resources and experience behind them, have produced a mass transportation unit that in the ordinary course of events, might not have been developed for another decade : : : Write for full details and specifications.

**AMERICAN CAR AND FOUNDRY MOTORS COMPANY**  
**30 CHURCH STREET . . . . . NEW YORK CITY**





**TIMKEN BEARING  
EQUIPPED**

**BUSES  
THAT  
STAY  
YOUNG**

**O**N the one hand—gruelling, grinding gaff . . . on the other—shock-proof, thrust-proof, torque-proof, speed-proof Timken Bearings.

At every vital point they stand their ground against depreciation and wear.

Youth abides in Timken-equipped buses . . . and profits accrue as a direct result. As time goes on and miles go by Timken-equipped buses go on running and earning.

Timken-equipped buses stay young because of these exclusive guardians of machine life—Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken-made steel.

Specify "Timken Bearing Equipped" and you get the bearing-protection which is universal in use and choice—*wherever wheels and shafts turn.*

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

**TIMKEN** *Tapered Roller* **BEARINGS**



## There are no "selling points" to a Stradivarius

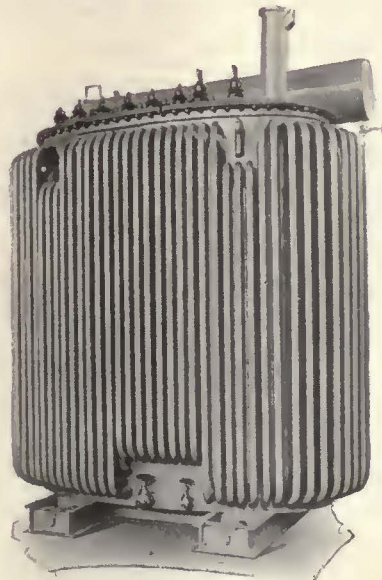
It is simply the world's finest violin because Stradivarius knew his business better than anyone before or since. He built a better violin because he took more pains with little things other violin makers considered unimportant.

ABB transformers are the result of similar recognition of the supreme importance of little things. Packard transformers have been built in the United States for

39 years. Brown Boveri transformers have been built in Europe and used all over the world for 38 years. For the most part, the experience of these two companies was not co-extensive. A Packard-ABB transformer that is built today represents the total experience of Packard and the total experience of Brown Boveri and incorporates every important little thing discovered in 77 years of striving to build perfection.

### One of the important little things

The oil used in ABB transformers is the result of the combined experience and development of oil refiners and scientists of two continents. It was developed primarily to meet service conditions in Europe with transformers operated on a 70° C. rise basis. It is the only oil manufactured in the United States which meets ABB specifications.



AMERICAN BROWN BOVERI  
CO., INC.  
CAMDEN, N. J.

# AMERICAN BROWN BOVERI



# *Cutting the Cost of Trolley Pole Service!*

**T**HE actual cost of trolley pole service is not confined to the purchase price of the pole itself. What the pole can do from day to day to keep down delays, avoid traffic tie-ups and eliminate frequent repairs or replacement of poles—are factors that determine the ultimate cost of trolley pole service.

NATIONAL-SHELBY Poles are designed with sufficient strength to meet all service requirements and yet not be of excessive weight. A special form of reinforcement at the proper place gives the pole great strength while the grade of steel used and a special heat treatment after drawing gives a high elastic limit and assures long life and satisfactory service.

In addition, every NATIONAL-SHELBY Trolley Pole is individually tested before it leaves the mill—a form of test that approximates actual service conditions. This type of test is especially important in that it minimizes the possibility of any defective pole being installed—thereby helping to cut the cost of trolley pole service before it begins. A description of this test and complete information about these poles will be sent on request.

**NATIONAL TUBE COMPANY · Pittsburgh, Pa.**

· Subsidiary of United States Steel Corporation



(SHELBY)



*Which proves that it*

**THERMIT**

**1909**



Condition  
of joint 5 years  
after new rails  
were laid

It took only five years to produce the result shown above. And that was on brand new rails. The company could easily have patched this joint and smoothed it off. Then it would have been as good as new—for another brief period. But the "easiest way out" is not the cheapest in the long run.

Rather than patch this joint, the company wisely decided to Thermit Weld. That was fifteen years ago. Now observe the picture and story of the same joint on the opposite page.



**1914**

**METAL & THERMIT**

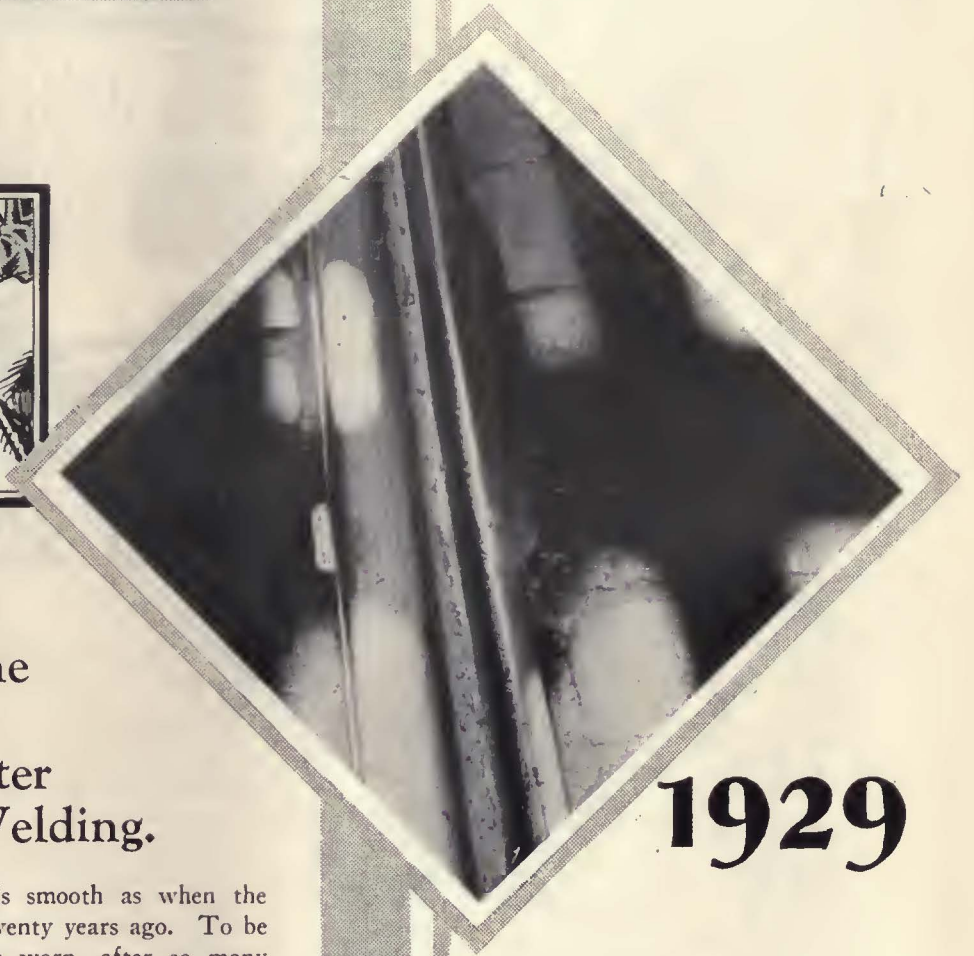
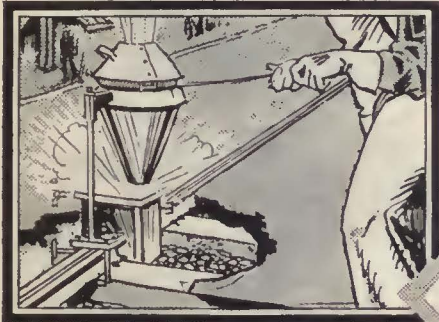
PITTSBURGH

CHICAGO

BOSTON

120 BROADWAY

# *pays to* **WELD** 1914



Condition  
of that same  
rail joint  
15 years after  
Thermit Welding.

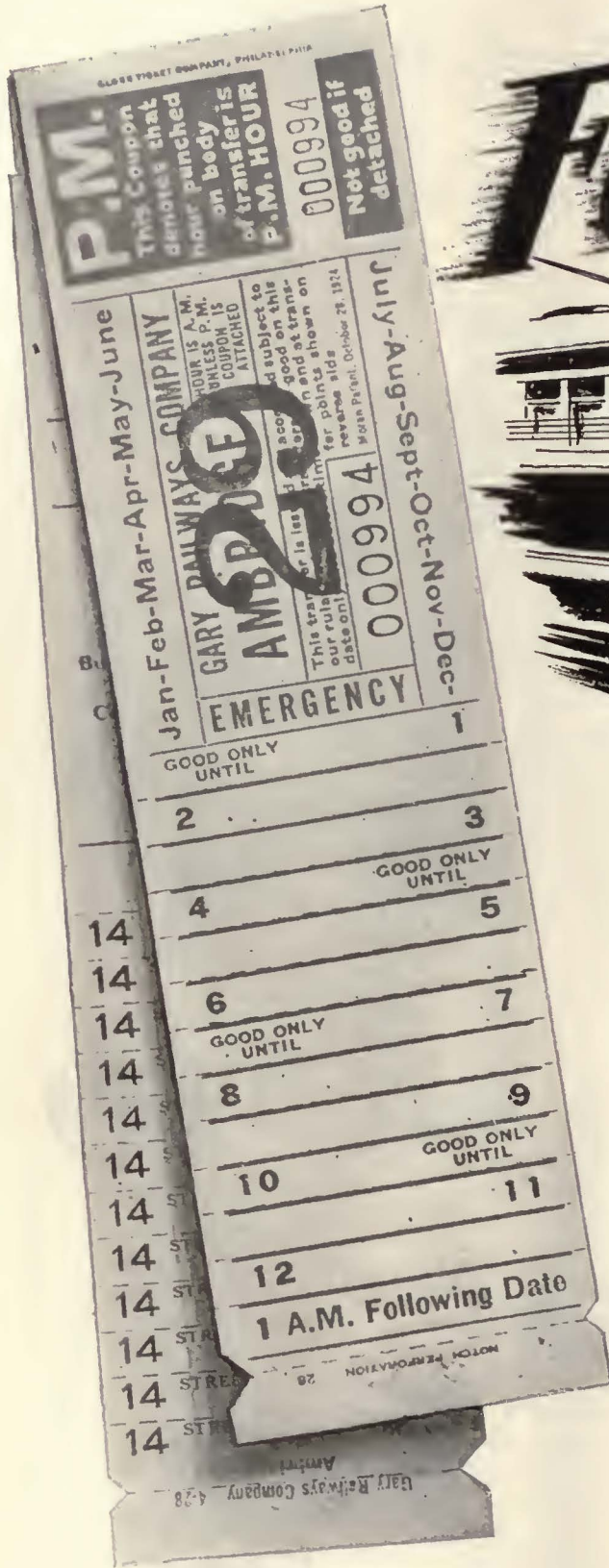
1929

Today the joint is smooth as when the tracks were laid twenty years ago. To be sure, the rails are worn, after so many years of heavy traffic, but for 15 years the pavement had been undisturbed,—the slight extra cost of Thermit Welding has been absorbed,—and what is more, the life of the rails has been extended many years to come.

Consider these facts when you are laying new rails or repairing worn joints. In either case, you'll find it *pays to Thermit Weld.*



**CORPORATION**  
NEW YORK, N.Y.      SOUTH SAN FRANCISCO      TORONTO



Showing both sides of the Moran Patent Transfer. The perforations at each indicated hour make its issuance fast and easy.



and safer !

This Moran Patent Transfer has three very decided advantages in transferring crowds of passengers at all hours.

*First*—The P.M. Coupon, if left intact, indicates that the time shown is between noon and midnight. When the conductor tears it off, it automatically indicates morning time.

*Second*—The transfer, when issued, is torn off at the proper time limit. This shortens the transfer by an amount determined by the time. Any attempt to use the transfer after the limit is instantly noticed, due to the difference in length.

*Third*—The transfer is perforated at each hour. This means that the conductor requires no tear off instrument.

Many prominent operators use this transfer to great advantage. It eliminates fraud to a great extent. It is faster and easier to handle. Write us for samples.

# Globe TICKET COMPANY

112 North Twelfth Street  
PHILADELPHIA

Factories  
PHILADELPHIA NEW YORK BOSTON LOS ANGELES JACKSONVILLE, FLA.  
Sales Offices  
BALTIMORE CINCINNATI CLEVELAND PITTSBURGH SYRACUSE, N. Y.



## Gas-Electric Cars Need This High Braking Power

**F**REQUENT STOPS are a feature of Gas-Electric car service. This calls for braking power as well as starting power.

You depend on Gas-Electric equipment to improve schedules—give them the means for doing so by applying Simplex Multiple Unit Clasp Brakes.

With two brake shoes per wheel instead of one, the Clasp Brake produces the maximum retarding effect, with minimum wear and tear on truck and journal parts. It also relieves the thrust on the motor bearing that otherwise occurs in one-sided braking.

The Simplex Multiple Unit Clasp Brake affords smoother braking with less heating of brake shoes and reduces the number of "slid flat" wheels. It is an essential part of Gas-Electric railway equipment.

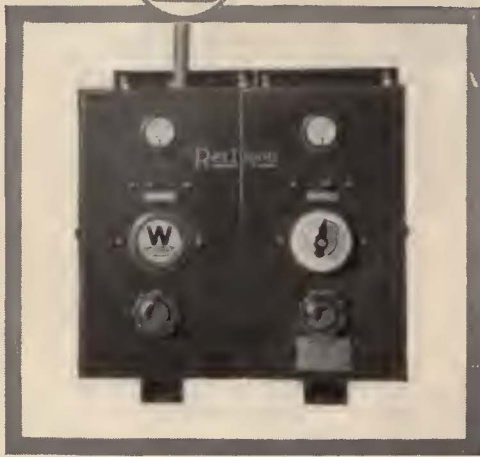


# AMERICAN STEEL FOUNDRIES

NEW YORK

CHICAGO

ST. LOUIS



Rectigons are made in two sizes, 15 and 30 battery capacity, at \$75 net and \$135 net, respectively.

# Low first cost ... low upkeep cost low attendance cost




The secret of battery charging economy lies in these three factors that the Rectigon gives you. You find them in no other type of charging equipment.

One man can install the Rectigon in less than an hour. No unlooked for maintenance expense can increase your costs. No drop in efficiency can menace the savings the Rectigon assures. You can look forward to years of service with only inexpensive bulb renewals to be made at long intervals.

The Rectigon needs no specialized knowledge to keep it operating and no attendant is required to watch the batteries on charge. Use it for night charging and get new efficiency from twenty-four hour service.

The booklet, "More Power to the Battery," tells how the Rectigon keeps down battery charging costs. Write for a copy.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.  
Merchandising Department East Pittsburgh, Pa.

each battery   
 charged with this  
 rectigon  and  
 this bulb  gives  
 you . . . a lower  
 charging cost

## Westinghouse

Use only genuine Westinghouse Bulbs  
for replacements

FOR PEAKS AND OFF - PEAKS  
FREQUENCY OF SERVICE  
LOW OPERATING COST  
LOW INITIAL COST  
SAFE INVESTMENT  
RIDER APPEAL  
REVENUE  
VALUE



# You play safe when you operate



 CHRYSLER MOTORS PRODUCT

# DODGE MOTOR

SOLD AND SERVICED BY



# on every count

# Dodge Motor Coaches

*These modern coaches have everything that you need to insure low cost, patronage-building service and investment safety*

Seek the reasons for the constantly increasing preference being given Dodge Brothers Motor Coaches and basic facts stand forth . . . . This year and for years they have worked dependably under various traffic requirements—have attracted the patronage of millions of riders—and have shown high earning ability on the record sheets of their owners.

Medium in size and attractively priced, these fast, powerful, economical coaches may be operated more frequently . . . . they earn consistently during both peak and off-peak periods.

Their appearance attracts riders. Their comfortable seats, 6-cylinder smoothness and quiet, hydraulic 4-wheel brake safety, 3-stage progressive rear springs for riding ease, and quality design in every detail please riders and win their continued patronage.

With coaches such as these, safety of investment is assured. Returns are certain. You play safe on every count.

**B R O T H E R S**  
**C O A C H E S**

DODGE BROTHERS DEALERS EVERYWHERE



## For riders with that *“in-between”* preference—

Already large, and ever growing, is that class of riders who want that service which is “in-between” the street cars and high-priced transportation.

Dodge Brothers 16-passenger Parlor Coaches meet this demand. They are fast, powerful, safe, quiet and comfortable. Their fine appearance attracts patronage. Their sturdy, simple construction keeps operating costs exceptionally low. Their fitness has been proved in large cities and small the country over.

See your local Dodge Brothers dealer or write direct to Dodge Brothers Corporation, Detroit.

# DODGE BROTHERS MOTOR COACHES

SOLD BY DODGE BROTHERS DEALERS EVERYWHERE

B-1219 Printed in U. S. A.

IT'S THE **NON-STOP MILEAGE**THAT MAKES THE **BIG HIT**

# General Builds a Special Tire For Every Kind of Service

## *The most complete line on the market*

General's leadership in supplying the big share of the truck and bus market is the result of its complete and *specialized* commercial line—each tire designed and built expressly for the work it must do.

Years of study in seeking out and solving the toughest problems in tire operating costs lie back of each General pneumatic or cushion. There is a General for *your* job—engineered to give you big, uninterrupted, economical mileage.

The General Tire dealer has all the information gained by General's engineering service at his finger tips. He knows the right tire for your equipment—it will pay you to see him. The General Tire and Rubber Company, Akron, Ohio.

### **The Complete General Commercial Line Includes:**

Dual-Grip Truck Cord; Truck and Bus Balloon; the "Jumbo" Ford and Chevrolet line; Heavy Express Special; One-Ton Express Special; Regular Cushion; Demountable Cushion; Heavy Duty Non-Skid Cushion; high speed and regular; Extra Heavy Non-Skid Cushion; Air Center Cushion, non-skid and rib tread; High Smooth Cushion.



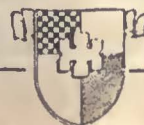
**General builds pneumatic and cushion tires especially engineered for**

- Dump trucking
- Oil field and excavating
- City and inter-city busses
- Heavy short-haul trucking
- Cannon-haul long-distance freighting
- 1½ to 3-ton delivery service
- 1-ton heavy express work
- Light commercial service (12 special types)
- Taxi service
- Farm, contracting and industrial tractors
- Trailers

The Truck  
and Bus Balloon

# The GENERAL TIRE

GOES A LONG WAY



TO MAKE FRIENDS

# GARY

## WROUGHT STEEL WHEELS

Into them have been built all the safety, all the dependability, all the trouble-free mileage that long steel-making knowledge and extensive wheel-making experience can provide . . . . Our wheel engineers are always glad to co-operate with your engineers in the solution of your wheel problems.

### Illinois Steel Company

Subsidiary of United States Steel Corporation

General Offices:

208 South La Salle Street, Chicago



ALL THAT GOOD WHEELS SHOULD BE

# Italy Repeats

with

830 Sets of "Tool Steel" Gears

Then With

1200 More Sets of "Tool Steel" Gears

Last year the City of Milan, Italy, began to revamp their electric railway system. After exhaustive tests of both American and European gears they placed an order for 830 sets of Tool Steel "Quiet" Gears.

Recently we received a cable order for *1200 additional sets* to complete the job.

Proof positive of the superiority of "Tool Steel" Quiet Gears.

The Tool Steel Gear and Pinion Company  
Cincinnati, Ohio



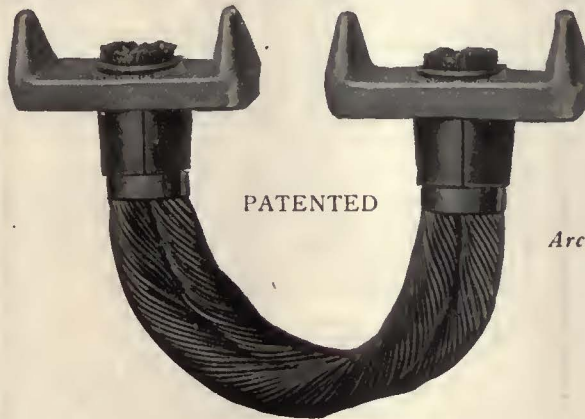
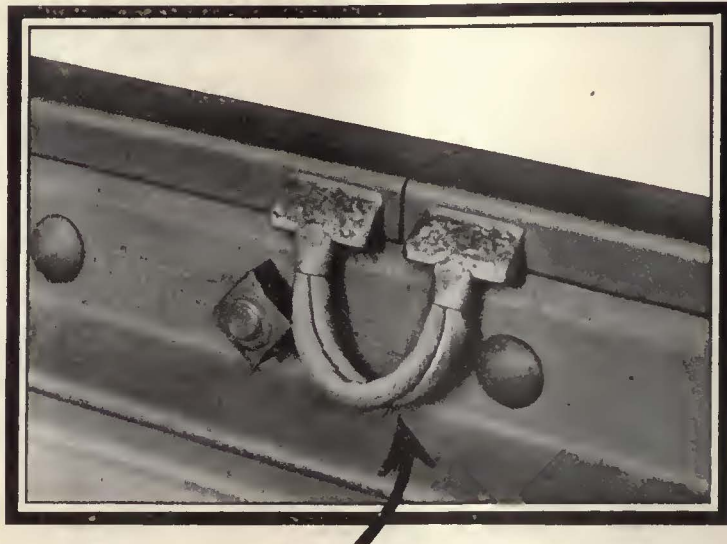
*The Standard of Quality*

**TOOL-STEEL QUALITY**  
**GEARS AND PINIONS**

# American Steel & Wire Company

## ARCON RAIL BONDS

"Trade Mark Registered"



Arcon "A" Bond in detail  
and installed

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

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

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

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

Prices and literature mailed upon request.

## AMERICAN STEEL & WIRE COMPANY

Subsidiary of United States Steel Corporation

CHICAGO.....208 S. La Salle St.	ST. LOUIS.....506 Olive Street	NEW YORK.....30 Church St.	BAITIMORE.....32 S. Charles St.
CLEVELAND.....Rockefeller Bldg.	KANSAS CITY.....417 Grand Ave.	BOSTON.....Statler Bldg.	BUFFALO.....670 Ellicott St.
DETROIT.....Foot of First Street	OKLAHOMA CITY.....First Nat'l Bank Bldg.	PITTSBURGH.....Frick Bldg.	WILKES-BARRE.....Miners Bank Bldg.
CINCINNATI.....Union Trust Bldg.	BIRMINGHAM.....Brown-Marx Bldg.	PHILADELPHIA.....Widener Bldg.	DALLAS.....Praetorian Bldg.
MINNEAPOLIS-ST. PAUL.....Merchants Nat'l Bank Bldg., St. Paul	MEMPHIS.....Union and Planters Bank Bldg.	ATLANTA.....101 Marietta St.	DENVER.....First Nat'l Bk. Bldg.
		WORCESTER.....94 Grove St.	SALT LAKE CITY, Walker Bank Bldg.

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

# Do You Know

... that spray painting methods with proper facilities will cut your painting cost on street cars and motor buses 50%? Do you know that the number of reserve street cars or buses may be reduced through a reduction in the "Out of Service" time required for refinishing? Do you know that if spray painting methods were employed 75% of the floor space in your present paint shop could be utilized for other purposes? Do you know that spray painting gives you a finer finish with much longer

life? Do you know that Railroads, Street Railways and Motor Bus operating companies are rapidly adopting this modern method of refinishing? ¶ Mahon engineers are prepared to show you definite figures from actual operation. This staff of highly specialized Spray Booth experts will cooperate with you in working out a Spray Booth installation best suited to your particular requirements. ¶ Consultation with these specialists will not place you under obligation. Write today.

**THE R.C. MAHON COMPANY**  
**DETROIT, MICHIGAN**

*Manufacturers of Spray Booths and Exhaust Stacks, Industrial  
 Drying Ovens and Blow Pipe Systems*

# MAHON

**SPRAY BOOTHS & EXHAUST STACKS**

• DESIGNED FOR FIRE SAFETY •



# Accelerated Transportation must be made **SAFE**

For the sake of their patrons . . . and their profits . . . modern railways must expedite the movement of traffic.

Today there is a growing demand for more frequent service . . . shorter, quicker stops . . . less delay at entrance and exit . . . a speedier getaway.

All of these requirements are met to an efficient degree by the use of complete protective and convenience-promoting devices . . . the Safety Car Control Equipment.

Safety Cars assure accelerated transportation — properly safeguarded.



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

*Postal and Telegraphic Address:*  
**WILMERDING, PA.**

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

*"We make The Safety Car Control Equipment  
. . . which makes the Safety Car"*

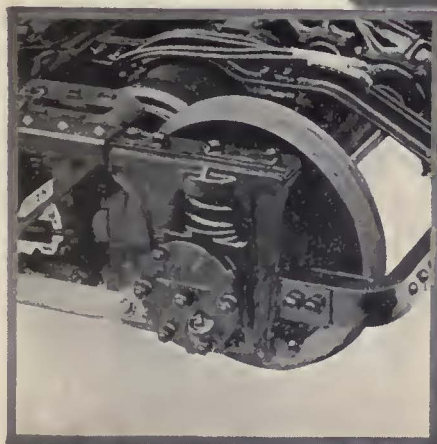
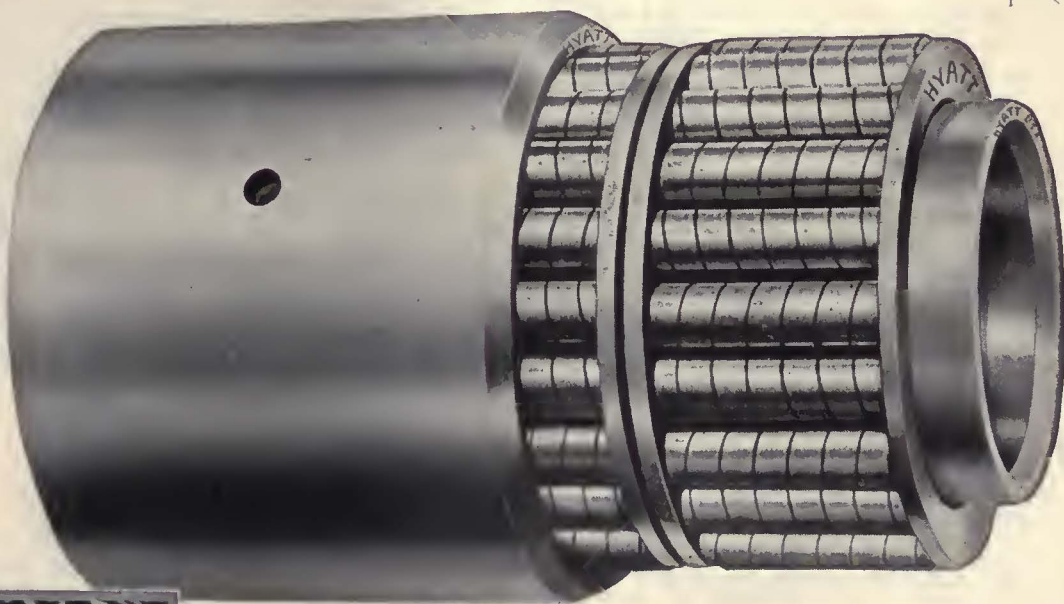


# SAVING and SERVING *-the Hyattway*

**T**HE many annoyances and power-waste of friction bearings may be banished forever with Hyatt Roller Bearings in your car journals.

Smooth starts, rapid pickups, quiet and easy running are further Hyatt contributions to greater passenger comfort, punctual service and economical operation.

In Hyattized journal boxes the sturdy Hyatt bearings rotate with the wheels in a natural, easy motion and, by reducing friction and drag, they cut power costs appreciably.



The only attention Hyatts ever require is an occasional oil inspection and replenishment at infrequent intervals. Hyatt journal boxes are installed to keep the cars busy earning profits instead of wasting time in repair shops.

The many advantages and economics to be derived from the application of Hyatt Roller Bearings are worth investigating. Every A. E. R. A. requirement for standard equipment or replacement is met.

**HYATT ROLLER BEARING COMPANY**  
Newark    Detroit    Chicago    Pittsburgh    Oakland

**HYATT**  
**ROLLER BEARINGS**  
PRODUCT OF GENERAL MOTORS



Carnegie Wrought Steel Wheels for electric railway service are multiple-life wheels. Which means that when the ordinary wheel is worn out and ready for the scrap heap, the multiple-life wheel is still good for many years of service. The cost of reconditioning the contour is trifling compared with the cost of a new wheel. A special process of rolling and forging under enormous pressure insures a homogeneous structure, free from irregularities that might cause failure. Defects are rolled out and mileage rolled in.

In city service, Carnegie Wheels have an additional advantage in that cars may be speeded up with safety over crossings, with less possibility of damage to special track work.

Operators who figure on a cost-per-mile basis will find Carnegie Wrought Steel Wheels the outstanding value in the wheel market today.

*Booklet on request.*


## CARNEGIE STEEL COMPANY

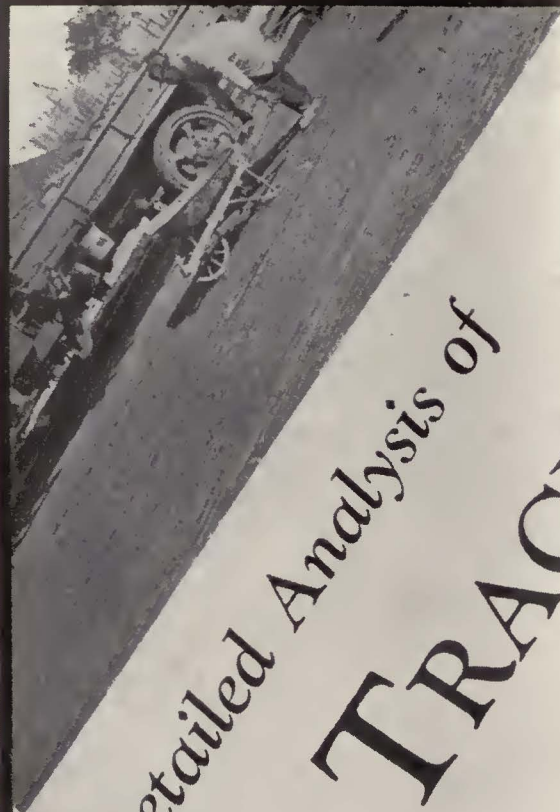
*Subsidiary of United States Steel Corporation*

CARNEGIE BUILDING ∞ PITTSBURGH, PA.

# NEW ORLEANS

**U**nique  
**TRACK**  
**ANALYSIS**  
Which Led To  
Use Of  
**DAYTON**  
**INTEGRAL TRACK**





Detailed Analysis of

# TRACK COSTS

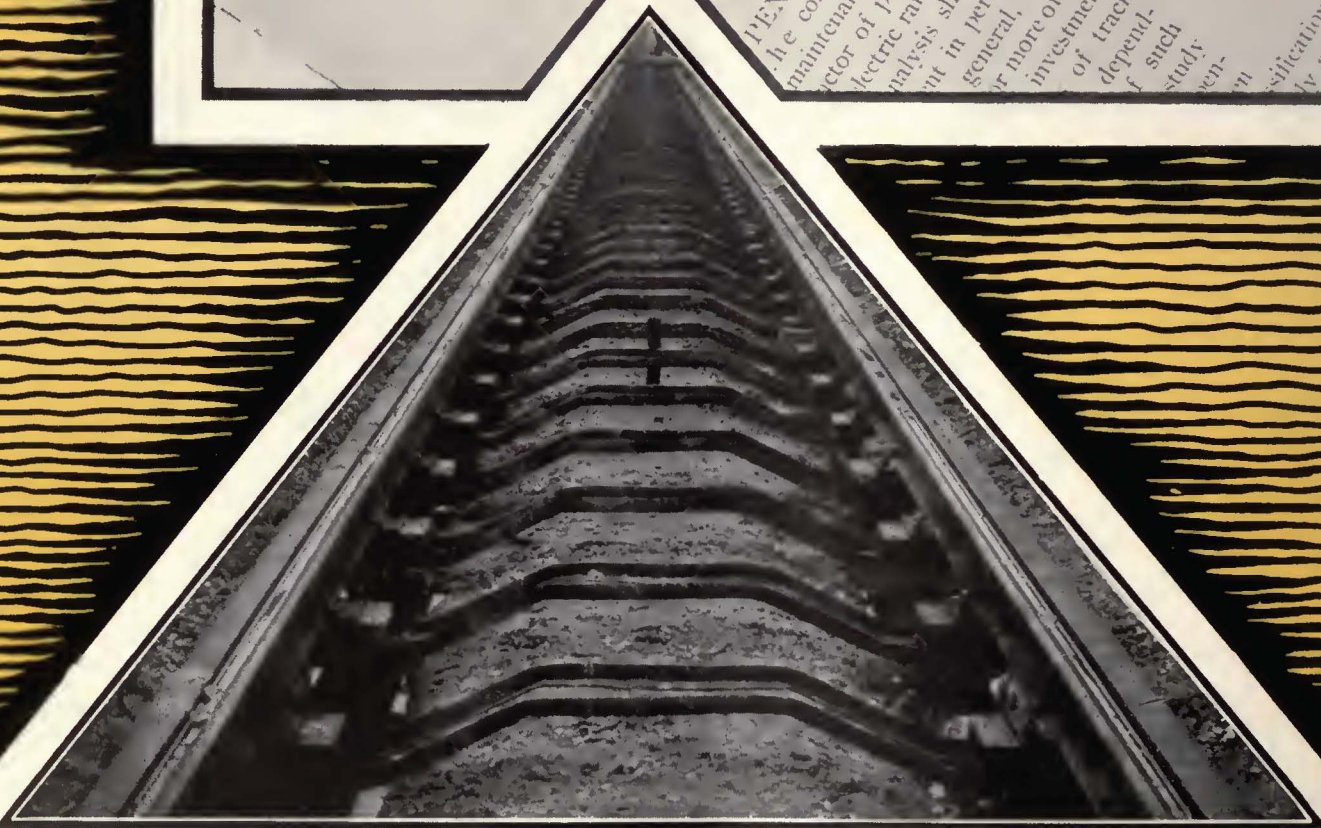
Promotes Economy

EXPENDITURES for the construction and maintenance of tracks factor of prime importance in electric railway operation. This analysis shows that in general, permanent investment, compared with more of the investment of track, is dependent upon the study of such factors as the classification of accounts established by a group of figures that This system does not convenient means of standardizing figures.

Street railway trackage in New Orleans is classified according to type and age of construction and accurate records are kept of all expenditures. These figures permit determination of most economical designs and methods.

By  
**I. O. MALL**  
Assistant Superintendent of Roadway  
New Orleans Public Service, Inc.

track system it is impossible to analyze performance. Unless maintenance methods and cost records are detailed attention is inevitable that money will be spent in vain.



# New Orleans Knows What Track Maintenance Costs And Why

New Orleans Public Service, Inc., has developed a unique and comprehensive method of taking care of track maintenance.

This method not only makes certain that maintenance is kept up, but also records exact cost figures which make possible detail study of maintenance required by every type and age of track in use.

It was this type of study which convinced New Orleans Engineers of the need of better paved track.

None of the types of track they were using fully met their needs. These records proved conclusively that not only was the life too short, but maintenance mounted year by year until the track was eating its head off.

Certain types showed, in a very moderate period of years, maintenance costs equal to or greater than the original cost of track.

The next step was to test other types of track. These tests led to the Dayton Integral System of Track and Paving Structure.

...that  
...com-  
...invest-  
...there-  
...methods  
...have been developed  
...the New Orleans  
...records that furnish  
...economical aspects of  
...maintenance. The limits  
...governed by type  
...at points  
...April, 1929

*Cost Records Led To Tests—  
Tests Led To*

## THE DAYTON INTEGRAL SYSTEM

By scientifically exact methods, New Orleans Public Service, Inc., went after the matter of track maintenance cost—track life.

Finding maintenance excessive and life too short, they immediately set to work to find better track.

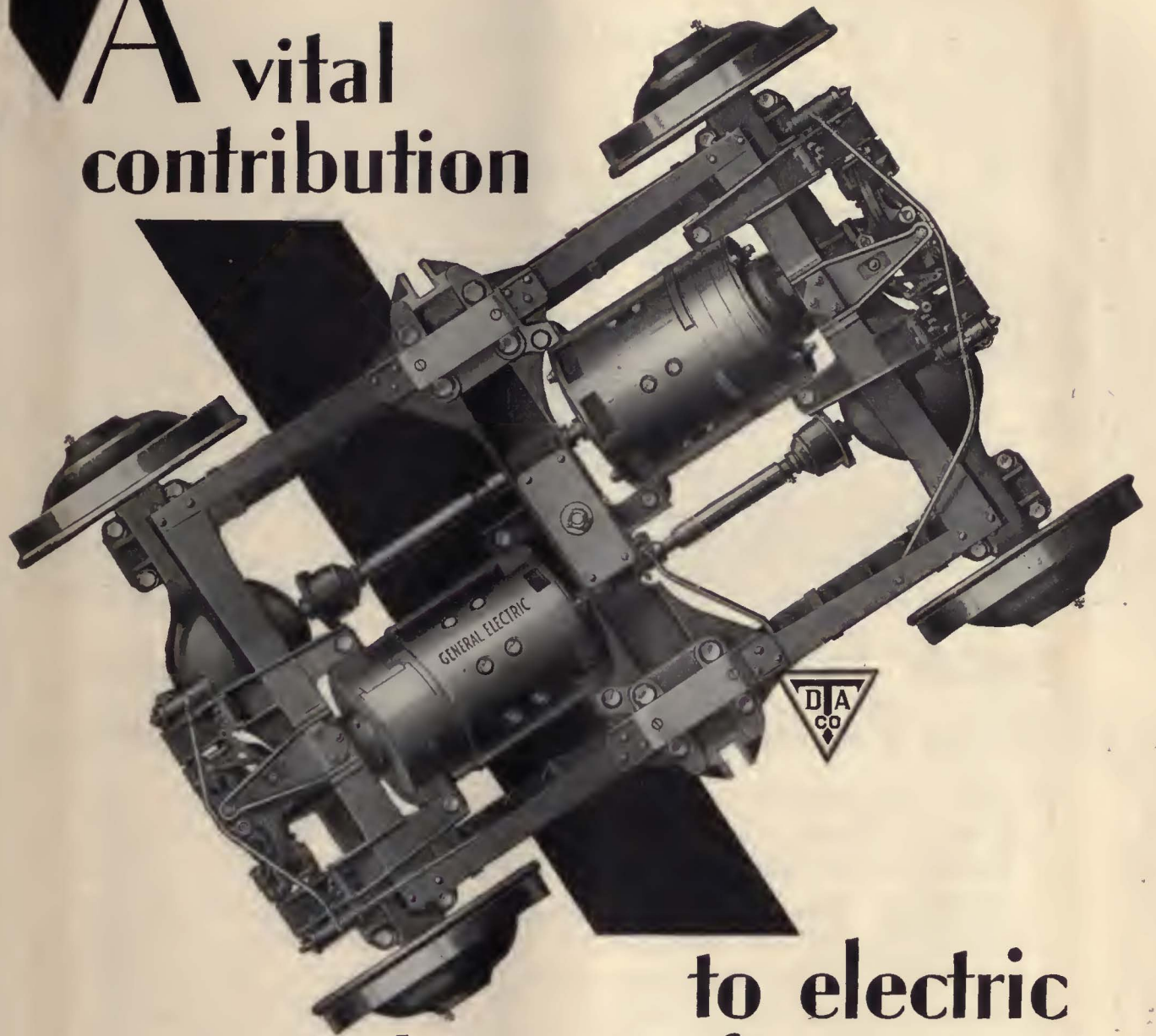
Again they used scientific methods. Tests worked out and performed with great care led to the utilization of the Dayton Integral System of Track And Paving Structure.

This system combines track and paving into a unified durable structure. It saves concrete—provides long life with no major maintenance at all.

THE DAYTON  
MECHANICAL TIE CO.  
DAYTON, OHIO



# A vital contribution



to electric  
railway performance,  
economy, comfort and profit

## TIMKEN WORM DRIVE TRUCKS FOR ELECTRIC RAILWAY CARS

THE TIMKEN-DETROIT AXLE COMPANY  
DETROIT, MICHIGAN

ANOTHER APPLICATION OF **SKF** BEARINGS ON THE  
STREET RAILWAYS OF AMERICA BY THE  
**ST. LOUIS CAR COMPANY**



YOU MAY BUY A  
BEARING AS A  
BARGAIN BUT  
TRY AND GET A  
BARGAIN OUT OF  
USING IT

*for*  
Nothing is apt to cost so much  
as a bearing that cost so little.



## **SKF** Bearings on Journals and Motors Satisfy Public and Reduce Operating Costs

**O**NE of the most forceful factors enabling street railway companies to successfully meet the challenge of newer methods of transportation is improved rolling stock. And a two-fold aid towards this betterment are SKF Journal Bearings. Not only do they insure quicker, smoother and easier riding for the public but their operating economies are distinctly traceable on the balance sheets.

For several years SKF Anti-Friction Bearings have been giving a successful record of performance on the motors and journals of the above car. The Master Mechanic of the road says: "It takes rough and uneven track with less oscillation than other cars of the same type and ....the riding and running qualities of the car are superior to other single truck safety cars we are operating."

**SKF** INDUSTRIES, INC., 40 East 34th Street, New York, N. Y.

1328

# SKF

## Ball and Roller Bearings





*All motor coaches of the St. Louis Public Service Co. are exclusively Goodyear-equipped*

# 1,800,000 Bus Miles Per Year in St. Louis

With 52 motor coaches totaling 150,000 miles per month, and with 312 Goodyear Tires in daily service—the St. Louis Public Service Company has an exceptional opportunity to judge tire performance.

Among these Goodyear Tires they find many which travel better than 30,000 useful miles. The top mileage recorded is 40,626.

But the more important fact about Goodyear Tires is their uniformity in delivering satisfactory service.

Certainly this is due, in part, to Supertwist—the special cord which is extra-elastic—and

puts added vitality into every Goodyear Tire.

It is due, also, to the Goodyear All-Weather tread which—in addition to powerful traction on hills and wet pavements—delivers exceptional mileage because of its slow, even, economical wear.

The excellence of each feature in a Goodyear tire is bound up in the reliability of the whole. It is the ultimate performance of these tires which has won them a place on the great majority of prominent motor coach fleets, just as it has on the fleet of the St. Louis Public Service Company.

*For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service*

**GOODYEAR**

# As Harmonious as its name



As a bus skims over the highway or ambles through traffic, its warning signal must appeal for the right of way in tones that are positive but pleasing. It must be heard—it must not be harsh.

The PNEUPHONIC HORN gives warning of approach, unmistakable, yet not irritating nor startling. Its tone is loud, clear, distinctive and harmonious.

WESTINGHOUSE AIR BRAKE COMPANY

Automotive Brake Division—Pittsburgh, Pa.



The Westinghouse Pneuphonic Horn is available in various types and sizes to produce different tonal qualities, and in combinations for producing a pleasing chime effect when desired. Write for descriptive literature and prices.



*The Past Performance  
of Yellow Equipment  
sold Washington Rapid Transit  
on the New  
39 passenger Z-240*

**CON**



**O**

**ut of the  
performance of this  
Yellow Coach Fleet  
came the order for Z-240  
39 passenger coaches**

# EVIDENCE



thereby taking up less street room and saving the expense of the additional operators that would be necessary.

Again the company made a careful survey of the operating and maintenance costs of their equipment and found that the Yellow Coaches, in use had from the day they went into service, *increased revenue 10 per cent and reduced operating and maintenance costs far below the equipment they replaced*, even reducing shop personnel, so easily were they serviced.

This record of performance, so typical of Yellow Coach fleets, supplied the answer when additional equipment was needed for peak hour service. The company promptly ordered 8 of the new large capacity, Z-240, 39-passenger City Service Coaches.

*Again, performance and knowledge gained by experience had won another repeat order for Yellow.*

**T**HE Washington Rapid Transit Company of Washington, D. C., rank as one of the early pioneer bus operators in the East.

In October, 1927, after having operated buses for 6 years, an extensive survey was made of the operating and maintenance costs of the various makes of equipment in use, with the result that 31 additional Yellow Coaches were secured and placed in operation—28 Z 29-passenger coaches and 3 X 21-passenger coaches.

In the fall of 1928 it was decided to add additional equipment to take care of rush-hour loads.

There were two alternatives: To either put on a number of extra smaller coaches or to put in operation a smaller number of larger capacity coaches,





# Already the Z-240 has Proved the Wisdom of Selection

Only a few short months in service, yet ample time in which to judge.

Satisfied with maintenance and appreciating the value of standardization, the Washington Rapid Transit Company is finding their new Z-240's all that they expected.

During peak hours these coaches run on an express schedule carrying passengers without stops to points outside the loading area.

During the off peak periods the coaches are used for sightseeing and profitable charter business.

Responsible for successful performance are the same factors that influenced the purchase of the original fleet of Yellow Coaches—factors checked against the operations of other companies using a wide variety of different makes.

1. Cost per mile of operation.
2. Cost per mile of maintenance.
3. Gasoline—miles per gallon.
4. Life of motor and other major units.
5. Accessibility of major units in dismantling and assembling.
6. Tire mileage.
7. Seating arrangement and riding quality of coaches.
8. Durability and life of body.

Through their dependable, economical operation, Yellow Coaches are everywhere placing motor coach transportation in the United States and Canada on a sound and profitable basis.

GENERAL MOTORS TRUCK COMPANY  
Pontiac, Mich.



# **The Texas Company**

## **announces**

**With the acquisition of the Penniman patent rights and in combination with other rights, The Texas Company is in a position to offer to the Electric Railways of the country a new power-saving principle of lubrication.**

**Speaking conservatively, a 20 per cent saving in power is assured — 33 per cent has been attained.**

**Executives of Electric Railways are invited to correspond with us to secure complete data.**

**THE TEXAS COMPANY**

**Lubricating Division**

**Dept. L, 17 BATTERY PLACE, NEW YORK CITY**

**NOTE—these savings do not require any radical change in present methods**

# These photos [from tell an of track



**S**HOWING the application of Carey Elastite System of Track Insulation on the Hydro-Electric Railway lines, at Windsor, Ontario, Canada.

THE PHILIP CAREY



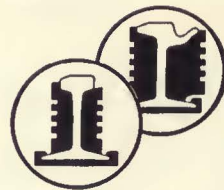
# ONTARIO } interesting story reconstruction work . . .

**C**AREY Elastite System of Track Insulation is an important part of the betterment program of Hydro-Electric Railways, Windsor, Ontario. For, in this improved traction development, the officials of this Canadian railway have found a logical, economical way to minimize track noises and to keep next-to-the-rail paving smooth and unwrinkled.

More than two hundred cities are using Carey Elastite System of Track Insulation with the same perfect results. For new tracks, for reconstruction work. A saving in railway maintenance, a route to faster schedules—a guarantee of smoother riding and better service to patrons. If you are planning any track construction work, it will be to your advantage to have our representative call and give you the facts on this advanced system of track insulation.



**Carey  
Elastite**  
TRADE MARK REGD. U.S. PATENT OFFICE



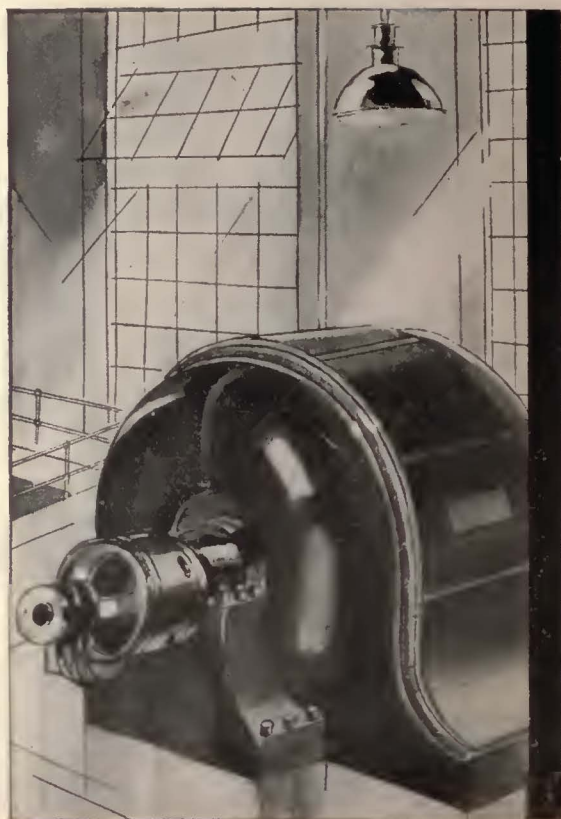
**SYSTEM OF  
TRACK INSULATION**

A preformed asphaltic compound, reinforced with asphalt-saturated fibres.  
A moisture-proof, shock-absorbing cushion between the rails and paving.

**COMPANY, Lockland, CINCINNATI, OHIO**



# Aluminum Busbar reduces the cost

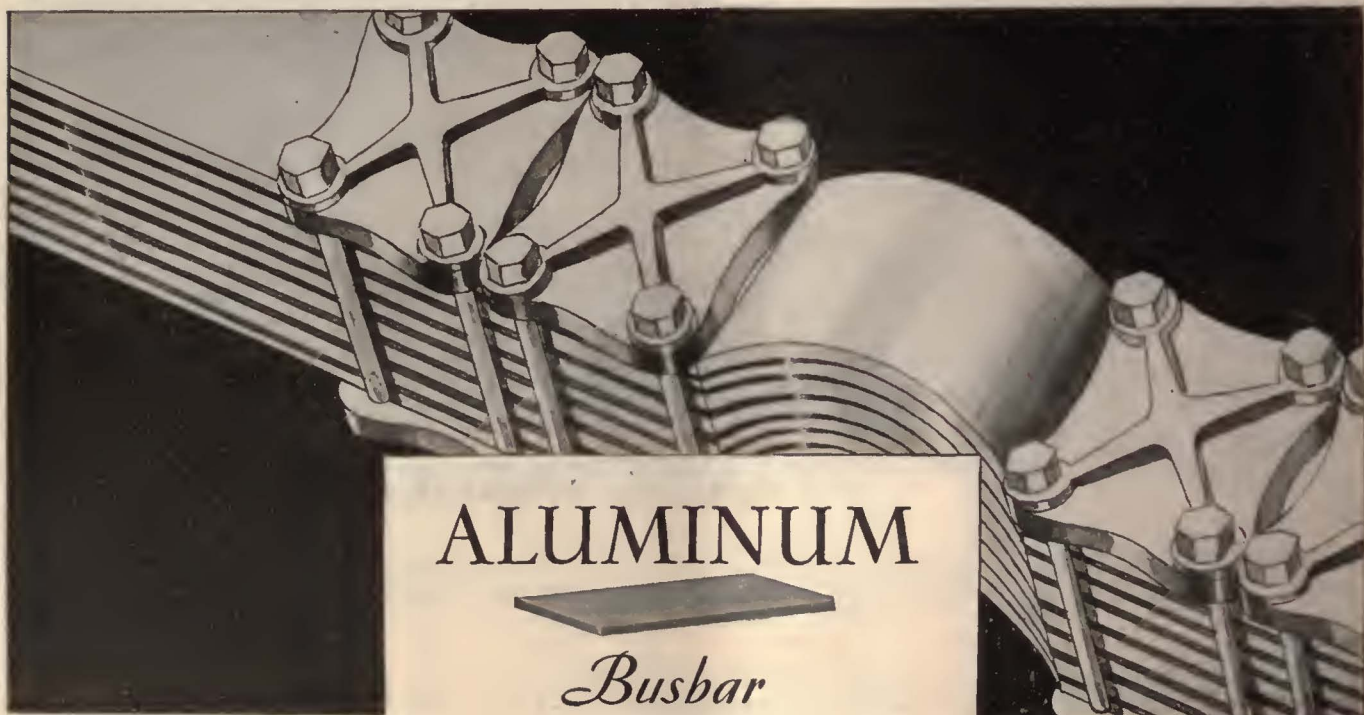


THE fact that the most important nations of Europe have standardized on Aluminum Busbars as the most satisfactory and economical material for transmission purpose, has only a collateral interest here in America.

But some American transmission engineers took advantage of the economy inherent in Aluminum Busbar many years ago and their use in America has grown year by year until today Aluminum Busbars have wider acceptance in this country

than at any other time in our electrical history. The booklet, "Aluminum Busbars," contains useful tables of weights, carrying capacities and physical properties, together with photographs of various installations. Please send for your copy.

ALUMINUM COMPANY OF AMERICA  
2463 Oliver Bldg., Pittsburgh, Pa.  
*Offices in 19 Principal American Cities*



what  
price  
development  
?



# LET US EXPLODE



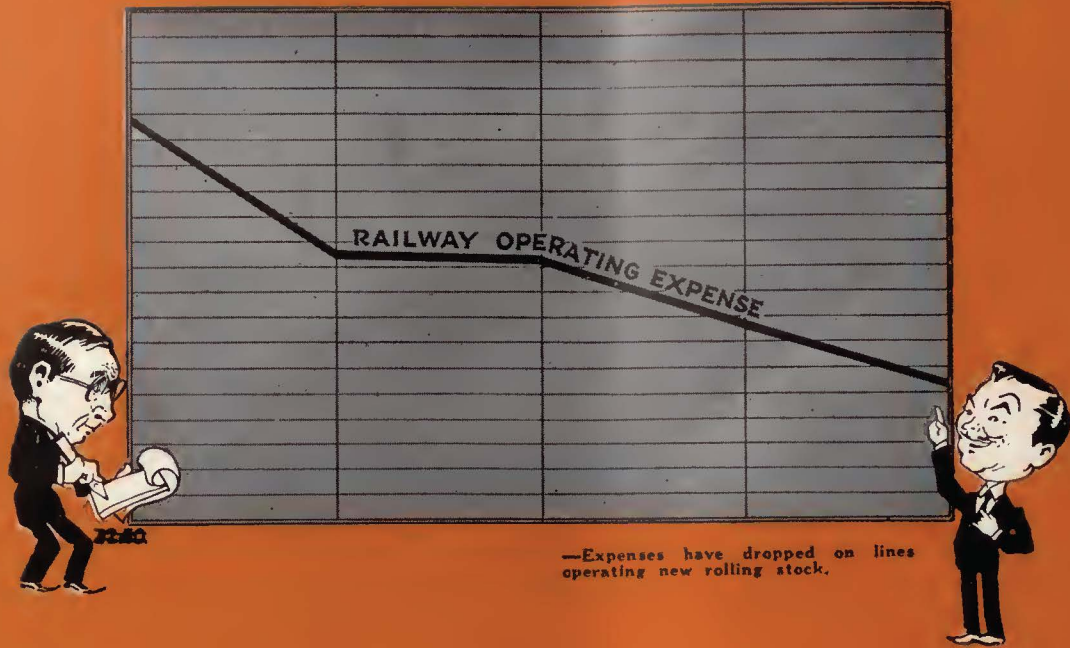
# THE TEST-TUBES

**N**EW rolling stock has saved the industry. New rolling stock bought today—and tomorrow—will keep the industry forging ahead.

But make sure that new rolling stock you buy is tested—tried,—make sure that all the explosions ceased when it left the factory.

Cincinnati explodes its own test tubes. We are constantly researching, planning, trying, testing.

That's why our customers **RE-ORDER**—why our reputation for building revenue producing vehicles is a mark for others to try for.



# New Cars Reduce Operating Costs

## New Rolling Stock Is NECESSARY



**I**T has been repeatedly proved that properties which have bought new cars are showing lower operating costs and steadily climbing operating revenue.




But whatever you need—street cars, trackless trolleys, gas-electric coaches, Cincinnati has the correct transportation units for you. Units that have been tried and tested, not only as to mechanical details, but revenue producing properties as well.

**THE CINCINNATI CAR CORPORATION**

Winton Place  
Cincinnati, Ohio

**T**  
**H**  
**E**  
**W**  
**O**  
**R**  
**L**  
**D**  
**'**  
**S**  
  
**L**  
**A**  
**R**  
**G**  
**E**  
**S**  
**T**  
  
**P**  
**R**  
**O**  
**D**  
**U**  
**C**  
**E**  
**R**  
  
**O**  
**F**  
  
**R**  
**U**  
**B**  
**B**  
**E**  
**R**  
  
**P**  
**R**  
**E**  
**S**  
**E**  
**N**  
**T**  
**S**  
  
**T**  
**H**  
**E**  
  
**W**  
**O**  
**R**  
**L**  
**D**  
**'**  
**S**  
  
**F**  
**I**  
**N**  
**E**  
**S**  
**T**  
  
**H**  
**E**  
**A**  
**V**  
**Y**  
**-**  
**S**  
**E**  
**R**  
**V**  
**I**  
**C**  
**E**  
  
**T**  
**I**  
**R**  
**E**  
  
**.**  
**.**  
**.**  
**.**  
**.**  
**.**



Purer, tougher rubber from our own plantations  heavy, brutal, canyon-notched tread blocks  rugged, reinforced side walls and carcass of famous Web Cord, make a super tire which fills the growing demand for a heavy service balloon. On every basis of performance, the U. S. Royal Heavy Service is the finest tire ever produced for use on trucks and buses. 

UNITED STATES RUBBER COMPANY



**U.S. ROYAL**



# You Profit *by this* ... leadership

DeVilbiss leadership in the spray-painting and spray-finishing equipment industry has a definite every-day value to you, because DeVilbiss leadership is based upon the efficiency of DeVilbiss equipment in the hands of the user.

The complete scope and variety of DeVilbiss equipment lines, the magnitude of the DeVilbiss manufacturing operations, the pioneering done for the entire industry by DeVilbiss research and engineering departments, are all qualifications for leadership, but DeVilbiss leadership is recognized today principally because DeVilbiss equipment saves and makes money for those who use it.

You will find that the knowledge, experience, and manu-

facturing economy in the DeVilbiss organization have been directed specifically against your individual painting or finishing problem. When you buy a DeVilbiss spray outfit you get more than something to take the place of a paint brush—you get an outfit designed to bring to your own operation the maximum advantages of a new and better way to apply protective and decorative coatings.

Let us tell you about DeVilbiss outfits and installations especially designed for electric railway finish maintenance work. In your field, operating and maintenance costs are sharply affected by the character of your finishing equipment, and this counsel, which costs you nothing, may save you much.

*Spray guns of various types and sizes.  
Pressure feed paint tanks and containers.  
Spray booths, exhaust fans, and approved  
lighting fixtures.  
Air compressing equipment.*

**DeVilbiss**  
**Spray- PAINTING FINISHING System**

*Air transformers and accessories.  
Air and fluid hose and connections.  
Complete outfits from the smallest hand-  
operated units to the largest industrial  
installations.*

THE DEVILBISS COMPANY , 272 PHILLIPS AVENUE , TOLEDO, OHIO

*Sales and Service Branches*

NEW YORK PHILADELPHIA CLEVELAND DETROIT INDIANAPOLIS CHICAGO ST. LOUIS  
SAN FRANCISCO WINDSOR, ONT.

*Direct factory Representatives in all other territories*



WATER-PROOF, SKID-PROOF, LIGHT WEIGHT, LONG-LASTING AND ECONOMICAL



# Floors for the life of these buses... *without maintenance costs*

At one low cost these Masticoke floors will last for the life of the buses. Masticoke was chosen by one of the largest bus operators\* as the most economical, serviceable material for this purpose. These floors will never have to be repaired. First cost will be the last cost. The thousands and thousands of feet that will tread these floors will not wear them out nor will vibration crack them.

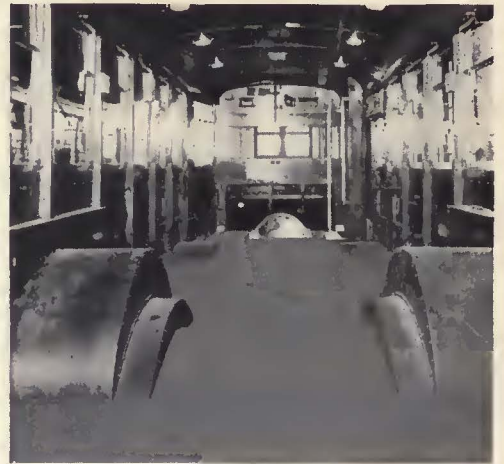
## J-M MASTICOKE THE MODERN-BUS FLOORING

This light weight bus flooring is tough and resilient—and long-lasting. Its natural dark gray color will add materially to the appearance of your buses. J-M Masticoke will help to keep your buses looking spic and span.

J-M Masticoke is skid-proof and water-proof. It is sanitary and odorless. It is easily cleaned by flushing with water. It is fire-retardant and acts as an insulation against cold.

J-M Masticoke, long in service on railroads, is being used by more and more bus fleet owners to reduce floor costs. Why not mail the coupon for complete information?

\*Name of operating company on request.



J-M Masticoke, an asphalt composition, is applied in a semi-liquid form to either metal or wood sub flooring. The upper picture shows an actual bus sub flooring of wood. The lower picture shows the smooth, even surface of J-M Masticoke as applied on the same bus.



# Johns-Manville

SERVICE TO  
BUS TRANSPORTATION

JOHNS-MANVILLE CORPORATION  
Motor Bus Division  
New York, Chicago, Cleveland, San Francisco, Toronto  
(Branches in all large cities)

Please send me full particulars on J-M Masticoke Bus Flooring.

Name.....

Address.....

SE-115-7



Union Metal Fluted Steel Pole Design No. 4229 as installed on Woodward Avenue, at Grand Circus Park, Detroit, Mich.

# DETROIT Bans Forest of Poles

DETROIT is proud of its sky-line, of the large buildings which are evidence of its growth and prosperity. But Detroit has diverted attention from sky-lines to curb-lines.

Formerly, separate supports were used for trolley span wires, street lights, traffic signals and street signs. Now the forest of poles which lined the streets of the downtown district is gone.

With the installation of Union Metal Fluted Steel Poles the number of poles along the curb-line was reduced 75%!

Every hundred feet there is a tall, artistically tapered, fluted steel shaft carrying the necessary street electrical equipment. Streets are now more beautiful, more dignified, and a remarkable economy has been effected.

Utilities in many cities are building good will by installing Union Metal Poles and are saving thousands of dollars. We will be glad to send you further information.



Union Metal Fluted Steel Poles used for trolley span wire support and distribution service, Joseph Campan Street, Detroit.



THE UNION METAL MANUFACTURING CO.

General Offices and Factory, Canton, Ohio  
Sales Offices—New York, Chicago, Philadelphia, Cleveland,  
Boston, Los Angeles, San Francisco, Seattle, Dallas, Atlanta



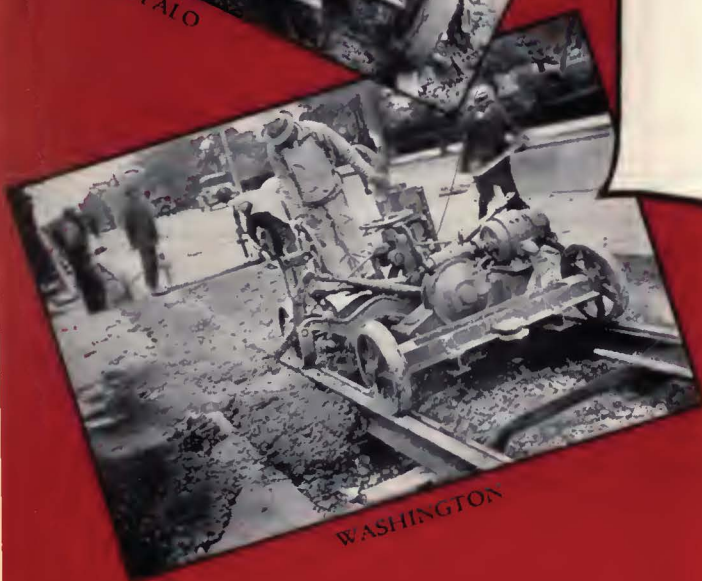
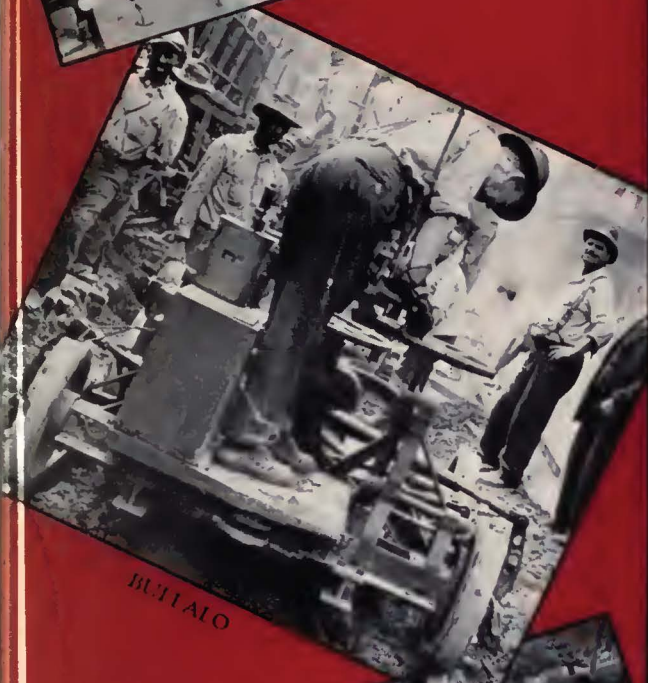
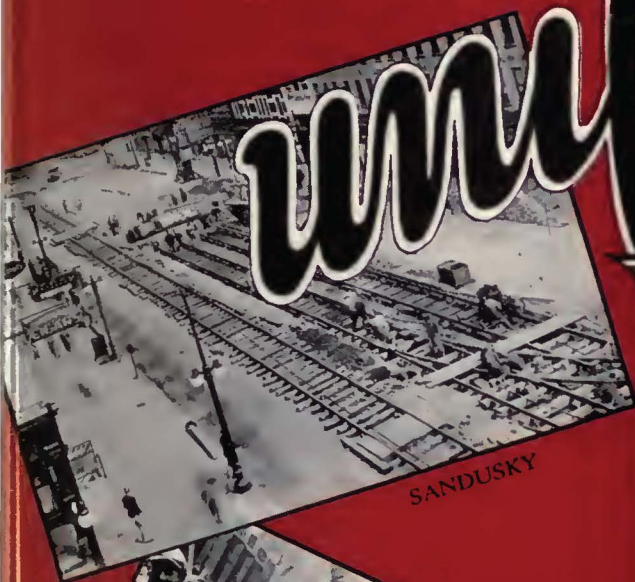
Distributors:

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

# UNION METAL DISTRIBUTION AND TRANSMISSION POLES

every - foot - just - like - every - other - foot -

# uniformity



## Mechanical Treatment of Concrete Insures Uniform Quality Track

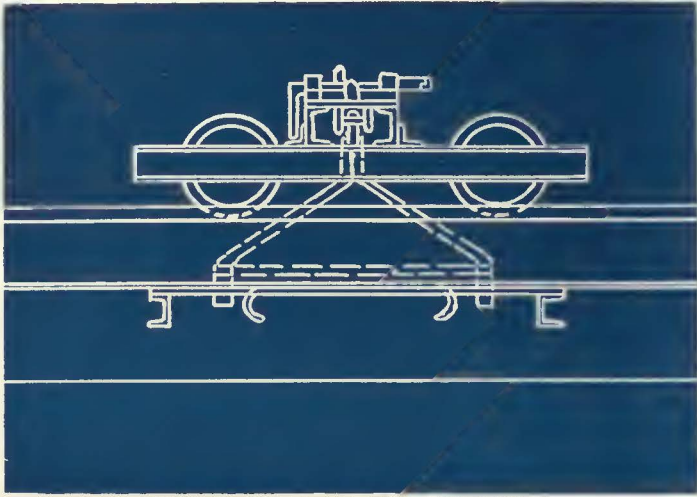
**H**AND methods *cannot* produce uniform results. Two pieces of wood are *never* alike. Paved track built by the old methods will sooner or later show points of initial failure. These demonstrate a lack of uniformity in the methods of construction, and sometimes in the materials used.

Steel Twin Ties of the latest design and mechanical track construction methods (tie layer, compression tamper, mortar-flow pulsator) produce *uniform* results. Every-foot-just-like-every-other-foot! The first foot laid is just like the last.

And tests have shown that the ultimate life of this construction is dependent on rail wear (see page 8, Nielsen Survey IS-51-BZ), not on the track structure. A Steel Twin Tie Foundation *should* last forever. It won't, but it will out-wear a good many rail heads!

The INTERNATIONAL STEEL TIE CO.  
Cleveland, Ohio

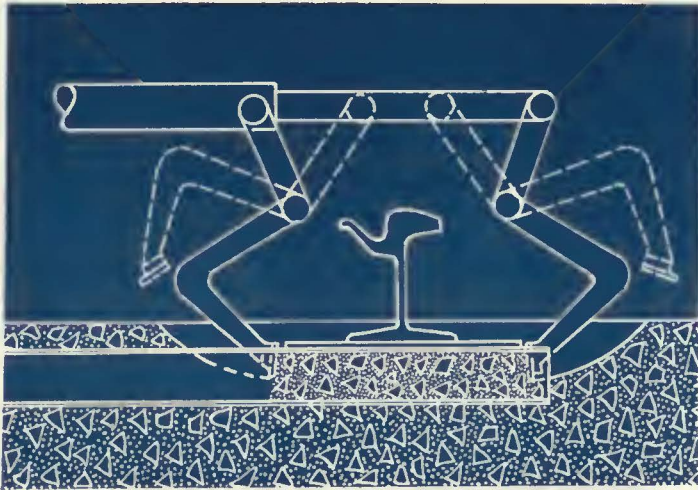
## UNIFORMITY *in the* ASSEMBLY OPERATION



MECHANICAL TRACK ASSEMBLY

**T**IES are lifted by one man with the D.S.R. Track layer, and bolted to the rail. Bolts are tightened. For this operation one man takes the place of four, does faster, more accurate work. The D.S.R. Track Layer is adjustable for various rail heights.

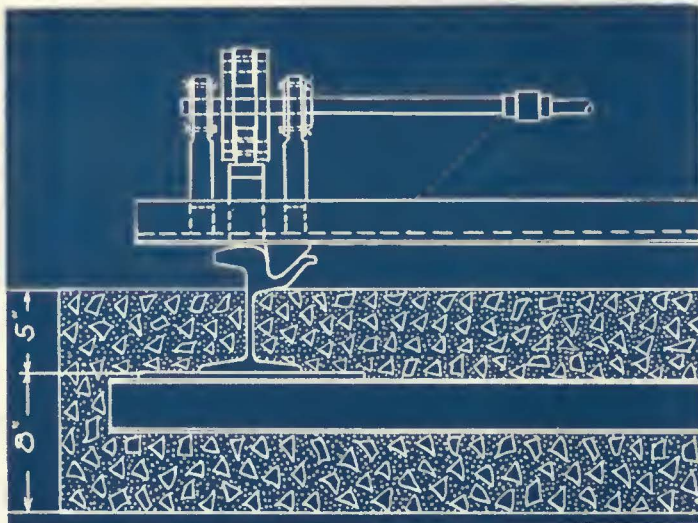
## UNIFORMITY *in the* TAMPING OPERATION



MECHANICAL COMPRESSION TAMPING

**C**ONCRETE is compressed under the tie plates, assuring perfect bond, absence of voids. The tamper is operated by one man, eliminating all hand tamping labor, giving uniform results throughout the entire track structure.

## UNIFORMITY *in the* FINISHING OPERATION



MECHANICAL "MORTAR-FLOW" BONDS STEEL TO CONCRETE

**T**HE "mortar-flow" pulsator rests directly on the rail and gives the track structure, mechanically, 4800 impulses per minute, causing a mortar flow which unites the steel of rail and ties, and the concrete, in perfect bond. Test samples taken after concrete is set shows absolute absence of even minute air pockets.

The INTERNATIONAL STEEL TIE CO.

Cleveland, Ohio

# "Canned Experience"

## Make use of the other man's experience

**That old saying**

about experience being the best teacher is absolutely sound. But most of us recite it without thinking that experience may be of various sorts — the experience of other men as well as our own, "canned experience," if you please, ready for use. Why not take advantage of the experience of other men as far as we can and save not only years of time but many expensive lessons?

Do you know that a large share of the world's best research work in the fields of science, technology and business is contained in

**McGraw-Hill Books?**

A single fact, a single table, a single idea may be worth many times the price of the book to you.

**Buy your Books on the Budget Plan**

**Choose any**

of these McGraw-Hill Books that you would like to see — one, or two or half a dozen — as many as you wish.

Read them for ten days free — keep those you want — send back those you don't want.

If desired you may pay for the books on our monthly budget plan, provided your order amounts to \$12.00 or more. The minimum monthly payment is \$3.00 and the monthly installments must be large enough so that the entire account will be paid in full within six months.

There is no additional charge for books purchased on the budget plan. The prices are the same as for cash.

**Choose the books you want to see — and just mail the coupon**

Richey—

1

### Electric Railway Handbook

Second Edition, 798 pages, flexible, pocket size, 528 illustrations, \$4.00

A thoroughly revised reference book of practical data, formulas and tables for the use of operators, engineers and students. It gives the essential reference data on all phases of electric railway construction and operation. It presents: (1) Data on subjects which come up in everyday electric railway practice. (2) Material of service to the non-technical manager or operator. (3) Reference material on electric railway practice for those who are specializing in other or allied lines.

2

Harding—

### Electric Railway Engineering

Third Edition, 480 pages, 6x9, 248 illustrations, \$5.00

A thorough revision of this standard work on the theory and practice of electric railway engineering. The book covers the principles of train operation, power generation and distribution, equipment and types of systems.

3

Kurtz—

### Lineman's Handbook

550 pages, pocket size, flexible, illustrated, \$4.00

The first book written expressly for linemen, foremen, and other employees of line departments. The book meets the growing need for a pocket volume of construction and maintenance data, procedure, and methods. It presents hundreds of kinks, shortcuts, expedients and time- and work-saving methods, as well as scores of useful diagrams, tables, and formulas for the lineman.

4

### Standard Handbook for Electrical Engineers

Fifth Edition, 2,100 pages, 4½x7, flexible, illustrated, \$6.00

A widely-known encyclopedia of electrical engineering. The book covers every branch of modern electrical engineering. It is complete and reliable, and so carefully and fully indexed that its information is readily accessible.

5

Croft—

### American Electricians' Handbook

823 pages, pocket size, 900 illustrations, flexible, \$4.00

The book is a reliable, useful handbook for wiremen, contractors, linemen, plant superintendents and construction engineers. It aims to give the practical man the facts on apparatus, materials and installation which he needs in his daily work. It is practical from cover to cover.

Blake and Jackson—

6

### Electric Railway Transportation

Second Edition, 437 pages, 6x9, 121 illustrations, \$5.00

A second edition of this widely known book on the transportation side of the electric railway business — getting the cars over the tracks — increasing the traffic — collecting the fares — and selling service in the face of modern conditions. Particular consideration is given to the place of the bus in modern transportation.

7

King—

### Railway Signaling

369 pages, 6x9, 349 illustrations, \$4.00

A completely adequate book on all phases of modern railway signaling. The book describes fully the construction, installation, operation and maintenance of signaling equipment, and presents a thorough discussion of principles.



8

Nash—

### Economics of Public Utilities

413 pages, 6x9, \$4.00

This book presents the essential facts and the most mature views upon the underlying financial and economic phases of public utility companies, with particular emphasis on electric railways, electric light and power companies and gas companies.

It discusses every angle of the public utility as a business and treats thoroughly such subjects as capitalization, investment features, franchises, regulation, valuation, depreciation, taxes, rates, service, accounting methods, public relations, etc.

**Mail this coupon to see these McGraw-Hill books**

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

Send me the books checked for 10 days' free examination:

- .... Richey's Electric Railway Handbook, \$4.00.
- .... Harding's Electric Railway Engineering, \$5.00.
- .... Kurtz' Linemen's Handbook, \$4.00.
- .... Standard Handbook for Electrical Engineers, \$6.00.
- .... Croft's American Electricians Handbook, \$4.00.
- .... Blake and Jackson's Electric Railway Transportation, \$5.00.
- .... King's Railway Signaling, \$4.00.
- .... Nash's Economics of Public Utilities, \$4.00.

I agree to return such books as I do not wish to keep, postpaid, or to remit for them within 10 days of receipt.

Name .....

Home Address .....

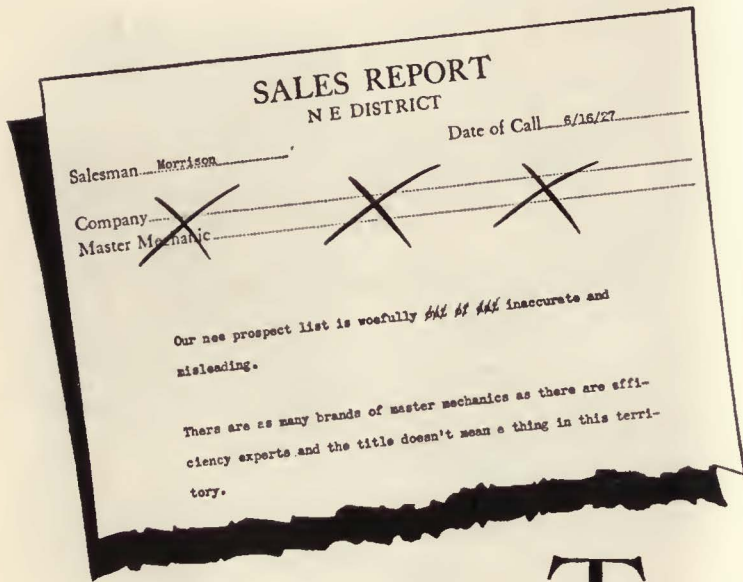
City .....

Position .....

Name of Company..... F-E-R-J.

This is one of a series of McGraw-Hill advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

# Is his title backed up with real buying authority?



What can you expect from an industrial advertising campaign that is planned to cover a prospect list built on this basis?

**T**HE one reliable method of running down the real buyers is to seek them by actual operating responsibilities. The important thing is not what they are called but what they do.

This principle comes out of McGraw-Hill's years of experience in circulation and editorial service throughout American Industry.

The confusion of titles in industry is discussed on pages 29 to 33 in *Industrial Marketing at Work*. A copy of this book will be delivered to executives interested in selling and advertising to industry.

—The publishers

# WHEELS

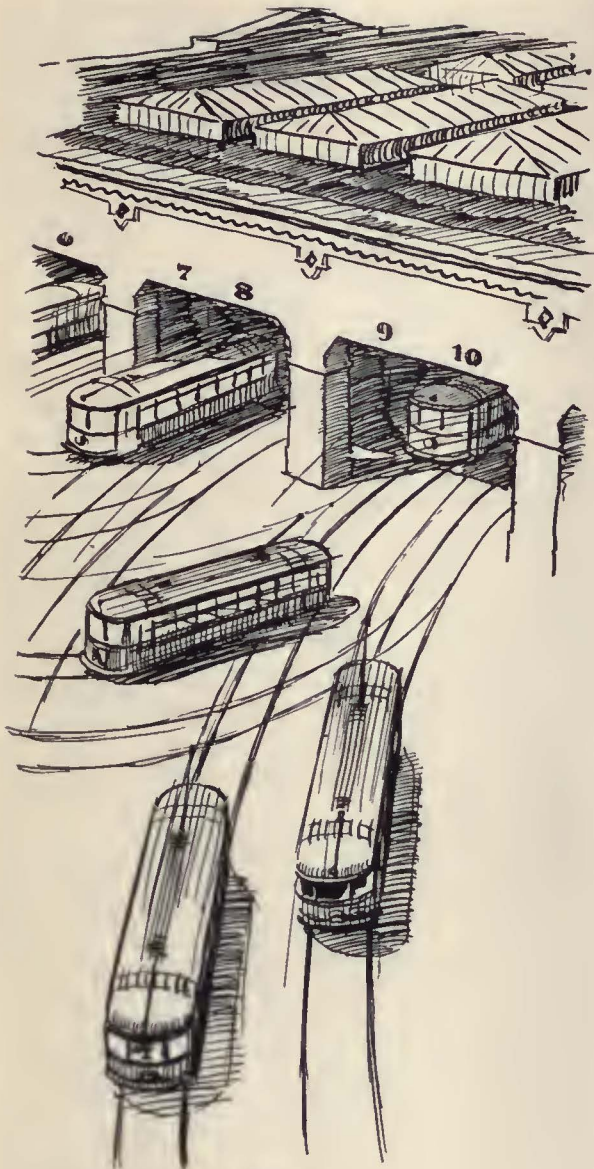
## The foundation of your rolling stock

Do your periodic inspections reveal frequent flat wheels and defective flanges? "Standard" Wheels are made of that stern stuff which stands the gaff of hard service.

*Rolled Steel Wheels*

*Armature Shafts*

*Axles and Springs*



"FOR EVERY TYPE OF CAR




IN EVERY TYPE OF SERVICE"

### STANDARD STEEL WORKS COMPANY PHILADELPHIA, PA.

CHICAGO  
ST. LOUIS

BRANCH OFFICES:  
NEW YORK  
PORTLAND  
WORKS: BURNHAM, PA.

RICHMOND  
SAN FRANCISCO



## *In the Spotlight*

Consolidated Door Operators are being selected by more and more properties. Improvements in design and superior operating qualities are winning this recognition.

Special features - by-pass for safety - duplex valve for simplicity - treadle operator for speed.

Made in various types and styles to meet every requirement.



**CONSOLIDATED CAR-HEATING COMPANY, INC.**

NEW YORK

ALBANY

CHICAGO



# WHAT IS THE LIFE OF A POLE



## *Studies in Pole Line Design*

Number three of a series of six. This is the third of six advertisements on pole line design. The first discussed pole strength, the second "maintained strength". This one presents pole life. The remainder of the series will cover other features of importance to engineers and pole users. It is suggested that the series be preserved for reference. A limited supply of Numbers one and two is available. Request a copy if you have mislaid yours.

AMERICAN CREOSOTING COMPANY  
LOUISVILLE, KENTUCKY



10  
years  
of 40

Must a Good Pole be Scrapped When  
Conditions Require a Change?  
*Why Not Reset It in a New Location?*

## The Third Big Factor in Pole Line Economy

The last of the three big factors in selecting the most economical pole for a given line is the probable life of the pole. The initial strength—which determines the size and spacing required—and the rate of deterioration in strength—which affects the factor of safety—are the other two big considerations. These were discussed in previous advertisements in this series.

### What is the Life of a Pole?

The life of a pole is the period of its useful service. It may end before the pole actually breaks, for if it has to be removed as no longer safe its service is finished. A variety of causes may contribute to produce the unsafe condition and end the life of a pole. In addition to decay—discussed in the last advertisement—fire, insects and birds are the most common of these causes. Changing conditions which may increase or decrease the load also serve to limit the life of some poles that would otherwise render many years of useful service. This feature is further discussed in a later paragraph. Any pole claiming long life must, therefore, be tested in the light of all these limiting factors.

### Do Wood Poles Vary Greatly in Life?

Many untreated poles subject to bad conditions have become unsafe in less than five years. Poles that are better protected against deterioration will, of course, last much longer. Thousands of creosoted poles have served 25, 30 and more years. Since the labor cost of setting a pole, placing the cross arms and stringing the wire is approximately equal to the more expensive types of poles and is independent of the probable life, it is obvious that a pole with a very short life is uneconomical even though its first cost is very low.

### Is Minimum or Maximum Life to be Used in Pole Studies?

Since all the poles in the line do not fail or become unsafe at the same

time, the question is often raised as to how to determine from past service records what life to assume for a given type of pole—the minimum or the maximum? Obviously, either of these two extremes would give erroneous conclusions for most of the poles in the line. The only fair basis is to use a weighted average.

### Some Pole Types Have Proven Their Life

Experience with untreated poles of various species has conclusively demonstrated the short term of life to be expected from any of the woods still commercially available. The life of butt-treated poles is also fairly accurately known. While better than untreated poles, they usually require careful watching after ten years, and twenty years is commonly taken as the estimated life for the best grades of poles in this class.

### Others are Still Making their Record

On the other hand, full length pressure treated creosoted southern yellow pine poles, of which the Amereco pole is the leading example, cannot yet be positively limited as to their life for they have been in commercial use only about 35 years. So many of the earliest poles set are still in service and so few of the later ones have failed that the fair average life is still a matter of estimate. Based on experience with such poles both in this country and in Europe and experience of American engineers with creosoted wood for railway cross ties and bridge timbers, it seems conservative to place the average life for an Amereco pole between 30 and 40 years, depending on the severity of the service in which it is placed. Complete service records will probably increase this estimate.

### How They Resist Deterioration

The pure creosote oil injected into the cells of the wood by pressure as in the Amereco process poisons decay producing fungi and prevents their

development. It is also repellent to white ants and other insects. The elimination of insects removes the primary cause for attack by birds. When a creosoted pole is ignited the oil burns first, as in a wick, and deposits a coat of carbon on the surface which shuts off oxygen and retards further combustion.

### Why Not Reset Good Poles?

It is, of course, wasteful to spend 50% or more of the cost of a pole to set one that has only a few years of life remaining. But if a pole with an estimated life of 40 years must be removed from a line in 10 years on account of changed conditions, it certainly pays to relocate that pole in another line. Such practice is not only economical, but is a commendable step toward closer utilization of forest products.

### Some of the Creosoted Pine Life Records

Hundreds of cases might be cited to support the claims of long life. Typical facts include the following:

The Washington & Norfolk line of the A. T. & T. Company built with creosoted pine poles more than 30 years ago is reported in "good as new" condition.

The Public Service Company of New Jersey reports creosoted southern yellow pine poles in its lines 32 years and "good yet".

None of the creosoted pine poles installed by the Louisville Railway Company had been replaced at the end of the 22 years of service.

The Pennsylvania Electric Association Overhead Systems Committee report gives the anticipated life of creosoted southern yellow pine as 35 years.

A paper based on the experience of the Carolina Power & Light Company attributes a life of 40 years to these poles.

For additional copies of this series of studies of pole line design or for quotations and information on AMCRECO Creosoted Southern Yellow Pine Poles, address the nearest sales office.

## AMERICAN CREOSOTING COMPANY

COLONIAL  
CREOSOTING  
COMPANY  
INCORPORATED



GEORGIA  
CREOSOTING  
COMPANY  
INCORPORATED

LOUISVILLE - KENTUCKY

### SALES OFFICES

332 S. Michigan Ave., Chicago  
350 Madison Ave., New York City  
401 W. Main St., Louisville, Ky.  
Brunswick, Ga. Bogalusa, La.

◆◆ BEHIND THE PYRAMIDS—7 ◆◆



# Half-way to a brush



*One side of moulding department*

HERE is one of the machines that produces the first semblance of a carbon brush—after more than 40 days of continual, uninterrupted manufacturing processes applied to raw materials.

Into this machine a milled and blended mixture of carbon and pitch is fed. The hydraulic press moulds this into large blocks. Pressures of 15 to 20 tons per square inch are necessary.

The products of these presses, however, are not brushes. Neither in size nor shape are they suitable. In order to give them the proper electrical and mechanical characteristics, baking, and other operations are required.

At this stage we are just about in the middle of

the manufacturing process—over 40 days have passed since the lampblack was manufactured and approximately as much more time will be required to turn these raw blocks into finished brushes of such perfection that they can bear the NCC Pyramids and carry the Silver Strand Cable.

The National Pyramid Brushes we would ship you today are saved from blocks that were made months ago, blocks that have passed through many other scientifically controlled operations. On receipt of your order, your brushes are made exactly to your specifications from brush blocks stored in our several factories. That is how we are able to ship so promptly.

*An interesting moving picture film illustrating in detail the processes used in the manufacture of carbon brushes will gladly be shown on request to any organization of engineers or students.*

## NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide  and Carbon Corporation

Carbon Sales  
Division



Cleveland, Ohio

Branch Offices and Factories

New York    Pittsburgh    Chicago    Birmingham    San Francisco



## Living for and not off the Industry....

This expression, used recently of Electric Railway Journal by a well-known electric railway executive,\* expresses exactly the guiding policy of the paper during its more than 40 years of service to the Industry.

In those seven words lies the reason why Electric Railway Journal has always been received in the light of a friend and counselor. Behind them is the spirit which was responsible for the recent presentation to this paper of the first Associated Business Papers' Award established in 1927 for Outstanding Editorial Service.

*Electric Railway Journal*

\*Mr. Walter A. Draper, President,  
The Cincinnati Street Railway Company.

# 3 years in the severest service



*... leading elevator, crane and motor builders have standardized on*

## SUPER-MICANITE



The use of commutator segments and rings of Super-Micanite, in both manufacture and repair work, is growing by leaps and bounds. In the short space of three years Super-Micanite has become the outstanding bonded mica insulation. It assures longer life and reduced maintenance even under the most severe operating conditions.

Overloads, high working temperatures, exposure to dirt and fumes and the inevitable arcing in such service will not cause deep pitting between segments as is likely when shellac bonded mica is used.

Decomposition products of the Super-Micanite binder, formed below the carbonization point are neither corrosive nor conductive. High temperatures employed when soldering leads to commutator bars have no detrimental effect on Super-Micanite.

Detailed advantages of this modern bonded mica insulation are given in our Super-Micanite Bulletin No. 111. Send for a copy.



### MICA INSULATOR COMPANY

New York:  
200 Varick Street

Chicago:  
542 S. Dearborn St.

Works: Schenectady, N. Y. London, England  
Cleveland Pittsburgh Cincinnati Birmingham Seattle  
San Francisco Los Angeles Toronto Montreal



# Electrical INSULATION





## Gasoline and Motor Oil -

*Like shoes - must be mates*

It is not enough to know that a motor oil or gasoline is good. These properties, though tremendously important, are not all of the requirements that you should demand from motor coach fuel and lubricants.

If you would get the most mileage from gasoline, the most efficient lubrication from your motor oil—select a fuel and motor oil that work in harmony. Red Crown Gasoline and Polarine Motor Oil form an ideal combination—a gasoline that gives power, mileage and complete combustion—a motor oil that is not too heavy, yet is rich and sturdy, supplying thorough,

efficient lubrication to the motor.

Red Crown and Polarine have been refined to work in harmony, to give separately and together, maximum service in the internal combustion engine. Working together they give that perfectly balanced performance which insures efficient service and low cost operation.

Have our engineers make a test of Red Crown and Polarine in your motor coaches. Compare the combined operating cost of this gasoline and motor oil with the combined operating cost of any other fuel and lubricant and let the figures speak for themselves.

### STANDARD OIL COMPANY (Indiana)

General Offices: 910 S. Michigan Ave.

CHICAGO, ILLINOIS

ILLINOIS  
Chicago  
Decatur  
Joliet  
Peoria  
Quincy

INDIANA  
Evansville  
Indianapolis  
South Bend  
KANSAS  
Wichita

IOWA  
Davenport  
Des Moines  
Mason City  
Sioux City

MICHIGAN  
Detroit  
Grand Rapids  
Saginaw

WISCONSIN  
La Crosse  
Milwaukee  
Green Bay

S. DAKOTA  
Huron

MINNESOTA  
Duluth  
Mankato  
Minneapolis

MISSOURI  
Kansas City  
St. Joseph  
St. Louis

N. DAKOTA  
Fargo  
Minot



57536



(Left) Over 600 buses operated by the Philadelphia Rapid Transit, Philadelphia, Pa., are equipped with Goodrich Silvertowns. Photo shows operator checking air pressure on a bus scheduled for a fast run.



(Left) "Metal to metal contact won't do," said P. R. T. officials. "Top leaks have to be eliminated." And they were with Goodrich Rubber Seam Bands!



(Right) "Before we installed Goodrich Rubber Fender Flaps, it was almost impossible to keep our bus fenders straight . . . more than saved their cost in labor," the general superintendent said.



(Left) "And another thing . . . these Goodrich rubber balls are component parts of both our front and back coupling. For packing they're better than any fabric we ever used."



(Right) "Let her down easy," says the general foreman when the new 60 mi. per hr. gas electric wrecker tows in a crippled bus. For speed in an emergency and strength to stand the overload weight Goodrich Silvertowns recommend themselves.



# RUBBER *in the* BUS INDUSTRY

WHEN you have learned to appreciate the uninterrupted service value of Goodrich Heavy Duty Silvertowns you have learned just *one* of the many advantages Goodrich has to offer you.

Goodrich manufactures rubber for the bus industry!

Among the items Goodrich makes are tires, tubes, seam bands, door flaps, fender flaps, coupling balls, air, water, steam and radiator hose, fan belts, rubber cement, floor matting, etc.

Think of Goodrich when you think of rubber for the bus industry.

The B. F. Goodrich Rubber Company, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Company, Los Angeles, Calif. In Canada: Canadian Goodrich Company, Kitchener, Ont.

*And now! in Philadelphia P. R. T. swings over to*

# Goodrich HEAVY DUTY Silvertowns *for* Double Deckers



*Off with the slow, old solids . . . on with the new Goodrich dual pneumatics! More speed, more comfort and uninterrupted tire service.*

**P.** R. T., one of the largest bus operators in the United States, have been satisfied users of Goodrich Heavy Duty Silvertown Tires for more than six years.

And now, even on the double deckers they go . . . these sturdy Goodrich Heavy Duty Silvertowns.

Tested first on front wheels, they made steering easier for the drivers . . . they cushioned motors over some of Philadelphia's worst paved streets . . . gave uninterrupted service and noticeably reduced motor adjustments and repairs.

Mileage? 75,148 bus miles without a delay!

## SEVEN SUPERIOR SPECIFICATIONS

### BUILT INTO EVERY HEAVY DUTY SILVERTOWN

1. Heavily insulated stretch-matched cords.
2. Additional *adhesion*—from greater insulation between outside plies.
3. Heavy *twin beads* for better rim seating.
4. Extra *gum fillers* between plies for longer tire life.
5. *Heat-resisting, interlocking cord breakers*.
6. Tread designed *correctly* for heavy duty service.
7. The whole tire toughened by the famous Goodrich "water cure."

*Goodrich Heavy Duty Silvertowns on the front and rear of P. R. T. wrecker-snow fighter? Of course. Note how the sturdy treads stand out in this unretouched photograph.*

Then further tests with dual pneumatic rears added so much comfort, speed and uninterrupted service to P.R.T. travel that two hundred double deck buses are to be Silvertown equipped *all around!*

Every bus operator owes it to himself to let a Goodrich salesman go into the detail of operating costs and uninterrupted service with him on Goodrich Heavy Duty Silvertowns.

The B. F. Goodrich Rubber Company, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Company, Los Angeles, Calif. In Canada: Canadian Goodrich Company, Kitchener, Ontario.

# Goodrich HEAVY DUTY Silvertowns



**SPECIFY GOODRICH ON YOUR NEXT BUS**



**T**HE TWO RADIATORS  
which cool the motors  
in the Twin Coach  
are products of the

**LONG MANUFACTURING CO.**  
DETROIT MICHIGAN

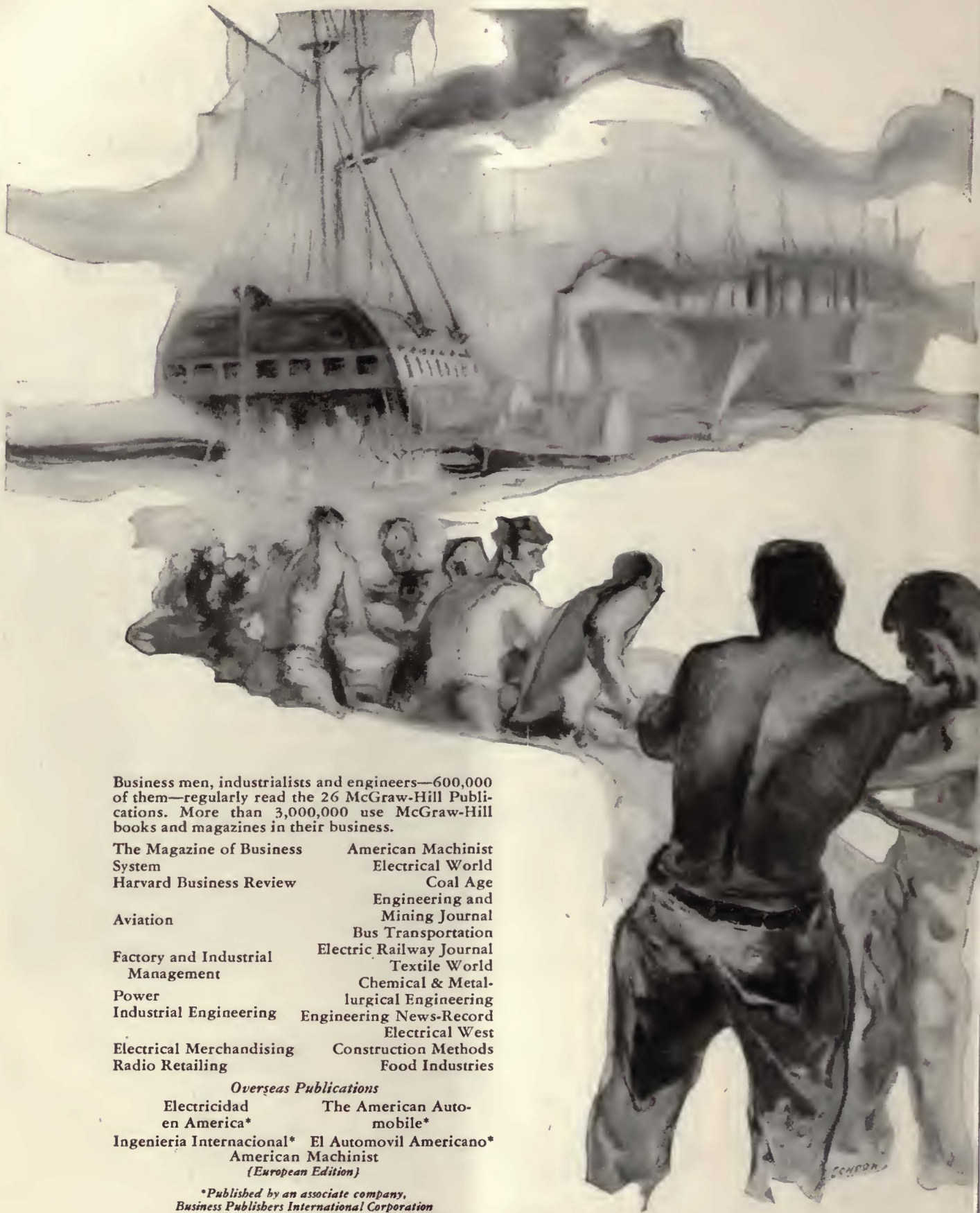


**LONG**

**AUTOMOTIVE  
RADIATORS**



**AUTOMOTIVE  
CLUTCHES**



Business men, industrialists and engineers—600,000 of them—regularly read the 26 McGraw-Hill Publications. More than 3,000,000 use McGraw-Hill books and magazines in their business.

- |                                   |                                      |
|-----------------------------------|--------------------------------------|
| The Magazine of Business System   | American Machinist                   |
| Harvard Business Review           | Electrical World                     |
|                                   | Coal Age                             |
| Aviation                          | Engineering and Mining Journal       |
|                                   | Bus Transportation                   |
| Factory and Industrial Management | Electric Railway Journal             |
|                                   | Textile World                        |
| Power                             | Chemical & Metallurgical Engineering |
| Industrial Engineering            | Engineering News-Record              |
|                                   | Electrical West                      |
| Electrical Merchandising          | Construction Methods                 |
| Radio Retailing                   | Food Industries                      |

*Overseas Publications*

- |                           |                                       |
|---------------------------|---------------------------------------|
| Electricidad en America*  | The American Automobile*              |
| Ingenieria Internacional* | El Automovil Americano*               |
|                           | American Machinist (European Edition) |

*\*Published by an associate company, Business Publishers International Corporation*

**M c G R A W - H I L L**

McGRAW-HILL PUBLISHING COMPANY, Inc., New York - Chicago - Philadelphia

# He put

# TWO CONTINENTS

# ON SPEAKING TERMS



**L**ONG years of trial and failure. One final tense gripping moment. Then the click-click-click.

London!

Clearly and distinctly over the first Atlantic cable came Queen Victoria's greeting to President Buchanan. Europe and America joined for instantaneous communication! An ocean barrier eliminated . . . distance conquered . . . weeks cut to split-seconds by Cyrus W. Field. Once again the vision, courage and persistence of a single man without engineering precedents, had overcome old obstacles and made a major contribution to the world's progress.

Space, time, waste . . . the great obstructionists of progress . . . are fast being vanquished today. Overnight,

science and industry are continually turning dreams into realities. This is possible because the united brain power of many men now seizes upon and solves these problems by the free exchange of ideas and of experiences through a highly specialized, scientific and industrial press.

❖ ❖ ❖

McGraw-Hill Publications—26 of them—serve industry, engineering and business. They tap news sources; record experience; analyze methods; crystallize opinion; conduct research; view today's events in terms of tomorrow's consequences. And through them month by month industry is able to organize its thinking and co-ordinate its leadership, to quickly gain desired ends without long years of waiting.

# P U B L I C A T I O N S

Detroit - St. Louis - Cleveland - San Francisco - Boston - Greenville - London

# Wilmington's HASKELITE equipped cars



# MAKE GOOD

## Ten more cars ordered

ONCE more HASKELITE equipped cars are re-ordered on an actual performance basis. Last year Wilmington ordered 10 model cars from the J. G. Brill Co. HASKELITE was used for interior side linings, frieze panels, and roofs, since these cars were designed to stimulate the public's desire to ride by appearance, speed, comfort, convenience and safety in operation. How well these HASKELITE equipped cars performed can be judged

by this latest order for 10 additional cars which are practically identical with the first lot ordered. HASKELITE'S extensive use and many years of economical service have demonstrated beyond a doubt the advantages of this light weight, strong, and unusually attractive material.



Write for useful data on the application of HASKELITE and its metal-faced mate, PLYMETL, in street car and bus construction.

## HASKELITE MANUFACTURING CORPORATION

120 South LaSalle Street, Chicago, Illinois

RAILWAY REPRESENTATIVES:

Economy Electric Devices Co., 37 W. Van Buren St., Chicago  
Grayson Bros., 600 LaSalle Bldg., St. Louis, Mo.

Railway & Power Engineering Corp., Ltd.,  
Montreal, Toronto, Winnipeg, New Glasgow. ERJ7Gray



## Prepare for Winter NOW

—for passenger comfort  
—for increased revenue

Install  
Utility Heating  
Heat Regulating and  
Ventilating  
Equipment



Cross Seat Electric Heater, fitted with Chromalox Strips. Listed as Standard by Underwriters' Laboratories. Delivers 100 per cent output for electric energy input.

**RAILWAY UTILITY COMPANY**  
2241 Indiana Ave., Chicago, Ill.



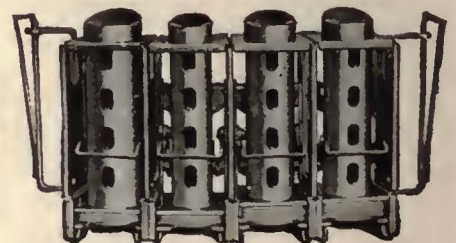
## JOHNSON FARE COLLECTING SYSTEMS



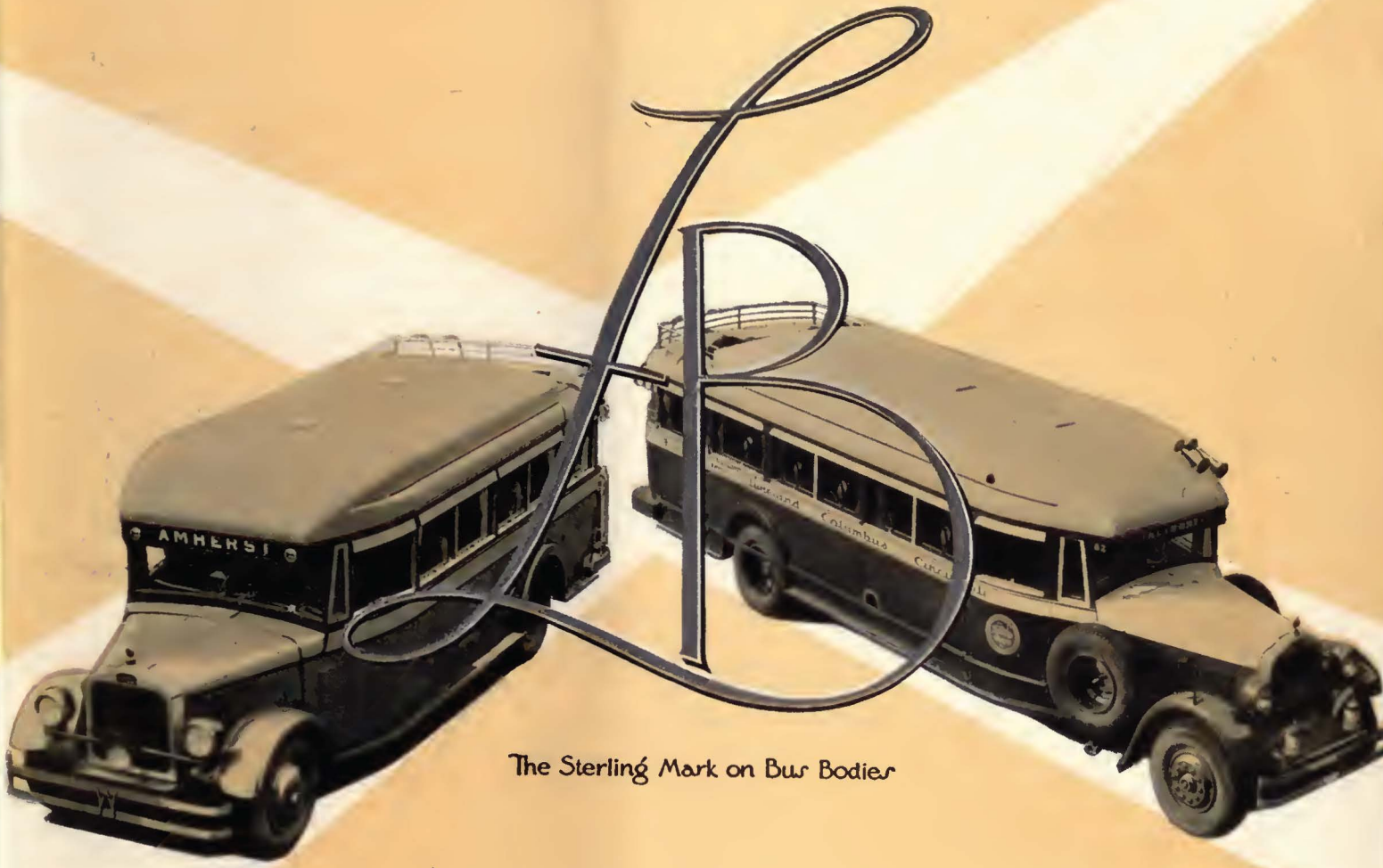
Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1 1/4 to 5% and the efficiency of one-man operation is materially increased. Quicker boarding of passengers with resultant reduction in running time for the buses. Over 5000 already in use.

When more than three coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates. It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tokens.



**Johnson Fare Box Co.**  
4619 Ravenswood Ave., Chicago, Ill.



The Sterling Mark on Bus Bodies

As originators of the All Metal Body, Lang offers to the Industry what is admittedly the last word in super-body building.

Lang All Metal Bodies are *bound* to be more lasting—for metal is more enduring than wood.

Such bodies are more easily serviced—for replacement of panels and other operations are easily made with standardized sections and units.

They are lighter, yet stronger—for

all metal construction assures more strength with less weight.

They are safer—for metal does not burn or splinter, gives instead of breaks, resists impact and provides greater safety to passengers.

Thinner walls permit greater interior width, with consequent added room and maximum passenger comfort.

Such factors are worth a higher initial cost because longer life and lower cost of maintenance more than make up the difference in the long run.

# LANG

*all* metal bodies

*Safer-and of enduring quality*



# Quality that endures . . . Safety that lasts

The lasting strength and safety and lightness of All Metal construction are now combined with the graceful lines and practical operating utility so characteristic of all Lang built bodies.

Experienced bus operators have been quick to recognize the significance and the important advantages that this achievement makes possible.

Safety is coupled with enduring quality. Maintenance costs are reduced. Hazards through fire and collision are almost entirely eliminated. Body life is extended . . . less depreciation and a greater return on the initial investment.

The Lang All Metal Body is unquestionably the last word in super-body building.

## LANG BODY COMPANY, CLEVELAND, OHIO

### RECENT PURCHASES

- Missouri Pacific Transportation Co.  
St. Louis, Mo.
- Automotive Transportation Co.  
Providence, R. I.
- Yelloway Pioneer System  
Chicago, Ill.
- Interstate Transit Lines  
Omaha, Nebr.
- Pennsylvania R. R. Co.  
Philadelphia, Pa.

### Study These Features

1. Longer life. Metal outlasts wood.
2. Lower cost of maintenance.
3. Lighter and stronger. Strength without bulk.
4. Greater safety. Better protection.
5. Thinner walls give more inside room.
6. Lower cost in the long run.

### RECENT PURCHASES

- Cleveland Railway Co.  
Cleveland, Ohio
- Schultz Management Corp.  
Camden, N. J.
- N. O. P. & L. Co.  
Akron, Ohio
- Buckeye Stages, Inc.  
Columbus, Ohio
- Cleveland Southwestern R. R.  
Elyria, Ohio
- Los Angeles Street Railway  
Los Angeles, Cal.

### Just Out!

A book that combines the description of the physical characteristics of the elements of electrification with the analysis of economic problems and the operating performance of both electrification and electric operation. Special emphasis is given to such topics as power supply contracts, overhead distribution systems and economic data.

## Electrification of Steam Railroads

By KENT T. HEALY

Assistant Professor of Transportation, Yale University; formerly, Inspector and Cost Engineer, N. Y., N. H. & H. Ry.

395 Pages, 6x9, 165 Illustrations, \$5.00.

This book is the result of a recent survey of the electrifications of both Europe and the United States.

Men actively interested in electrification, either as railroad officials or construction engineers will find this book full of usable information. It includes valuable cost data and treats fully of the economics of electrification and personnel organization.

### Chapter Headings

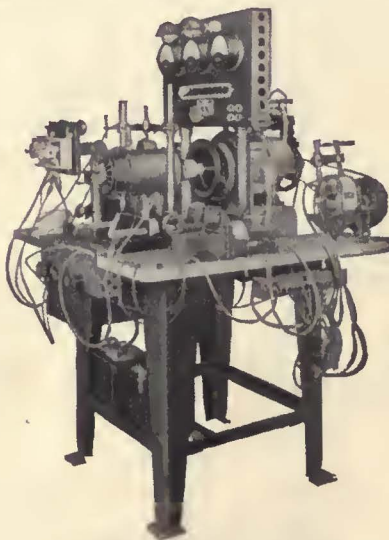
- I. General Economics of Electrification.
- II. Source of Power for Electric Operation.
- III. Power Contracts.
- IV. Power Substations.
- V. Distribution Switching and Sectionalizing.
- VI. Overhead Supporting Structures.
- VII. Overhead Contact System.
- VIII. Rail Distribution System.
- IX. Economics and Operation of the General Transmission and Distribution System.
- X. Coordination of Traction-circuit Stray Electric Fields and Foreign Circuits of Conductors.
- XI. General Problems of Motive Power.
- XII. Collection of Current From the Distribution System.
- XIII. Control of Current to the Traction Motors.
- XIV. Traction Motors.
- XV. Transmission of Power from the Motors to the Driving Wheels.
- XVI. Mechanical Elements of Locomotives.
- XVII. Economics and Operation of Motive Power.
- XVIII. Organization and Personnel for Electric Operation.

Special emphasis is given to such topics as power supply contracts, overhead distribution systems and economic data.

See this new book—FREE



# Are you up-to-date? Here's the last word in a complete test bench



The new "Super" Test Bench for the very heaviest and most exacting work. Will take care of every electrical test job on any kind of small or large *automobile, bus, truck, marine or airplane.*

## National Railway Appliance Co.

420 Lexington Ave., New York

Hegeman-Castle Corp.  
Railway Exchange Bldg.  
Chicago, Ill.

## McGraw-Hill FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

You may send me on 10 days' approval Healy—ELECTRIFICATION OF STEAM RAILROADS, \$5.00 net, postpaid. I agree to remit for the book or to return it postpaid within 10 days of receipt. (To secure books on approval write plainly and fill in all lines.)

Name .....

Home Address .....

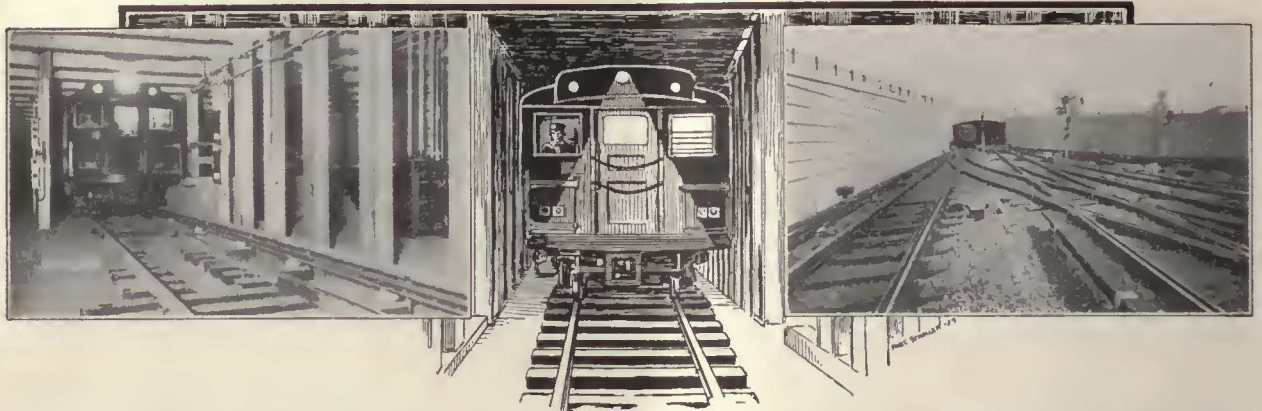
City and State .....

Name of Company .....

Occupation .....

(Books sent on approval to retail purchasers in U. S. and Canada only.)

E. 7-29



## “Union” Signals Speed Traffic on P.R.T.

PHILADELPHIA'S newest high speed transit system, the Broad Street Subway, has been signaled by the Union Switch and Signal Company. This is a four-track structure having six interlockings in its seven-mile length. Trains are operated on close headway at the peak hours.

“Union” Subway Type Signals, Model 14 Electro - pneumatic Interlocking Machines, and auxiliary apparatus speed traffic on this system as on the others in Philadelphia. “Union's” half-century of experience in the signaling field enables it to meet your signaling needs and provide added economies.

*Our specialists are at your service without obligation.*

1881  **Union Switch & Signal Co.**  1929  
SWISSVALE, PA.



R 11 Double Register

### A Fare Registration System that Gains the Confidence of ALL

The durability, accuracy, speed and convenience of International Registers has given them the nation-wide reputation for efficient service that they have enjoyed for over thirty years.

Electric operation gives the new types even greater speed, accuracy and convenience. Mechanical hand or foot operation can be furnished, if required.

The International Register Co.  
15 South Throop St., Chicago

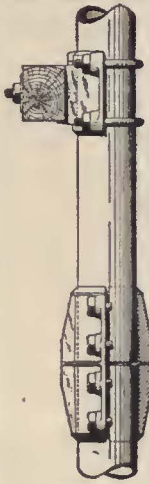


Brake shoes in street railway service get a lot of wear. They must stop smoothly and positively. In this exacting work “Diamond S” brake shoes keep in service months after ordinary shoes have been scrapped.

### The American Brake Shoe and Foundry Company

230 Park Ave., New York  
332 So. Mich. Ave., Chicago





Extension Clamp and Crossarm Gain Assembly

### Economical Accessories for Tubular Iron Poles

Whether for new construction or for salvaging corroded poles, you will find these M.I.F. Specialities for tubular iron poles most economical, most sturdy and most easily installed.

**Reinforcing and Extension Clamps**

**A Type**—for reinforcing corroded joint between pipes differing in diameter by full inch. Or for extending pole with section one inch smaller.

**B Type** — for reinforcing corroded swaged joint where pipe diameters differ by less than one inch.

**C Type**—for reinforcing pole corroded at ground-line. Or to extend pole with pipe of same size, as illustrated.

**Ornamental Covers**—designed to fit over similar Clamps, harmonizing with design of ornamental pole.

**Williams Pole Mounts**—used to anchor poles on bridges, rock, or concrete. Or with pre-cast concrete base to salvage pole corroded at ground-line. Or for maximum clearance with full length of pole above ground.

**Crossarm Gains**—See illustration. Do not require drilling of pole. For heavier loads bracing accessories are provided. **Cable Insulator Hangers and Span Wire Hangers**—provided in various types for suspending signal wires, etc., from messenger or span wires.

Send for literature with prices

### Malleable Iron Fittings Company

Pole Hardware Department  
Factory and New England Sales Office: Branford, Connecticut  
New York Sales Office:  
Thirty Church Street



General Sales Agents elsewhere in U.S.:



LINE MATERIAL COMPANY, South Milwaukee, Wis.  
Canadian Distributor: Canadian Line Materials, Limited, Toronto



### Cool Comfort

Cool comfort is assured your passengers all summer long when your coaches are equipped with N-L Coach Fans.

It effectively meets the long felt need of a reliable fan, built especially for heavy bus service.

An N-L Fan recently ran 2448 hours without stopping, requiring only a brush adjustment at that time. It was again placed in service and is still running. This is, we believe, a record for motors of this type.

Write for Supplement B-2.

**The Nichols-Lintern Co.**  
7960 Lorain Ave., Cleveland, Ohio

## Brazed Bonds Meet Every Requirement—



Type ET Brazed Bond

### Conductivity

The conductivity of the braze-bonded joint is unsurpassed. The brazed union of bond terminal to rail is eight times the cross section of the bond, the ratio of conductivity of copper to steel.

### Permanence

Brazed bonds stay on the job. A force of five to nine tons per square inch is required to remove a single terminal. We guarantee that when properly applied the terminals of brazed bonds cannot be removed from the rail except by actual mutilation.

### Low Cost

The first cost of brazed bonds is low. Speedy application—15 to 20 bonds per hour—means low cost bonding. Permanence of the bonded joint means exceptionally low maintenance.

A brazed bond to suit your rail is described in circular 12. Address—

**The Electric Railway Improvement Co.**  
2070 East 61st Place, Cleveland, Ohio

## CHOSEN for PERFORMANCE

**T**ROLLEY wheels are never chosen for looks, never selected because one kind costs a little more or less than another. They're chosen for performance. That's why

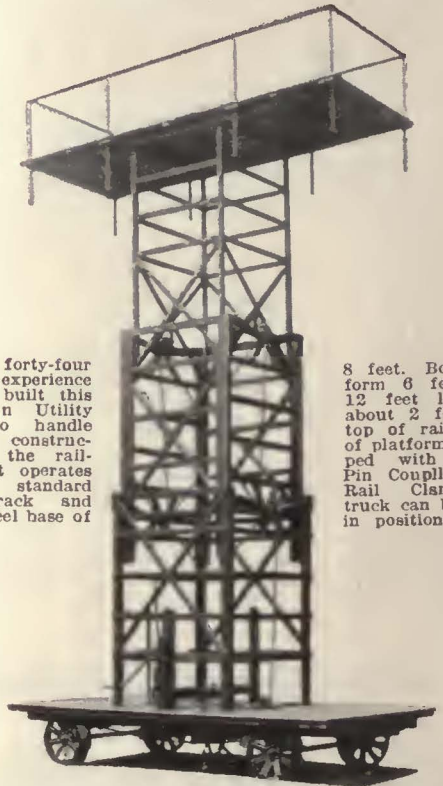
## KALAMAZOO



trolley wheels and harps are the standard of comparison today. That's why many properties use them exclusively. There's a difference in trolley wheels. May we tell you about it?

**THE STAR  
BRASS WORKS  
KALAMAZOO, MICHIGAN**

## THERE'S A TRENTON TOWER for Railway Work, too!



From our forty-four years' experience we have built this Trenton Utility Tower to handle overhead construction on the railroads. It operates on ARA standard gauge track and has a wheel base of

8 feet. Body platform 6 feet wide, 12 feet long and about 2 feet from top of rail to top of platform. Equipped with Brakes, Pin Couplings, and Rail Clamps so truck can be locked in position.

**J. R. McCARDELL AND COMPANY**  
391-401 SO. WARREN ST., TRENTON, N. J.



## Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000 Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

**Hemingray Glass Company**  
Muncie, Ind.

Est. 1848—Inc. 1870

# Modern *Light weight* Cars

With their fast operation, comfortable interiors, and attractive design are bound to appeal to the riding public. They have proven their ability to increase revenue and decrease operating costs on every property we have served. They will pay you, too.

## CUMMINGS CAR AND COACH CO.

*Successors to McGuire-Cummings Mfg. Co.*

111 W. Monroe St.  
Chicago, Ill.



## FLEXIBILITY

The "CLEVELAND" is the Fare Box that always fits the fare and fare collection system.

The "Cleveland" accommodates any rate of cash fare and either paper or metal tickets. It fits into any fare collection plan whether it be Flat Fare, the Zone System, or Service at Cost. Changes in your rate of fare *never* entail additional fare box expenditures if you adopt the "Cleveland."

Cleveland Fare Boxes meet *all* modern fare collection conditions.

### The Cleveland Fare Box Co.

4900 Lexington Ave.

Cleveland, Ohio

Canadian Cleveland Fare Box Co., Limited, Preston, Ontario

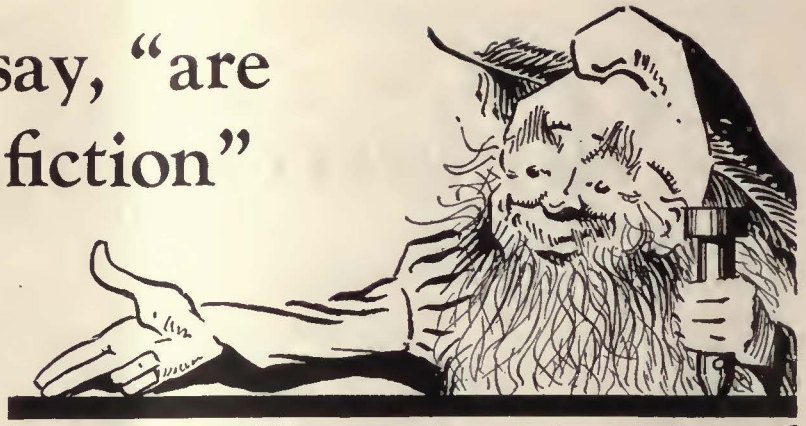
"4-Way" Padlocks, Coin-Auditing Machines, Change Carriers, Tokens

# “Facts,” they say, “are stranger than fiction”

Perhaps, that's why a few railway operators who have been reading our advertisements for years have yet to give Boyerized Car Parts a trial.

They think that the statements we make are fiction. All we can say to these fellows is: “Ask the man who uses Boyerized Parts.” He'll give you facts about long service life and freedom from maintenance troubles that will far outdo our own enthusiasm.

Two to three times the wear is what we say to be on the safe side!



- |                 |                      |                       |
|-----------------|----------------------|-----------------------|
| Brake Pins      | Spring Post Bushings | Spring Posts          |
| Brake Hangers   | Brake Bushings       | McArthur Turnbuckles  |
| Brake Levers    | Bronze Bearings      | Manganese Brake Heads |
| Pedestal Gibs   | Bolster and Transom  | Manganese Truck Parts |
| Brake Fulcrums  | Chafing Plates       |                       |
| Center Bearings |                      |                       |
| Side Bearings   |                      |                       |

## BOYERIZED PARTS

### BEMIS CAR TRUCK COMPANY ELECTRIC RAILWAY SUPPLIES SPRINGFIELD, MASS.

Representatives:

- F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
- W. F. McKenney, 54 First Street, Portland, Ore.
- J. H. Denton, 1328 Broadway, New York City, N. Y.
- A. W. Arlin, 519 Delta Building, Los Angeles, Cal.

# Roebbling Welding Wire

Makes strong welds and is used where only the highest quality of welding wire is acceptable.

John A. Roebbling's Sons Company  
Trenton, New Jersey



# PANTASOTE

TRADE MARK

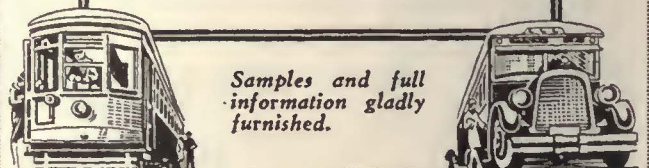
—the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

# AGASOTE

TRADE MARK

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

Standard  
for electric railway cars  
and motor buses



Samples and full information gladly furnished.

The PANTASOTE COMPANY, Inc.  
250 Park Avenue  
NEW YORK

# Less than a cent a gallon!

FOR less than one cent a gallon you can make up an Oakite solution that will prove the best thing you ever tried for washing the rattan seats, sashes, woodwork, handholds and windows of cars and busses. Oakite cleans speedily and thoroughly, and is *safe* for all car cleaning.

Many traction companies also use Oakite cleaning materials and methods in their maintenance departments. The Oakite Service Man near you can give you complete details—send for him. No obligation.

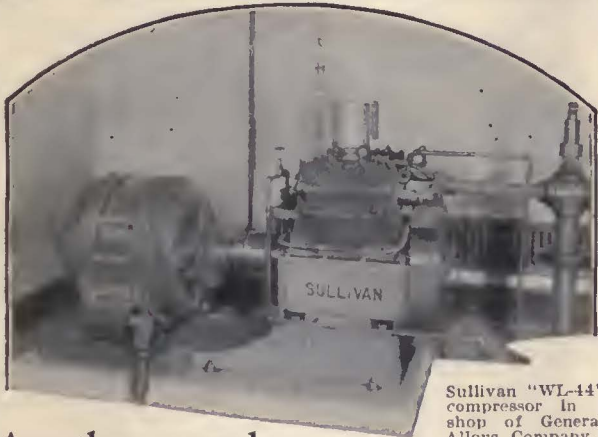
*Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U. S. and Canada*

Manufactured only by  
OAKITE PRODUCTS, INC., 28B Thames St., NEW YORK, N. Y.

# OAKITE

TRADE MARK REG. U. S. PAT. OFF.

**Industrial Cleaning Materials and Methods**



Sullivan "WL-44" compressor in shop of General Alloys Company, South Boston.

## Another popular Sullivan Shop Compressor

*direct connected—automatic—compact*

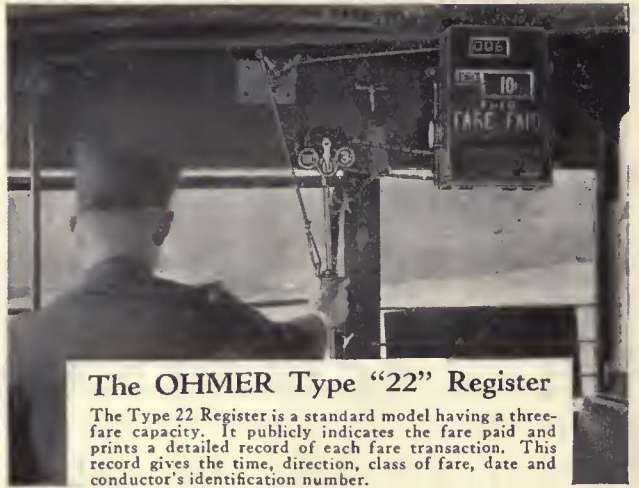
Compactness, automatic control, direct motor or oil engine drive, and semi-possibility, are some of the advantages of these Sullivan Vertical Compressors. The "WL-44" is a "Balanced V" 4-cylinder machine, available in capacities of 240 and 350 cu. ft. of air per min. "WL-22" has two vertical

cylinders, and capacities of 120 and 175 cu. ft.

Wafer valves, sweep-control unloading, automatic lubrication, and full water cooling of cylinder barrels and heads, are features which improve the economy of these machines. Compressor and engine are rigidly mounted on a cast iron base.

Send for Catalog 32/83-H

Sullivan Machinery Company  
809 Wrigley Bldg., Chicago



### The OHMER Type "22" Register

The Type 22 Register is a standard model having a three-fare capacity. It publicly indicates the fare paid and prints a detailed record of each fare transaction. This record gives the time, direction, class of fare, date and conductor's identification number.

# 6 years later we receive another letter from Mr. Hull

THERE is practically no limit to the years of service OHMER Fare Registers will give. Many of the first installations, made more than twenty-five years ago, are still protecting cash fare profits . . . eliminating clerical detail . . . giving accurate, dependable service. So the experience of the Conestoga Traction Company of Lancaster, Pa., is not unusual.

In 1922, Mr. Hull wrote to tell us that the OHMER Registers installed the previous year were doing all we had claimed. Six years later, in 1928, we received another letter from Mr. Hull. He writes, "Notwithstanding the fact that our suburban fare collections are rather complicated, we are pleased to advise you that your system of fare collection has been very satisfactory to both the Company and the trainmen."

### Many Models for Many Needs

Let us help you determine the type of OHMER Register adaptable to *your* business. Let us show you how to reduce losses from carelessness, indifference and temptation . . . how to save time, money and labor. At your request, one of our transportation systems men will discuss with you your particular problems and study a solution to them. Write today.

OHMER FARE REGISTER CO., Dayton, Ohio

# OHMER

REG. U. S. PAT. OFF. AND OTHER COUNTRIES

## FARE REGISTER COMPANY



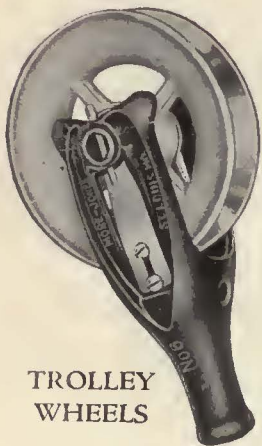
Let our  
SPECIALIZATION  
be of profit to you



"ARMATURE"  
BABBITT  
METAL

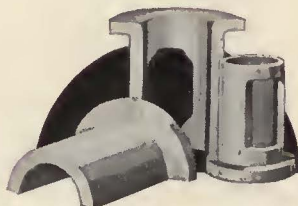
"ARMATURE" Babbitt Metal—Trolley Wheels and "TIGER" Bronze Axle and "ARMATURE" Bearings have been perfected by this organization because we have specialized in their development. Years of experimentation gave us a complete knowledge of proper quality and design—huge plants operated under chemical and physical laboratory control have made it possible to standardize and maintain the highest quality products. The personnel of this organization is composed of many men of proven ability whose connections with the electric railway industry date back to the beginning of electric railway transportation.

We will gladly cooperate with you.



TROLLEY  
WHEELS

"TIGER"  
BRONZE  
AXLE AND  
ARMATURE  
BEARINGS



National Bearing Metals Corporation  
ST. LOUIS, MO.

JERSEY CITY, N. J.  
PORTSMOUTH, VA.

NEW YORK, N. Y.

PITTSBURGH, PA.  
MEADVILLE, PA.

Some One  
Wants  
To  
Buy

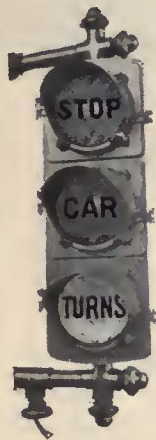
the equipment or machinery that you are not using. This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it

before depreciation  
scraps it.

*The Searchlight Section is  
helping others—*

*Let it help you also*



# NO MORE SIDE SWIPES!

**T**HIS new and brilliant right-turn signal flashes the warning, STOP—CAR—TURNS, at points where cars turn across the automobile roadway, when they diverge from the main line, say to the right. It indicates only for those cars that make the turn. Cars that do not switch to the right drift under the current-selective contactor and go ahead without causing any signal display. Autos are warned when the car is about to turn.

## NACHOD SPELLS SAFETY

Nachod devices include signals for single and double track, permissive and absolute, stub-end signals, highway crossing signals, headway recorders, overhead trolley contactors, relays, etc.

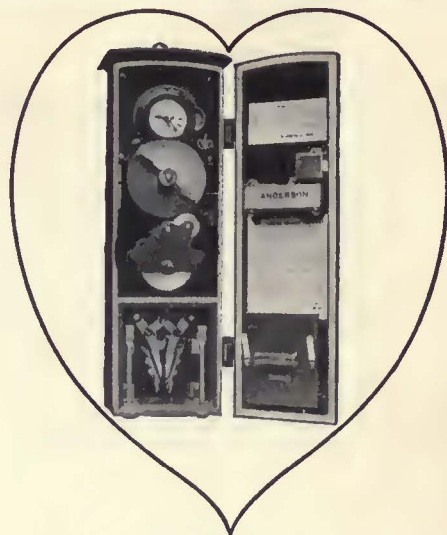
**Nachod & United States Signal Co., Inc.**

4777 Louisville Ave., Louisville, Ky.

*August Issue Closes  
JULY 15th*

Early receipt of copy and plates will enable us to serve you best—to furnish proofs in ample time so changes or corrections may be made if desired.

ELECTRIC RAILWAY JOURNAL



## The Heart of a Time Switch

The heart of a Time Switch is its clock; the better the workmanship and the sturdier the construction, the more dependable is the Time Switch.

The entire clock, including the switch, is made in our own factory—a clock designed and built specifically for use in our Time Switches.

That is one reason for their unquestioned reliability.

*Send for Bulletin No. 37*

**Albert & J. M. Anderson Mfg. Co.**

289-305 A St., Boston, Mass.

NEW YORK    CHICAGO    PHILADELPHIA    LONDON

# ENGINEERS *and* CONSULTANTS

## Ford, Bacon & Davis

Incorporated

### Engineers

39 Broadway, New York

PHILADELPHIA CHICAGO  
SAN FRANCISCO  
NEW ORLEANS

## STEVENS & WOOD

Incorporated

### Engineers and Constructors

20 Pine Street,  
New York

*Transportation Examinations  
and Reports*

## THE BEELER ORGANIZATION

Transportation, Traffic,  
Operating Surveys,  
Better Service  
Financial Reports  
Appraisals—Management

52 Vanderbilt Ave. New York

## ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

EXAMINATIONS  
REPORTS-APPRAISALS-RATES  
OPERATION-SERVICE

C. B. BUCHANAN, President  
W. H. PRICE, JR., Sec'y-Treas.  
JOHN F. LAYNG, Vice-President

## Buchanan & Layng Corporation

*Engineering and Management,  
Construction, Financial Reports,  
Traffic Surveys and  
Equipment Maintenance*

BALTIMORE NEW YORK  
1004 First National Bank Bldg. 49 Wall Street

Phone: Hanover: 2142

## J. ROWLAND BIBBINS

CONSULTING ENGINEER  
TRANSPORTATION  
UTILITIES

Transit-Traffic Development Surveys.  
Street Plans, Controls, Speed Signals.  
Economic Operation, Schedule Analy-  
ses, Bus Co-ordination, Rerouting.  
Budgets, Valuation, Rate Cases and  
Ordinances.

EXPERIENCE IN 25 CITIES

2301 Connecticut Avenue  
Washington, D. C.

## STONE & WEBSTER INCORPORATED

NEW YORK BOSTON CHICAGO

Organization  
Financing  
Design  
Construction  
Management  
Reports  
Appraisals

PUBLIC UTILITY AND  
INDUSTRIAL PROPERTIES

## HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells  
Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management  
Operation Construction

50 East 42nd St., New York City

## BYLLESBY ENGINEERING *and* MANAGEMENT CORPORATION



231 S. La Salle Street, Chicago  
New York Pittsburgh San Francisco

## SANDERSON & PORTER

ENGINEERS

PUBLIC UTILITIES  
AND  
INDUSTRIALS

DESIGN AND CONSTRUCTION  
EXAMINATIONS REPORTS VALUATIONS

NEW YORK

CHICAGO SAN FRANCISCO

## E. H. FAILE & CO.

*Designers of*

Garages—Service  
Buildings—Terminals

441 Lexington Ave. New York

## WALTER JACKSON

*Consultant on Fares  
and Motor Buses*

The Weekly and Sunday Pass  
Differential Fares—Ride Selling

Holbrook Hall 5-W-3  
472 Gramatan Ave., Mt. Vernon, N. Y.



## The P. Edward Wish Service

50 Church St., NEW YORK

*Street Railway Inspection*  
**DETECTIVES**

131 State St., BOSTON

## H. U. WALLACE

Bus, Truck and Railway  
Transportation, Traffic and  
Operating Surveys. Financial  
Reports, Appraisals, Reorgan-  
izations, Management.

All Work Under Personal Supervision

6 N. Michigan Ave. 420 Lexington Ave.  
Chicago New York City

Phone LEXINGTON 8485

## KELKER, DE LEUW & COMPANY

Consulting Engineers

Transit Development

Operating Problems

Traffic Surveys

Valuations

111 W. WASHINGTON ST., CHICAGO

## GRIFFIN WHEELS

with

**Cross Grain  
Chill of  
Rim and Flange**



**S**ERVICE records maintained by one of the largest street railway companies show 38% lower cost per wheel mile for Griffin Chilled Tread Wheel than any other make or type.

*Have you given the new wheel a trial?*

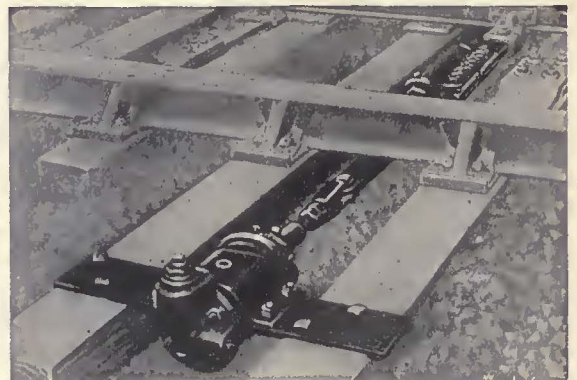
**GRIFFIN WHEEL COMPANY**  
410 N. Michigan Ave., Chicago, Ill.

## Used and Surplus Equipment

**I**NDIVIDUAL items of used equipment, or surplus new equipment, or complete plants, are disposed of (and found) through advertising in the *Searchlight* Section of this paper.

This is the section which so effectively aided the Government in selling the many millions of dollars worth of surplus material and equipment accumulated during the war without disturbing the market.

**“SEARCHLIGHT”**



**QUICK TO OPEN - SLOW TO CLOSE**  
*The Racor Oil Cylinder Retarding Dash Pot*

acts on the principle of a door check. Used where switches are normally trailed through, it eases the return of the points and thus saves wear on the inside of the points. The action is definite and it will work under all climatic conditions. Particularly adapted for use with Ramapo Automatic Return Switch Stands.

### **RAMAPO AJAX CORPORATION**

General Offices - 230 PARK AVENUE, NEW YORK

**RACOR PACIFIC**  
PACIFIC SWITCH CO.  
Los Angeles - Seattle

SALES OFFICES AT WORKS, AND  
**McCORMICK BUILDING, CHICAGO**  
**METROPOLITAN BANK BLDG, WASHINGTON**  
**BUILDERS EXCHANGE BLDG, ST. PAUL**

**CANADIAN RAMAPO**  
**IRON WORKS, LTD.**  
Niagara Falls, Ontario

*Nine Racor Works*

Hillburn, New York. Niagara Falls, N.Y. Chicago, Illinois. East St. Louis, Ill.  
Superior, Wis. Pueblo, Col. Los Angeles, Cal. Seattle, Wash. Niagara Falls, Ont.

# SEARCHLIGHT SECTION

EMPLOYMENT and BUSINESS OPPORTUNITIES—USED and SURPLUS NEW EQUIPMENT

**UNDISPLAYED—RATE PER WORD:**  
*Positions Wanted*, 5 cents a word, minimum \$1.00 an insertion, payable in advance.  
*Positions Vacant* and all other classifications, excepting Equipment, 10 cents a word, minimum charge \$2.00.  
*Proposals*, 40 cents a line an insertion.

**INFORMATION:**  
*Box Numbers* in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.  
 Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

**DISPLAYED—RATE PER INCH:**  
 1 inch ..... \$6.00  
 2 to 3 inches..... 5.75 an inch  
 4 to 7 inches..... 5.50 an inch  
*Other spaces and contract rates on request.*  
 An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

R. J.

## POSITION VACANT

WANTED master mechanic, Western short line interurban A.C. operation; state complete experience and salary expected. Address P-175, Electric Railway Journal, 883 Mission St., San Francisco, Calif.

## POSITIONS WANTED

ELECTRICAL engineer desires position; 2 years as mechanic in car shop; 2 years as car and material inspector; 1 year as student electrical engineer; 1 year as assistant electrical engineer with the government. PW-180, Electric Railway Journal, 520 No. Michigan Ave., Chicago, Ill.

PURCHASING agent—Twenty years' experience as purchasing agent and storekeeper for three different large electric railways including gas and power properties and operating buses. Also accounting experience. Best references. Any location. Available immediately. PW-181, Electric Railway Journal, Tenth Ave. at 36th Street, New York.

STREET RAILWAY MAN, 32; eleven years' experience on railway checking and inside operating; six years on present position as confidential (inside) trainman, desires to make connection with railway company as assistant or in some official capacity, familiar with all phases of the operating trainman. PW-182, Electric Railway Journal, Tenth Ave. at 36th Street, New York.

## BUSINESS OPPORTUNITY

MANAGER, experienced street railway, also bus operation, will handle small property on percentage basis. Or will buy good property. BO-179, Electric Railway Journal, Tenth Ave. at 36th Street, New York.

## OFFICIAL PROPOSAL

Bids: August 2.

### Furnishing and Installing Systems

New York, N. Y.

Sealed bids or proposals for furnishing and installing the Block Signaling and Interlocking Systems for a portion of the Independent System of City Subways, in the Borough of Manhattan, City of New York, will be received by the Board of Transportation, acting for and on behalf of the City of New York, at the office of said Board at No. 49 Lafayette Street, Borough of Manhattan, New York City, until the 2nd day of August, 1929, at eleven-thirty (11:30) o'clock a.m., at which time and place or at a later date to be fixed by said Board, the proposals will be publicly opened and read. A description of the work and other requirements, provisions, details and specifications are given in the Information for Contractors and in the Form of Contract, Specifications, Contract Drawings, Bond and Contractor's Proposal, which are to be deemed a part of this Invitation and copies of which may be inspected and purchased at said office of the Board.

The receipt of bids will be subject to the requirements specified in said Information for Contractors.

New York, May 21, 1929.

BOARD OF TRANSPORTATION OF THE CITY OF NEW YORK,  
 By JOHN H. DELANEY, Chairman.  
 DANIEL L. RYAN,  
 FRANK X. SULLIVAN,  
 Commissioners.  
 FRANCIS J. SINNOTT, Secretary.

# WANTED

## ELECTRIC RAILWAYS AND EQUIPMENT

Electric Railways, Overhead Trackage and Equipment. Highest cash prices paid. Expert satisfactory work guaranteed.

Among the other work just completed we have recently dismantled the entire trackless trolley line of Staten Island, New York and over 200 miles of overhead and some trackage of the Worcester Consolidated and Springfield Street Railway abandoned Suburban lines.

## THE ALLITE CORPORATION

636-638 Broadway, New York, N. Y.

### WANTED

#### 5 BIRNEY CARS

Double end, must be in good condition and price must be low. Address

UNION TRACTION COMPANY  
 Coffeyville, Kansas

### WANTED

1—Second-hand Rotary Converter. Must be in good condition, price reasonable and to the following specifications:  
 8 Poles, 1,000 kw. capacity, 900 r.p.m., 650 volt, 1,540 amp., 6 phase, 60 cycles, compound field winding.

W. Winslow,  
 Boston Revere Beach & Lynn Railroad  
 350 Atlantic Ave., Boston, Mass.

**E**QUIPMENT of the latest type is frequently advertised for sale in the *Searchlight Section*. Don't let a limited budget stop you from buying modern cars, busses or equipment that will cut costs or improve your service. Modernize your lines throughout *now* by buying wisely from these equipment bargains.

Stretch your Budget  
 to Cut Your Costs

**THE PERRY, BUXTON, DOANE CO.**

**New and Relaying Rails**

*All Weights and Sections*

We specialize in buying and dismantling entire Railroads, Street Railways, and all other industrial properties which have ceased operation. We furnish expert appraisals of all such properties.

*May We Serve You?*

**THE PERRY, BUXTON, DOANE CO.**

Rail Department, Philadelphia, Pa.    General Department, Boston, Mass.  
Pacific Sales Office—Failing Building, Portland, Oregon

FOR SALE

500 KW., 1,000 KW.,  
1,500 KW., 25 cycle

**Rotary  
Converters**

Send for List of Motor  
Offerings

*Write or Wire to*

**G. T. ABEL**

393 Seventh Ave., New York City

Longacre 7372

"Sole Distributors for  
SIMPLEX SAFETY DEVICES"

**If** you don't see the equipment you need advertised on these pages, send a list of your requirements to the Searchlight Department, Electric Railway Journal, 10th Ave. at 36th St., N.Y.C. You will be put in prompt touch with reliable sources of supply.

FOR SALE

**30 Freight and  
Passenger Cars**

All in first-class condition. Also store-room materials and car and shop repair parts. Dismantling road. Priced to sell quick. Address

**W. G. Bell, Gen. Mgr.**  
Springfield Suburban R. R. Co.  
Springfield, Ohio

**Girder Rails**

141 lb. Section 465, 9-in. high.  
106 lb. " 422, 9-in. high.  
116 lb. " 434, 7-in. high.

**High "T" Rails**

93 lb. Section 507, 7-in. high  
28 to 32-ft. lengths.

Immediate Shipment—All New

**ZELNICKER IN ST. LOUIS**

Have you any Rails or Equipment for Sale?

**Saving is a good habit, BUT—**

**Why Save Things You'll Never Use?**

**W**HY let Mother Nature grow grass between the wheels of replaced cars? Why pile up rails, shop equipment, power plant equipment, line equipment, car appliances, road building material, etc., etc., you will never use again?

**TODAY** you can turn them over at a fair price. Tomorrow they will be—JUNK. Is it not the better part of good horse-sense to dispose of them **NOW**?

6000 other electric railway men will see your advertisements of used or surplus equipment and materials here—in the Searchlight Section of their business paper.

Some of these men—officials or executives of other lines in other parts of the country and operating under different conditions—can use what you no longer need. For an insignificant investment you

can tell these others what you have. And they will buy.

One "Searchlight" advertiser wrote, "We can cheerfully recommend the Searchlight Section as a wonderful medium for reaching buyers of rails and equipment." Another—"The strongest proof that your 'Searchlight' finds its way to many readers is shown by the numerous letters we have received in answer to our recent ad."

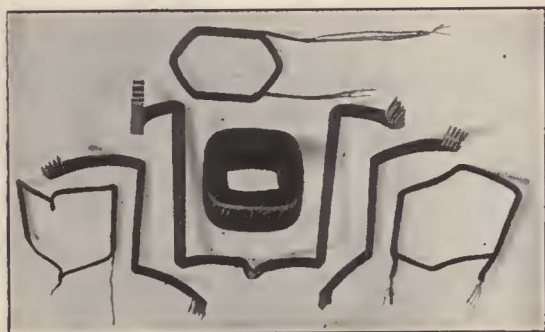
Let us tell you the cost of advertising your used or surplus equipment and materials in the Searchlight Section. Just address a list of what you have to dispose of to the

Searchlight Department

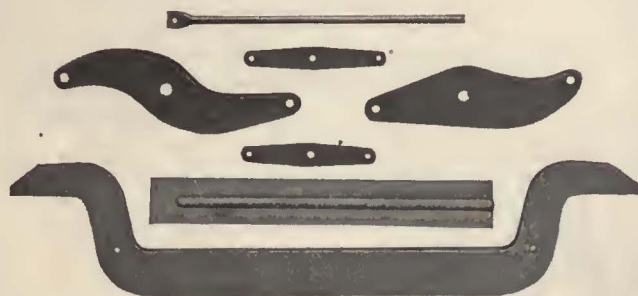
**ELECTRIC RAILWAY JOURNAL**

Tenth Ave. at 36th St., New York, N. Y.

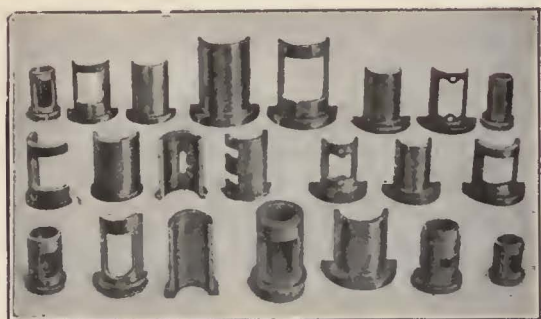
# COLUMBIA QUALITY



Only the best grade of double cotton covered magnet wire, molded or pressed to accurate slot dimensions, is used in the making of Columbia Armature and Field Coils.



This Equalizer Bar and Brake Rigging are good examples of Columbia Heavy Forgings. Our complete equipment enables us to provide a wide variety of light and heavy forgings. Send us your blue prints and specifications.



Columbia No. 1—an especially developed bearing bronze—gives Columbia Armature, Axle and Journal Bearings the long wearing qualities that have made them standard equipment on many of the leading roads.

## COLUMBIA MACHINE WORKS & M. I. CO.

265 Chestnut Street, Corner of Atlantic Avenue  
BROOKLYN, NEW YORK

### ALPHABETICAL INDEX

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Aluminum Co. of America .....	68
American Brake Shoe & Foundry Co. ....	96
American Brown Boveri Co., Inc. ....	34
American Car & Foundry Motor Corp. ....	Insert 29-32
American Car Co. ....	Third Cover
American Creosoting Co. ....	Insert 83-84
American Steel & Wire Co. ....	48
American Steel Foundries ....	39
Anderson Mfg. Co., A. & J. M. ....	103
Beeler Organization .....	104
Bemis Car Truck Co. ....	100
Bender Body Co., The .....	110
Bethlehem Steel Co. ....	24
Bibbins, J. Rowland .....	104
Brill Co., The J. G. ....	Third Cover
Buchanan & Layng Corp. ....	104
Byllesby Eng. & Manage. Corp. ....	104
Carey Co., Philip .....	66-67
Carnegie Steel Co. ....	52
Cincinnati Car Corp. ....	Insert 69-72
Cities Service Co. ....	18-19
Cleveland Fare Box Co. ....	99
Collier, Inc., Barron G. ....	Front Cover
Columbia Machine Works .....	108
Consolidated Car Heating Co. ....	82
Cummings Car & Coach Co. ....	99
Dayton Mechanical Tie Co. ....	Insert 53-56
De Vilbiss Co., The .....	74
Dodge Brothers .....	Insert 41-44
Electric Railway Improvement Co. ....	97
Electric Service Supplies Co. ....	10
Faile & Co., E. H. ....	104
Ford, Bacon & Davis .....	104
"For Sale" Ads .....	106-107
General Electric Co. ....	Back Cover and 20-21-22
General Motors Truck Co. ....	Insert 61-64
General Tire and Rubber Co. ....	45
Goodrich Rubber Co., The B. F. ....	Insert 89-90
Goodyear Tire & Rubber Co. ....	59
Globe Ticket Co. ....	38
Griffin Wheel Co. ....	105
Hale-Kilburn Co. ....	16
Haskelite Mfg. Co. ....	94
"Help Wanted" Ads .....	106-107
Hemingray Glass Co. ....	98
Hemphill & Wells .....	104
Heywood-Wakefield Co. ....	25
Hyatt Roller Bearing Co. ....	51
Illinois Steel Co. ....	46
International Register Co., The .....	96
International Steel Tie Co. ....	Insert 77-78
Jackson, Walter .....	104
Johns-Manville Corp. ....	75
Johnson Fare Box Co. ....	94

Kelker, DeLeuw & Co. ....	105
Kuhlman Car Co. ....	Third Cover
Lang Body Co. ....	Insert 94a-94b
Long Mfg. Co., The ....	91
Lorain Steel Co. ....	28
Mahon Co., The R. C. ....	49
Malleable Iron Fittings Co. ....	97
McCardell Co., J. R. ....	98
McGraw-Hill Book Co. ....	95
McGraw-Hill Publishing Co. ....	92-93
Metal & Thermit Corp. ....	36-37
Mica Insulator Co. ....	87
Nachod and U. S. Signal Co. ....	103
National Bearing Metals Corp. ....	102
National Brake Co., Inc. ....	23
National Carbon Co. ....	85
National Pneumatic Co. ....	15
National Railway Appliance Co. ....	95
National Tube Co. ....	35
Nichols-Lintern Co. ....	97
Oakite Products, Inc. ....	101
Ohio Brass Co. ....	8-9
Ohmer Fare Register Co. ....	101
Pantasote Co., Inc., The ....	100
Positions Wanted and Vacant ....	106-107
Railway Track-Work Co. ....	6-7
Railway Utility Co. ....	94
Ramapo Ajax Corp. ....	105
Richey, Albert ....	104
Roebling's Sons Co., John A. ....	100
S.K.F. Industries, Inc. ....	58
Safety Car Devices Co. ....	50
Sanderson & Porter ....	104
Searchlight Section ....	106-107
Standard Oil Co. (Indiana) ....	88
Standard Steel Works Co. ....	81
Star Brass Works ....	98
Stevens & Wood, Inc. ....	104
Stone & Webster ....	104
Sullivan Machinery Co. ....	101
Texas Co., The ....	65
Thomas Car Works, Perley A. ....	26-27
Timken-Detroit Axle Co. ....	57
Timken Roller Bearing Co. ....	33
Tool Steel Gear & Pinion Co. ....	47
Twin Coach Corp. ....	Insert 11-14
Union Metal Mfg. Co. ....	76
Union Switch & Signal Co. ....	96
United States Rubber Co. ....	73
Wallace, H. W. ....	105
"Want" Ads ....	106-107
Wason Mfg. Corp. ....	Third Cover
Westinghouse Elec. & Mfg. Co. ....	Second Cover, 4, 5 and 40
Westinghouse Traction Brake Co. ....	17
Westinghouse Air Brake Co. ....	60
Wharton, Jr. & Co., Inc., Wm. ....	109
Wish Service, The P. Edw. ....	105



## Specialists in MANGANESE STEEL TRACKWORK

WHARTON special trackwork is the result of 70 years of concentration on the problems affecting the design and wearing qualities of the switches, mates, frogs and crossings entering into layouts for subway, elevated and surface lines.

WHARTON layouts are constructed to give satisfactory service notwithstanding the greater burdens they have to bear in the way of increased speed and traffic, TISCO manganese steel imparting the enduring qualities required to stand up under the most exacting conditions.

**Wm. WHARTON Jr.  
& COMPANY, Inc.  
EASTON, PA.**

We can help you on trackwork layouts whether complicated or simple.  
Write.

### Searchlight Section—Classified Advertising

EQUIPMENT (Used, Etc.) .....	106-107	Perry, Buxton, Donne Co. ....	107
EMPLOYMENT .....	106	Springfield Suburban Railroad	
Abel, G. T. ....	107	Co. ....	107
Allite Corp. ....	106	Zelnicker in St. Louis ....	107

R. N. GRAHAM  
MANAGER OF RAILWAYS

THE PENN-OHIO SYSTEM  
THE PENNSYLVANIA-OHIO POWER & LIGHT COMPANY  
PENNSYLVANIA-OHIO PUBLIC SERVICE CORPORATION  
PENNSYLVANIA POWER COMPANY



Youngstown, Ohio,  
Feb. 26, 1929.

Bender Body Company,  
Cleveland, Ohio.

Gentlemen:

The transportation properties operated under the general name of the Penn-Ohio System, have purchased, altogether, 99 bus and coach bodies from the Bender Body Company. A number of these bodies were purchased in 1922 and many of them have been in use for a period of five years.

Fifty-seven of these bodies are in use in the city of Youngstown and as our schedules require very nearly this number of buses, they are in nearly constant, daily service. The manner in which these bodies have stood up under severe service and the ease in which they can be kept in good appearance has been very satisfactory to the company.

We have found that the Bender Body Company is a leader in adopting the latest improvements in body design and on each successive order that we have placed for bodies, we have had the satisfaction of feeling that the product we have bought is the last word in modernity.

We have always found the Bender organization responsive to suggestions that would improve the merchandising qualities of their buses. I have attempted to convey the idea in this letter that, as far as this company is concerned, the Bender Company has achieved customer-satisfaction.

Yours very truly,

*R. N. Graham*  
R. N. Graham,  
Manager of Railways.

RNG/ET

**F**OR the past seven years we have been supplying buses to the Penn-Ohio System, noted for its able management and progressive policies.

It is a source of gratification to realize that Bender Bodies have possibly contributed in some degree to this company's successful record.

THE BENDER BODY CO.  
W. 62nd and Denison, Cleveland, Ohio





## Lima Cars

### *Exemplify Brill Craftsmanship*

Two double-end cars were recently built for service in Lima, Peru. These cars embody the MASTER UNIT design but were constructed with nine windows on each side instead of eight which is standard for double-truck MASTER UNIT cars. They are excellent examples of coordinated engineering skill and Brill craftsmanship in electric car construction.

Such up-to-date equipment indicates that our South American neighbors know the value of modern cars in attracting fares and lowering operating costs. Weight, fully equipped, is 34,640 pounds. Total seating capacity is 48. Peruvian citizens will have the opportunity of riding in comfort on these cars, which will operate in Lima as well as between that city and Callao, the seaport.

Details may be obtained for the asking.



**THE J. G. BRILL COMPANY**

PHILADELPHIA, PA.

AMERICAN CAR CO. —  
ST. LOUIS, MO.

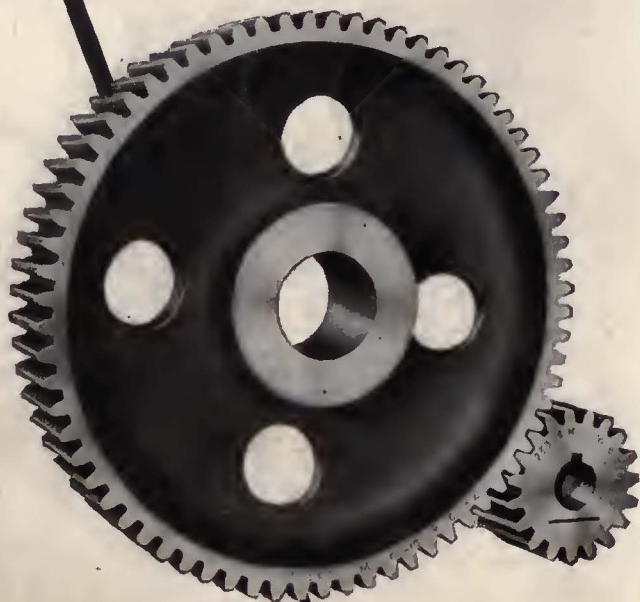
G. C. KUHLMAN CAR CO. —  
CLEVELAND, OHIO.

WASON MAN'G CO.  
SPRINGFIELD, MASS.

Pacific Coast Representative: Raito Bldg., San Francisco

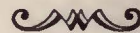
# Brill MASTER UNIT Cars

# Strengthen the links between motor shaft and wheels

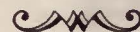


Grade M gears meshed with grade A-1 pinions—here is a combination to relieve your gearing worries.

Hard but not brittle, this G-E long-life gearing minimizes breakage and reduces maintenance and replacement costs.



Good operating practice requires that gearing be properly enclosed and well lubricated. G-E gear cases are rigid and strong; they hold the gear grease, exclude dirt, and permit easy adjustment to compensate for any wear of supporting brackets.



Every maintenance man realizes the value of quality in bearing linings. G-E linings are made especially for haulage service and are typical of the engineering and manufacturing excellence back of every G-E renewal part.



# GENERAL ELECTRIC

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